Investigating teleconsultations in primary care pharmacy using human factors

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Copyright Declaration

This thesis is the result of the author's original research. It has been composed by the author and has not been previously submitted for examination which has led to the award of a degree.

Signed:

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Presentations

- Ferguson A., Newham, R., Dunlop E., Preston, K., Bennie, M. Investigating teleconsultations in primary care using human factors. Oral presentation at: Chartered Institute of Ergonomics & Human Factors Conference; 2024 April 22-24; Birmingham, UK.
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- Ferguson A., Newham, R., Dunlop E., Preston, K., Bennie, M. Video consultations in primary care pharmacy services across Scotland: Pharmacist and patient perspectives. Poster presented at: European Drug Utilization Research Group (EuroDURG) Conference; 2023 June 27-30 **(prize won)**; Bologna, Italy; and at: the Scottish Practice Pharmacy & Prescribing Advisers Association (SP3A) conference; 2023 November 17th; Glasgow, Scotland; and at: DigiFest Conference; 2023 December 14th; Glasgow, Scotland
- Ferguson A., Newham, R., Dunlop E., Preston, K., Bennie, M. Applying human factors models to healthcare technologies. Poster presented at: Health and Care Futures Showcase Event; 2022 October 10th; Glasgow, Scotland.

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Abbreviations

AI	Artificial Intelligence
CHFG	Clinical Human Factors Group
CIEHF	Chartered Institute of Ergonomics and Human Factors
CPS	Community Pharmacy Scotland
CSQ	Consultation Satisfaction Questionnaire
COREQ	Consolidated criteria for reporting qualitative research
EB	Elaine Blair
DJ	Derek Jamieson
DoPs	Directors of Pharmacy Scotland
ED	Emma Dunlop
GDPR	General Data Protection Regulation
GMS	General Medical Services
GMC	General Medical Council
GP	General Practitioner
GPhC	General Pharmaceutical Council
GPCP	General Practice Clinical Pharmacist
HFES	Human Factors and Ergonomics Society
HIS	Healthcare Improvement Scotland
IEA	International Ergonomics Association
IT	Information Technology
KP	Kate Preston
LS	Laura Straughair
MB	Marion Bennie (Second supervisor)
NES	NHS Education for Scotland
NHS	National Health Service
NPT	Normalisation Process Theory
NVCS	National Video Conferencing Service
OOH	Out of hours
PEI	Patient Enablement Instrument
PIS	Participant Information Sheet
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
RCT	Randomised Controlled Trial
RCGP	Royal College of General Practitioners
RE-AIM	Reach, Effectiveness, Adoption, Implementation and Maintenance Model
RN	Rosemary Newham (First supervisor)
RPS	Royal Pharmaceutical Society
SEIPS	Systems Engineering Initiative for Patient Safety
SG	Scottish Government
SIGN	Scottish Intercollegiate Guidelines Network
SOP	Standard Operating Procedure
SPO	Structure Process Outcomes Framework
SP3AA	Scottish Practice Pharmacist and Prescribing Advisers Association
TAM	Technology Acceptance Model
TEC	Technology Enabled Care
UNICEF	United Nations Children's Fund
UK	United Kingdom
US	United States
UTAUT	Unified Theory of Acceptance and Use of Technology
VA	Veterans Affairs
WHO	World Health Organisation

Thesis abstract

Introduction: Given the drive for transforming primary care using digital solutions such as teleconsultations, there is a need to understand how these technologies are developed and used. The discipline of human factors (HF) is suited to this type of research, however, evidence of applications of HF in primary care are limited.

Methods: The Systems Engineering Initiative for Patient Safety (SEIPS) 2.0 model was used throughout this thesis. A scoping review identified previous applications of HF approaches and methods to the development of teleconsultations in primary care. A secondary analysis of studies from the review provided an evidence base of factors influencing use of teleconsultations. Interview schedules, informed by the secondary analysis, were then used to understand patient and pharmacists' perspectives on the use of video consultations (VCs) in Scotland. A scoping review and content analysis of guidance available to pharmacists in Scotland identified commonalities and differences across resources.

Results: Twenty HF approaches were identified across 70 studies, with the majority set in general practice and focusing on evaluating use. The secondary analysis identified 36 and 39 factors influencing patients' and primary care providers' use of teleconsultations. Fourteen patients and 19 pharmacists participated in interviews, outlining factors influencing their use related to the six components of the SEIPS 2.0 Work System. Pharmacists expressed a need for more organisational guidance on using VCs with patients. Analyses of existing guidance identified 94 resources, the majority of which were published by Scottish Government and Technology Enabled Care.

Conclusions: To facilitate successful implementation and use of VCs into pharmacy services in Scotland, a systems perspective should be taken to understand the users' needs in each individual context, and to develop guidance which considers each component within the current Work System. Future research should continue to explore applications of HF in primary care, to encourage integration of the discipline in healthcare.

Thesis summary

Background: Primary care is the most utilised level of healthcare in the UK, and government strategies are aligned to the transformation of primary care services using digital technologies such as teleconsultations to provide care closer to patients' homes Teleconsultations allow patients to access care from a time and place that's most convenient for them, removing the need to travel to in-person appointments.

As there are UK policy level plans for continued use of teleconsultations, it would be beneficial to understand how these technologies are being developed and used to deliver primary care services. The discipline of human factors – *the study of the interactions between humans, the tools/technologies they use, and the complex environments/systems they work in* – is suited to this type of investigation. However, evidence of applications of the discipline in primary care are limited in comparison to secondary care settings. The overall aim of this thesis was to describe the ways in which human factors can be applied to the Design, Implementation, and Use of teleconsultations in primary care.

Methods: Describing the ways in which the human factors discipline can be applied to the development of teleconsultations involved a four-stage process, which was informed by the Systems Engineering Initiative for Patient Safety (SEIPS) 2.0 model:

Stage 1 involved a systematic scoping review to identify previous applications of human factors (2010 to 2023) to examine components of the Work System and different types of Processes and Outcomes at each stage of the technologies lifecycle (i.e. Design, Implementation, and Use) in primary care.

Stage 2 involved a secondary analysis of studies evaluating use identified in the review. Firstly, a thematic analysis organised the data into meaningful themes and sub-themes. Secondly, a deductive content analysis mapped the data onto the SEIPS 2.0 model, to understand the Work System components presenting as barriers. Stage 2 produced an evidence base of facilitators and barriers for patient and primary care providers' use of teleconsultations in primary care, which informed the development of interview schedules for Stage 3.

Stage 3 involved interviewing patients and primary care pharmacists in Scotland to understand the factors influencing their use of video consultations (November 2022 to June 2023).

Stage 4 involved a scoping review and content analysis to identify and synthesise the existing guidance relevant for primary care pharmacists working in Scotland on the use of video consultations. The SEIPS 2.0 model was used to understand the extent to which existing guidance contained information relevant to each component of the system.

Results: Stage 1 resulted in the identification of 70 studies, applying 20 approaches, the majority of which had been used to examine use of teleconsultations. The majority of studies were set in general practice (n=44, 62.9%), with less in settings such as community pharmacy (n=1, 1.4%). Stage 2 identified 36 and 39 factors influencing patients and primary care providers' use of teleconsultations respectively, the majority of which related to personal characteristics for both groups. When patients (n=14) and primary care pharmacists (n=19) in Scotland were interviewed on their perspectives on using video consultations (Stage 3), only five pharmacists had experience of using video consultations with patients. Pharmacists perceived a lack of patient demand; however, patients were unaware that teleconsultations were available at all. Participants agreed on the majority of patient characteristics which were deemed more or less compatible with video consultations. Pharmacists highlighted a lack of organisational drive for uptake, and despite being aware of some existing resources, pharmacists expressed a need for more guidance on when video consultations may or may not be appropriate to use with patients. The subsequent review (Stage 4) identified 94 resources on teleconsultations that were relevant to primary care pharmacists working in Scotland, the majority of which were published by the Scottish Government or Technology Enabled Care. Stage 4 revealed that the majority of resources contained information relevant to only one of the Work System components, with only four containing information relevant to all six components. The majority of resources contained information relevant to the *tools and technologies* component, with the *internal* and *external environment* components being the least represented. Resources from pharmacy bodies signposting to guidance designed for GPs, and Scottish health board resources signposting to guidance for professional working in England, could be causing uncertainty and confusion in pharmacists looking to use VCs in practice.

Conclusion: The findings within this thesis provide an evidence base illustrating how approaches and methods can be applied to the development of teleconsultation technologies, and the benefit of using a systems model. It would be beneficial for future researchers to update the review conducted in Chapter 4 to understand how applications of human factors in this area evolves as integration of the discipline into healthcare moves forward. Future efforts to integrate video consultations into pharmacy services in Scotland could utilise the results of this thesis to understand some of the key barriers for patients and primary care pharmacists. It is hoped that the results of Chapter 7 will inform future updates of national video consultation guidance, by illustrating the types of information and requirements that could be considered in relation to each of the Work System components.

Chapter 1: Introduction to healthcare

This thesis describes applications of human factors to real-time teleconsultations in primary care, both globally and specific to Scotland. The purpose of this chapter is to provide a background to healthcare and the use of teleconsultations. It begins by briefly outlining the different levels and models of healthcare used across the world and in Scotland, providing examples of relevant global and Scotland-specific healthcare strategies. In addition, it summarises the evolution of healthcare technology, from simple patient encounters to the use of advanced technologies in more recent years (e.g. teleconsultations). Finally, the chapter provides an overview of teleconsultations in healthcare, with a focus on primary care globally, and primary care pharmacy services in Scotland.

1.1 Healthcare systems globally

Healthcare systems consist of all organisations, people, and actions whose primary intent is to promote, restore or maintain health. This includes a focus on determinants of individuals' health as well as more direct health improving activities (1). Healthcare delivery concentrates on preventing, diagnosing, and treating physical and mental illnesses, diseases, and injuries (2), and is provided by a variety of healthcare professionals across three main levels of care (See Figure 1.1).

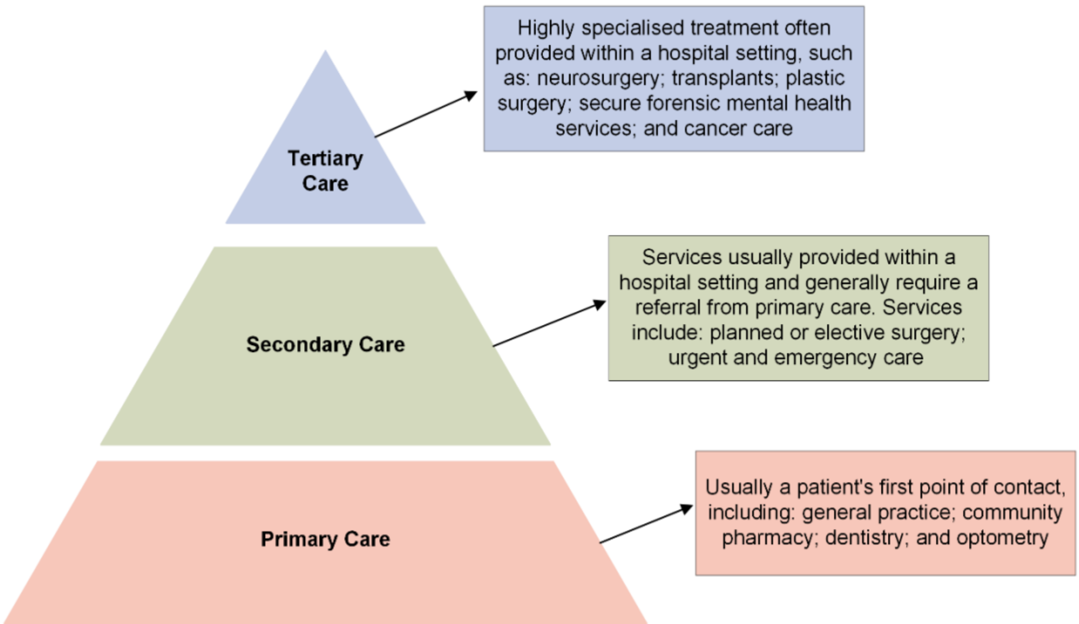


Figure 1.1: Different levels of healthcare

Healthcare systems across the world tend to operate within the remit of primary, secondary, and tertiary care as outlined above, however there will be a variety of set ups depending on country-specific factors, including which model of healthcare they have adopted. Globally, there are four well established models of healthcare, which can be seen in Table 1.1.

Table 1.1: Models of healthcare (3)

Type of model	Description	Examples of where the model is currently used
Out-of-pocket model: *market-driven health care*	Often found in lower income countries that cannot provide a national healthcare service. This model is a pay-as-needed service.	Rural India, China, Africa, and South America
Bismarck model: *social health insurance model*	Uses insurance payments which come from both an employee and an employer via a payroll deduction. This model requires employment and is not universal.	Germany, Belgium, Switzerland and Japan
Beveridge model: *single-payer national health service*	Provides healthcare to all residents and is financed through citizens paying tax to the government.	UK, Spain, New Zealand, and Cuba
National health insurance model: *single-payer national health insurance*	Comprises elements of the Beveridge and Bismarck model. The model uses payments from a government insurance tax programme, but private healthcare is used to access care.	Taiwan, South Korea, and Canada

In line with the complex nature of healthcare systems, it is worth noting that although most countries adopt a single model of care, some apply them differently and may use a combination of models (4). For example, citizens in the UK have the option to pay for private medical care (5), and those over the age of 26 years must pay for government subsidised dental care (6).

1.1.1 Global healthcare strategies

Several strategies have been published globally, including plans and policies to improve health outcomes and increase access to healthcare. Examples of these strategies are discussed below.

(i) Universal Health Coverage (UHC)

The World Health Organisation's (WHO) Universal Health Coverage strategy strives to ensure that everyone across the world has access to the health services they need, when and where they need them, without missing out due to financial difficulties. Whilst devising the 2030 Sustainable Development Goals, the nations of the world identified achieving Universal Health Coverage as a key target. However, despite worldwide progress before the COVID-19 pandemic, there were clear disparities between those in lower and higher income countries receiving COVID-19 vaccinations. WHO continue to work collaboratively with partnerships around the world with the aim of achieving Universal Health Coverage (7).

(ii) Global Strategy on Digital Health

In an effort to address countries' health priorities and make progress towards Universal Health Coverage, WHO devised their Global Strategy on Digital Health (8). The vision is to improve health by facilitating the design and implementation of person-centred digital technologies/solutions. The strategy aims to provide guidance on digital health transformation and to strengthen the work done between initiatives and the wide range of stakeholders to improve worldwide health and reduce the risk of adverse outcomes, by following four strategic objectives:

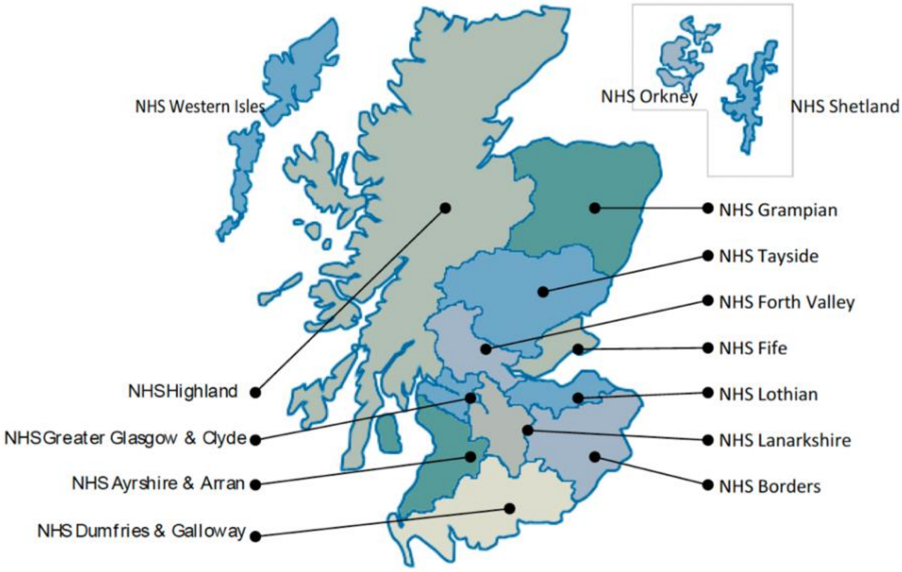
- Promote global collaboration and advance the transfer of knowledge on digital health
- Advance the implementation of national digital health strategies
- Strengthen governance for digital health at global, regional, and national levels
- Advocate for people-centred health systems that are enabled by digital health.

(iii) Strategy for Health 2016-2030

Developed by the United Nations Children's Fund (UNICEF), the Strategy for Health 2016-2030 envisions that health is *"a world where no child dies from a preventable cause and all children reach their full potential in health and well-being"*. Goals set to achieve this vision include: ending preventable maternal, new born, and child deaths; and to promote the health and development of all children. The strategy facilitates collaborative working between partners to deliver on existing global commitments (e.g. Universal Health Coverage; Sustainable Development Goals) by promoting three key approaches: addressing inequalities in health outcomes; strengthening health systems; and promoting multi-sectoral policies. For example, their approach aims to achieve UHC by focusing on children and families who are often excluded from progress towards global health goals (9).

1.2 Scottish healthcare context

The UK uses the Beveridge model (Table 1.1) for its healthcare delivery through the National Health Service (NHS), which was founded in 1948. Scotland was part of the larger NHS system until the devolution of powers from the UK Government to the Scottish Parliament in 1999, when NHS Scotland was created and subsequently delivered by the Scottish Government. NHS Scotland comprises 14 regional health boards responsible for delivering health care to the population in each region (Figure 1.2). Moreover, there are an additional eight special NHS Boards that support the regional boards by providing a range of specialist services (10).



Special NHS Boards

NHS Education for Scotland	NHS Health Scotland
NHS National Services Scotland	NHS National Waiting Times Centre
Healthcare Improvement Scotland	NHS 24
Scottish Ambulance Service	The State Hospitals Board for Scotland

Figure 1.2: NHS Scotland health boards

Figure taken directly from (11).

1.2.1 Relevant Scottish healthcare strategies

In an effort to continually improve healthcare for the citizens of Scotland, the Scottish Government have devised a number of healthcare strategies, which are described below:

(i) Digital Health and Care Strategy 2021 (12)

The vision of the Scottish Government's 2021 Digital Health and Care Strategy is to improve the care and wellbeing of people in Scotland by making best use of digital technologies in the design and delivery of services (12). The strategy outlines three main aims which will focus on six key priority areas (Table 1.2).

- **Aim 1:** Citizens have access to, and greater control over, their own health and care data – as well as access to the digital information, tools and services they need to help maintain and improve their health and wellbeing
- **Aim 2:** Health and care services are built on people centred, safe, secure, and ethical digital foundations which allow staff to record, access and share relevant information across the health and care system, and feel confident in their use of digital technology, in order to improve the delivery of care
- **Aim 3:** Health and care planners, researchers and innovators have secure access to the data they need in order to increase the efficiency of our health and care systems, and develop new and improved ways of working.

Table 1.2: Six key priorities in the Scottish Government's Digital Health and Care Strategy (12)

Priority areas	Description
Digital access	People have flexible digital access to information, their own data and services which support their health and wellbeing, wherever they are.
Digital services	Digital options are increasingly available as a choice for people accessing services and staff delivering them.
Digital foundations	The infrastructure, systems, regulations, standards, and governance are in place to ensure robust and secure delivery.
Digital skills and leadership	Digital skills are seen as core skills for the workforce across the health and care sector.
Digital futures	Our wellbeing and economy benefits as Scotland remains at the heart of digital innovation and development.
Data-driven services and insight	Data is harnessed to the benefit of citizens, services and innovation.

The strategy states that if successfully delivered, citizens will have greater choice and control over how they access services and manage their lives in relation to their healthcare. The goal is to achieve a fundamental shift in organisational mind-sets and approaches to how services are delivered, making them more patient-centred. Finally, whilst planning future services, the strategy recognises the potential for health and care to take place outside of the traditional healthcare settings, such as in the community (e.g. libraries or community hubs) and in people's homes.

(ii) NHS Scotland Recovery Plan 2021-2026 (13)

During the COVID-19 pandemic, the Scottish Government published their NHS Scotland Recovery Plan 2021-2026 (13). The aim of the plan is to increase NHS capacity by at least 10% in order to address the backlog in care as a result of the pandemic, and meet healthcare demand across the country. The plan outlines eight key principles for safe and effective recovery, one of which focuses on providing services close to people's homes. The premise is that future services will be designed to minimise unnecessary travel and increase the focus on 'net-zero' approaches by developing the role of teleconsultations and community hubs, ensuring that all individuals have access to remote models of care. There is a specific focus on developing digital services in primary care, including access to £3.4m of funding each year to facilitate the scale up of video consultations for appointments, using the Near Me platform. Near Me is a Scottish Government endorsed programme aimed at providing citizens across Scotland with the choice to attend health and social care appointments via video call, at a time and place that is convenient for them (14).

1.2.2 Primary care pharmacy in Scotland

Primary care is often the first point of contact patients have with NHS Scotland, as primary care providers act as a gateway to secondary or tertiary care (15). Providers work across many settings to manage most health problems and provide continued long term care (15). A variety of healthcare professionals work at the primary care level, including general practitioners (GPs); nurses; dentists; optometrists; and pharmacy personnel.

There are approximately 5,285 pharmacists and 2,338 pharmacy technicians working in Scotland (16) alongside pharmacy support staff to provide a range of services in community and general practice pharmacy. Pharmacists in Scotland are professionally qualified and must be registered with the General Pharmaceutical Council (GPhC) (17). Once registered they are able to provide expert medicines advice and treatment for common conditions (18), with assistance from additional pharmacy support staff. Pharmacy technicians are GPhC registered professionals who conduct specialised tasks including preparation and dispensing of complex medications and providing healthcare advice (19, 20). Moreover, pharmacy support workers provide support in the preparation and dispensing of medicines (19, 20).

Community pharmacies are a key part of primary care services in Scotland, and pharmacy owners are independent contractors delivering pharmacy services on behalf of NHS Scotland (21). There are around 1,250 community pharmacies in Scotland – typically located in retail settings - providing over-the-counter and prescription medications, medication reviews, and advice on managing health conditions (15). The community pharmacist is known for their primary role in being accessible to the public without the need for an appointment, however some services can be offered on a scheduled basis (22, 23). Community pharmacies provide a range of services beyond dispensing medication. A core part of community pharmacy services in Scotland is the delivery of the Pharmacy First service, where a pharmacist or member of the pharmacy team can give advice and treatment for various minor illnesses and common conditions (e.g. acne; hay fever; allergies; and some skin conditions) (18, 23). In addition, some pharmacies offer an advanced Pharmacy First Plus service, whereby pharmacists with an independent prescribing qualification can prescribe treatment for a wider range of clinical conditions (22). Community pharmacies play an important role in public health initiatives including: emergency hormonal contraception; vaccinations; and smoking cessation services (19). Funding for community pharmacy is through a combination of NHS financial support for essential (e.g. the delivery of the Pharmacy First Service) and enhanced (e.g. public health initiatives) services, as well as the private sale of over-the-counter medications, health and well-being products and other retail items (22). Finally, it is important to note the distinction between “independent” and “multiple” community pharmacies. Independent pharmacies are typically classed as a group of 1-5 pharmacies, owned and operated by individual pharmacists or small groups of pharmacists (24). On the other hand, multiples (also known as chain pharmacies) are often owned by corporations or companies, and may have a larger number of pharmacies (6 - 200+) and in more geographical locations (24).

In Scotland, patients are required to register with a specific general practice in order to have access to medical advice and treatment. Primary care teams within the 911 general practices across Scotland consist of various healthcare professionals who work together to provide comprehensive physical, mental and social-wellbeing care. Although pharmacists and pharmacy technicians have been working in general practice in Scotland for decades, their roles in the practice have evolved more recently due to increasing pressure and lack of capacity in the general medical workforce (25). Pharmacy professional bodies recognised that pharmacy and general practice teams could be integrated to broaden the multidisciplinary team, and in 2018 an investment was made to ensure that every practice in Scotland would have access to a pharmacist with advanced clinical skills by 2022 (25). General practice clinical pharmacists (GPCPs) now work alongside pharmacy technicians and other members of the practice to deliver three levels of the pharmacotherapy service as part of the 2018 General Medical Services (GMS) contract (Table 1.3) (26). General practices are private businesses holding an NHS contract, part of which is aligned to the GMS contract (26). Although GPCPs are operating in these private premises, the vast majority of them are employed by the local NHS Health Boards (27). In general practice, services are primarily delivered through scheduled appointment based care, however urgent or unscheduled care services can also be provided (28, 29).

Table 1.3: Three levels of the pharmacotherapy service (26)

Core and additional pharmacotherapy services		
Level	Pharmacists	Pharmacy technicians
1 – Core service	Authorising prescription requests; immediate discharge letters; outpatient letters; medicine safety reviews and monitoring high risk medicines	Monitoring clinics; medication compliance reviews; medication management advice and reviews; prescribing indicators and audits
2 – Additional advanced service	Medication reviews of >5 medicines and resolving high risk medicine problems	Non clinical medication review; medicines shortages; pharmaceutical enquiries
3 – Additional specialist service	Polypharmacy reviews and specialist clinics for chronic pain, heart failure, diabetes etc.	Medicines reconciliation; telephone triage

In a 2021 update, the Scottish Government recognised the progress made in the majority of general practices, however highlighted areas requiring focus, including the need for general practices to prioritise their delivery of the core level one services to relieve GP workload (30). However due to the interdependencies between levels, the statement also recognises the simultaneous need to focus on other tasks such as delivering regular medication reviews, especially for high risk medicines and patients, to ensure safe patient-centred care is being delivered (30).

Importantly, some pharmaceutical services across both contexts are supported by a series of Standard Operating Procedures (SOPs) - detailed instructions that outline the steps or activities which must be undertaken to complete a task or carry out a specific process (e.g. prescribing of medications, answering the telephone). However the SOPs used across pharmacy contexts are likely to differ, as pharmacies can adapt readily available SOPs or develop their own in line with national guidance (31). For example, from a discussion with a community pharmacist in Scotland, some independent pharmacies opt to purchase template SOPs from Newark Pharmacy, adapting them to suit (Meeting with NW – 08/04/2024) (32).

Despite their widespread adoption in an effort to ensure consistency, efficiency, and safety, research suggests that often SOPs are not adhered to in pharmacy settings (33, 34). In Peat et al's (2022) study investigating how community pharmacy responded and adapted to the COVID-19 pandemic, pharmacists reported that adhering to procedures was often not feasible or effective, for example during the COVID-19 pandemic where there was limited space in the pharmacy resulting in staff being unable to fully adhere to social distancing (33). Peat and colleagues (2022) state that their findings will facilitate narrowing the gap between work-as-imagined (i.e. how work is guided by SOPs) and work-as-done (i.e. how work actually takes place), which will enhance the resilience of community pharmacies in any future pandemic scenarios (33). Therefore, lack of adherence may be in part due to the absence of user-centric design (35) if organisations procure and amend, or develop, SOPs without involving those with a practical and realistic understanding of the related work in each specific pharmacy setting.

All areas of health and social care, including primary care, face an increased demand for services and resources due to an ageing population and the number of people living with long term conditions (36). One solution for managing this demand has been the increased drive for the uptake of technologies in healthcare, including teleconsultations to deliver care beyond the traditional models (12, 13).

1.3 Evolution of healthcare technology

In line with global strategies to transform health systems into digitally enabled services, technological developments in healthcare have provided opportunities to improve on and move beyond the traditional methods of healthcare delivery. Healthcare systems have experienced key technological developments similar to those experienced in manufacturing industries, as illustrated in Figure 1.3 (37). Industry moved from the emergence of initial simple technologies (e.g. steam power and mechanisation) to the more recent complex and intelligent technologies such as the Internet of Things (e.g. interrelated devices connecting and exchanging data) and artificial intelligence (AI) (37). Similar to industrial advancements, Healthcare 1.0 started in the 1990s with a focus on providing advanced patient consultations, and introduced administrative systems as the first form of automation (38). Healthcare 2.0 represents the introduction of medical equipment and devices for testing and diagnoses, and a focus on responding according to patient symptoms using monitoring devices (37, 38). Healthcare 3.0 is categorised by the development of electronic medical records (EMR) and information systems, and the transformation of manual processes to computerised and digitised formats. Moreover, remote care models (e.g. teleconsultations) became possible and started replacing face-to-face interactions (37, 38). The fourth healthcare revolution is said to be emerging in line with Industry 4.0, with the introduction of wearables and innovative medical devices using cloud computing, big data and AI alongside decision support technologies. Healthcare 4.0 represents the shift from proactive care in Healthcare 3.0 to predictive care and a more patient-centred healthcare system (37, 38). Although there are clear similarities between the industrial and healthcare revolutions in terms of increased automation, a critical difference is about engagement, as in healthcare the patients and clinicians are increasingly involved and share responsibilities despite increased automation (37).

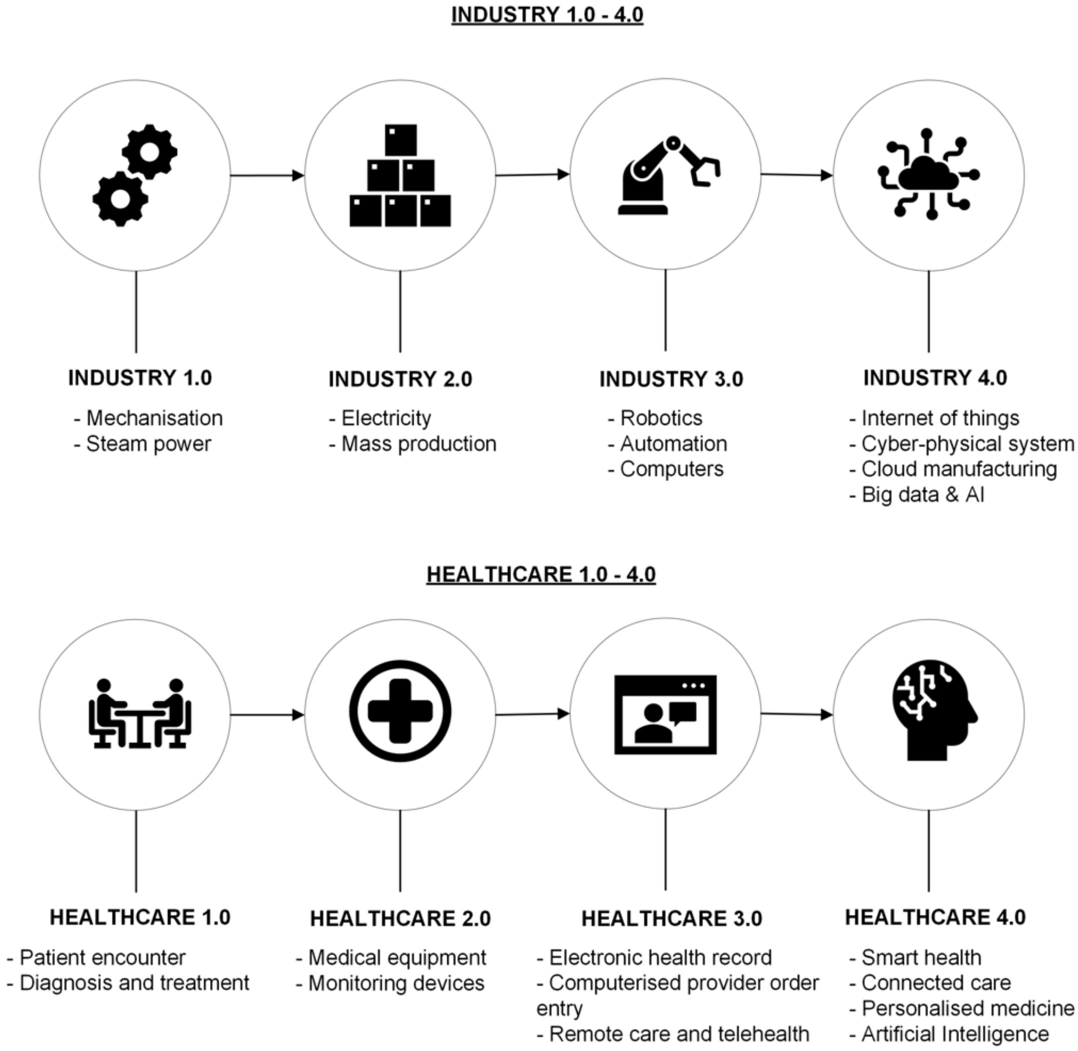


Figure 1.3: Industry and healthcare 1.0-4.0

Whilst progress in the development and adoption of healthcare technologies has been gradual, public health emergencies such as the COVID-19 pandemic can cause technologies to advance at an accelerated rate. For example, technologies such as teleconsultations were rapidly upscaled to provide remote health care, in an effort to reduce the risk of transmission and adhere to physical distancing regulations (39, 40).

1.4 Teleconsultations in healthcare

Teleconsultations - sometimes referred to as telemedicine; telehealth or remote consultations (41) - represents a branch of healthcare which uses a variety of technologies to deliver healthcare from a distance. WHO specify that teleconsultations include four interrelated elements: clinical support; the use of various types of technologies, leading to; improving health outcomes; and overcoming geographical barriers, connecting all users (42). Although there are different types of teleconsultations *(i.e. between patients and healthcare professionals versus between two healthcare professionals (43))*, this thesis will focus on the former. Teleconsultations allow patients and healthcare professionals to interact and exchange information using synchronous (i.e. live/real-time) technologies such as telephone and video, or asynchronous (i.e. delayed response) technologies such as email or text messages (44). Healthcare professionals use either of these technologies to conduct remote examinations and provide diagnoses and treatment decisions without the need for patients to attend consultations in-person (44). For the purpose of this thesis, consultations are considered to be interactions "Comprising processes such as history taking, examination, investigation and diagnosis…subdivided into several tasks reflecting the agenda of the doctor and patient" (45).

Teleconsultations can help achieve WHO's Sustainable Development Goal of Universal Health Coverage by improving citizens' access to good, safe, and cost effective health services, especially for those living remotely or living with illnesses restricting their ability to leave their homes (44). Moreover, teleconsultations minimise the need for patients and healthcare professionals to travel to in-person appointments, having direct environmental benefits (46). Teleconsultations increase the convenience of healthcare for patients as they do not have to take time out of their daily schedules to physically attend appointments (47).

Despite the potential benefits, it is important to note that due to the reliance on citizens having access to a suitable device and internet connection, and having the necessary IT skills, teleconsultations have the potential to widen the existing digital divide (48). Specific groups in society are more likely to experience difficulties in using teleconsultations, such as those: from vulnerable socio-economic backgrounds; living with physical or mental disabilities; and those living in regions with poor access to the necessary infrastructure (e.g. remote and rural) (48). However, it is reassuring that issues around digital exclusion are recognised at policy level in countries such as the UK and Australia, and plans for reducing the digital divide are in place (49-51). For example, the Scottish Government suggest that video consultation services are offered as a choice for patients, alongside other modes of consultation, to ensure a variety of options are available (50).

Despite increased use of teleconsultations at all three levels of healthcare (Figure 1.1) - tertiary (52-54), secondary (55-58), and primary care (59, 60) - Beheshti et al (2022) highlight that there is still work to be done in advancing the use of teleconsultations at primary care level (60).

1.4.1 Teleconsultations in primary care

Primary care is the most utilised level of healthcare, responsible for around 85% of patient interactions with healthcare services (61). Given that communication is a key aspect of primary care, it is important to understand the use of technologies such as teleconsultations, to facilitate interactions at this level of care. A number of reviews have illustrated the wide-ranging use of teleconsultation technologies in primary care across the world (59, 60, 62, 63).

For example, de Albornoz et al (2021) conducted a systematic review evaluating the impact of telephone and video consultations compared to face-to-face interactions on key patient outcomes and utilisation of primary care services. The review identified 11 studies set in seven countries including, Australia, USA, Spain, Canada, Denmark, Japan and Scotland. The clinical conditions addressed in the studies were wide ranging, with telephone and video consultations being used to provide: general primary care services; post-natal care; weight loss and nutrition counselling; smoking cessation; support for cancer patients, carers of hard of hearing children; and those living with acute non urgent conditions and respiratory infections (59). Beheshti et al (2022) identified further applications of teleconsultations in primary care in China, Zambia, Ireland, Poland, Italy, and Sweden. Additional services identified included treatment and management of diabetes and hypertension, and the delivery of healthcare in prisons (60).

Downes et al (2017) collated evidence on the use of telephone consultations as an alternative to face-to-face visits (63). Their review identified two systematic reviews and one randomised control trial (RCT), all set in the UK. The overall findings demonstrated that telephone consultations provide an appropriate alternative to face-to-face interactions, as despite leading to an increase in the number of repeated visits, there was a reduction in the overall time spent with patients (63). Similarly, Thiyagarajan and colleagues (2020) conducted a systematic scoping review of studies exploring patients' and clinicians' experience of video consultations in primary care (62). The review identified seven studies set in the UK and US and outlined some of the key benefits of video consultations, including convenience and improved access. Patients chose to use video consultations to reduce travel costs or minimise waiting times for an appointment, however clinicians' choice to use video consultations depended on the patients clinical condition, unless geographical distance meant video consultations were required (62).

Finally, it is important to note that use and experience of teleconsultations will depend on the primary care setting within which the technology is used. The majority of studies in the aforementioned reviews on primary care focused on GPs services, which suggests there may be a lack of engagement in other settings. For example, despite the development of strategies encouraging adoption and use of teleconsultations across primary care in Scotland (12, 13), uptake has been limited in pharmacy services (64).

1.4.2 Teleconsultations in primary care pharmacy in Scotland

A number of strategies outline goals for the digital transformation of Scottish pharmacy services, including the integration and widespread use of teleconsultations (19, 23, 65, 66). For example, a key commitment in the 2017 Achieving Excellence in Pharmaceutical Care Strategy for Scotland focused on enhancing access to pharmacy services for those living in remote and rural communities (19). Part of this commitment included the scale-up of existing Technology Enabled Care initiatives including the use of the Near Me service for video consultations, which was already being used in NHS Highland (19). Near Me is a Scottish Government endorsed programme aimed at providing citizens across Scotland with the choice to attend health and social care appointments via video call, at a time and place that is convenient for them (14). The service is hosted on the Attend Anywhere online platform.

More recently, the Royal Pharmaceutical Society (RPS) Scotland, and the National Pharmacy Technician Group Scotland set out their 2030 Visions for community and general practice pharmacy (23, 65, 66). Key future pharmacy roles outlined in the strategies include ensuring equal access to services by harnessing digital technology and innovation. By 2030 the Visions state that pharmacy teams will have developed remote services and will routinely offer patients the choice of virtual care using Near Me, digital applications and telephone consultations. Moreover, the visions set out plans for working towards greener, more sustainable pharmacy services, and recognise the benefits of Near Me and other remote methods for reducing patient and pharmacist travel. In 2017, NHS Highland trialled using the Attend Anywhere platform to deliver medication reviews as part of the “Pharmacy Anywhere” service. During this time the service was re-branded as Near Me as part of a co-design engagement piece with the public (67). In 2020, the Scottish Government secured a license to extend the use of Near Me, which resulted in the service being rolled out across all health and social care sectors in Scotland (67).

Despite access to video consultation technology being made available across primary care in Scotland, engagement in pharmacy has been limited in comparison to the uptake of telephone consultations, both before and during the COVID-19 pandemic (64, 68, 69). For example, when evaluating a general practice pharmacy medicine review service in two remote and rural areas of Scotland (NHS Highland and NHS Western Isles), Stewart et al (2017) found the majority of consultations (85.5%, n=153/179) were conducted by telephone, with only 14.5% conducted over video (68). Similarly, when assessing the impact of COVID-19 on working practice and job satisfaction of pharmacists (n=134) and pharmacy technicians (n=46) within general practice in Scotland, Weir et al (2022) found no video interactions with patients before or during the pandemic. Moreover, their findings show evidence of pharmacy personnel using telephone consultations to interact with patients before COVID-19, with an increase in reliance on telephone calls during the pandemic (64). In 2017, a Telepharmacy Robotic Supply Service (TRSS) was installed as part of a proof of concept study in a rural north-east area of Scotland without a community pharmacy (69). The technology provided community pharmacy services such as medicines supply via a robot, and virtual care using video and telephone consultation facilities. Inch et al (2017) evaluated patients' and healthcare professionals' perceptions and experiences of the service and found that despite participants recognising the benefits of the video facilities, there were only three interactions over video between patients and pharmacists over a seven month period (69).

Despite limited engagement with video consultations in comparison to those conducted over telephone, strategies relevant to Scottish pharmacy services outline plans for the continued upscaling of digitally enabled care, making teleconsultations a choice for all patients (13, 23, 65, 66). As there are plans to continually upscale teleconsultations in Scottish primary care pharmacy, it would be beneficial to understand the use of teleconsultations in this context in more depth. For example, exploration into the facilitators and barriers influencing use would allow identification of any areas of the current Work System requiring re-design or amendments. The discipline of human factors is suited in this type of research as it takes a systems perspective, allowing for a full understanding of the environment that the technology is used within, and the users of that technology (70).

Chapter 2: Introduction to human factors

2.1 What is human factors?

Human factors and ergonomics, first defined as *"the study of work" (71)*, are terms used interchangeably to represent the scientific study of interactions between humans, the tools and technologies they use and the complex environments/systems they work in. It draws on many disciplines including psychology, physiology, biomechanics, engineering, and computer science (72) in an effort to understand how people perform in different contexts. Due to having roots in many disciplines, definitions of human factors vary. For the purpose of this thesis, the following International Ergonomics Association definition will be used:

"The scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data, and methods to design in order to optimise human well-being and overall system performance" (73).

The discipline involves taking a systems approach to understand and describe all the interdependent elements of a system and the interactions between them which contribute to outcomes, including system performance (e.g. systems safety, sustainability, effectiveness, efficiency) and human wellbeing (e.g. satisfaction, stress, fatigue) (74-77). By focusing on all interdependent elements in the system, the discipline moves away from striving to identify one singular cause for an outcome, to considering the influence that each component of the system individually, and together, are having (77).

A key aim of the discipline is to maximise compatibility between system components, with the main focus on the *person(s)* at the centre of the system (78). In doing so, it involves taking a holistic approach to the integration of humans into the systems they use. Instead of finding humans to 'fit' existing systems, built without knowledge of human strengths and limitations, the discipline focuses on applying human capabilities and characteristics to the design of a system (79). Creating systems based on human abilities facilitates ease of use, improved performance, safety and wellbeing, and reduces the risk of error or adverse events (80). The importance of applying the discipline extends beyond the Design stage, as human factors should be considered at each stage of a systems life cycle – through Design, to Implementation, evaluations of Use, and continuous improvement (81). For example, at the end of the life cycle once the system is implemented and is being used, it is equally as important to evaluate designs to ensure they are satisfying the intended outcomes (82, 83).

2.2 Brief history of human factors

Human factors emerged primarily in the 1940s due to the increased use of technology and the realisation that technologies were becoming more complex. Increasing complexity meant technologies were more difficult to use and as a result, performance of those using them was compromised, heightening the risk of errors (84).

The discipline has military heritage as by the end of World War II, which saw the advancement of technologies, it was clear that humans were experiencing problems with using equipment/technologies which resulted in adverse events including airplane crashes (85). Focus shifted to understanding the failed interactions between humans, their environment and the tools and technologies they use to understand why adverse events/errors were happening. Investigations found pilot errors to be linked to the design of the cockpit, specifically the systems within which were incompatible with human capabilities, making them unsafe and difficult to use (86). When coming into land, skilled pilots were retracting landing gear instead of adjusting landing wing flaps due to the controls looking identical, causing catastrophic accidents. Efforts from psychologists and military personnel during the post-war investigations facilitated the development of human factors as a discipline (87). Post-war reports illustrated that pilot error could be reduced when more logical and differentiable controls replaced similar looking and confusing designs in airline cockpits. The reports emphasised the need for simpler designs to ensure pilots experiencing high cognitive load in highly stressful environments make the right decision about which control to use (87). Human factors is now an essential component of both military and civil aviation curriculum for pilots (88), and is known in more recent years for delivering crew resource management (e.g. non-technical skills: decision making situation awareness, communication, team work), aircraft maintenance and system design, and operation (88, 89).

After discovery in aviation/the military, application of human factors spread across other industries, including introduction to rail systems in the 1960s (90). The discipline is important for understanding how people interact with the railway to ensure service performance and safety of users (90). People are at the centre of rail systems, as firstly the moving of people from place to place is the purpose of such services, and secondly the safe and reliable running of the service depends relies on the workforce and their interactions with the systems they use (90). Rail operators and safety management teams in the UK now have human factors specialists working alongside them to ensure rail systems are running as efficiently and safely as possible (91).

The discipline was brought to the forefront of the oil and gas industry after the 1988 Piper Alpha disaster which resulted in the death of 167 crew members. Investigations into the disaster highlighted many human factors failings including: design issues, communication, and complacency in safety culture, which brought the introduction of the Health and Safety Executive (HSE) in the UK in 1992. The HSE have since been responsible for overseeing and ensuring safety offshore in the UK and other countries around the world have adopted a similar strategy (92). Similarly in the nuclear industry, the discipline has been applied widely after accidents such as Three Mile Island and Chernobyl were linked to a lack of human factors considerations in Work System design (93).

Since the emergence of human factors as a discipline and increasing interest in its application in different industries, an increasing number of human factors bodies have formed, all of which work similarly in their motivation to increase adoption of human factors approaches and methods into every day working, making it a way of thinking rather than an added extra. Groups provide memberships allowing access to educational resources, and provide opportunities for collaboration by bringing together a network of likeminded people. For example, the Chartered Institute of Ergonomics and Human Factors (CIEHF) is a professional organisation providing membership and Chartership for ergonomists and human factors specialists (84). Other organisations include the Human Factors and Ergonomics Society (HFES) (94) and the International Ergonomics Association (IEA)(73). All of these organisations strive to raise awareness and drive advances of human factors across all industries.

2.3 Human factors in healthcare

Early applications of human factors in healthcare occurred in the 1960s with research on medication safety (95), with later interest from James Reason, a British psychologist, who wrote about the importance of human factors for the design of a safe healthcare system (96). He encouraged a shift from blaming users to a culture of understanding all factors which could influence service performance. However, it was not until the publication of the Institute of Medicine's report, "To Err is Human: Building a Safer Health System" in 2000 that efforts to integrate human factors into healthcare significantly increased (97). The report highlighted patient safety risks in healthcare by reporting the markedly high number of deaths (98,000) in the United States (US) per year resulting from medical errors. It alleged that humans were not to blame, but that poorly designed Work Systems were. The report set out national and local strategies in the US aimed at improving patient safety through the design of safer health services/systems (97). Nowadays, the application of human factors into healthcare contexts is encouraged by government, with regulations in place for the inclusion of human factors in health systems in countries including England (98). Similarly, plans are in place for the design of policy to guide the development, implementation, and sustainability of the discipline in NHS Scotland (99). Another catalyst for the adoption of human factors into healthcare was the work of Martin Bromiley, an airline pilot with an interest in human factors. His efforts to introduce human factors into healthcare came after the death of his wife was linked to a number of human factors failings within healthcare, including: hierarchical structures causing communication issues; lack of situational awareness; and lack of leadership (100). On discovering there was no human factors group overseeing and promoting the advancements of human factors in healthcare, Martin formed the Clinical Human Factors Group (CHFG) in 2007 (101).

Healthcare settings are highly complex systems and involve a range of stakeholders across multiple different areas, using a variety of tools and technologies to carry out a series of tasks (102). Wilson (2014) described healthcare as an overlapping and interrelated System of Systems (103):

"A bed in a hospital is a system, the patient monitoring equipment is a sibling system, the two together plus the patient's room comprise another system, …whereas the radiology or scanning equipment, the drugs dispensary, the beds, the ambulances are all systems, but together can be seen as a system of systems when looking at maintenance and replacement of regimes" (103)

The complexity of healthcare services warrants the application of human factors considerations to optimise service delivery and patient safety (104). However, the level of complexity means integration of the discipline in healthcare has been slower than in other industries (105). In an effort to enhance knowledge and understanding of how the discipline can and should be used, the CIEHF have produced a White Paper and book chapters on human factors in health and social care (77, 83, 106, 107). The resources illustrate the depth that human factors can bring to understanding issues within healthcare settings. To assist in understanding the complexity of healthcare, human factors research often adopts a systems model.

2.3.1 Systems models in healthcare

There are a variety of socio-technical systems models used in human factors research, however one designed specifically to represent the complexities of interactions in healthcare is the Systems Engineering Initiative for Patient Safety (SEIPS) model (108-110). The model was designed to illustrate how interacting components within a sociotechnical Work System result in work Processes, and the impact that these Processes have on the subsequent Outcomes. The original model, published in 2006 by Carayon et al, comprised a combination of Donabedian's structure-process-outcome (SPO) framework and the Work System model (Figure 2.1) (108).

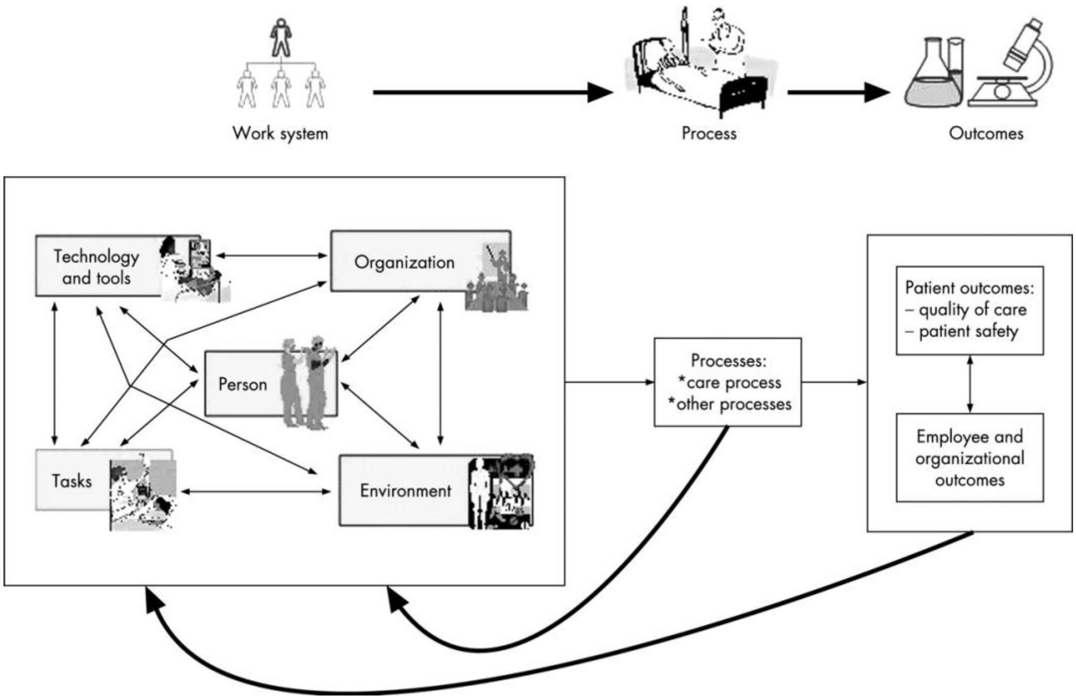


Figure 2.1: SEIPS model

Figure taken directly from Carayon et al (2006)(108).

However, since 2006 the model has evolved to expand areas within it further, to represent healthcare system complexities in more detail (SEIPS 2.0) (Figure 2.2) (110).

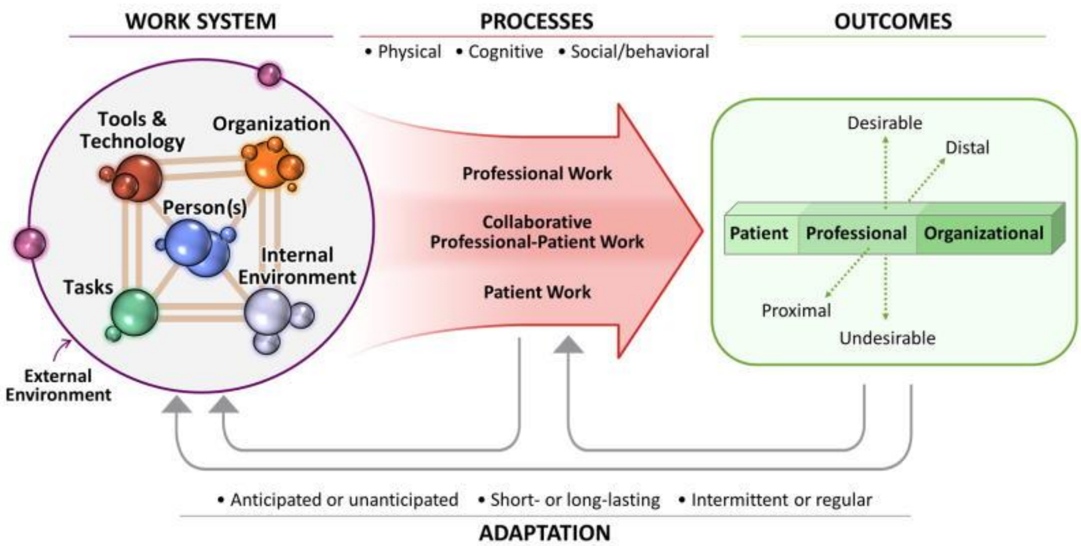


Figure 2.2: SEIPS 2.0

Figure taken directly from Holden et al (2013) (110).

SEIPS 2.0 Work System

The Work System within the model represents a sociotechnical system with six interacting components which influence work Processes (110):

- The ***person(s)*** component represents the physical, cognitive, and psychosocial characteristics of the individual(s) at the centre of the system. A key difference from the original model is that SEIPS 2.0 considers not just a singular *person* at the centre of the system, but also the interactions between multiple individuals (e.g. patient, carers and healthcare providers) and groups of individuals (e.g. teams within health settings etc) simultaneously
- ***Tools and technologies*** refer to the objects that the individual(s) use to do the work and can represent information technology (IT) as well as physical tools and equipment
- ***Tasks*** refers to the attributes or characteristics of the task the individual is taking part in, such as: difficulty, complexity, variety, ambiguity, and sequence
- ***Organisation*** refers to the structures external to the individual(s) (but often put in place by people) that organise time, space, resources, and activity. For patients, organisation refers to: living arrangements; family roles and responsibilities; work and life schedules; financial and health-related resources; interpersonal relationships; and social norms and culture. Within institutions, organisation refers to: characteristics of work schedules; management and incentive schemes; organisational culture; training; policies; team work; communication and work relationships
- ***Internal environment*** (physical environment in the original model) refers to the physical environment and includes: lighting; noise; vibration; temperature; physical layout; available space; and air quality
- The ***external environment*** component was not included in the original model. However, the component was added in the second version to consider the macro-level societal, economic, ecological, and policy factors outside of an organisation. Factors include the impact of: budget; cost on quality tools and technologies; societal expectations for patient and family preferences; and local infrastructure.

SEIPS 2.0 work Processes

In comparison to the original model, Processes in SEIPS 2.0 were expanded to consider the concept of engagement (110). As a result, Processes could be categorised as professional, patient or patient-professional collaborative dependent on whom was engaged in the Processes. Moreover, Holden et al expanded Processes further and allowed consideration for them to be physical, cognitive, or social/behavioural in nature, if relevant to the investigation the model is being used for. The model explains that work process will impact subsequent Outcomes (110).

SEIPS 2.0 Outcomes

Outcomes in SEIPS 2.0 are somewhat similar to the original model as the model considers the patient, professional and organisational Outcomes. However, SEIPS 2.0 expands on Outcomes to allow identification of how proximal (i.e. immediate result) or distal (i.e. result which emerges over time) in nature the Outcomes are, and the level of desirability (110).

Adaptations

Finally, SEIPS 2.0 introduces the concept of adaptations, which represents the monitoring of Processes and Outcomes in health services to allow adaptations when required to ensure intended Outcomes (110). The model stipulates that adaptations can be anticipated, regular, and long-lasting, or unanticipated, short lasting and intermittent depending on the situation. As shown in the model (Figure 2.2), processes and outcomes are reviewed and adaptations are made as required to improve performance and wellbeing. Workarounds taken by healthcare professionals to overcome barriers when using technologies represents an example of a commonly used adaptation in healthcare settings.

Carayon et al (2020) recently developed a third version of the model (SEIPS 3.0) which focuses solely on the Processes to represent the patient journey through healthcare systems (109). As SEIPS 3.0 focuses only on the Processes, this thesis will utilise the SEIPS 2.0 model throughout to allow a more detailed exploration of the whole system. The flexibility of the SEIPS model(s) is emphasised in the CIEHF masterclass on applying SEIPS. The speakers outlined that the entire model does not have to be used in every investigation (111), albeit some studies do utilise the full model (112). Examples of partial application are evident in the wider literature, with studies utilising only the Work System components in their research (61, 113, 114). For example, Woolridge et al (2020) focused on Work System components to identify barriers and facilitators in inpatient care transitions of paediatric trauma patients (113). On the other hand, Strauven et al (2020) focused on two areas – the Work System components and Processes to investigate medicine pathways in nursing homes (115).

2.3.2 Progress of human factors research in healthcare

Research thus far in healthcare has mainly focused on secondary care settings, with less research on human factors in primary care (61, 116-118). One key area in secondary care where human factors has been widely implemented is in the operating theatre. The discipline has been important for understanding and managing the complex interactions between the personnel in the room (e.g. surgeon, anaesthesiologists, nurses and others), the equipment being used (e.g. surgical tools and monitors), and workplace conditions (e.g. staff availability, costs, and operating room availability). Research has focused on developing tools and training to measure and improve interpersonal non-technical skills (e.g. communication, leadership, teamwork, situation awareness, and decision making), which have been linked to patient safety (119, 120). For example, this includes the development and now widespread use of safety checklists to minimise errors, and the encouragement of general communication and discussions around roles and responsibilities in the operating room (120-122). In other areas of secondary care, system redesign has been required to improve performance outcomes (122). For example, in obstetrics, birthing pools were designed in the 1990s without consideration for user needs, which resulted in the pools being difficult to get in and out of, especially in emergency situations. The redesign process involved assessing user needs and incorporating them into the new design, which comprised steps and rails for assistance on entry and exit (83). Similar progress has been seen in standardising the design of ambulances (83).

Despite sharing similar complexities in terms of the need for effective communication, leadership and teamwork, problem solving, and situation awareness to ensure patient safety, integration of human factors into primary care was initially slower (61, 88). Bowie et al (2016) suggested that this could be due to misunderstandings around the discipline and its application in healthcare settings (123). In an effort to address the lack of knowledge around what human factors are already known or applied in primary care settings, the CHFG worked alongside a team of researchers at NHS Education for Scotland (NES) in conducting a scoping review (61). Their review included published literature (2000-2016) in traditional databases as well as grey literature, and consultations with human factors specialists and healthcare professionals. A total of 356 published papers were included, with the majority set in general practice (n=190, 53.4%) with less in settings such as community pharmacy (n=29, 8.1%). Moreover, the majority of studies were published in the US (n=122, 33.2%) and UK (n=130, 35.4%). Their results highlight a variety of human factors methods used in the studies including: questionnaire surveys; focus groups; interviews; usability methods; literature reviews; observations; and reporting and analysis of incident data. Overall, their review outlined that despite increasing attention in this area, especially to safety in general medical practice, there still remains limited evidence of human factors approaches and methods being applied across the full range of primary care services (61).

(i) Human factors or factors of the human?

It is important to highlight some of the common misunderstandings which are suggested to be impeding the successful widespread integration of human factors into healthcare (123-126). Firstly, research often refers to “human factors” despite focusing solely on the failures of humans or “factors of the human” as the cause of undesirable outcomes, which is in contrast to the premise of the discipline (124, 125). Wears and Sutcliffe (2019) expand on this notion, stating that the understanding of human factors can be summarised in two contrasting views (126). One viewpoint is described as “deficit thinking” (i.e. factors of the human) where humans are viewed as being flawed information processors, whose behaviour is dictated by heuristics and biases, leading to the human being the failing component in any interaction. In contrast, the second viewpoint (i.e. human factors) recognises humans as “successful adapters”, able to deal with the complexities and uncertainties in complex working environments, whose adaptations can sometimes fail (126). Moreover, those holding the second viewpoint are likely to believe accidents to be a naturally occurring consequence of increasingly complex working conditions, which human adaptations occasionally cannot overcome. Wears and Sutcliffe (2019) suggest that this second viewpoint is only superficially understood in healthcare, with some efforts to improve patient safety still adopting the "deficit thinking" viewpoint, referring to humans as the failed component within the system (126).

Bowie & Jeffcott (2016) highlight that it is not uncommon for healthcare organisations to strive to modify the behaviour of individuals using methods such as training, when an investigation into an adverse events determines the cause to be "human error" (123). However, Russ et al (2013) make a clear distinction between how problems/errors are addressed inside and outside of the discipline. Human factors seeks to modify the design of systems to better fit the user, instead of striving to eliminate errors by teaching people to change their behaviour (124). Wears and Sutcliffe (2019) provide an example of this misconception from the early years of the discipline, when the concept of "accident proneness" was considered, alongside other personal attributes such as carelessness, to explain accidents (126). Workers deemed accident-prone were initially re-trained or moved to a non-hazardous working environment. However, discovery of medical conditions such as colour blindness and its link to work related accidents in the 19th century, brought a shift in viewpoint. Focus turned to changing existing designs or designing new technologies in line with human capabilities, to allow workers to use systems that are resilient to potential future incidents (126).

Aligned with the systems perspective at the heart of the discipline, human factors work is not restricted to the individual, and ranges from the individual to the organisational level (123, 124) . For example, ensuring a new technology is designed with the intended users in mind is important, however, equally as important is the need to understand how interactions with this technology are impacted by organisational factors such as financial resources, the physical environment, and relevant policies and procedures. Overall, although the focus of human factors is on understanding human capabilities and limitations to facilitate system design, researchers applying the discipline must look beyond the "factors of the human" to consider the wider system components. It is crucial to understand how all components within a system are interacting, and the impact that these interactions are having on subsequent outcomes.

2.3.3 Human factors and healthcare teleconsultations

The human factors discipline is useful in a healthcare context where performance of the health system and wellbeing of patients can be compromised, for example in the implementation of new technologies or services such as teleconsultations. The discipline is essential for understanding the potential risks, hazards and limitations of communication between patients and their healthcare providers (108). The discipline focuses on understanding the humans using the technology, what they need from it, how they intend to use it, and the interactions that using the technology will create (127). As government-level strategies are in place to encourage widespread utilisation of teleconsultations in the coming years (Chapter 1), consideration of human factors is essential to maximise system performance and human wellbeing. It is essential to ensure the technologies work well with users to satisfy intended outcomes (127, 128). A recent review of human factors considerations for wider applications of telemedicine (including teleconsultations; robotic surgery; remote monitoring; and asynchronous messaging within portals) found only a small number of studies (n=26), which Fouquet et al (2020) stated demonstrated the current lack of empirical work within telemedicine design (129). The review concluded that human factors are often overlooked when technologies are being introduced, which suggests there is still work to be done in incorporating human factors into the digital transformation of healthcare services (129).

Research has illustrated the need for human factors' consideration when developing guidelines for teleconsultations in healthcare (130). As discussed in Chapter 1, the rapid upscaling of teleconsultations as a result of the COVID-19 pandemic may have resulted in healthcare professionals using the technology without sufficient training or resources. Powers et al reviewed existing patient guidelines for using teleconsultations to assess the extent to which human factors had been considered (130). Due to the high number of results obtained, the review included only those published in the last ten years and associated with professional and government organisations in the US. The identified guidelines focused on three key areas of requirement, including technology requirements (e.g. devices, software, and bandwidth); environmental requirements (e.g. privacy of location, lighting, and noise); and safety requirements (e.g. data privacy and safety). However, there was a lack of consideration for the environmental and safety requirements across all guidelines, as well as consideration for patients' perspectives in its development. The review outlined that the guidelines varied in the level of detail and the type of information provided, the consideration for patient perspectives and accessibility issues. Moreover, few of the guidelines were based on human factors design principles or had been validated through testing with end users. Powers and colleagues suggest that consideration for human factors during guideline development could mitigate against barriers and reduce the risk to patient safety when using the technology. Therefore, human factors professionals should assist in developing guidelines that provide sufficient information on all components of a system that could influence the interaction, and make suggestions for the technical set up (130).

Given the relevance of human factors for the digital transformation of health services, and the continued use of teleconsultation technologies in the future, it would be beneficial to understand in more detail how the discipline can be applied to facilitate the development of these technologies, and any procedures and/or guidelines for using them.

Chapter 3: Thesis aims and objectives

Based on all previous evidence, it is clear that government and policy-focused bodies will continue to encourage the widespread implementation and use of teleconsultation technologies in primary care, as part of plans to digitally transform healthcare services. As discussed, it would be beneficial to understand how teleconsultation technologies are currently being used in primary care contexts, and the factors influencing their use. Identification of facilitators and barriers to the use of teleconsultations would enable changes to the tools, technology or services in line with end users' capabilities and needs. Any investigation into the interactions between humans and the tools and technologies they use would benefit from adopting a human factors perspective, to facilitate consideration of the entire system. As the majority of human interaction with the healthcare system occurs at the primary care level, it would be beneficial to understand and synthesise all previous applications of human factors methods and approaches to the use of teleconsultations in primary care.

This thesis aims to describe the ways in which human factors can be applied to the Design, Implementation, and Use of teleconsultations in primary care. This was achieved through a four-stage process as presented in Figure 3.1.

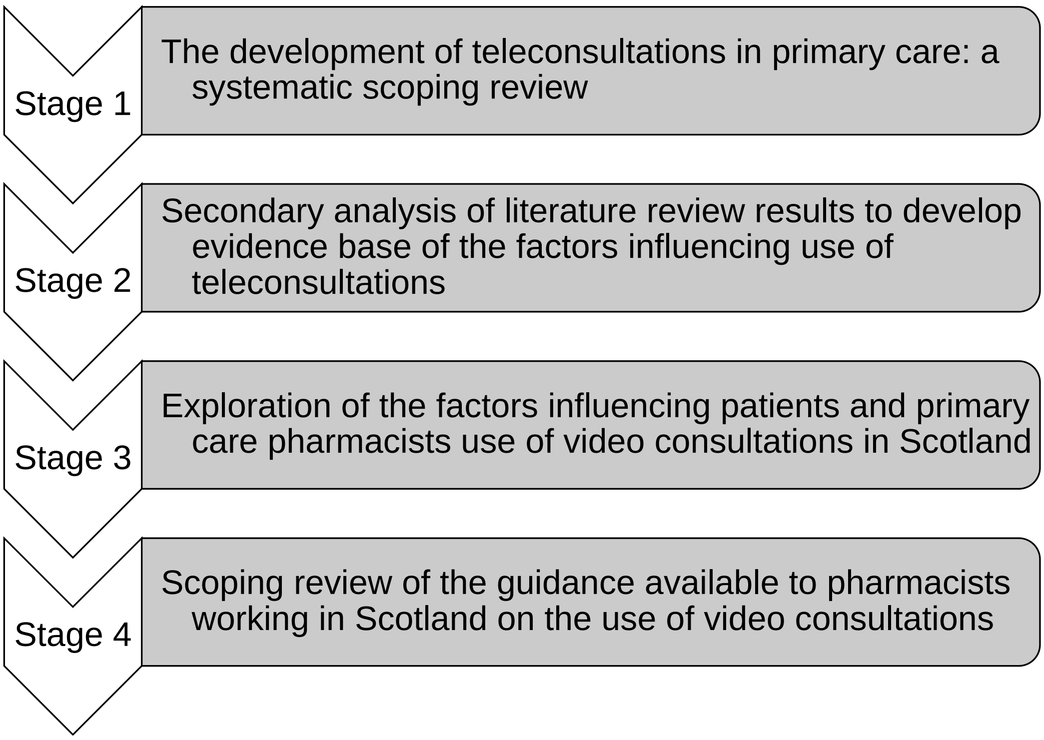


Figure 3.1: Stages of thesis

Each of these four stages had a number of corresponding aims and objectives which are presented below.

Stage 1: The development of teleconsultations in primary care: a systematic scoping review

Aim: To understand what approaches and methods have been applied to the development of real-time teleconsultations in primary care (Chapter 4), with the following objectives:

- Report on the characteristics of studies that have applied approaches to the development of teleconsultations in primary care
- Categorise the approaches applied to the Design, Implementation, and Use of teleconsultations in primary care, using the SEIPS 2.0 model as a framework.

Stage 2: Secondary analysis of literature review results to develop an evidence base of the factors influencing use of teleconsultations

Aim: To understand the factors outlined in Chapter 4's review as influencing the use of teleconsultation technologies in primary care, from both a patient and primary care provider perspective (Chapter 5), with the following objective:

- To synthesise the factors influencing use of teleconsultation technologies in primary care, through inductive and deductive analyses using the SEIPS 2.0 model.

Stage 3: Exploring the factors influencing patients' and primary care pharmacists' use of video consultations in Scotland

Aim: To explore the factors influencing the use of video consultations by patients and pharmacists working in primary care (Chapter 6), with the following objectives:

- To synthesise the factors influencing patients use of video consultations

- To synthesise the factors influencing community and general practice pharmacists' use of video consultations
- To use an established human factors systems model (SEIPS 2.0) to identify components of the current Work System influencing use.

Stage 4: Scoping review of the guidance available to pharmacists working in Scotland on the use of video consultations

Aim: To provide an overview of the existing guidance and resources relevant to pharmacists working in primary care in Scotland for the use of video consultations (Chapter 7), with the following objectives:

- Provide a summary of existing video consultation resources relevant to pharmacists working in primary care in Scotland
- Identify and synthesise the components of the Work System represented in each resource, using an established human factors systems model (SEIPS 2.0).

Chapter 4: The development of teleconsultations in primary care: a systematic scoping review

4.1 Introduction

Healthcare systems are characterised by shortages of resources (131), and as the fastest growing area of healthcare, digital health services provide a solution for this (132). In an increasingly digitised society, government bodies in developed countries encourage the use of technologies to help provide alternatives to traditional face-to-face consultations in healthcare settings (50, 133-135). A variety of alternatives exist and are currently being used to diagnose and treat patients remotely (132). As outlined in Chapter 1, teleconsultations provide an alternative to face-to-face consultations, which can occur in real-time (i.e. a synchronous or live interaction) using technologies such as telephone or video; or with a delayed response (i.e. asynchronous methods; not live interaction) using technologies such as email, online forms, or text messages (131). The terminology used to represent teleconsultations varies, and most terms are often used interchangeably, including: telemedicine; telehealth; and e-health (136).

Although the COVID-19 pandemic was a major catalyst for the uptake of teleconsultations (132), plans were already in place pre-pandemic to incorporate digital technology into healthcare in an effort to provide a more person-centred healthcare system (137). Teleconsultations provide patients with better access to convenient healthcare from remote or rural locations (138), as they reduce the need to take time away from work and other commitments/responsibilities, and reduce the time and money spent on travelling to appointments (139). Removing the need for healthcare providers to travel to home visits and patients into practice for face-to-face appointments, teleconsultations present an opportunity to contribute to a greener health service (139).

As existing technologies change and new ones are introduced, there needs to be a focus on how these technologies are being designed, implemented, and used in healthcare, to ensure they are providing the desired outcomes (140). For that purpose, human factors should be considered – a discipline which studies the interactions between humans, the tools and technologies they use, and the environments within which they work.

In human factors, the emphasis is on human beings, and how the design of systems influences them (82), however human factors should be considered at all stages of a systems life cycle - through Design to Implementation, evaluations of Use, and continuous improvement (81-83). Despite the complexity of healthcare warranting interest from human factors considerations, a 2017 scoping review found that evidence of human factors being applied in primary care was scarce and that applications were mainly focused on safety in general practice (61). However, it is worth noting that due to limited resources and time, the authors were not able to conduct a fully systematic or exhaustive search of the literature, and therefore may have missed relevant studies. Their review includes studies published until 2016, however since then it is possible that with growing interest in human factors in healthcare (83) that there may be more literature in this area. The review provided an insight into human factors applications in primary care however a more systematic search of the literature is required in order to fully understand applications of the discipline to the development of teleconsultations at this level of healthcare.

Communication between healthcare professionals and patients is a key aspect of primary care, and with increased demand on primary care providers and continually evolving services and technologies, interactions are becoming more complex (131). Human factors is particularly relevant here, as system performance and patient wellbeing can be compromised (123), however currently there is no review examining how the discipline has been applied to primary care teleconsultations. With policy makers encouraging the use of teleconsultations (137) it would be beneficial to understand what influences primary care providers and patients choice to use (or not use) them. This would allow identification of barriers restricting the use of teleconsultations, providing an opportunity to address these issues and enhance service performance and patient outcomes. From a human factors perspective, this would provide an opportunity to ensure that existing technologies used for teleconsultations ‘fit’ the users.

As outlined in Chapter 2, the SEIPS 2.0 model (110) is often used in healthcare to assess complex interactions and subsequent Processes and Outcomes. Considering the complexity of teleconsultation interactions, it is crucial to understand how these technologies have been developed to ensure their use optimises service performance and the wellbeing and safety of patients. As the continued use of teleconsultations is encouraged at policy level, it is essential to understand previously used approaches for developing these technologies, and the state of human factors in this area. To address this, a review of the literature will be completed, using the SEIPS 2.0 model as a framework.

4.2 Aims and objectives

The overall aim of this systematic scoping review is to understand what approaches and methods have been applied to teleconsultations in primary care, with the following objectives:

- Report on the characteristics of studies that have applied approaches to examine teleconsultations in primary care
- Categorise the approaches applied to the Design, Implementation, and Use of teleconsultations in primary care, using the SEIPS model as a framework.

4.3 Methods

This review utilised a systematic search strategy, selection process and data collection method with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis for Scoping Reviews (PRISMA-ScR) 2020 checklist used as a guide to report the methods (141).

4.3.1 Eligibility criteria

Inclusion criteria

(1) The studies could take an approach relevant to the human factors discipline: A study was identified as taking this type of approach if it applied a methodology or thinking that relevant to the discipline of human factors and ergonomics. The studies must have included users of the technology (including clinical and non-clinical staff members as well as patients) to understand their involvement in the technology's lifecycle. The studies did not need to explicitly state that they took a 'Human Factors' or 'Ergonomics' approach, as previous research has suggested that often this is not stated. When studies did not state this clearly, the subjective opinion of the reviewer was taken, which is common practice in human factors related reviews within healthcare due to the discipline's infancy in this setting (142, 143). The

following working definition was used to inform the decision: "…the study of the interrelationship between humans, the tools and equipment they use in the workplace, and the environment in which they work" and if needed, a second reviewer was consulted to help make the decision. Studies that used a human factors approach alongside other approaches were also included but only the section on human factors was extracted.

(2) Studies that focus on real-time teleconsultation technologies for consultation purposes:

Studies were included if they focused on the use of real-time technologies used as alternatives to face-to-face consultations (primary care provider to patient). Real-time is considered 'live' communication between people - the exchanging of information in the same moment. This includes but is not limited to: telephone and videoconferencing. As outlined in Chapter 1, consultations are considered to be interactions "Comprising processes such as history taking, examination, investigation and diagnosis…subdivided into several tasks reflecting the agenda of the doctor and patient" (45).

(3) Studies that are based in primary care:

Studies were included if they focused on primary care areas such as, but not limited to: pharmacy, general practice, optometry, nursing and care homes, home care, community-based outpatient, and dental practice. If a primary care clinic was based within a secondary or tertiary setting, but primary care was being provided, then the study was included.

(4) Studies that are peer reviewed and primary papers:

Studies were included if they had gone through the peer review process and were published, including journal articles and reports.

(5) Studies should be published in English, from any geographical location and after 2010:

The studies were included if they were published in the English language and were conducted in any geographical location. The studies needed to be published after 2010 due to previous reviews reporting a lack of published evidence and low levels of usage before 2010 on the use of videoconferencing in primary care (62); and, a lack of publications before 2010 on telephone consultations replacing general practice face-to-face visits (63).

(6) Studies should focus providers of primary care and patients from primary care:
Studies were included if they focused on patients and primary care providers such as, but not limited to: doctors, nurses, pharmacists, optometrists, dentists and call-handlers in out-of-hours services (e.g. NHS 24/111). If the healthcare provider worked in both primary and secondary care settings but the focus of the study was on their primary care role, the study was included.

(7) Studies can use any type of method:
Studies using all types of methods were included, such as: quantitative, qualitative and mixed methods.

Exclusion

(1) Studies that do not focus on the user of the technology:
Studies were excluded if they focused solely on the technology and not how users interact with it, and other components of the system. This included the Design, Implementation, and evaluation of Use of technologies without user input (e.g. designing technology without incorporating user capabilities, needs and limitations; and assessing the success of technology implementation and use without understanding the experiences of the users).

(2) Studies that do not focus on the use of real-time technologies for consultation purposes:
Studies were excluded if they: used real-time technologies for non-consultation purposes such as booking a face-to-face appointment; used real-time technologies solely for professional-professional communication; or used delayed response technologies for teleconsultations with patients (e.g. email, text messages, and e-consult forms).

(3) Studies that are not the primary paper or peer-reviewed:
Studies were excluded if they were not primary research, including reviews (e.g. scoping, literature, narrative, and systematic), opinion pieces and

discussion articles. Papers that had not been peer-reviewed were excluded, along with conference proceedings, books, and other unpublished literature.

(4) Studies that focus on participants from settings other than primary care: Studies were excluded if they focused on clinicians working in a setting other than primary care. If the clinician(s) worked in both primary and secondary care settings and the focus of the study was on their secondary care role, the study was excluded.

4.3.2 Information sources

The databases Medline, Embase, PsycINFO, Engineering Village and Ergonomics Abstracts were searched on the 19th of May 2021 and on the 19th of April 2023. Medline and Embase were chosen as prominent databases in the field of healthcare and PsychINFO for its broad focus in the field of psychology. Ergonomics Abstracts was chosen due to its focus on human factors and ergonomics, and Engineering Village was used to capture studies that had applied human factors thinking from an engineering perspective.

After full text screening of the studies identified via database searching, hand searches were conducted to identify any studies missed. This included hand searches of the references of the included studies and searches on Google Scholar©.

4.3.3 Search strategy

The first search covered all studies available between 1st January 2010 and the 19th of May 2021, with the second search covering studies available from 19th May 2021 to 19th April 2023. The search strategy was developed by creating key terms and synonyms under three areas: human factors, primary care, and teleconsultations. Search terms were informed by previously completed reviews (61, 142) and validated by a University of Strathclyde librarian and colleague within the department (CM and KP). For each database, the structure of the search strategy remained the same; however, each database required slightly different search options. Two types of search terms were used (MeSH/Emtree and key words) along with a variety of different syntax. Appendix 1 outlines the types of search terms and syntax used for each database, along with a description of what each syntax contributed.

A **sample** of the Medline search strategy can be seen below in Table 4.1. The full search strategy can be found in Appendix 2.

Table 4.1. Sample of search terms used.

Main Heading	Example of search terms
Human Factors	Human factors OR ergonomics OR patient safety OR patient harm OR human-centred OR user-centred OR system design OR systems thinking OR incident reporting OR adverse event OR human error OR ethnographic analysis OR task analysis
Primary Care	Pharmacy OR family practice OR general medical practice OR general dental practice OR community health services OR optometry OR out of hours
Teleconsultations	Telemedicine OR teleconsultations OR telecommunication OR videoconferencing OR telephone OR remote consultation OR synchronous communication OR e-health
Human factors AND primary care AND teleconsultations	

4.3.4 Selection process

The software Covidence© (144) was used for the full screening process. A random 20% of studies were independently screened at both title and abstract and full text stages by the researcher and KP to ensure consistency. The level of agreement was calculated and a percentage of 80-90% was considered good, and 90%+ considered excellent (145). If a good or excellent level of agreement was achieved, screening continued. However, the agreement level fell below 80%, a further 10% of studies would be screened, and ED would be consulted.

Where articles could not be accessed online for full text screening, the authors would be contacted through ResearchGate© where possible plus twice via email (with two weeks to respond after each email). If the full texts were not provided, the studies would be excluded.

Authors would also be contacted via email if it was unclear whether the study met the inclusion criteria (e.g. consultation being ‘live’ (synchronous) or not; primary care setting).

4.3.5 Data charting process

A data charting table was developed using Microsoft Excel© and a random sample of 20% of studies were selected to be independently charted by KP to ensure consistency. If a good (80-89%) or excellent (90%+) percentage of agreement was reached, charting would continue. However, if the agreement level was below 80%, a further 10% of studies would be screened, and ED consulted. Data charted for each of the objectives is presented in Table 4.2.

Table 4.2. Data charted for each of the 2 objectives

Objective	Data charted
1. Report on the characteristics of studies that have applied approaches to the development of teleconsultations in primary care	• Title • Author • Date published • Primary care setting • Geographical location • Study aim • Type of technology.
2. Categorise the approaches applied to the Design, Implementation, and Use of teleconsultations in primary care, using the SEIPS 2.0 model as a framework	• Approaches used (where several were used, these were separated) • Specific methods for each approach (e.g. specific questionnaires, analysis methods or models used).

4.3.6 Synthesis methods

The synthesis methods used for each objective are as follows:

Objective 1: Report on the characteristics of studies that have applied approaches to the development of teleconsultations in primary care

A PRISMA flow chart was generated to illustrate the screening process used to identify studies. The characteristics of the included studies (title, author, date published, primary care setting, geographical location, study aim) were presented in tabular form and, when appropriate, percentages were calculated.

The type of technology used was inductively categorised and presented in tabular form. An inductive method was adopted to avoid limiting the technologies included, however ‘telephone’ and ‘video’ were expected to be found in the literature.

Objective 2: Categorise the approaches applied to the Design, Implementation, and Use of teleconsultations in primary care, using the SEIPS model as a framework

Content analysis was used as a guide for the synthesis methods (146) and included the following steps:

Step 1: A count of the studies that explicitly mentioned human factors or ergonomics within their main text was completed, as previous research has highlighted that while human factors thinking may be adopted, the specific term(s) may not be used (142, 143).

Step 2: Studies underwent a deductive content analysis which aligned the approaches under the headings of Design, Implementation, and Use (70). The operational definitions used for this stage of analysis were derived from the literature (147-149), and are displayed in Table 4.3 below. Deductive content analysis is useful when there is an existing framework which can be used for analysis (146, 150). KP independently completed the deductive content analysis to ensure consistency. Any disagreements were discussed and if consensus could not be reached, ED would be consulted.

Table 4.3. Definitions for Design, Implementation, and Use (147-149)

Heading	Definition
Design	Design is the process of developing, testing, and evaluating the teleconsultation technology before it is implemented into practice. The design phase ends after a prototype of the technology is ready to be integrated into practice.
Implementation	Implementation is the integration of the technology prototype into practice. This stage starts after the prototype is designed, by understanding the factors that influence integration and ends when the technology is used in practice.
Use	Use refers to the evaluation of teleconsultation technology once it's implemented into practice to understand its suitability for the task and the factors influencing successful use. This stage starts once the technology is used in practice and should only end if the technology is no longer used.

Step 3: Once aligned under the above headings, the approaches were inductively analysed using Microsoft Excel©. The approaches that were duplicates or focused on similar areas were grouped (e.g. studies exploring reasons for use and non-use and studies exploring facilitators and barriers to use). KP completed 20% of this analysis for consistency, and if there was disagreement and consensus was not reached after a discussion, then ED would be consulted. Once finalised, a name and definition were created for each approach, which was checked for face validity by KP, to ensure the final approaches and their definitions were suitable/appropriate.

Step 4: The approaches were then deductively aligned under the three areas of the SEIPS 2.0 model (i.e. Work System, Processes & Outcomes) (110). A deductive content analysis method was used for this as SEIPS is a useful framework often used to understand the interactions between components of the Work System and the influence these interactions have on Outcomes. This stage of analysis also involved identifying which component(s) of the Work System, or type(s) of Processes or Outcomes the approach was being used to examine. The definitions for this stage of synthesis are displayed in Table 4.4 below.

KP validated coding by deductively aligning 20% of the approaches under the SEIPS 2.0 model. Any disagreements were discussed and if agreement could not be met then ED would be consulted.

Table 4.4. Definitions for each area of the SEIPS 2.0 model (SEIPS 2.0) (108, 110)

<table>
<tr><th>Areas of the SEIPS model</th><th>Definition of the area</th></tr>
<tr><td>Work System</td><td>The Work System represents a sociotechnical system with six interacting components: person(s), tools and technologies, tasks, organisation, internal environment, and external environment.

• Person(s) refers to the characteristics of the individual at the centre of the system. This can be a single individual (e.g. patient) or a group (e.g. team, organisational unit). Individual characteristics include physical characteristics – strength, weight, height; cognitive characteristics: expertise, experience; Psychosocial characteristics: motivation, needs, social status
• Tools and technologies are objects that people use to do work or that assist people in doing work. This can include IT as well as physical tools and equipment
• Tasks refers to the attributes or characteristics of the task, such as: difficulty, complexity, variety, ambiguity, and sequence
• Organisation refers to the structures external to a person (but often in place by people) that organise time, space, resources, and activity, which differ for patients and primary care providers:
    o <u>Patients:</u> For patients this includes factors like: communication infrastructure; living arrangements; family roles and responsibilities; work and life schedules; interpersonal relationships; culture; social norms and rules; financial and health-related resources
    o <u>Primary care providers:</u> Within institutions, organisation factors can be characteristics of work schedules and assignments; management and incentive systems; organisational culture; training; policies; resource availability; team work; communication and work relationships.
• Internal environment refers to the physical environment and includes lighting; noise; vibration; temperature; physical layout; available space; and air quality.
• External environment refers to macro-level societal, economic, ecological and policy factors outside an organisation. Factors such as the impact of budget and cost on quality of tools/technologies used; societal expectations for patient and family preferences; and local infrastructure

Interactions between the six components produce work Processes, which subsequently shape Outcomes.</td></tr>
<tr><td>Processes</td><td>This includes processes which are influenced by interacting components in the Work System. The processes can be professional, patient, or collaborative depending on who is actively engaged in performing the process.

• Professional work processes are those in which primary care providers or a team of professionals are the primary agents, with minimal active involvement from patients or other non-professionals</td></tr>
</table>

Areas of the SEIPS model	Definition of the area
	• ***Patient work processes*** are those in which the patient (and/or family caregiver) is the primary agent, with minimal active healthcare professional involvement • ***Collaborative work processes*** are those in which both healthcare professionals and patients (and/or family) are jointly and actively involved. Work Processes subsequently impact Outcomes.
Outcomes	Outcomes refers to states or conditions resulting from the Work System components interacting and subsequent Processes. The Outcomes can be directly related to the patient, organisation, or professional.

Step 5: The specific methods (e.g. relevant questionnaires, models, frameworks, or data collection methods) were then presented in tabular form, under each approach with reference to the specific area of the SEIPS 2.0 model (Work System, Processes or Outcomes) and stage of development (Design, Implementation or Use).

4.4 Results

4.4.1 Study selection

The first search of the literature between 1st January 2010 and 19th May 2021 identified 10,500 studies to be screened, 37 of which were included (see Figure 4.1 for the full PRISMA flow chart of the studies included at each stage). The percentage of agreement for the title and abstract screening was 94% and 92% for full text screening; this indicated an excellent level of agreement. The second search of the literature between 19th May 2021 and 19th April 2023 identified 2,400 articles to be screened, 33 of which were included (see Figure 4.1 for the full PRISMA flow chart of the studies included at each stage). The percentage of agreement for the title and abstract screening was 95% and 86% for full text screening; this indicated a good level of agreement. The total number of studies included in this review is 70.

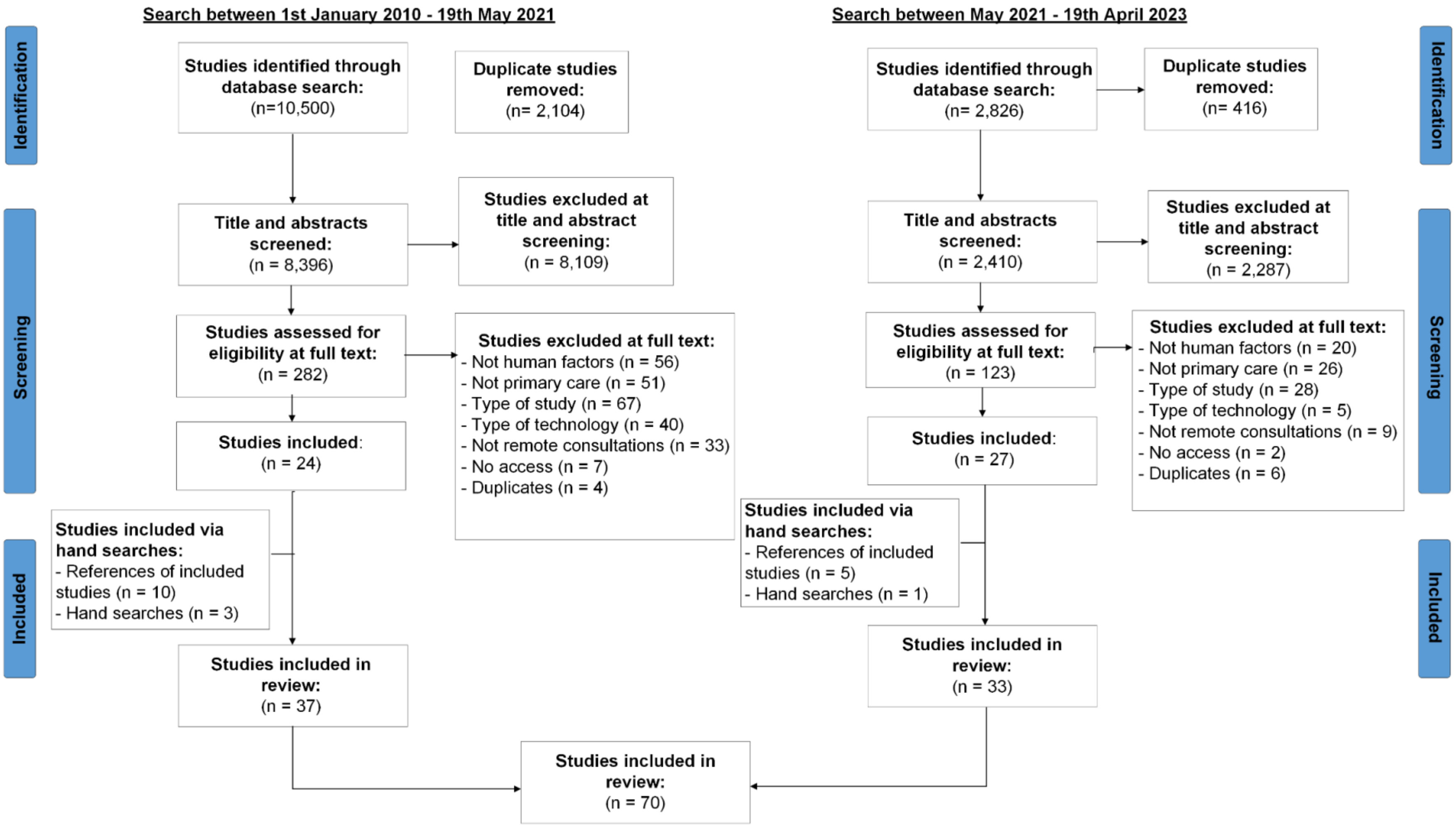


Figure 4.1: PRISMA flow charts showing the number of studies identified at each stage of the searches

4.4.2 Study characteristics

All 70 studies were published from 2010 onwards, with the majority published 2019 onwards (n=49, 70%). The year with the most published studies was 2022 (n=20, 28.6%) and the least were 2011 and 2016, with only one in each year (1.4%). The majority of studies were published in the UK (n=25, 35.7%), with 16 in the US (22.9%), seven in Australia (10%) and three (4.3%) in Norway, Germany, Denmark, Sweden, and Canada each. The remainder were set in Israel, the Netherlands, New Zealand, Poland, Brazil, the US and Canada, and one (1.4%) study set in 20 different countries.

The majority of studies were set in general practice (n=44, 62.9%), with thirteen (18.6%) in primary care clinics, four (5.7%) in 24/7 telephone healthcare, three (4.3%) in community pharmacy, and two (2.9%) in community primary care nursing. The remainder were set in community physiotherapy, out of hours (OOH) primary care, community health centres, and private digital health clinics, with one study (1.4%) each. The majority of studies focused on primary care providers only (n=29, 41.4%), with 21 (30%) focusing on both patients and primary care providers, and 19 (27.1%) on patients only. The full characteristics of the studies and individual aims are displayed in Table 4.5.

Across all 70 studies, 29 (41.4%) looked at video consultation only, 15 (21.4%) at telephone only, and 26 (37.1%) looked at both modes of consultation communication.

Table 4.5: Characteristics of studies included in final review (n= 70)

Study	Study aims and objectives	Date	Primary care setting	Participants	Location
Ernesater et al (151)	To describe errors that lead to an incident report within the context of the Swedish Health Directorate telenursing.	2010	National telephone triage system	Nurses	Sweden
McKinstry et al (152)	To determine if face-to-face and telephone consultations differ with regard to the number and type of problems presented; the quantity of data gathering and patient counselling that took place; the amount of rapport and partnership building; the degree to which doctors tried to involve patients in decision making; the quality and safety of the consultation; and patient satisfaction and enablement.	2010	General practice	GPs, patients	UK
Hanna et al (153)	To investigate attitudes to non-face-to-face consultation technologies in the routine delivery of primary care and managers roles in the introduction and normalisation of these technologies.	2011	General practice	Practice managers	UK
LeVela et al (154)	Article presents findings about incoming patient calls to primary care for medically based reasons during office hours and reports factors independently associated with satisfaction, considering patient characteristics, call reasons, and staff responsiveness.	2012	VA Primary care clinic	Patients	USA
Turnbull et al (155)	To examine the skills and expertise required and used by call-handlers doing telephone triage and assessment, supported by a computer decision support system.	2012	NHS 111	Call handlers, managers, clinicians	UK
Jiwa et al (156)	To explore GPs attitudes to video consultation with a range of patients who may not be known to them previously.	2013	General practice	GPs	Australia
LaVela et al (157)	To evaluate experiences and outcomes before and after a national telephone transformation quality improvement (QI) collaborative.	2013	VA primary care clinic	Patients	US
Salisbury et al (158)	To assess whether PhysioDirect is equally as effective as usual models of physiotherapy; by investigating the cost	2013	Community physiotherapy	Physiotherapists, physiotherapy	UK

Study	Study aims and objectives	Date	Primary care setting	Participants	Location
	effectiveness of physiotherapy compared with usual care; exploring experiences and views.			managers, GPs and patients	
Sperber et al (159)	To elicit stakeholder views on this mode of healthcare delivery (telephone visits), including potential facilitators and barriers.	2014	VA primary care and community outpatient clinic	Patients, primary care providers, and staff	US
Turnbull et al (160)	To investigate four core features of health-care innovation and change in relation to the new NHS 111 telephone-based service for 24/7 access to urgent care, namely the way in which *work,* and *workforce* are organised for this new service and how this technology and organisational context shape the way in which services are aligned.	2014	NHS 111	Call handlers, managers, clinicians	UK
Campbell et al (161)	In comparison with usual care (UC), to assess the impact of GP-led telephone triage (GPT) and nurse-led computer-supported telephone triage (NT) on workload and cost, experiences of care, and patient safety and health status.	2015	General practice	GP, nurses, practice managers, administration staff and patients	UK
Huygens et al (162)	To investigate the actual use and intention toward using Internet services to communicate with the general practice, and to study the factors and characteristics that influence intentions to use such services.	2015	General practice	Patients	Netherland s
Murdoch et al (163)	To provide insights into the observed effects of the ESTEEM trial, and to specify the circumstances under which triage is likely to be successfully implemented.	2015	General practice	Nurses	UK
Leng et al (164)	To investigate attitudes towards video consulting and establish how widely used video communication, for social and business reasons, is and whether there is a demand for using it as an alternative method of consulting.	2016	GP	Patients	UK
Inch et al (69)	To determine the feasibility and acceptability of the Telepharmacy Robotic Supply Service (TPRSS). To describe perceptions of the need for a TPRSS and the services that might be delivered and accessed using this technology; refine the specification of the TPRSS and install in a rural location; describe the TPRSS services accessed by the public; assess satisfaction; and explore	2017	Community pharmacy	Local residents; community pharmacists; GP practice: general practice pharmacists, nurses, GPs, practice managers	UK

Study	Study aims and objectives	Date	Primary care setting	Participants	Location
	the impact of the TPRSS on staff and make recommendations for refinements.				
Newbould et al (165)	To evaluate a telephone first approach, in which all patients wanting to see a GP are asked to speak to a GP on the phone before being given an appointment for a face-to-face consultation.	2017	General practice	Patients	UK
Powell et al (166)	To describe patients experiences of video visits performed with their established primary care clinicians	2017	Primary care clinic - academic medical centre	Patients	US
Turnbull et al (167)	Examine how call handlers manage, experience and respond to risk in their everyday practice of telephone assessment.	2017	NHS 111	Call handlers, nurses, managers	UK
Atherton et al (168)	To understand how, under what conditions, for which patients, and in what ways, alternatives to face-to-face consultations present benefits and challenges, and to explore the feasibility and impact of alternatives to face-to-face consultations.	2018	General practice	Primary care providers and patients	UK
Ball et al (169)	To understand views on a telephone first approach, in which all appointment requests in general practice are followed by a telephone call from the GP.	2018	General practice	Patients	UK
Rygg et al (170)	To illuminate experiences of the technical functionality, usability, and training of tablet use in video consultation in primary cancer care in order to determine pitfalls concerning the introduction of video consultation.	2018	General practice	Nurses and patients	Norway
Chudner et al (171)	To identify relevant attributes and levels of a stakeholder choice of video consultations over in-clinic consultations for a discrete choice experiment (DCE) questionnaire development. Also sought to gain insights for a future DCE quantitative stage to be conducted in three stakeholder groups in parallel.	2019	General practice	Primary care providers and patients	Israel
Donaghy et al (172)	To explore use in general practice to determine acceptability and to examine how video consultations	2019	General practice	Patients, GPs, nurses	UK

Study	Study aims and objectives	Date	Primary care setting	Participants	Location
	varied from face-to-face consultations and telephone consultations in terms of length and contact.				
Graversen et al (173)	To develop a valid and reliable assessment tool to measure quality of communication, patient safety and efficiency in telephone triage.	2019	Out of hours primary care	GPs, nurses, doctors and communication experts	Denmark
Hammersley et al (174)	Explored the use of video consultation in general practice to determine its acceptability, and to examine how video consultations varied from face-to-face consultations (FTFCs) and telephone consultations (TCs) in terms of length, quality, and content.	2019	General practice	Patients, nurses, GPs	UK
Liaw et al (175)	To assess awareness, perceptions, and value of telehealth in primary care.	2019	General practice	Patients	US
Randhawa et al (176)	To explore views and attitudes towards video consultations in primary care; specifically, in three broad areas: the benefits of video consultations ; potential problems with video consultations and its implementation; and the cost-effectiveness of video consultation in this setting.	2019	General practice	GPs	UK
Gordon et al (177)	Explore perspectives on the technical, social, and personal barriers and benefits to communicating using CVT technology.	2020	VA Community based outpatient clinics and primary care clinics	Patients	Colorado
Imlach et al (178)	To explore how patients accessed general practice during lockdown and evaluate experiences with telehealth, to inform how telehealth could be most effectively used in the future.	2020	General practice	Patients	New Zealand
Mueller et al (179)	To unveil and compare the acceptance-promoting factors of patients without and with experiences in using video consultation in a primary care setting and to provide implications for the design, theory, and use of video consultation.	2020	General practice	Patients	Germany
Ohligs et al (180)	To develop a user-orientated, integrated telemedical system for pre-existing doctor-patient-relationships. Focus was placed on the feasibility of a structured video	2020	General practice; nursing homes	Patients, nursing staff, GPs	Germany

Study	Study aims and objectives	Date	Primary care setting	Participants	Location
	anamnesis and physical examination through telemedically connected devices in nursing homes. Focus was also placed on the evaluation of this system's acceptance.				
Salisbury et al (181)	To explore whether and under what circumstances digital-first access to general practice is likely to decrease or increase general practice workload.	2020	General practice	No participants involved, but focused on GPs and patients	UK
Sinha et al (182)	To describe the implementation and evaluation of a video visit program at a large, academic primary care practice in New York.	2020	Primary care clinic at an academic medical centre	Patients	US
Srinivasan et al (183)	To seek stakeholder perspectives on video visits' acceptability and effect 3 weeks after near-total transition to video visits.	2020	Primary care clinic at an academic medical centre	Primary care provider, medical assistant/nurse	US
Breton et al (184)*	To describe the positive and negative implications of using telehealth during the COVID-19 pandemic.	2021	General practice	GPs	US and Canada
Guzman et al (185)	Investigated perceptions on providing telehealth (telephone and video consultations) services in Australia.	2021	GP	GPs	Australia
Gilkey et al (186)*	To characterize recent adolescent telehealth use and attitudes as well as support for continuing to offer adolescent telehealth after the COVID-19 pandemic is over.	2021	Primary care clinic	GPs, GP assistants, nurses,	US
Javanparast et al (187)	To investigate experiences with telehealth by patients at high risk of poor health outcomes during the COVID-19 pandemic.	2021	General practice	Patients	Australia
James et al (188)*	To explore experiences of using telehealth during COVID-19.	2021	General practice	Nurses	Australia
Johnsen et al (189)	To explore perceived suitability of video consultations compared to ordinary face-to-face consultations during the COVID-19 lockdown and to whether continuity of care (i.e. prior knowledge of the patient/problem) had an impact on perceptions of suitability.	2021	General practice	GPs	Norway
Li et al (190)*	To explore perspectives on the main benefits and challenges of virtual care, mapping them against the	2021	General practice	GPs	Across 20 countries

Study	Study aims and objectives	Date	Primary care setting	Participants	Location
	domains of quality of care whenever possible. A secondary aim sought to summarise findings as a framework for recommendations for the implementation of virtual care in primary care settings.				
Lackey et al (191)*	To understand experiences using triage during the COVID-19 pandemic in a way that can promote further use of triage. The first objective is to quantitatively describe behavioural factors that influence practitioners' triage use. The second objective is to capture more nuanced experiences with and attitudes toward triage.	2021	General practice	GPs	UK
Manski-Nankervis et al (192)*	To examine the experiences and preferences of consumers who attended a primary care telehealth consultation via videoconference during late 2020 and early 2021, and to estimate the savings for consumers.	2021	Primary care clinic	Patients	Australia
Murphy et al (193)*	To investigate the impact of the rapid implementation of remote consultations in March 2020 on the delivery of patient care and explore how this changed during the first 4 months of the COVID-19 pandemic.	2021	General practice	GPs, practice managers, nurses	UK
Anaraki et al (194)*	To explore experiences of using virtual health care in clinical practice during the COVID-19 pandemic.	2022	General practice	GPs	Canada
Berry et al (195)*	To examine perspectives on the shift to telemedicine, the remote delivery of health care via the use of electronic information and communications technology.	2022	Primary care clinics	Patients and carers	US
Berntsson et al (196)*	To explore experiences and perceptions of patient safety when providing health advice over the phone.	2022	Primary care nursing	Nurses	Sweden
Bhatia et al (197)*	To inform policy, interviewed adults >65 years to learn about their experience with telemedicine since the pandemic.	2022	Community primary care practices	Patients	US
Chen et al (198)*	To compare satisfaction with audio only, video, and in person primary care visits.	2022	Primary care clinics	Patients	US
Dixon et al (199)*	To explore perspectives and concerns about safeguarding practice during the pandemic, focusing on challenges and opportunities created by remote consultation.	2022	General practice	GPs	UK

Study	Study aims and objectives	Date	Primary care setting	Participants	Location
Ford et al (200)*	To 1) characterize facility plans for continuing telemedicine following COVID-19; 2) characterize perspectives on the value and utility of telemedicine; and 3) identify the barriers to conducting telemedicine encounters.	2022	General practice, nursing homes	Nursing staff	US
Gray et al (201)*	To identify the most salient factors that impact decisions about when to offer virtual care.	2022	VA primary care clinic	Primary care providers	US
Greenhalgh et al (202)*	To explain why video consultations are not more widely used in general practice.	2022	General practice	Patients, GPs, managers, support staff, other clinicians	UK
Hardie et al (203)*	To identify the benefits and barriers to telehealth use using an 'Action Research' approach.	2022	General practice	GPs, patients, representatives from primary health networks	Australia
Han et al (204)*	To explore views on what appointment types would be appropriate for app-based video calls from home and what user interface challenges would emerge; how video-based appointments might change the workflow of an appointment, in comparison to an in-person appointment; concerns regarding the technologies; and, how new designs can address social and technical challenges.	2022	General practice	GPs and patients	Canada
Jepsen et al (205)*	To analyse how the patient's use of handheld technology in video consultations affects communication and the possibilities for the delivery of quality healthcare.	2022	General practice	Patients and GPs	Denmark
Lynnerup et al (206)*	To explore attitudes towards delivering a New Medicine Service through video communication at community pharmacies.	2022	Community pharmacy	Patients; pharmacists	Denmark
Payan et al (207)*	To investigate experiences on telemedicine implementation and use during the pandemic.	2022	Community health centres	Clinicians and patients	US
Park et al (208)*	To understand use, experiences, and perspectives of telepharmacy.	2022	Community pharmacy	Pharmacists	Canada
Razavi et al (209)*	To explore experiences of using video consultations in a digital care setting, and the opportunities and limitations, and its impact on workflow and communication.	2022	Private digital health clinic	Nurses	Sweden

Study	Study aims and objectives	Date	Primary care setting	Participants	Location
Rosen et al (210)*	To develop an empirically based and theory informed taxonomy of risks associated with remote consultations.	2022	General practice	GPs and patients	UK
Segal et al (211)*	To understand appropriate use of telemedicine in primary care to inform future development of a framework that should be valuable to diverse stakeholders.	2022	Primary care clinics	Patients, GPs, GP assistants, nurses	US
White et al (212)*	To explore the telehealth experiences including barriers, enablers and opportunities.	2022	General practice	GPs	Australia
Walczak et al (213)*	To assess acceptance of telehealth during the COVID-19 pandemic and to explain the factors that drive the need to implement a telehealth system in primary care.	2022	General practice	GPs	Poland
Bin et al (214)*	To assess the feedback regarding the use of telemedicine.	2023	General practice	GPs and patients	Brazil
Esber et al (215)*	To assess the acceptance of video consultation as an alternative to face-to-face in-office visits in general practice and to investigate its drivers and barriers	2023	General practice	Patients	Germany
Norberg et al (216)*	To explore experiences of potentials and pitfalls associated with the use of video consultations during the first pandemic lockdown.	2023	General practice	GPs	Norway
Parsons et al (217)*	To understand who used a private general practice service, how, and their reasons for this.	2023	General practice	GPs, patients	UK
Payne et al (218)*	To understand how and why video is used in urgent care settings.	2023	General practice	GPs	UK
Verity et al (219)*	To explore the perspectives of people from a wider range of inclusion health groups, bringing to light not only the access issues these patients face but also their suggestions for improvements.	2023	General practice	Patients	UK

**Studies included from the second search (May 2021-19th April 2023)*

4.4.3 Approaches applied to teleconsultation development

Objective 2: Categorise the approaches applied to the Design, Implementation, and Use of teleconsultations in primary care, using the SEIPS model as a framework

The results of the review found that none of the 70 included studies explicitly mentioned ‘human factors’ or ‘ergonomics’ in their main text.

The majority of studies (n=56, 80%) applied an approach to examine the Use of teleconsultations only, and seven (10%) applied an approach to examine Implementation and Use. Three studies (4.3%) applied an approach to Design only, and three (4.3%) at Design and Use. Finally only one (1.4%) study examined Design, Implementation, and Use, as displayed in Table 4.6.

Table 4.6: Studies applying approach(es) at each stage of development (n=70)

Study	Design	Implementation	Use
Chudner 2019 (171)	✓		
Graversen 2019 (173)	✓		
Ohligs (180)	✓		
Anaraki et al (194)*			✓
Berntsson et al (196)*			✓
Berry et al (195)*			✓
Bhatia et al (197)*			✓
Bin et al (214)*			✓
Breton et al (184)*			✓
Chen et al (198)*			✓
Dixon et al (199)*			✓
Donaghy 2019 (172)			✓
Esber et al (215)*			✓
Ernesater 2010 (151)			✓
Ford et al (200)*			✓
Gilkey et al (186)*			✓
Gordon 2020 (177)			✓
Gray et al (201)*			✓
Greenhalgh et al (202)*			✓
Guzman 2021 (185)			✓
Han et al (204)*			✓
Hardie et al (203)*			✓
Hammersley 2019 (174)			✓
Huygens 2015 (162)			✓
Imlach 2020 (178)			✓
James et al (188)*			✓
Javanparast 2021 (187)			✓
Jepsen et al (205)*			✓

Study	Design	Implementation	Use
Jiwa 2013 (156)			✓
Johnsen 2021 (189)			✓
Lackey et al (191)*			✓
LaVela 2012 (154)			✓
LaVela 2013 (157)			✓
Leng 2016 (164)			✓
Li et al (190)*			✓
Liaw 2019 (175)			✓
Lynnerup et al (206)*			✓
Manski-Nankervis et al (192)*			✓
McKinstry 2010 (152)			✓
Mueller 2020 (179)			✓
Murphy et al (193)*			✓
Norberg et al (216)*			✓
Parsons et al (217)*			✓
Payne et al (218)*			✓
Park et al (208)*			✓
Powell 2017 (166)			✓
Razavi et al (209)*			✓
Rosen et al (210)*			✓
Rygg 2018 (170)			✓
Salisbury 2020 (181)			✓
Segal et al (211)*			✓
Sinha 2020 (182)			✓
Srinivasan 2020 (183)			✓
Sperber 2014 (159)			✓
Turnbull 2017 (167)			✓
Turnbull 2012 (155)			✓
Verity et al (219)*			✓
Walczak et al (213)*			✓
White et al (212)*			✓
Ball 2018 (169)	✓		✓
Campbell 2015 (161)	✓		✓
Newbould 2017 (165)	✓		✓
Atherton 2018 (168)		✓	✓
Hanna 2011 (153)		✓	✓
Murdoch 2015 (163)		✓	✓
Payan et al (207)*		✓	✓
Randhawa 2018 (176)		✓	✓
Salisbury 2013 (158)		✓	✓
Turnbull 2014 (160)		✓	✓
Inch 2017 **(69)**	✓	✓	✓

**studies included from second search (May 2021-19th April 2023)*

Twenty approaches were identified. Table 4.7 outlines the stage of development (Design, Implementation, Use) at which the approaches were used to examine components of the Work System, Processes or Outcomes. Definitions of approaches are provided, and the methods or models/frameworks used are outlined.

Table 4.7: Approaches used for the Design, Implementation, and Use of teleconsultation technologies, categorised using the SEIPS model

DESIGN				
WORK SYSTEM				
Approaches	**Definition**	**Component(s) of Work System**	**Studies**	**Methods/models/frameworks used to apply approach**
Assessment of user needs	Assessing what stakeholders/end users need for the design of a technology, including their expectations, concerns, and preferences	Person(s), tools and technologies	(69, 171, 173, 180)	• Interviews (69) • Focus groups (69, 171, 173, 180)
User involvement in evaluation of the technology	The involvement of patients and primary care providers in the design of study materials used to evaluate technology (e.g. use of steering groups)	Person(s), tasks, tools and technologies	(161, 165, 169)	• Document analysis (161, 165)
OUTCOMES				
Approaches	**Definition**	**Type(s) of outcome**	**Studies**	**Methods/models/frameworks used to apply approach**
Evaluation of a prototype	Review of the prototype by stakeholders to help with the design of the technology. This includes feedback in general regarding the prototype as well as the usability of it and any other technical issues	Professional and patient outcomes	(173, 180)	• Survey based Delphi (173) • Self-developed questionnaire (180) • Interviews (180)
IMPLEMENTATION				
WORK SYSTEM				
Approaches	**Definition**	**Component(s) of Work System**	**Studies**	**Methods/models/frameworks used to apply approach**
Understanding factors that influence implementation	Understanding the factors that influence the implementation of teleconsultations into practice, including facilitators and barriers	All components of the Work System	(158, 160, 168, 176) (207)*	• Interviews (158, 160, 168, 176, 207) • Observations (160, 168) • Focus groups (160)
Understanding the organisational context of implementation	Exploring the differences in implementation in different contexts to provide a basis for understanding differences in experiences with teleconsultations	Organisation, person(s), tools and technologies	(163)	• Interviews (163)

Approaches	Definition	Component(s) of Work System	Studies	• Methods/models/frameworks used to apply approach
Observations to identify operational issues	Observing the implementation of teleconsultations into practice to identify and amend any operational issues	Tools and technologies, person(s), organisation	(69)	• Observations (69)
PROCESSES				
Approaches	**Definition**	**Type(s) of process**	**Studies**	**Methods/models/frameworks used to apply approach**
Assessment of implementation requirements	Assessment of what processes need to be in place for implementation to be successful in practice	Professional processes	(153)	• Interviews (153)
USE				
WORK SYSTEM				
Approaches	**Definition**	**Component(s) of Work System**	**Studies**	**Methods/models/frameworks used to apply approach**
Assessing users' intentions and willingness to use	Assessment of individuals' intentions, preferences, and willingness to use teleconsultations, both at the current time and in the future	Person(s), tools and technologies	(153, 156, 158, 162, 164, 166, 172, 178, 182, 185, 187, 189) (204, 215, 220)*	• Interviews (164, 166, 172, 178, 185, 187, 204) • Self-developed questionnaire (153, 158, 162, 182, 189, 215, 220) • Theory of Planned Behaviour (156) • Innovation Adoption Theory (164) • Modified Unified Theory of Acceptance and Use of Technology (UTAUT) model (215)
Understanding the influence of organisational factors on use	Understanding the impact that practice characteristics and the roles and responsibilities of users' have on the use of teleconsultations	Organisation, person(s), external environment, internal environment	(153)	• Interviews (153)

Approaches	Definition	Component(s) of Work System	Studies	Methods/models/frameworks used to apply approach
Assessing the safety and quality of teleconsultations	Assessment of the safety and quality of teleconsultations, the risk work involved in teleconsultations, and the errors in teleconsultations that lead to primary care provider incident reporting	Person(s), tasks, tools and technology	(151, 152, 167) (210, 221)*	• Document analysis (151) • Observations (167) • Interviews (221) • Focus groups (167) • Survey based on the Royal College of General Practitioners (RCGP) consultation assessment instrument (152) • Analysis of datasets (210)
Understanding the skills required	Understanding what skills and expertise are required for delivering teleconsultation services to patients in out-of-hours settings	Person(s), tasks	(155) (201)*	• Observations (155) • Interviews (155, 201) • Document analysis (155) • Self-developed questionnaire (155)
Understanding how patients interact with the technology	Understanding how patients physically use handheld devices during video calls	Person(s), tools and technologies	(205)*	• Analysis of consultation recordings (205)

Approaches	Definition	Component(s) of Work System	Studies	Methods/models/frameworks used to apply approach
Understanding the factors influencing use of teleconsultations	Understanding users' perceptions on the variables that influenced their use of teleconsultations, including facilitators and barriers, as well as advantages/benefits and disadvantages/challenges. Due to the ambiguous nature of these terms and them being used interchangeably.	All components	(69, 153, 158, 159, 161, 164-166, 168, 169, 172, 174-179, 185, 187) (184, 186, 188, 191, 194, 195, 200-202, 204, 207-209, 212, 213, 216-219, 222-224)*	• Interviews (69, 153, 158, 161, 164, 166, 168, 169, 172, 176-179, 184, 185, 187, 188, 191, 194, 195, 200, 201, 204, 207, 209, 212, 217, 219, 222) • GP Patient Survey (165, 174) • Focus groups (159, 218, 223) • Modified Structure – Process – Outcomes (SPO) Framework (159) • Self-developed questionnaire (175, 186, 208, 213, 216, 224) • Observations (168) • Document analysis (168) • Modified Technology Acceptance Model (TAM) (213) • Multiple dataset analysis (202) • The socio-technical model (209) • Normalisation Process Theory (NPT) (222)
Evaluating the suitability of teleconsultations	Gauging in what circumstances users' feel teleconsultations are appropriate for use (e.g. type of health problem or patient group)	All components	(159, 161, 163, 164, 168, 172, 174, 179, 185, 187, 189) (197, 200, 201, 204, 211-213, 216, 218, 223)*	• Interviews (161, 163, 164, 168, 172, 174, 179, 185, 187, 200, 201, 204, 211, 212) • Self-developed questionnaire (174, 189, 197, 213, 216) • Innovation adoption theory (164) • Focus groups (159, 218, 223) • Structure – Process – Outcomes (SPO) Framework (159) • Observations (168) • Document analysis (168) • Modified Technology Acceptance Model (TAM) (213)

PROCESSES				
Approaches	**Definition**	**Type(s) of process**	**Studies**	**Methods/models/frameworks used to apply approach**
Understanding the workflow	Understanding the steps involved in teleconsultations	Collaborative	(209)*	• Interviews (209) • Socio-technical model (209)
OUTCOMES				
Approaches	**Definition**	**Type(s) of outcome**	**Studies**	**Methods/models/frameworks used to apply approach**
Analysis of adverse events in patients	Identification of adverse outcomes in patients, as a consequence of using teleconsultations	Patient outcome	(158, 161)	• Document review (e.g. adverse event logbook) (158, 161)
Understanding the implications of use for the organisation	Assessing the influence that using teleconsultations has had on everyday work in the organisation, including primary care provider workload and workflow	Organisational and professional outcome	(69, 160, 161, 165, 167, 176, 181) (208, 216)*	• Observations (160, 167) • Focus groups (160, 167) • Process mapping (181) • Document review (161, 165) • Interviews (160, 176) • Self-developed questionnaire (208, 216)
Understanding the variables influencing perceived level of care received	Assessing patients' perceptions about what variables cause them to feel they have received poor or fair quality of care, whilst using teleconsultations	Patient outcome	(157) (217)*	• Interviews (157) • Self-developed questionnaire (217)
Analysis of implications of teleconsultations for patient enablement	Assessment of the impact that different modes of teleconsultation have on patients' abilities to understand and cope with their health issues after a consultation	Patient outcome	(152)	• Patient Enablement Instrument (PEI) (152)

Approaches	Definition	Component(s) of Work System	Studies	Methods/models/frameworks used to apply approach
Evaluating user satisfaction	Measuring primary care provider and patient satisfaction with aspects of teleconsultations after use	Patient and professional outcomes	(152, 154, 157-159, 161, 177, 178, 182, 189) (191, 197, 198, 207, 209, 214, 217)*	• Interviews (154, 157, 177, 191, 197, 207, 209) • Self-developed questionnaire (158, 178, 182, 189, 198, 214, 217) • Focus groups (159) • Consultation Satisfaction Questionnaire (CSQ) (152) • Medical Interview Satisfaction Scale (152) • Socio-technical model (209) • GP Patient Survey Instrument (161) • Modified Reach, Effectiveness, Adoption, Implementation, Maintenance model (RE-AIM) (182)
Understanding users' experience with technical aspects of the consultation	Understanding the performance of the technology during consultations by asking users about their experience of different aspects of the technology, including any qualities, issues, and its usability	Professional and patient outcomes	(166, 170, 172, 174, 182, 183, 189) (191, 206, 208, 209, 214)*	• Interviews (166, 170, 172, 183, 206, 209) • Focus groups (206) • Self-developed questionnaire (174, 189, 191, 208, 214) • Socio-technical model (209) • Modified Reach, Effectiveness, Adoption, Implementation, Maintenance model (RE-AIM) (182)

**studies included from second search (May 2021-19th April 2023*

4.4.3.1 Design

Design is defined as the development and evaluation of real-time teleconsultation technologies before it is implemented into practice, and the design of tools to measure quality of teleconsultations and stakeholder involvement in the design of the study materials (see Table 4.7). Of the seven studies, all either examined components of the Work System by *assessing user needs* (n=4, 57.1%) or ensuring *user involvement in the evaluation of the technology* (n=3, 42.9%). Only two studies (2.9%) applied an approach to examine the Outcomes of technology design, in the *evaluation of a prototype.* There were no studies examining Processes at the technology Design stage.

4.4.3.2 Implementation

Implementation refers to the process and perceptions of integrating the technology into practice. Eight studies (11.4%) used an approach to assess Implementation of the technology. Seven of these studies (87.5%) examined components of the Work System during Implementation, the majority (n=5, 62.5%) of which focused on *understanding factors that influence implementation.* Only one of the eight studies (12.5%) examined Processes during implementation by conducting an *assessment of implementation requirements* to understand what processes need to be place for successful implementation. There were no studies examining Outcomes of Implementation.

4.4.3.3 Use

Use refers to the use of the technology once it has been integrated into practice, and therefore does not cover prototypes. Sixty-seven studies (95.7%) used an approach to examine Use of the technology. At the Use stage, studies applied approaches mostly focusing on the Work System (n=35, 52.2%) and Outcomes (n=33, 49.3%). The majority of studies focusing on the Work System applied approaches to *understand the factors influencing use of teleconsultations* (n=41, 61.2%) and *evaluating the suitability of teleconsultations* (n=21, 31.3%) for certain patient groups or health concerns. The majority of studies applying an approach to assess Outcomes of use focused on *evaluating user satisfaction* (n=17, 25.4%) and *understanding users' experience with technical aspects of the consultation* (n=12, 17.9%). There were no studies examining Processes at the Use stage.

4.4.4 Associated methods, models, and frameworks for each approach

There were a variety of methods applied for each of the approaches found as displayed in the last column of Table 4.7. The majority of studies conducted interviews (n= 42, 60%) with the remainder using: self-developed questionnaires (n=22, 31.4%); focus groups (n= 10, 14.3%); document analysis (n=6, 8.6%); observations (n= 5, 7.1%); the application of a theory/model/framework (n=8, 11.4%); an existing measure/questionnaire (n=4, 5.7%); data-set analysis (n= 2, 2.9%); Delphi consensus methods (n= 1, 1.4%); analysis of consultation recordings (n= 1, 1.4%); and process mapping (n= 1, 1.4%). Four studies (5.7%) explicitly mentioned using ethnographic methods which included interviews, focus groups, document analysis, and observations (155, 160, 167, 168). The eight different theories/frameworks/models identified were only applied when examining the Use of teleconsultations (none for Design and Implementation).

4.5 Discussion

This systematic scoping review aimed to provide an overview of the approaches and methods that had previously been used to examine the Design, Implementation and Use of teleconsultations in primary care. It is hoped that the results will provide an evidence base illustrating how teleconsultations can be developed for use at this level of healthcare. Overall, there were 70 studies included in this review (conducted between 2010 - 2023), with the majority published from 2019 onwards (n=49, 70%), and (n=44, 62.9%) set in general practice, with less in settings such as community pharmacy (n=3, 4.3%) (Table 4.5). No studies explicitly used the terms ‘human factors’ or ‘ergonomics’ in their main text, and no studies appeared to apply a pure human factors approach, appearing instead to focus more on factors of the human. The majority of studies focused on primary care providers only (n=29, 41.4%) with 21 (30%) focusing on both patients and primary care providers, and 19 (27.1%) on patients only. The results were structured to create an evidence base of approaches that can be applied at each stage of the technology’s life cycle (Design, Implementation, and Use) to examine areas of the SEIPS 2.0 model (Work System, Processes, and Outcomes,) and the methods used for each approach. Only one study adopted an approach to assess the work system, processes, or outcomes, at all three stages of development, and only 10 at two stages (Table 4.6). There were seven studies (10%) using an approach to examine technology design, all of which focused on components of the Work System (i.e. *assessment of user needs* and *user involvement in evaluation of technology* (Table 4.7)). Only two of the seven studies used a further approach to examine Outcomes of Design through *evaluation of a prototype*, however none of the 70 studies focused on Processes during the Design stage.

There were eight studies (11.4%) examining Implementation, seven of which focused on the Work System by applying approaches to *understanding the factors that influence implementation; understanding the organisational context of implementation; and observations to identify operational issues*. Only one study focused on Processes at the Implementation stage, using an approach to conduct an *assessment of implementation requirements,* and no studies examined Outcomes of implementation.

Finally, there were 67 (95.7%) studies examining Use of technology, 35 of which examined components of the Work System and applying seven approaches including: *assessing users' intentions and willingness to use teleconsultations; understanding the influence of organisational factors on use, assessing the safety and quality of teleconsultations; understanding the skills required; understanding the factors influencing use;* and*, evaluating the suitability of teleconsultations; and, understanding how patients interact with the technology.* Only one of the 67 studies examined Processes at the Use stage, applying an approach to *understand the workflow*.

A total of 33 studies focused on Outcomes of Use, applying six approaches which comprised: *analysis of adverse events in patients; understanding the implications of use for the organisation; understanding the variables influencing perceived level of care; analysis of implications for patient enablement; evaluating user satisfaction;* and *understanding users experiences with technical aspects of the consultation (*Table 4.7). The most common method used was interviews, which were used across 16 approaches, and in 43 studies (Table 4.7).

Using the three headings – Design, Implementation, and Use - this discussion reviews these results in the context of the wider evidence base. The strengths and limitations of the review and recommendations for future research will be outlined, and conclusions drawn.

4.5.1 Study characteristics

Overall, there were 70 studies included in this review, the majority of which were published from 2019 onwards (70%) with most being published in 2022 (n=20, 28.6%), possibly due to increased use of teleconsultations during the COVID-19 pandemic (225). The majority of studies were set in general practice (62.9%) with less set in community pharmacy (4.3%), which was expected as a 2016 scoping review of human factors in primary care (not specific to teleconsultations) found 53.4% (n=190/356) of the identified studies were set in general practice (61). Despite evidence suggesting that all end users (providers and patients) should be involved in the development of technology of services (77), the majority of the studies identified in the current review involved primary care providers only (n=29, 41.4%). Nevertheless, it is reassuring that 30% (n=21) of studies did involve both primary care providers and patients. Future researchers and technology developers should strive to involve all end users in the process to make any end product more user-centric (77). Finally, the majority of studies focused on video consultations or video and telephone consultations, with the least amount of studies focusing solely on telephone. Given the time window of the search strategy and the natural progression and advancement of technologies in healthcare (37), it is not surprising to find less of a focus on more traditionally used telephone technology.

Surprisingly, given increasing knowledge of human factors in healthcare in recent years (77, 106, 107), no studies explicitly mentioned human factors or ergonomics, making it difficult for the researcher to ascertain whether a human factors mindset was present in the studies. Moreover, given that the identified approaches focus primarily on understanding the perspectives of the person(s) at the centre of the system, with little focus on the wider system components, no studies could be considered to have adopted a human factors approach.

4.5.2 Approaches applied to the development of teleconsultations

This review provides an evidence base of the approaches that can be applied at all three stages of a technology's development (Design, Implementation and Use) (Table 4.6). Interestingly, only one study applied illustrated approaches that can be taken at all three stages of the teleconsultation technologies life cycle (69). A small number of studies focused on Design (n=7) and Implementation (n=8). It could be suggested that the lack of human factors applications focus on the earlier stages of development relates to the complexity of healthcare systems and ongoing resourcing issues (226). By using the SEIPS 2.0 model, the review illustrated how these approaches can be used to examine components of the Work System, the different types of Processes and the Outcomes at each of the developmental stages (Table 4.7). The original SEIPS model has been used similarly in a scoping review of human factors and ergonomics literature, issues, interventions, and resources in primary health care (61).

4.5.3 Design

The first stage of any teleconsultation technology's lifecycle is Design, involving the development and evaluation of the technology before it is implemented into practice (Table 4.7). Considering the importance of involving users from an early stage to ensure technologies are developed to fit specific contexts and users (128), it is of note that only seven studies (10%) applied an approach at the Design stage (Tables 4.7). In more recent years, this lack of consideration for the Design stage may have been due to the need for rapid development and implementation of teleconsultation technologies in response to the COVID-19 pandemic (227). Nevertheless, the review has identified three approaches which can be used to examine components of the Work System (i.e. *assessment of user needs; user involvement in designing materials used to evaluate technology,* and Outcomes i.e. *evaluation of a prototype).* These approaches were corroborated in the wider evidence base on user-centred design and health technology (228-231). For example, Dopp et al (2020) have provided a glossary of user-centred design strategies, which included the identification of user needs, co-creation with users, and usability testing of prototypes (229). Similarly, Holden et al (2021) outlined key user-centred approaches that are taken to address healthcare quality and safety challenges. These approaches included conducting a user needs assessment to inform iterative development of the design into a prototype, which is evaluated by targeted end users to test the usability of the technology before implementation (230). The results of this review combined with the wider literature suggest that the Design stage is important for the development of teleconsultation technologies, as incorporating a systems perspective ensures that the end product fits future users' needs.

4.5.4 Implementation

The next stage of the lifecycle was Implementation, which was defined as integrating the teleconsultation prototype into practice and understanding the factors influencing integration (Table 4.7). Similar to Design, only eight studies applied an approach at the Implementation stage (Table 4.6 & 4.7), seven to examine components of the Work System and one to examine Processes (Table 4.7). This low number was expected as research has previously shown that the Implementation stage of developing technologies is often not considered (70, 232). Nevertheless, the identified approaches are consistent with other published literature. For example, the current review found *assessing the factors influencing implementation* to be a commonly applied approach, which Xie et al (2015) also identified in their review of the healthcare system redesign process (232). Furthermore, studies in Xie et al's review developed solutions for identified barriers to implementation (232), which is somewhat similar to the approach taken by one study in this review: *observations to identify operational issues* (69).

It is important that healthcare technologies are implemented in a way that fits with existing clinical and patient workflows in each individual context (232). Two approaches identified in this review could facilitate this. For example, *understanding the organisational context of implementation* (Table 4.7) could help to understand how the technology or service is implemented differently across different settings, and how this impacts experience. Secondly, conducting an *assessment of implementation requirements* (Table 4.7) would build an understanding of what processes need to be in place for implementation to be successful in any healthcare context. Overall, the limited number of studies applying an approach at the Implementation stage highlights that more work is needed to explore the implementation of teleconsultations in primary care, and potentially other healthcare technologies, to understand the impact that research in this area has on Outcomes (142).

4.5.5 Use

The final stage of the teleconsultation technologies lifecycle was Use (Table 4.7), which referred to evaluating the technology after implementation to understand suitability for the task and factors influencing use. The literature emphasises the importance of continuously evaluating the Use of technologies once implemented into practice, to highlight any areas of the Design or Implementation requiring amendments in order to satisfy the intended outcomes (83, 233). The majority of studies applied an approach to evaluate Use (Table 4.6), with 35 examining components of the Work System, one focused on Processes, and 33 evaluating Outcomes (Table 4.7). The most commonly used approach to assess components of the Work System was *understanding the factors influencing use* (Table 4.7). Application of this approach extends to the evidence base on digital decision support technologies and the use of teleconsultations in secondary care (234, 235). For example, Cunha et al (2023) conducted a systematic review of the facilitators and barriers to accessing hospital medical specialists via teleconsultations during the COVID-19 pandemic, in an effort to facilitate equitable future use of remote care (235). Applications of another commonly applied approach - involving *assessing users' intentions and willingness to use the technology* (Table 4.7) – are evident in the wider evidence base on health technologies (236-238). For example, Mekonnen et al (2021) investigated mothers' intentions and preferences for using a text message reminder service for a child vaccination service in Ethiopia. Their research included assessing any preferences for the number and frequency of reminders before an appointment, and any language preferences for the text message (237). Moreover, research often assesses the suitability of the technology (239, 240) (e.g. for specific patient groups or health concerns), which is consistent with a commonly used approach identified in this review (i.e. *evaluating the suitability of teleconsultations* (Table 4.7). In a review of the current and future use of telemedicine in surgical clinics during and post COVID-19 pandemic, McMaster et al (2021) aimed to evaluate the suitability of telemedicine, particularly whilst social distancing restrictions were in place (239). Similarly, Mathijssen and colleagues (2018) explored the needs of patients with rheumatoid arthritis and their perspectives on the suitability of e-health technologies to address their specific needs (240). Overall, the review has identified a series of approaches that can be used to evaluate Use of teleconsultations, which are consistent with the wider evidence base.

It is important when introducing new technologies or services into healthcare that two related outcomes are met: system performance (e.g. systems safety, sustainability, effectiveness) and human well-being (e.g. satisfaction, stress, fatigue) (75, 76). It is reassuring that the majority of studies using an approach to examine Outcomes of Use focused on *evaluating user satisfaction*, a key outcome within the discipline.

Application of this approach is reflective of the wider literature on teleconsultations (241-243). For example, Zanaboni et al (2020) explored patient experiences and satisfaction with asynchronous e-consultations as part of general practice services in Norway (243). Moreover, Engeltjes et al (2023) explored patient experiences with obstetric telephone triage systems in two Dutch hospitals, with a key focus on satisfaction (241). Finally, another commonly used approach identified in this review related to *understanding users' experience with technical aspects of the consultation*, including any qualities, issues and its usability. This type of testing has been applied more widely in healthcare, for example, to assess patients experiences with technical functions within a heart failure self-management app (244).

4.5.6 Methods/models/frameworks associated with approaches

Overall, there were a number of methods, models or frameworks associated with the application of approaches at each stage of the technology's life cycle in the literature (Table 4.7). Finding a variety of methods is consistent with previous reviews which stipulate that many methods can be used (142). The most commonly used methods in Carayon et al's (2015) review of mixed methods research in healthcare are similar to those found in this review, including interviews, focus groups, observations, and surveys (245). However, Carayon also found assessment of archival data to be a commonly applied method (245), whereas only six studies in this current review conducted documentary analysis, and two used dataset analysis of archival data (Table 4.7). Some of the studies in the current review used several methods for a single approach, such as Turnbull and colleagues who applied two methods *(observations and focus groups)* whilst *assessing the quality and safety of teleconsultations* (Table 4.7) (167). Moreover, several methods were used across all three stages of the lifecycle, but also to examine more than one area of the system within a single stage. For example, interviews were used at the Design stage to examine components of the Work System *(assessment of user needs)* and Outcomes *(evaluation of a prototype)*. The use of a variety of methods has been recommended in previous reviews in healthcare, as it can result in a better understanding and analysis of the system that the technology will be operating within (142, 245).

Despite no studies in the review having taken a human factors approach - due to lack of focus on the whole system and explicit mention of the discipline - eight (11.4%) studies used a model, theory or framework that could be considered to fit within human factors thinking (Table 4.7 & Section 4.4.4.). This small number of studies (n= 8, 11.4%) is less than the number found in a previous review looking at human factors in the pharmacy dispensing process. Weir et al (2019) found 31% (n=10/32) of the identified studies applied a human factors model, theory or framework (142), suggesting that research focusing on other primary care services may be further in terms of adopting the discipline and applying human factors. The current review identified application of two user acceptance models (Table 4.7) - a modified version of the Technology Acceptance Model (TAM) and the Unified Theory of Acceptance and Use of Technology (UTAUT) – which is reflective of the wider literature on healthcare technology (246, 247). Labarta and colleagues evaluated healthcare professionals' perspectives on the use of an automated hormone injection device for children, focusing on perceived usefulness and ease of use by using a mixture of the TAM and UTAUT (247). Given that the SEIPS model was designed specifically for healthcare contexts (77, 108, 110), it is surprising that no studies in the current review had used any version of the SEIPS model. Nonetheless, one study did use Donabedian's Structure-Process-Outcome (SPO) framework (159), which Carayon et al (2006) combined with the Work System model to create the original SEIPS model (108). Similar to Weir et al's (2019) review of human factors in the pharmacy dispensing process, this review found one study using a version of the Socio-technical systems model (142). Despite the limited number, it is reassuring that some studies have used human factors-related models, theories and frameworks given that the discipline is in its infancy in primary care research in comparison to other industries (123). However, these models may have been used without knowledge of their relation to human factors, and to facilitate approaches which do not consider the whole system.

4.5.7 Strengths and limitations

To the author's knowledge, this is the first review focusing on previously applied approaches to the development of teleconsultations in primary care. Therefore, it is hoped that this review will add to the existing literature on the Design, Implementation, and Use of teleconsultation technologies in primary care in the future.

Whilst searches were limited to real-time teleconsultations in primary care, comparison of the results to the wider literature suggests the findings are somewhat transferable to other healthcare settings and technologies. As the eligibility criteria limited studies to those published in peer reviewed journals, some studies may not have been included (e.g. grey literature; conference proceedings). However, as recognised by Xie et al (2015) this type of limitation is common in reviews on health services, as publication in a peer-reviewed journal indicates a level of scientific quality (232). Finally, the review was limited to studies completed from 2010 onwards, which was based on previous reviews suggesting engagement with teleconsultations was limited before then (62, 63). While some relevant studies may have been published before 2010, this review found that most were published after 2019, suggesting that limiting the timescale was appropriate and expanding the search to before 2010 would not have resulted in the inclusion of a large number of additional studies.

Previous research has suggested that a human factors approach can often be applied despite studies not explicitly stating the terms ‘human factors’ or ‘ergonomics’ anywhere in the main text (142, 143). Therefore, this review set out to include studies that used a human factors approach regardless of whether the terms were explicitly stated in text. The reviewer had to use their judgement when deciding if the study had used a human factors approach, which is in line with previously completed reviews in the area of human factors (142, 143). However, this practice may have resulted in the exclusion of studies which other reviewers would have considered to have taken a human factors approach. To mitigate against this, KP, who has knowledge of the discipline validated 20% of the screening and 100% of data charting.

Finally, a content analysis of the review results using the SEIPS 2.0 model identified where approaches have been used to examine components of the Work System, Processes, and Outcomes at each developmental stage. However, the flexibility of the SEIPS 2.0 model may have resulted in variation in the categorisation of approaches under the three areas of the model. To mitigate this, definitions were taken from the SEIPS 2.0 literature during analysis, and 20% of the analysis was independently coded by KP as part of the validation process.

4.5.8 Future directions and recommendations

The results of this review add to the growing evidence on the development of health technologies. Categorising the identified approaches under the SEIPS 2.0 model may encourage future researchers to take a systems approach, by considering which aspect of the system they are focusing on at each developmental stage.

Out of 70 studies, the review has identified 67 focusing on evaluating the Use of teleconsultations. Further analysis of these studies could provide insight into how the technologies are being used, and the factors influencing their use. This would provide an opportunity to develop an evidence base of the facilitators and barriers to using teleconsultations, which could be used in future research to explore use in healthcare settings where engagement with teleconsultations has been limited.

Finally, it would be beneficial to repeat or update the review in the future to allow for the inclusion of new publications. For example, as the majority of studies were set in general practice and focused on video only or video and telephone consultations, updating the review would allow researchers to observe the progress in the application of human factors across different primary care settings, and any changes to the technologies used.

4.5.9 Conclusion

To the author's knowledge this is the first comprehensive review of the approaches used to develop teleconsultations, with consideration for the adoption of human factors. The results have been used to illustrate how the approaches that can be applied to focus on different areas of a system when designing, implementing, and evaluating the use of teleconsultation technologies. The review identified a variety of approaches and methods, with the majority focusing on evaluating Use of teleconsultations, and less at the Design and Implementation stages. Overall, the approaches and methods found were consistent with the wider evidence base on the development of healthcare technologies. As the digital landscape in healthcare is continually evolving, alongside continued efforts to integrate human factors thinking, it would be beneficial to update this review in the future to observe any progress. Finally, the results provide an opportunity to develop an evidence base of the factors influencing use of teleconsultations, which could be used to explore use/non-use in healthcare settings where engagement with teleconsultations has been limited.

Chapter 5: Factors influencing the use of teleconsultations in primary care: a secondary analysis of literature review results

5.1 Introduction

As highlighted in Chapter 4, teleconsultations provide an alternative to face-to-face diagnosis and treatment, with synchronous technologies (e.g. telephone/video) offering real-time (live) communication between patients and their primary care providers. Although incorporating end users' (e.g. patients and primary care providers) needs, capabilities, and limitations into the design of these technologies may assist in achieving technologies that are a good fit, it is equally as important to involve users once the technology has been implemented, to evaluate use (81, 82). Seeking feedback at this stage provides understanding of how effectively the technology is being used, and whether it is achieving the intended outcomes (82). When assessing the use of healthcare technologies, both patients and healthcare providers should be consulted to provide their individual opinions on and/or experiences of the technology, as these may differ (248). Therefore, providing an opportunity to identify commonalities and differences in the factors that encourage use of the technology, as well as potential end users perceived and/or actual obstacles to use, is essential. Identifying obstacles to use helps to identify aspects of the technology requiring further development. If any healthcare technology is not initially designed to incorporate end-users' abilities, this latter stage of development provides an opportunity for the technology's design to be altered to fit the requirements of varied end users (249).

The review in Chapter 4 (covering the period 2010 to May 2021) set out to identify studies applying approaches at all stages of the teleconsultation technology's life cycle (i.e. Design, Implementation, and Use). The review found that no studies explicitly used a human factors approach. The majority of studies looked solely at Use, with a small number of studies focusing on earlier stages of development. Use – defined as "*the evaluation of teleconsultation technology once it's implemented into practice, to understand its suitability for the task and the factors influencing successful use*" - was assessed in a variety of ways, all of which involved seeking feedback from end users – either patients and primary care providers alone, or from both. As the majority of studies focused on evaluating Use, it would be beneficial to understand in detail how the technologies identified in these studies are being used, and the factors influencing whether people do or do not choose to use them. Further analyses of these studies would provide an evidence base of facilitators and barriers which could be used to assess Use in healthcare settings where engagement with teleconsultations is limited but could be beneficial. The majority of studies included in Chapter 4 collected data from GPs, with only one study focused on pharmacists working in general practice and community pharmacy (250). Despite pharmacists in Inch et al's (2017) study recognising the benefits of using video consultations in practice, engagement with the technology was limited (250). More recently, a study by Weir et al (2022) assessing the impact of the COVID-19 pandemic on pharmacists working in general practice in Scotland reported similar limited use of video consultations both before and during the pandemic (64). Despite increased use of other synchronous methods such as telephone during the pandemic, video consultations remained unused. This was considered surprising due to the availability of the software and pre-pandemic efforts to roll out video consultations in pharmacy. Weir et al (2022) suggested future work should explore patient and pharmacy personnel perceptions and preferences for teleconsultations (64).

This secondary analysis of studies identified in Chapter 4 sought to understand and synthesise the factors influencing the use of teleconsultation technologies in primary care, from both patient and primary care provider perspectives. Analysis of these use examples will help to inform an exploration of the limited use in community and general practice pharmacy, from both a patient and pharmacist perspective.

5.2 Aims and objectives

Aim:

The aim of this chapter was to understand the factors outlined in Chapter 4's review as influencing the use of teleconsultation technologies in primary care, from both a patient and primary care provider perspective, with the following objective:

- To synthesise the factors influencing use of teleconsultation technologies in primary care, through inductive and deductive analyses using the SEIPS 2.0 model.

5.3 Methods

Note that this secondary analysis focuses on studies identified in the first search of the review in Chapter 4 (2010 – May 2021).

As detailed in Chapter 4, a literature review was previously conducted to understand what approaches and methods had been applied to real-time remote consultations in primary care. Studies were considered for inclusion if they applied a human factors approach or method to examine real-time consultation technologies in primary health care between a patient and primary care provider. Studies were excluded if they did not focus on the user (patient or primary care provider) of the technology, or if they focused on professional–professional communications, and on participants from settings other than primary care (See chapter 4 section 4.3.1.- eligibility criteria). The databases Medline, Embase, PsycINFO, Engineering Village and Ergonomics Abstracts were searched for studies published between 2010 and the 19$^{th\ of}$ May 2021, using a search strategy comprising key terms and synonyms under the three areas of: “human factors”, “primary care”, and “teleconsultations” (See Chapter 4: Table 4.1 for a sample of search terms used, and Appendix 2 for full search strategy).

In Chapter 4, Table 4.7 describes how the approaches identified in the literature review were categorised under the stage of technology development (Design, Implementation, Use; see Chapter 4 Table 4.3 for definitions), with reference to whether the approach was applied to examine components of the SEIPS 2.0 **Work System** *(which includes studies which look at the users, the tools and technologies, the tasks, the organisation, the internal and external environment(s), and how they interact together to produce Outcomes)*, **Processes** *(processes which are influenced by components of the Work System, which can be professional, patient, or collaborative depending on who is actively engaged in performing the process)*, or **Outcomes** *(which are states or conditions resulting from the Work System components interacting and the subsequent processes; the Outcomes can be related to the patient, professional, or organisation)*. See Table 4.4 in Chapter 4 for definitions of each area of the SEIPS 2.0 model (110).

All studies identified in Table 4.7 under the development stage “Use” *(the evaluation of teleconsultation technology once it’s implemented into practice, to understand its suitability for the task and the factors influencing successful use, see Chapter 4, Table 4.3 for definition)* and defined under the SEIPS 2.0 areas of the “Work System” and “Outcomes” were included in this study. This study comprised a secondary analysis of the 34 studies identified from the literature review meeting these criteria. The following methods were applied:

5.3.1 Data extraction

A data extraction table was developed using Microsoft Excel© and a random sample of 20% of studies were independently extracted by KP to ensure consistency. If a good (80-89%) or excellent (90%+) percentage of agreement was reached, extraction continued. However, if the agreement level was below 80%, a further 10% of studies were screened, and ED would be consulted.

For each of the 34 studies the results section was read, and any data identified as a factor influencing primary care providers' or patients' use of teleconsultations was extracted. This included both positive *(forces in, on, or around a person to encourage them to use teleconsultations)* and negative factors *(perceived obstacles to using teleconsultations).*

5.3.2 Synthesis methods

5.3.2.1 Thematic analysis

The individual factors identified from the results sections firstly underwent an inductive thematic analysis (251) to identify and understand their commonalities and differences, and facilitate grouping of the factors influencing use into themes and sub-themes. The six thematic analysis steps outlined by Braun and Clarke (2006) (251) were followed and are detailed in Table 5.1.

Table 5.1: Stages of thematic analysis (as per Braun and Clarke (251))

Stage	Description
Stage 1 and 2: Familiarising with the data and generating initial codes	Results sections of eligible studies were read, and any data identified as a factor influencing primary care providers' or patients' use of teleconsultations was extracted into Microsoft Excel©. This included both positive *(forces in, on, or around a person to encourage them to use teleconsultations)* and negative factors *(perceived obstacles to using teleconsultations).* To become familiar with the data, AF made notes of early impressions to facilitate generation of initial codes. Any connected factors with both positive and negative connotations were combined (e.g. the factors "improved access" and "reduced access" were combined to "access") into one. On completion of this stage, ED reviewed initial coding and met with AF to discuss and check agreement.
Stage 3: Searching for themes	The factors identified from the studies were reviewed and similar ones were grouped into wider sub-themes using Microsoft Excel©. Coding was done inductively and involved assigning a label which accurately represented the factors grouped together. Both AF and ED independently grouped the factors into wider sub-themes before meeting to discuss any differences and reach consensus. Once in agreement, AF and ED worked together to inductively categorise the sub-themes under themes.
Stage 4: Reviewing themes	A framework of the themes, sub-themes and factors was given to KP for validation. KP coded 100% of the factors under the relevant sub-themes before meeting with AF and ED to discuss any differences and reach a consensus.
Stage 5: Defining and naming themes	Results extracted for each of the factors influencing use were read to inform the development of definitions for each one, and the sub-themes they were categorised under. The themes were defined with reference to the sub-themes within. ED and KP checked 100% of definitions for face validity.
Stage 6: Producing the report	The factors influencing patients' and primary care providers' use of teleconsultations were displayed in tables, one for each of the themes. References in columns were used to illustrate whether the factor was reported by patients, primary care providers, or both. A breakdown of how many factors fit within each theme and sub-theme were discussed. The most commonly cited factors within each theme were outlined and a synthesis of factors reported more than once by patients or primary care providers was written, highlighting commonalities and differences between patients and primary care providers where possible. Post-validation review of the report by the supervisory team resulted in minor changes to: (1) the wording of some factors, and (2) one factor was moved (for primary care providers' workload was initially a personal resource, however this was changed to an organisational resource).

5.3.2.2 *Content analysis*

The output from the thematic analysis – themes, sub-themes, and the factors influencing use of teleconsultations - underwent a deductive content analysis (150).

This type of analysis is useful when there is an existing framework which can be used – in this case, the Work System area of the SEIPS 2.0 model was used to outline where the influential factors lie in the current Work System (110). The Work System (See Table 4.4, Chapter 4) comprises six components: *person(s); tasks, tools and technologies, organisation, internal environment, and external environment*, which interact together to influence Processes to produce Outcomes. Definitions of the six Work System components can be seen in Table 5.2. Factors influencing use were mapped onto the Work System component(s) most closely involved, and due to the interrelatedness of the Work System components, the factors could be mapped onto more than one component. To ensure consistency, KP and ED independently coded 100% before meeting with AF to discuss any disagreements. Coding was conducted separately for patients and primary care providers using the definitions shown in Table 5.2 (110).

Table 5.2: Definitions of Work System components used for coding factors influencing use, adapted from SEIPS 2.0 (110)

Work System component	Definitions used for coding patient and primary care provider factors
Person(s)	The characteristics of the individual at the centre of the system. This can be a single individual (e.g. patient) or a group (e.g. team, organisational unit). Individual characteristics include physical characteristics: strength, weight, height; cognitive characteristics: expertise, experience; Psychosocial characteristics: motivation, needs, social status.
Tools and Technologies	The objects that people use to do work or that assist people in doing work. This can include IT as well as physical tools and equipment.
Tasks	Description of characteristics of tasks. Undertaken by a person and may vary in difficulty, complexity, ambiguity, sequence or variety.
Organisation	The structures external to a person (but often in place by people) that organise time, space, resources, and activity. **Patients:** For patients this includes factors like: communication infrastructure; living arrangements; family roles and responsibilities; work and life schedules; interpersonal relationships; culture; social norms and rules; financial and health-related resources **Primary care providers:** Within institutions, organisation factors can be characteristics of work schedules and assignments; management and incentive systems; organisational culture; training; policies; resource availability; team work; communication and work relationships.
Internal Environment	Refers to the physical environment and includes lighting; noise; vibration; temperature; physical layout; available space; and air quality.
External Environment	Refers to macro-level societal, economic, ecological and policy factors outside an organisation. Factors such as the impact of budget and cost on quality of tools/technologies used; societal expectations for patient and family preferences; and local infrastructure.

5.4 Results

5.4.1 Study characteristics

The aim of this study was to understand the factors influencing the use of teleconsultation technologies in primary care, from both a patient and primary care provider perspective. The 34 studies identified in the first search of Chapter 4's review were included in the analysis (69, 151-156, 158-160, 162-170, 172, 174-179, 181-183, 185, 187, 189, 252, 253). See table 5.3 for the characteristics of the included studies.

Table 5.3: Characteristics of studies included in the analysis (n=34)

Study	Setting	Type of participants
Atherton et al (168)	General practice	Primary care providers and patients
Ball et al (169)	General practice	Patients
Campbell et al (161)	General practice	GP, nurses, practice managers, administration staff and patients
De Guzman et al (185)	General practice	GPs
Donaghy et al (172)	General practice	Patients, GP, nurses
Hanna et al (153)	General practice	Practice managers
Huygens et al (162)	General practice	Patients
Hammersley et al (174)	General practice	Patients, nurses, GPs
Imlach et al (178)	General practice	Patients
Javanparast et al (187)	General practice	Patients
Jiwa et al (156)	General practice	GPs
Johnsen et al (189)	General practice	GPs
Leng et al (164)	General practice	Patients
Liaw et al (175)	General practice	Patients
Mueller et al (179)	General practice	Patients
Murdoch et al (163)	General practice	Nurses
McKinstry et al (152)	General practice	GPs, patients
Newbould et al (165)	General practice	Patients
Randhawa et al (176)	General practice	GPs
Rygg et al (170)	General practice	Patients and nurses
Salisbury et al (181)	General practice	*No participants involved, but focused on GPs and patients*
Powell et al (166)	Primary care clinic at an academic medical centre	Patients
Sinha et al (182)	Primary care clinic at an academic medical centre	Patients

Study	Setting	Type of participants
Srinivasan et al (183)	Primary care clinic at an academic medical centre	Primary care provider, medical assistant/nurse, technologist/administrator
Turnbull et al (167)	24/7 telephone health care	Call handlers, managers, and nurses
Turnbull et al (155)	24/7 telephone health care	Call handlers, managers, clinicians
Turnbull et al (160)	24/7 telephone health care	Call handlers, managers, clinicians
LeVela et al (154)	Primary care clinic	Patients
LaVela et al (157)	Primary care clinic	Patients
Gordon et al (177)	Community based outpatient clinics and primary care clinics	Patients
Sperber et al (159)	Primary care clinic and community outpatient clinic	Patients, primary care providers, and staff
Salisbury et al (158)	Community physiotherapy	Physiotherapists, physiotherapy managers, GPs and patients
Ernesater et al (151)	24/7 telephone health care	Nurses
Inch et al (69)	Community pharmacy	Patients, pharmacists, GPs, nurses, and practice managers

The majority of studies were set in general practice (61.8%, n= 21), with the remainder set in primary care clinics (20.6%, n= 7); community based outpatient clinics (5.9%, n= 2); 24/7 telephone health care (11.8%, n= 4) (151, 155, 160, 167); community pharmacy (2.9%, n= 1); and community physiotherapy (2.9%, n=1).

Nine (26.5%) of the studies focused on both patients and primary care providers in assessing use of teleconsultations, with the remaining studies focusing on patients only (35.3%, n= 12) and primary care providers only (35.3%. n= 12). One study developed a process map of the patient pathway for contacting a GP via telephone or video, without involvement of participants.

The type of primary care providers in the studies varied, with the majority of studies involving healthcare professionals (58.8%, n= 20) including GPs; nurses; physiotherapists; pharmacists; call centre clinicians; and undefined primary care providers. Eight (23.5%) focused on non-clinical staff including managers; undefined staff; and call handlers.

5.4.2 Thematic analysis

Three levels of coding were used for the thematic analysis, as shown in Figure 5.1.

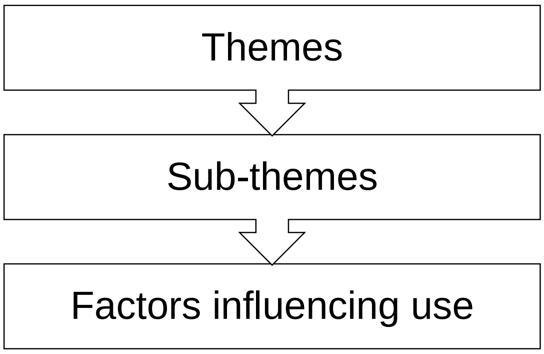


Figure 5.1: Levels of coding for thematic analysis

There were three overarching themes for primary care providers and patients, with a series of sub-themes within:

1. **Personal:** includes personal experiences and views; personal assets (including motivations) or resources.
2. **Infrastructural:** includes IT, software, and the factors that underpin systems
3. **Organisational:** includes the health system, primary care providers, and how care is organised

Overall, primary care providers identified 39 factors influencing the use of teleconsultations, and patients identified 36.

5.4.2.1 Personal (theme)

Table 5.4 below illustrates the sub-themes within the personal theme, and the personal factors influencing patient and primary care providers' use of teleconsultations, as well as the component(s) of the Work System aligned to each of these factors.

For primary care providers, 20/39 (51.3%) of the factors were categorised under the personal theme, under five sub-themes:

- personal resources (n=3, 7.8%)
- quality of consultation/experience (n=4, 10.3%)
- technology and data (n=5, 12.8%)
- need for call (n=3, 7.8%)
- patient characteristics (n=5, 12.8%).

The most commonly cited personal factor reported by primary care providers was related to the reason for contact (e.g. patients health problem).

For patients, 28/36 (77.8%) of the factors were categorised under the personal theme, under six sub-themes:

- personal resources (n=6,16.7%)
- competing priorities (n=1, 2.7%)
- quality of consultation/experience (n=10, 27.8%)
- technology and data (n=5, 13.9%)
- need for call (n=2, 5.6%)
- patient characteristics (n=4, 11.1%).

The most commonly cited personal factors reported by patients were: reason for contact (e.g. health problem), the importance of and implications for the primary care provider-patient relationship, and the convenience of not having to travel to face-to-face appointments.

Table 5.4: Personal theme, sub-themes and factors influencing patients' and primary care providers' use of teleconsultations, and the components of the SEIPS Work System most closely linked to each factor

Personal theme - includes personal experiences and views; personal assets (including motivations) or resources.				
Sub-themes	**Factors influencing use**	**Reported by patients**	**Reported by primary care providers**	**Associated Work System components**
Personal Resources *- concepts around personal assets, possessions, properties, or psychological motivations*	Privacy of available space for consulting	(69, 166, 169, 172, 178)		Internal Environment
	Convenience – travelling to appointments	(164, 166, 169, 172, 174, 175, 177-179)	(69)	Person(s); Tasks; External Environment
	Convenience - time spent using remote compared to other modes of communication	(159, 164, 172, 175, 179)		Person(s); Tasks
	Convenience - time spent consulting and travelling to patients' homes		(168, 176)	Person(s); Tasks
	Convenience – general implications for patient's daily routine	(164, 166, 169, 172, 174, 175, 185)	(168, 172)	Person(s); Tasks
	Cost	(164, 166, 178, 187)		Person(s)
	Perceived need for change	(164)		Person(s)
Competing priorities *–what matters to the patient or what is important to them, which may impact their decisions and choices day to day.*	Illness and infection	(175, 178, 179)		Person(s)
Quality of consult/experience *- how positive or negative the consultation was, whether the expected or intended outcomes were met, if the*	Visual cues on video	(170, 172, 177)	(69, 170, 172, 185)	Person(s); Tasks, Tools/tech
	Personalisation and focus of consultation	(159, 164, 166, 169, 172, 178, 179)	(172)	Person(s); Tools/tech
	Length of consultation	(169, 178)		Tasks
	Confidentiality of conversation	(161, 177)	(176)	Person(s); Tasks
	Care preferences	(164)		Person(s); Tools/tech

Personal theme - includes personal experiences and views; personal assets (including motivations) or resources.				
Sub-themes	**Factors influencing use**	**Reported by patients**	**Reported by primary care providers**	**Associated Work System components**
consultation was lacking or exceeding in any way, and positive or negative aspects of the interaction/conversation between the primary care provider and patient	Primary care provider-patient relationship	(159, 161, 169, 172, 177, 178)	(159, 172, 176, 185, 189)	Person(s)
	Implications for care received	(152, 157, 174, 177, 178, 182)		Person(s); Tasks
	Stress in relation to mode of consultation	(172, 178)		Person(s)
	Confidence in ability to communicate problems remotely	(169, 177)		Person(s)
	Primary care provider attitude	(152, 154)		Person(s)
Technology and data *- personal abilities, experience, and opinions on using technology, and having access to technology.*	IT literacy	(164, 178, 187)	(153, 176)	Person(s); Tools/tech
	Stress in relation to the 'virtual' waiting room	(172)	(172)	Person(s); Tools/tech; Internal environment
	Privacy of consultation	(175)		Person(s); Tools/tech
	Perceived patient perceptions of the technology		(69)	Person(s); Tools/tech
	Availability and quality of the technology for patients		(176)	Tools/tech
	Technology preferences	(170)		Person(s); Tools/tech
	Data security	(179)	(176)	Tools/tech
Need for call *- patients' awareness of the service and their motivations for seeking consultations*	Patients' awareness of service	(162)	(69, 168)	Person(s); Organisation
	Demand for service		(153, 168)	Person(s)
	Reason for contact	(154, 157, 159, 164, 168, 172, 174, 179, 187)	(156, 159, 168, 172, 185, 189)	Person(s); Tasks
	Patients age	(164, 168)	(168)	Person(s); Tasks

Personal theme - includes personal experiences and views; personal assets (including motivations) or resources.				
Sub-themes	**Factors influencing use**	**Reported by patients**	**Reported by primary care providers**	**Associated Work System components**
Patient characteristics **-** *individual factors unique to each patient (e.g. age, cognitive abilities, and current medications)*	Ethnic group		(168)	Person(s); Tasks
	Socioeconomic status		(168)	Person(s); Tasks
	Patients verbal and cognitive abilities	(168)	(159, 168)	Person(s); Tasks
	Complexity of medications currently taking	(168)	(168)	Person(s); Tasks
	Ability to understand advice	(159)		Person(s); Tasks

Theme - Personal:

includes personal experiences and views; personal assets (including motivations) or resources.

Personal sub theme – personal resources:

concepts around personal assets, possessions, properties, or psychological motivations

Factor: Privacy of available space for consulting

For patients, a commonly reported personal factor influencing their use of teleconsultations was the privacy of the space they had for having the teleconsultation. For example, in one study, although patients reported the benefit of not having to leave work for their appointment, it resulted in a struggle for those without private offices as they had to try and find a space that co-workers could not overhear. For one patient, the inability to find a private room to take the consultation impaired their ability to have a full examination (166). Similarly, in other studies, patients reported concerns about confidentiality of the consultation when they had to receive the call at a time or in a location where their conversation could be overhead, whether at home with family members present or in a work or public setting (169, 178). One patient reported receiving a teleconsultation call whilst in the library which left them feeling uncomfortable about discussing their health problem (172).

Factor: Convenience

Both patients and primary care providers reported on the convenience of teleconsultations influencing whether they use them or not. This included convenience in relation to travelling, time, and disruption to patients' day to day routines. The benefit of not having to travel to appointments was a particular benefit to those for whom travelling was difficult, including a mother with a disabled child, a carer whose husband was disabled with chronic conditions and mobility issues, those dependent on limited public transport services (169) and those living rurally (69, 185). Related to travel was the saving on costs and time spent travelling to the in-person appointments (164, 172, 179). In one study, patients indicated that they saved 2-3 hours or more by using teleconsultations instead of face-to-face appointments (175). Similar time saving benefits were reported by primary care providers as teleconsultations removed the need for them to travel to patients' homes for home visits. However, primary care providers in the same study reported concerns that teleconsultations could also waste time if they end up having to bring the patient into practice after a teleconsultation (176). Both patients and primary care providers agreed on the convenience of teleconsultations for patients' day-to-day routines. For example, three studies highlight the benefit of patients not having to take time off work to attend the consultation in person (166, 172, 174). Despite this convenience for some patients (e.g. those at home during the day, retired, or who work flexibly), other patients felt teleconsultations were inconvenient as they had to wait around at home to ensure they didn't receive the call at an inconvenient time and/or place (169).

Factor: Cost

In one study set in general practice in New Zealand (178), patients who usually paid to see their doctor had mixed views on whether they were willing to pay the same fee regardless of whether the appointment was face-to-face or not. Those who were willing to pay the same fee would do so as long as their health needs were met. Similar reservations were around whether short consultations should be charged at the same rate as lengthy ones, and whether a teleconsultation for an issue that then requires an in-person visit means they will be charged for more than one. However, cost savings (e.g. fuel, time, absenteeism, parking costs) or no additional costs associated with teleconsultations were favoured in some studies (164, 166).

Personal sub-theme – Competing priorities:

what matters to the patient or what is important to them, which may impact their decisions and choices day to day.

Factor: Illness and infection

In three studies, patients chose teleconsultations to remove the risk of spreading their illness to others, or being exposed to infection (e.g. COVID-19) in the waiting room (175, 178, 179). In one study, patients reported sending photos, emailing blood pressure readings from home, and moving between telephone consultations and video consultations for visual assessment as 'workarounds' during the COVID-19 pandemic to reduce the risk (178).

Personal sub-theme – Quality of consultation/experience:

how positive or negative the consultation was, whether the expected or intended outcomes were met, if the consultation was lacking or exceeding in any way, and positive or negative aspects of the interaction/conversation between the primary care provider and patient.

Factor: Visual cues

A commonly reported factor influencing patient and primary care providers use of teleconsultations was in relation to the benefits of visual cues when using video consultations. Both patients and primary care providers highlighted the benefit of being able to see non-verbal cues (170, 172, 177). For example, a patient with hearing loss reported that the non-verbal cues helped them understand their cancer nurse during the consultation (170). Primary care providers believed that video consultations provided a higher quality of care than telephone as it allows for visual assessment of patients (185) and provides an opportunity to demonstrate how to use equipment (e.g. oral syringes), as well as provide feedback on patient technique (69). Primary care providers felt video consultations could reduce the risk of miscommunication that can occur during telephone consultations, making it easier for them to detect the level of patient understanding (172).

Factor: Personalisation, focus and length of consultation

There were mixed feelings about using teleconsultations in relation to how it impacted how personal and focused the consultation was, and how much time was spent on the consultation. Some patients felt that teleconsultations were less rushed, more personal and focused, and provided more space to talk freely than in face-to-face appointments (178, 179). In one study this was linked to the web-based application used for booking 10-minute appointments. Patients felt the scope of the appointment was clearer and more narrowed as the remaining time was displayed on screen (179). However, for others the consultation was impersonal, rushed, and abrupt (164, 166, 169, 178). In one study focusing on telephone consultations, the impersonal experience was linked to the lack of social cues (169). Primary care providers noted in one study that telephone visits work best for more focused health problems (159). Both patients and primary care providers agreed that video consultations were beneficially more formal and focused than telephone due to the visual component (172).

Factor: Confidentiality of consultation

Patients and primary care providers both highlighted concerns around other people overhearing the conversation during a teleconsultation (176, 177, 252). For example, patients were hesitant to share personal details over video consultations with their doctor as there was also video technology personnel present in the doctor's room (177). Although primary care providers liked that using video consultations meant they could identify that they were talking to the correct person, they expressed concerns around patient confidentiality due to not being able to see the whole room (176).

Factor: Primary care provider-patient relationship

Both patients and primary care providers spoke of the benefits of having an existing primary care provider-patient relationship prior to using teleconsultations (172). Patients felt having this existing relationship made the consultation easier, as they felt more comfortable discussing their health problems remotely (177). There was a shared sense that teleconsultations provided an opportunity to improve and maintain an existing relationship, through increased patient care and greater continuity of care (159). However, there were shared concerns and reported experiences regarding difficulties in establishing and maintaining a relationship (169, 176). Patients in one study linked this to having less small talk over teleconsultation in comparison to face-to-face consultations (177). When comparing video and telephone consultations, GPs highlighted that video could help foster more patient rapport in comparison to telephone, due to the visual experience and the importance of visual cues, as previously mentioned (185).

Factor: Implications for care received

Patients reported on the implications that teleconsultations had on the level of care they received. In one study where patients were asked to rate how "good" face-to-face, video, and telephone consultations were, video and telephone consultations were considered "very good" less frequently than face-to-face appointments for items such as time for discussion, decision making, communication and sincerity of care.
including (174). Similar items were outlined as important by studies focusing on patients level of satisfaction with their care (177, 178, 253). In one study, the lack of attention over video consultations was linked to a lack of eye contact due to the primary care provider gazing back and forth to their computer screen. As a result, these patients felt 'unheard' and 'neglected' (177). Conversely, some studies reported

high rates of patient satisfaction with teleconsultations vs face-to-face, and similarly high rates for the level of care they received (152, 182).

Factor: Stress in relation to mode of consultation

Patients' preferences for using teleconsultations over face-to-face, and video over telephone consultations were linked to the stress they experienced. One study, found in-person appointments more stressful due to, for example, patients experiencing Agoraphobia, whereas in another study it was found setting up video consultations was more stressful than having a telephone call (178).

Factor: Confidence in ability to communicate problems remotely

A deciding factor when choosing to use teleconsultations vs face-to-face was whether patients felt they could explain their health problem better face-to-face versus over video or telephone (178). In another study, patients reported difficulties describing their symptoms to the GP over the telephone (169).

Factor: Primary care providers' attitude

Patients' level of satisfaction was linked to the attitude of the primary care provider during the telephone consultation. In one study, patients had equally high rates of satisfaction when using telephone versus face-to-face consultations (152). In another study, the proportion of patients who were satisfied with their telephone consultation was greater when the primary care provider was perceived to be courteous versus not courteous (154).

Personal sub-theme – Technology and data:

personal abilities, experience, and opinions on using technology, and having access to technology.

Factor: IT literacy

Both patients and primary care providers agreed on the importance of having the skills and abilities to use teleconsultation technology. Not having the skills or training for using teleconsultations were reported by GPs as barriers (153). Patients and GPs felt that video consultations and teleconsultation services would be most beneficial for technologically-abled people (164) (176). In a study set in general practice, patients' willingness to use video consultations to speak to their GP was associated with the patient’s level of computer proficiency (164). Moreover, older patients with lower digital literacy felt telephone consultations were more convenient than video consultations (187). Patients raised concerns about the potential for some patients to be excluded from accessing healthcare via teleconsultations due to lack of support for using the technology, resources, or infrastructure, suggesting more support could be provided by the health service to prepare patients, but highlighted that inadequate resources and infrastructure pointed to deeper societal inequities (178).

Personal sub-theme – Need for call:

patients’ awareness of the service and their motivations for seeking consultations

Factor: Patients’ awareness of service and demand for service

Primary care providers in three studies highlighted perceived lack of patient demand as a barrier to using teleconsultations (69, 153, 168) and suggested that lack of patient awareness was the reason for low levels of usage (69). In support of this, a further study found that half of participants did not know the service was available (162). In another study, primary care providers believed that patients preferred to see the doctor in person (168).

Factor: Reason for contact

The results illustrate the commonalities and differences in what patients and their primary care providers deem teleconsultations to be suitable for, in terms of the reason for contact. They agreed on the suitability of teleconsultation for: health problems not requiring physical examination (159, 164); the provision of results (if not to receive bad news) (172, 179, 185); follow-up appointments instead of new problems (168, 172, 189); remote monitoring (159); and, medication review (172). Primary care providers reported additional scenarios suited to the use of teleconsultations, including: some skin/throat issues; domestic abuse care; and repeat prescriptions (185). On the other hand, situations in which teleconsultations were not deemed suitable were: acute chest or stomach pain; the prescription of antibiotics or new medications (189); when patients were older or experienced confusion; and for complex polypharmacy patients (168). Interestingly, opinions on the suitability of teleconsultations for mental health problems differed. Although primary care providers and some patients felt they were suitable for this purpose (159, 164, 172, 187), other patients expressed concerns in relation to difficulties in speaking about mental health when not in-person (187).

Personal sub-theme – Patient characteristics:
individual factors unique to each patient (e.g. age, cognitive abilities, and current medications)

Factor: Patients age and, verbal and cognitive abilities
Both patients and primary care providers agreed that the suitability of teleconsultations depended on the age and abilities of the patient, and felt that it would be unsuitable for older patients, or those with verbal or cognitive difficulties including confusion (159, 168). Similarly in another study, patients under the age of 60 years were more than twice as likely to be willing to use video consultations with their GP than those years 60 years or over (164).

5.4.2.2 Infrastructural (theme)

For both primary care providers and patients one factor was related to the infrastructural theme under the sub-theme of technology and data. The performance of the technology was reported by patients in five studies (13.8%) and primary care providers in six studies (15.4%).

Table 5.5 below illustrates the infrastructural factor influencing patient and primary care providers' use of teleconsultations within the technology and data sub-theme, and the components of the Work System relevant to the factor.

Table 5.5: Infrastructural theme, sub-theme, and factor influencing patients' and primary care providers' use of teleconsultations, and the components of the SEIPS Work System most closely linked

Infrastructural theme - includes IT, software, and the factors that underpin systems				
Sub-themes	**Factors influencing use**	**Reported by patients**	**Reported by primary care providers**	**Associated Work System components**
Technology and data *- the performance of the IT, technology, and equipment, and opinions and concerns around security of patient data*	Performance of the technology	(166, 170, 172, 174, 178)	(153, 170, 172, 174, 176, 183)	Tools/tech

Theme - Infrastructural

includes IT and the factors that underpin systems

Infrastructural sub-theme – Technology and data:

the performance of the IT, technology, and equipment, and opinions and concerns around security of patient data

Factor: Performance of the technology

For some, the technology was easy to use (166), with patients reporting that consultations on a tablet versus a telephone were experienced as if talking to the nurse face-to-face (170). However, both patients and primary care providers reported concerns around or issues with the performance of the technology including: connectivity, image and sound quality, and the logging-in process (166, 170, 174, 176, 178). Problems with video consultation technology could disrupt the consultation process resulting in a switch in consultation mode from video to telephone (172, 174). Where efforts were made to minimise issues with broadband connectivity - by providing additional internet boosters - issues still occurred and the additional hardware increased the complexity process for primary care providers (174). Continuing issues with connectivity were in part linked to patients' own broadband being insufficient for the health service's video consultation software (174).

5.4.2.3 Organisational (theme)

For primary care providers, 18/39 (46.2%) factors were organisational in nature and were categorised under four sub-themes of: organisational resources (23.1%); learning opportunities (2.6%); quality of the consultation/experience (7.7%); and workplace characteristics (12.8%). The most commonly cited organisational factor reported by primary care providers was in relation to workload. This included the redistribution of workload between staff when using teleconsultations and the impact on the time spent consulting.

For patients, seven 7/36 (19.4%) of the influential factors fell within the organisational theme, under two sub-themes of: organisational resources (5.6%) and quality of the consultation/experience (13.9%). The most commonly cited organisational factor reported by patients was in relation to appointment availability, as studies mentioned both the positive and negative implications of using teleconsultations on patients' access to appointments.

Table 5.6 illustrates the organisational factors influencing patient and primary care providers' use of teleconsultations within each sub-theme, and the components of the Work System relevant to each of the factors.

Table 5.6: Organisational theme, sub-themes, and factors influencing patients' and primary care providers' use of teleconsultations, and the components of the SEIPS Work System most closely linked to each factor

Organisational theme - includes the health system, primary care providers, and how care is organised				
Sub-themes	**Factors influencing use**	**Reported by patients**	**Reported by primary care providers**	**Associated Work System components**
Organisational resources *- assets that underpin the organisation's abilities to deliver teleconsultations*	Access	(158, 159, 161, 164, 169, 175, 177-179, 187)	(159, 161, 168)	Person(s); Organisation
	Business and financial drivers		(168, 185)	Organisation
	Financial support		(168, 185)	External environment
	Local practice characteristics		(153)	Person(s)
	Infrastructure availability		(185)	Tools/tech; Organisation
	Cost		(185)	Tools/tech; Organisation
	Management of work schedules		(161, 168)	Person(s); Organisation
	Staffing available		(163)	Organisation
	Implications for workload	(179)	(69, 159-161, 165, 168, 176)	Person(s); Organisation
Learning opportunities *The opportunity provided by delivering remote consultations to gain new skills and responsibilities*	Professional development		(161)	Person(s); Organisation
Quality of consult/experience *- how positive or negative the consultation was, whether the expected or intended outcomes were met, if the consultation was lacking or exceeding in anyway, and positive or*	Waiting times	(152, 164, 166, 169, 174, 177, 179)		Person(s); Tasks; Organisation
	Continuity of care	(159, 169)		Person(s); Organisation
	Primary care providers call handling skills	(154, 157)	(155)	Person(s); Tasks, Organisation
	Examination	(177-179)	(176)	Tasks

Organisational theme - includes the health system, primary care providers, and how care is organised				
Sub-themes	**Factors influencing use**	**Reported by patients**	**Reported by primary care providers**	**Associated Work System components**
negative aspects of the interaction/conversation between primary care providers *and patients*	Primary care providers ability to diagnose remotely	(164, 169, 177-179)		Person(s); Tasks
	Errors in relation to the consultation process		(151)	Person(s); Tasks, Tools/tech; Organisation
Workplace characteristics **–** *aspects of the* primary care providers *workplace and roles/responsibilities that influence their decision to, and ability to, deliver teleconsultation services*	Peer support		(155, 161)	Person(s); Organisation
	Daily tasks not suitable for virtual consultations		(153)	Tasks
	Implications for job role/responsibilities		(163, 167)	Person(s); Tasks; Organisation
	Communication between staff		(161)	Person(s); Organisation
	Culture of resistance		(161)	Person(s); Organisation

Theme - Organisational:

includes the health system, primary care providers, and how care is organised

Organisational sub-theme - Organisational resources:

assets that underpin the organisation's abilities to deliver teleconsultations

Factor: Access

Patients and primary care providers agreed that teleconsultations provided patients with better and faster access to appointments in comparison to face-to-face (158, 164, 168, 169, 175, 177-179, 187). However it is important to note that this was not the case for all, as some patients experienced difficulties in accessing care via teleconsultations (158, 169), which they linked to the use of a telephone booking system instead of an online one (178). Although there was a sense that the introduction of telephone triage in general practice resulted in a fairer system, making appointments available for those who needed them most unlike the previous first come first served appointments system (169, 252), some patients felt telephone triage was a barrier to getting a face-to-face appointment (169).

Factor: Business and financial drivers *and* *financial support*

The availability of financial support encouraged the use of teleconsultations, with the introduction of a COVID-19 telehealth reimbursement scheme being recognised as a main driver in one study (168, 185). Nevertheless, GPs have expressed concerns about the discontinuation of funding, as ongoing financial support would be required for sustainable provision of teleconsultation services (185). On the other hand, business pressures (e.g. time pressures or pressure to use the cheapest mode of communication) influenced whether primary care providers chose to use teleconsultations vs face-to-face appointments (185).

Factor: Implications for workload and management of work schedules

Although some primary care providers felt that using teleconsultations reduced their workload (165) for the majority, using teleconsultations caused an increase in overall workload, or caused concerns about potential increases (69, 160, 165). Reasons for this were related to: having to bring the patient into practice after a teleconsultation (168, 176); and a lack of extra staffing capacity to accommodate the new consultation system (159, 252). Patients shared the concern that providing teleconsultations would increase their primary care providers' workload (179). In a study focusing on video consultations in community pharmacy, primary care providers concerns around increases in workload related to a potentially high number of calls and perceived patient expectation – as they felt patients would expect their call to be answered instantly, whereas if attending the pharmacy in person they could visualise their place in the queue (69). For some GPs, their main motivation for introducing teleconsultations was to help better manage their workload and schedules (168). As a result of using teleconsultations, primary care providers in a telephone triage study reported having more flexibility and control over their workload and schedules (252).

Organisational sub-theme – Quality of consultation/experience:
How positive or negative the consultation was, whether the expected or intended outcomes were met, if the consultation was lacking or exceeding in anyway, and positive or negative aspects of the interaction/conversation between primary care providers *and patients.*

Factor: Waiting times
Patients reported the benefit of not having to wait as long for an appointment when using teleconsultations vs face-to-face (164, 166, 174, 179), and spending less time in the waiting room (177). However, others gave examples of long wait times to get through on the telephone and reported having to abandon calls while on hold (169, 179).

Factor: Continuity of care
Patients had conflicting opinions on the implications of using teleconsultations on their ability to see their preferred primary care provider. Some patients felt using teleconsultations made it easier to speak to their preferred GP than with face-to-face appointments and enabled more frequent contact (159, 169). In one study this was linked to the way in which calls were allocated, as patients were able to specify which GP they wished to speak to. However, others felt it was harder to see their preferred GP, and experienced a trade-off between being able to see their preferred GP or getting an appointment quickly (169).

Factor: Primary care providers' call handling skills

Primary care providers reported on a series of important skills required for call-handlers to deliver 24/7 telephone care such as: effective call control; skilled questioning; active listening; skilled provision of information and advice; effective communication; and skilled use of clinical decision support technology (155). Differences in patients' perceptions of, and satisfaction with, the care they received were linked to certain call handling skills, including: calls being answered in a timely manner and whether they experienced transfers whilst on the telephone call (154, 253).

Factor: Examination

Both primary care providers and patients expressed concerns about how the geographic distance between them could affect the quality of care patients receive due to limitations in the examination processes (177-179), with a sense that examination of the patient was incomplete when using teleconsultations (176, 177). However, the convenience of teleconsultations outweighed concerns over not being physical examined when the consultation was for a routine or familiar health problem, and patients had an existing relationship with their primary care providers (178). On the other hand, both patients felt that the use of teleconsultations bridged the geographic distance between them as it helped primary care providers in conducting some level of physical exam (177).

Factor: Primary care providers' ability to diagnose remotely

Linked to limitations in primary care providers' ability to physically examine over teleconsultations, patients expressed concerns with regards to obtaining a diagnosis (169, 178). Patients questioned whether providers could gather enough information remotely to fully assess and diagnose them (177). Elsewhere, some patients chose not to use video consultations due negative experiences of diagnosis over video consultations in the past (164). Nonetheless, GPs felt that being able to see the patient's condition over video increased their confidence in diagnosing (176).

Organisational sub-theme – Workplace characteristics:

aspects of the primary care providers *workplace and roles/responsibilities that influence their decision to, and ability to, deliver teleconsultation services.*

Factor: Peer support

Primary care providers highlighted the importance of working alongside colleagues to deliver teleconsultation services, with the quality of the relationships, consultation, and communication between primary care providers in practice influencing whether teleconsultations were viewed as acceptable (252). For call-handlers, team work was an essential skill for delivering their service and highlighted that the location of their work setting facilitated communication and sharing of knowledge, supporting the delivery of a 24 hour telephone service (155).

Factor: Implications for job roles/responsibilities

Primary care providers reported a shift in responsibility between staff as a result of using teleconsultations and changes to roles and daily activities of staff as a consequence. For example, in a study looking at the use of GP-led telephone triage in place of the traditional face-to-face triage with a nurse, nurses felt a central role of their everyday work had been taken away. On the other hand, nurse-led triage left nurses feeling as if they had gone from applying their clinical skills in conducting tasks such as illness reviews, to a role of remote gatekeeper to GP care (163). In another study, where call handlers replaced nurses in dealing with clinical assessment over the telephone, call handlers reported that the added responsibility - and sometimes anxiety – resulted in them handing over to other members of staff (167).

5.4.3 Content analysis

Table 5.7 outlines how many of the factors identified by patients and primary care providers were mapped onto each of the Work System components.

Table 5.7: Number of patient (n=36) and primary care providers (n=39) factors mapped onto each of the Work System components

Work System components*	Patient factors n (%)	Primary care provider factors n (%)	Total N
Person(s)	31 (86.1%)	29 (74.4%)	60
Tasks	16 (44.4%)	16 (41%)	32
Tools/Tech	9 (25%)	11 (28.2%)	20
Organisation	6 (16.7%)	15 (38.5%)	21
Internal Environment	2 (5.6%)	1 (2.6%)	3
External Environment	1 (2.8%)	2 (5.1%)	4

**Note that due to the interrelated nature of the SEIPS 2.0 Work System, factors could map onto more than one component*

When mapping the factors influencing use of teleconsultations onto the Work System of the SEIPS 2.0 model, the majority fit within the *person(s)* component for both patients (n=31; 86.1%) and primary care providers (n=29; 74.4%). The *person(s)* component represents the *person(s)* at the centre of the system (e.g. primary care provider and/or patient) and their individual characteristics such as physical (e.g. strength, weight, height), cognitive (e.g. expertise, experience), and psychosocial characteristics (e.g. motivation, needs, social status), as well as the interactions between the individuals (Table 5.2 for definitions)

Examples of factors which fit within the *person(s)* component include individual characteristics such as: technological experience and abilities; patients age and verbal and cognitive abilities; patients' confidence in their own abilities; patients' awareness, needs (e.g. their health problem that influences the type of consultation had) and demand for the service; primary care provider attitudes towards teleconsultations. Furthermore, primary care providers' motivations included the opportunities around management of workload and schedules and the convenience of not having to spend personal resources travelling to patients' homes. Patient motivations included perceptions around the primary care providers' abilities in diagnosing remotely, their emotional experience influencing their choice of consultation type (e.g. finding video less stressful than face-to-face), and the convenience of not having to spend personal resources attending appointments (e.g. time and money on travel). Additionally, the *person(s)* component was relevant for factors relating to interactions between the individuals at the centre of the system. For example, the importance of and implications for the primary care provider-patient relationship when using teleconsultations, and the importance of peer support between Primary care providers for successful delivery of teleconsultation services.

The majority of factors were mapped over two components for both patients (n=20; 55.6%) and primary care providers (n=22; 56.4%) (see far right column Tables 5.4, 5.5, and 5.6). For example, IT literacy was mapped onto both the "*person(s)" and "tools and technologies"* components as it represents the individuals experience and abilities in using the teleconsultation technologies. On the other hand, some were mapped onto only one Work System component, such as performance of the technology, as it refers solely to aspects relating to the technology itself.

5.5 Discussion

This secondary analysis of studies identified in the first search of the Chapter 4 literature review – focusing on human factors applied to teleconsultations in primary care - sought to understand and synthesise the factors influencing the use of teleconsultation technologies in primary care, from both patient and primary care provider perspectives. The analysis was conducted to provide an evidence base which could inform the exploration of teleconsultations in community and general practice pharmacy, where the potential benefits are recognised but engagement with the technology remains limited (64, 69). A thematic analysis generated three themes of personal, organisational, and infrastructural factors, and a content analysis mapped these factors onto the SEIPS 2.0 model. A major finding was that for both patient and professionals groups in the literature, the majority of factors were personal and organisational in nature, with the least amount of factors related solely to the infrastructure (Tables 5.4, 5.5 & 5.6). There were similarities within the personal theme including convenience and the primary care provider-patient relationship, with both agreement and disagreement in opinions regarding patients' reasons for contact. Moreover, only patients were concerned about illness and infection and having access to a private space, with only primary care providers citing lack of patient demand as a barrier to the use of video consultations. There were both similarities and differences in opinions within organisational factors regarding the influence of patients' access to care, however patients and professionals shared concerns about primary care provider workload increasing as a result of using teleconsultations, and the limitations to the examination process whilst using teleconsultations. Additionally, only patients expressed concerns about the remote diagnosis, and only primary care providers emphasised the importance of peer support and culture on the use of teleconsultations. Infrastructural factors were similar, as both groups experienced technological issues which impacted their use of teleconsultations. The identified factors mapped across all six components of the SEIPS 2.0 Work System *(person(s), tasks, tools and technologies, organisation, internal environment, and external environment)* indicating that examination of the literature as a whole illustrates the potential for a systems perspective to be useful. Using the three headings themes - personal, organisational, and infrastructural - derived from the thematic analysis, this discussion reviews these results in the context of the wider evidence base and discusses the suitability of the SEIPS 2.0 model as a tool to encourage consideration of all aspects of a system that may influence the adoption of teleconsultations in primary care. The strengths and limitations of this secondary analysis will be outlined along with suggestions for future research. Note that comparison to the wider literature includes studies identified in the second search in Chapter 4 (Table 4.5), however not included in this secondary analysis due to time of completion.

5.5.1 Personal

Findings within the personal theme related to "*personal experiences and views; personal assets (including motivations) or resources"* and were categorised under six sub-themes of: *personal resources; competing priorities*; *quality of the consultation/experience; technology and data; need for call; and patient characteristics (see Table 5.4).* The analysis found convenience to be a major factor influencing use of teleconsultations, which was expected as providing healthcare at a time and place convenient for patients is often one of the driving factors for the implementation of such services (254). This is consistent with other published evidence in both primary and secondary care settings, where video consultations have been adopted across a range of clinical areas including general practice (255) and outpatient clinics including neurology and nephrology (256, 257). Although teleconsultations were viewed as practical and convenient in these studies, as they reduced financial burdens associated with travelling to appointments, the study by Carly et al (2021) found that neurology patients with limited mobility, (e.g. due to using a wheelchair, having vision loss or epilepsy) still deemed telephone consultations more convenient than using video (255-257).

There were shared concerns around the ability to establish new and maintain existing relationships when using teleconsultations, which were corroborated in the wider evidence base for both primary and secondary care (202, 258-260). For example, in a recent study by Greenhalgh et al (2022) exploring why GPs rarely use video consultations, GPs felt established relationships could “wear out” over time and close relationships would not be sustained without in-person contact (202). Elsewhere, Spronk et al (2022) interviewed healthcare professionals and patients in the field of geriatric medicine to understand their experiences with video consultations in outpatient care (260). Their findings mirror those in this secondary analysis as healthcare professionals found video consultations more convenient when they had an existing relationship with the patient. Moreover, the importance of an existing relationship with patients was frequently mentioned, leading to higher suitability of video consultation use (260).

The impact of IT literacy on the use of teleconsultations in this secondary analysis echoes that of the wider literature in areas such as: general practice; specialist dermatology; outpatient geriatric clinics; and, cardiology, spinal cord injury, and palliative care specialties (201, 255, 260, 261). Patient abilities in using the technology determined the appropriateness of video consultations, with limited abilities cited as a barrier by both patients and primary and secondary care providers, especially for key groups such as older adults (201, 255, 261). Reliance on family members to support those less familiar with the technology is also cited in this secondary analysis and in a recent review on primary and secondary care teleconsultations in India (261). Although not a concern of primary care providers in this secondary analysis, geriatric outpatient clinicians in Spronk et al’s (2022) study expressed concerns that patients’ unfamiliarity with the technology could lead to increased stress levels (260), which patients in this secondary analysis did experience due to difficulties setting up video consultations.

The analysis highlighted three studies in which patients expressed concerns in relation to illness and infection, as they used teleconsultations to avoid spreading illness to others or being exposed to infection from others whilst sitting in the physical waiting room. Two of the three studies collected data during the COVID-19 pandemic, when physical restrictions were in place, meaning face-to-face interactions were limited (262). However, although primary care providers were not influenced by concerns around the spread of infection in the studies examined in this analysis, they outlined patient fear of the COVID-19 pandemic as a common facilitator in their use of teleconsultations in a more recent review (258).

There were shared concerns around others overhearing consultations, impacting the confidentiality of the conversation, which patients linked to not having access to a private space to have the consultation. Interestingly, this was not a concern for primary care providers which suggests that they are more likely to have access to a private space in their workplace for conducting teleconsultations. However, it is worth noting that this may not be applicable for all primary care providers, as the majority of studies included in this secondary analysis focused on GPs and it is likely that GPs have a designated private room for in-person appointments, which could also be used for teleconsultations. It is possible that for other primary care providers, access to a private space for teleconsultations may be limited. For example, although most community pharmacies in the UK have at least one private consultation room for confidential conversations with patients, these rooms can be used for all types of consultations, both in-person and virtual (263, 264). The unpredictability of community pharmacy may restrict access to the consultation room for teleconsultations, as walk-in patients seeking help may also require use of the same room(s).

Although primary care providers in this secondary analysis cited a lack of patient demand as a barrier to use of teleconsultations, a 2020 evaluation of public opinions (n=4,235) on using Near Me (video consultation software used in NHS Scotland) suggests otherwise (139). The evaluation found that over 80% of the public thought video should be offered for healthcare consultations. A potential explanation for the difference in opinions could be that the studies in this analysis collected data pre-COVID-19, whereas the Near Me evaluation project was conducted and published during the pandemic. It is possible that patient and primary care provider views could have changed due to Government guidance around staying home to minimise the risk of spreading the virus (265). For example, Nguyen et al (2020) surveyed US adults to explore their use of different digital communication technologies during the pandemic and found 46% (n=632) of respondents increased their digital communication without decreasing any of the digital methods they used pre-pandemic, and only 9% (n=124) decreased their use of digital communication without increasing other methods (266).

This secondary analysis illustrates the commonalities and differences in what patients and primary care providers deem teleconsultations to be suitable for, in terms of reason for contact. They agreed on teleconsultations being suitable for the provision of results (if not to receive bad news), and follow up appointments, and not suitable for conditions requiring physical examination. However, opinions differed on suitability for mental health concerns. This variability in patient opinion concerning remote mental health care extends to the wider literature. In Costa et al's (2021) study assessing the use of teleconsultations in outpatient mental health clinics during the COVID-19 pandemic, 33% (n=144) of patients preferred in-person consultations to video, compared with 3% (n=13) who preferred video (267). Patients were reluctant to speak about their mental health over video consultations as the experience exacerbated their mental state - e.g. causing further confusion or trauma flashbacks (267). These findings highlight the need to consider the individual patient's needs and preferences when deciding on the type of consultation to use (137, 268).

5.5.2 Organisational

Findings within the organisational theme related to *"the health system, primary care providers, and how care is organised"* and were categorised under four sub-themes of: *organisational resources; learning opportunities; quality of the consultation/experience; and workplace characteristics* (see Table 5.6). Part of the drive for implementing teleconsultation services in healthcare has been to provide person-centred care, ensuring patients can access care at a time and place that is convenient for them and without burden. In this secondary analysis of the literature, primary care providers and some patients felt teleconsultations provided better access to care, however for other patients, teleconsultations made accessing care more difficult. These findings are reflective of the wider published evidence in primary and secondary care, where video consultations have been adopted including general practice (269) and outpatient gynaecology clinics (270). A 2022 rapid evidence review of patient access to remote primary care services found that although the shift to virtual care improved access for many, access was made more difficult for certain groups of patients – worsening already existing health inequalities (269). In contrast, McLaughlin et al (2022) reported improvements in patient access to gynaecology outpatient clinics after a move to remote care, with no patients reporting difficulties in access. However, they do highlight that their sample was younger and possibly likely to have higher rates of digital literacy and access (270).

Another driving factor for the implementation of teleconsultations has been to support primary care providers in managing their time and workload (271, 272). Although some primary care providers in this secondary analysis felt teleconsultations helped them to manage their work schedules, for the majority, using teleconsultations caused an increase in their overall workload or caused them to be concerned about increases - a concern also shared by patients. This variation in experiences is corroborated in the wider literature around primary care. For example, during the COVID-19 pandemic, one study exploring the use of teleconsultations found that increased workload, and subsequent burnout, was the major drawback to providing teleconsultations. This was due to teleconsultations being more taxing and time consuming than face-to-face due to the increased administrative tasks involved (224). In contrast, nurses working in a private digital care setting in Sweden felt the opposite as they liked having more control over how working days could be scheduled (209).

Clinicians working in geriatric outpatient clinics have previously expressed the absence of physical examination during video consultations as a major disadvantage causing insecurities about safety, completeness, and the risk of misdiagnosis (260). Although this mirrors concerns expressed by patients in this analysis, primary care providers outlined that using video over telephone increased their confidence in remotely diagnosing patients. Interestingly, the opportunity that remote examinations provided for professional development is consistent with the wider literature. Primary care providers in Gray et al's (2022) study expressed that assessing patients remotely requires a different approach to traditional consultations, as they described learning to provide virtual exams to be predominantly experiential while also drawing on the fundamentals of their clinical training (201). Furthermore, they described the benefits of acquiring these new skills and strategies for conducting the exam and gaining an increased awareness of the observations they make about patients and their health in all types of consultation (201).

Primary care providers highlighted the importance and benefits of peer support when delivering teleconsultations, whilst expressing that the quality of the relationships and communication influenced whether teleconsultations were viewed as acceptable by peers. Similarly, a more recent review by Coves et al (2022) comparing primary care provider reported facilitators and barriers to teleconsultation adoption in Hong Kong and the Netherlands recognised peer support as a factor influencing the uptake of the service by colleagues (258). This may be linked to the suggested influence that organisational culture has on the uptake of digital services (224, 273). Li et al (2021) explored GP perspectives on the main benefits and challenges of using digital remote care during the pandemic and identified challenges in overcoming organisational resistance to change and a lack of pre-existing use of teleconsultations by peers as barriers (224).

5.5.3 Infrastructural

Findings within the infrastructural theme relate to *"IT, software, and the factors that underpin systems"* and were categorised under one sub-theme of *Technology and data* (see Table 5.5). Due to the reliance on technology for the remote interaction, it is not surprising that the performance of the technology during the consultation process influenced use for both patients and primary care providers. Issues with the technology were consistent with the wider evidence base on primary and secondary care where teleconsultations have been adopted, including primary care clinics and general practice (59, 201, 210), and outpatient rheumatology clinics (274). For example, a recent study assessing clinical risk of teleconsultations in general practice during the COVID-19 pandemic identified technical issues/failures as one of the main risks involved in teleconsultations (210). As also seen in this secondary analysis, Gray et al (2022) reported that technical issues resulted in time wasted on troubleshooting before changing to a different mode of consultation (201). Furthermore, technical issues including unstable connections and audio/visual problems were reported in Tveter et al's (2021) study set in outpatient rheumatology (274). Technical issues emphasise the importance of user-centred design when developing health technologies (275). By involving end users from the outset, digital solutions in the healthcare setting can accommodate for their capabilities and limitations, potentially mitigating against problems related to usability (230).

5.5.4 SEIPS 2.0 model

The SEIPS model has been used previously to examine the facilitators and barriers in a number of healthcare-related investigations, including: patient care pathways and transitions (113); infection control and prevention (276, 277); impact of interventions and medical technologies on health (278); safety of healthcare practices (279); and the implementation of telehealth during the COVID-19 pandemic (280, 281). In this secondary analysis, using the SEIPS 2.0 model allowed the identification of aspects of the Work System influencing use of teleconsultations. The factors mapped across all six components indicating the usefulness of adopting a systems perspective to examine the literature. For both patients and primary care providers, the majority of factors were related to the *person(s)* component (see Table 5.7), which may be explained by the fact that the premise of the SEIPS 2.0 model is that the *person(s)* is at the centre of the Work System, interacting with the other components to influence Outcomes (110). Similarly, it is unsurprising that the *person(s),* organisational and tools and technology components of the SEIPS 2.0 model were most commonly related to personal, organisational and infrastructural factors identified in the studies from this secondary analysis, respectively. It is important to identify where the factors influencing use of teleconsultations in primary care relate across a number of the SEIPS 2.0 components in order to understand how these components interact (see section 5.4.3.), and whether any interactions pose barriers to the effective use of teleconsultations. Due to the interrelated nature of the Work System, future research exploring use of teleconsultations or other digital health technologies may find application of the SEIPS 2.0 model helpful to assist in considering a holistic systems approach.

The thematic analysis resulted in the data being categorised under the three Work System themes of personal, infrastructural, and organisational, which is to be expected as these are the key elements involved in a teleconsultation interaction (i.e. the organisation providing the service, the people interacting with the service, and the use of technological infrastructure to facilitate this interaction). However, the benefit of mapping the data onto the SEIPS 2.0 model is that it considers the wider system. This mapping subsequently facilitated identification of further factors influencing use related to tasks and the internal and *external environments*, which would not have been fully explored without application of the SEIPS 2.0 Work System.

5.5.5 Strengths and limitations

This secondary analysis has provided a comprehensive, however not exhaustive, list of factors influencing the use of teleconsultations in primary care, which may provide a basis on which to explore video applications in different healthcare settings. This study also illustrates how a human factors model (SEIPS 2.0) may be applied to highlight areas of the system presenting as barriers, and where factors influencing use interact and overlap.

Due to the nature of secondary analysis, the results are based on existing data synthesis, collected for the purpose of a prior literature review, and therefore may not represent all data on the factors influencing use. A limitation is that the findings are based on the analysis and interpretations of the researchers who conducted the originally published works, and not the researcher conducting this secondary analysis due to lack of access to the raw data. Furthermore, the secondary analysis is based on a review concluded in May 2021, which was updated in April 2023, and the (n= 33) studies from the updated review were not included in this analysis. However, the wider evidence base has been utilised within the discussion to contextualise the additional studies with those found in the initial review.

Although the interrelated nature of the SEIPS 2.0 Work System components can be viewed as a strength, individual researchers may have differing perspectives on which components are most proximally related to the factors influencing use. However, in this study, this was mitigated against by the validation process conducted during the content analysis, which involved two validators who are experienced in qualitative analysis methods.

5.5.6 Future directions and recommendations

The majority of the studies included in the secondary analysis focused on GPs, therefore future research should apply the current findings to explore use of teleconsultations in other lesser-researched settings of primary care to understand the barriers where teleconsultations are not widely used, but could be beneficial. For example, only one study in this secondary analysis focused on pharmacists working in general practice and community pharmacy. Interestingly in studies identified after the secondary analysis was conducted, pharmacists have cited the benefits of using video consultations over telephone consultations in terms of visual cues and information gathering. However, engagement with video consultations has been limited both before and during the COVID-19 pandemic, which brought a major increase in the delivery of virtual care (64, 69). The next stage of research in this thesis will apply the findings of the secondary analysis to understand the factors influencing use of video consultations by patients and pharmacists in primary care, by using the results to inform study materials. The SEIPS 2.0 model, which has been used previously in qualitative studies (114, 282), will be applied to ensure each component of the Work System is considered. Furthermore, it is important for future researchers evaluating the effectiveness of digital health technologies to consider all end users (e.g. both healthcare professionals and patients) as barriers to using the technologies may vary between these groups.

5.5.7 Conclusion

This secondary analysis of the literature identified the factors influencing patient and primary care provider use of teleconsultations, and has illustrated the benefits of using a human factors model (SEIPS 2.0) to understand the influence of each component of a system. Despite the benefits for some patients and primary care providers, and the opportunity for professional development, there is uncertainty about whether teleconsultations add to or alleviate primary care providers' pre-existing workload, which may highlight a need for further exploration and support. The results have emphasised the importance of continuing to consider that remote care restricts access for certain patient groups as health services become increasingly digitised. Furthermore, the analysis has highlighted ongoing issues with infrastructure which should be considered before choosing to use teleconsultations. Finally, as the majority of studies included in the analysis were based on GPs perspectives, it is unknown how relevant these results are for other primary care providers; however, the results could provide a starting point for exploring use in other areas.

Chapter 6: Video consultations in primary care pharmacy services across Scotland: Pharmacist and patient perspectives

6.1 Introduction

In line with the UK Government's aim to transform health and care services through the use of digital technologies, the Scottish Government released their Digital Health and Care strategy, which strives to give patients control over how and when they access care, support, and services (12, 283). Part of the response to the strategy was the drive for widespread adoption of video consultations in every relevant health and care interaction, for every member of society (12). Near Me is a Scottish Government programme, powered by the Attend Anywhere platform, which aims to provide the people of Scotland the choice to attend health and care appointments via video call when appropriate (284). Attend Anywhere has been available for use since 2016 however use before the COVID-19 pandemic was limited to mainly remote and rural areas of Scotland. However, by late 2019 nearly all health boards had adopted video consultations in small numbers with around 1,200 consultations a month across Scotland (284). The start of the pandemic brought the rapid scale up of Near Me and by mid-May 2020 the number of consultations had risen to 13,000 per week and then to 17,000 per week by June (284). In 2020, Near Me and the Scottish Government collaborated on a public and clinician engagement exercise which aimed to understand the benefits and barriers to using video, collecting the views of people who had never used Near Me, to raise awareness of the service. The exercise yielded 5,400 responses and found strong support for the use of Near Me services from both clinicians and patients, with over 80% of patients and 94% of healthcare professionals expressing that video consultations should be offered to patients for health and care appointments (284). As of November 2022 there were around 40,000-50,000 calls made over video each month across health, social care and the public sector including social security Scotland (285).

Despite the availability of the Near Me platform, use by pharmacists working in general practice and community pharmacy has been limited (64, 69). Although pharmacists recognise the benefits of using video, such as increased access for patients without having to travel, and being able to pick up on non-verbal cues (e.g. facial expression and general demeanour), a low number of video interactions were recorded in Inch et al's (2017) study (69). The low numbers may be linked to concerns around increases in workload and the time taken to answer video calls (69). More recently, a study by Weir et al (2022) assessing the impact of the COVID-19 pandemic on pharmacists working in general practice in Scotland reported similar limited use of video consultations both before and during the pandemic, despite an increase in the use of telephone consultations (64). Furthermore, despite there being approximately 1,256 community pharmacies across Scotland, between January-May 2023 only 269 had registered Near Me waiting areas, and only nine of which were active (286, 287). The limited use of video is surprising given the drive for widespread adoption of Near Me in pharmacy in Scotland (23, 288-290). The literature around why video consultations have not been adopted by pharmacists in Scotland remains scarce and Weir et al (2022) suggested future work should explore patient and pharmacy personnel perceptions and preferences for teleconsultations (64).

The secondary analysis (Chapter 5) which focused on the factors influencing use of teleconsultations (telephone and video) has provided an evidence base, albeit rooted mainly in GPs perspectives, which could be used to explore patient and pharmacy personnel perceptions and preferences. As outlined in Chapter 2, taking a systems approach – by obtaining perspectives of all individuals at the centre of the system (both patients and pharmacists) (Chapter 2) – facilitates an understanding of how they interact with one another and all other components within the system, to influence whether they choose to use video consultations (110).

6.2 Aims and objectives

The aim of this research was to explore the factors influencing the use of video consultations by patients and pharmacists working in primary care, with the following objectives:

- To synthesise the factors influencing patients use of video consultations
- To synthesise the factors influencing community and general practice pharmacists' use of video consultations
- To use an established human factors systems model (SEIPS 2.0) to identify components of the current Work System influencing use.

6.3 Methods

6.3.1 Study design

Qualitative semi-structured interviews were used in this study. Qualitative interviews were chosen as they facilitate gathering information about participants' experiences, views and beliefs concerning a specific research question or phenomenon of interest (291). Using semi-structured interviews allows the interviewer to ask the required questions with flexibility, through the use of open-ended questioning techniques (291). Ethical approval was granted for this study by the Strathclyde Institute of Pharmacy and Biomedical Science in October 2022. The study was reported in line with the Consolidated criteria for Reporting Qualitative research Checklist (COREQ) (Appendix 3) (292) (Section 6.3.9.).

6.3.2 Development of materials

6.3.2.1 Screening questionnaires:

The screening questionnaires were developed to help maintain a balanced sample of participants, as per the sampling strategy (See section 6.3.4.). The questionnaires asked all participants about their:

- Experience with video technology (work, social/personal, or health reasons)
- Gender
- Age
- Geographical location – the NHS health board they live/work in.

Additionally, pharmacists were asked about:

- Where they currently work (community or general practice)
- The type of community pharmacy if applicable
- Years' experience in current role
- Years qualified as a pharmacist

Finally, all participants were asked to provide contact details which enabled the lead researcher to contact them to either let them know if they had been selected for an interview or not, and if so to arrange a suitable time for interview (See Appendix 4 for screening questionnaires).

6.3.2.2 Semi-structured interview schedules

Structure

Due to its development as a framework for understanding the complexities of healthcare contexts, the SEIPS 2.0 model was used to structure the interview schedules (110). Previous work has highlighted the importance of the SEIPS model and its variants for the identification of influential factors in the Work System which interact to impact subsequent Outcomes (113). The researcher chose to focus only the work system area of the model, to allow an in-depth understanding of the components, their interactions, and their influence on the use of video consultations. Understanding these interactions allows a holistic understanding of the system and its components, facilitating potentially targeted interventions to improve the use of video consultations in pharmacy.

Using the six components of the SEIPS 2.0 Work System *(person(s), tasks, tools and technologies, organisation, internal environment, external environment)* to structure the interview schedules ensured that each component of the system had been considered (See Table 5.2, Chapter 5 for definitions of the six components). The schedules comprised six sections, one for each component, with relevant questions and prompts within.

Questions and prompts

Development of questions and prompts was informed by Chapter 5 findings which identified studies using approaches and methods to assess use of teleconsultations in primary care. This included data extraction of positive and negative factors influencing use, aligned to the six components of the SEIPS 2.0 Work System model. Factors were selected for inclusion within the patient and pharmacist interview schedules if cited more than once by primary care providers and patients, respectively as detailed in Chapter 5 Tables 5.4-5.6. Due to the interrelated nature of the Work System components, factors influencing use were often relevant to more than one

Work System component (see Tables 5.4, 5.5 & 5.6). For the purposes of interview schedule development, each of the included factors were mapped onto the Work System component most closely related and were therefore placed in that section of the schedule. Where required, additional prompts were used to enhance understandability of the questions and/or elicit further information from the participants. These were informed by definitions of the SEIPS 2.0 Work System components (See Table 5.2) (110). The development of questions and prompts was peer reviewed by members of the supervisory team (RN, ED) before validity checks and piloting. The finalised interview schedules can be seen in Appendix 5.

6.3.2.3 Participant information sheet and consent form

Participant Information Sheets (PIS) and consent forms were developed to provide participants with information about the study and to gain their consent before being interviewed. These were adapted from university templates.

6.3.2.4 Recruitment adverts

Recruitment adverts and posters were developed in line with the University's branding guidelines and went through iterative stages of review by members of the supervisory team (RN, ED) (Appendix 6). Contained within each respective advert/poster were QR codes, hyperlinks and an email address which potential participants could use to gain access to the online PIS, consent forms, and screening questionnaires.

Validity of interview materials

Testing the validity of an instrument involves establishing how well it measures the construct under study (293). The screening questionnaires and interview schedules underwent face validity testing. Face validity testing is the subjective assessment, by lay people or experts, of whether the instrument measures what it intends to, at 'face value'. It can provide an initial assessment of the syntax, grammar, flow, and appropriateness of questions (293). Content validity involves establishing whether the items on the instrument fully evaluates all aspects of the topic it's designed to measure. As the interview schedule items were generated solely from the literature, content validity can be assumed. Four researchers within the Pharmacoepidemiology & Healthcare Research Group at the University of Strathclyde were approached to conduct face validity testing of the questionnaires and interview schedules. This included three from a psychology background (PhD student KP, a research associate and third supervisor ED, and a research fellow and first supervisor RN), and a research associate with a chemistry background (LS). Most of the validators have experience of conducting qualitative research with patients, and all were asked to comment on the understandability of the questions. Further validation of the tools was conducted with participant resources at the stage of piloting. Any amendments made to the interview schedule were reviewed by RN and ED.

6.3.3 Piloting

Piloting allows the interviewer to: highlight any ambiguities or difficulties with questions and amend them; record the time taken to complete the interview; determine whether each question elicits the expected response; determine if any questions are missing; establish whether replies can be properly interpreted; and, practice interviewing techniques (294). The interview schedules were piloted with eligible participants (two patients, one community pharmacist and one general practice pharmacist) where they were taken through the interview process and asked to provide any feedback on the interview schedule. Two of the transcripts were sent to a supervisor (ED) to check for any other issues with the schedules as well as review the researcher's interview skills. As no major changes were required, the data from the pilot participants was used in the main sample.

6.3.4 Sample strategy

A convenience sampling approach was taken, where potential participants are approached and recruited based on their availability and willingness to participate. The sample of participants was monitored by the PhD candidate with support from the supervisory team as the study progressed, in an effort to ensure a balanced sample was achieved. The screening questionnaires were developed to facilitate this process. The researcher strived to balance the number of participants across the following variables where possible:

1. Age
2. Gender
3. Geographical location (NHS health board that patients live in/pharmacists work in)
4. Experience with using video technology
5. Type of pharmacy currently working in (community/general practice pharmacy - pharmacists only).

The initial intended sample size was 10 participants for each group (i.e. patients, community pharmacists and general practice pharmacists). After 10 interviews were completed, the researcher continued to interview another three participants. If during those three interviews no new themes were produced, recruitment would stop. Recruitment and interviewing would continue until there were no new themes produced for three consecutive interviews (295). This indicated that data saturation had been reached and recruitment stopped.

6.3.5 Recruitment strategy

Recruitment was completed through several strategies for each group of participants:

Patients

- Study details were advertised on the Volunteer Scotland (296) and Volunteer Glasgow (297) websites
- Relevant organisations were contacted to ask if they could help circulate the study details to patients (e.g. including any patient groups they may have/run). This included: NHS Education for Scotland; NHS Healthcare Improvement Scotland; Volunteer Scotland; NHS Research Scotland; Near Me; Lanarkshire Links; Voluntary Health Scotland; Marie Curie Scotland; Genetic Alliance UK; Scottish Youth Parliament; Young Scot; Third Force News; Alliance Scotland; Age UK; and Age Scotland
- The study advert was posted on Twitter© (298) and relevant organisations were tagged
- Participants were asked to pass on the study details to anyone they knew who may be interested in taking part in the study.

Pharmacists

- Relevant organisations were contacted to ask if they could circulate the study advert in any newsletters or news emails. This included: NHS Education for Scotland (NES); NHS Healthcare Improvement Scotland (HIS); Community Pharmacy Scotland (CPS); Scottish Practice Pharmacy and Prescribing Advisors Association (SP3AA) group; and the University of Strathclyde (pharmacy teaching staff)
- The researcher attended the SP3AA conference and discussed study details with potential participants during the networking sessions
- The study advert was posted on Twitter© (298) and relevant organisations or individuals were tagged (if consent had been given to do so)
- All participants were asked to forward the study details onto anyone they thought may like to participate.

There was no offer of payments, expenses or other incentives for participation.

6.3.6 Data collection

Screening questionnaire

Participants completed the consent form and screening questionnaire, and the researcher reviewed responses before deciding to either contact the participant to arrange an interview or inform them that they were no longer needed in the study - as per the sampling strategy (See Section 6.3.4.).

Interviews

Telephone, video, or face-to-face interviews were conducted with patients and pharmacists. Table 6.1 outlines the steps taken during the interview process.

Table 6.1: Steps taken during the interview process

Step	Description
Step 1	The researcher introduced themselves and the study before confirming that the participant was happy to take part in the interview, knowing that they could stop at any point, and remain anonymous throughout the study. Participants were given an opportunity to ask questions before the recording began. Two recording devices were used – Microsoft Teams© and a Dictaphone.
Step 2	The recording was started, and the researcher completed the interview as per the interview schedule, taking field notes when required. Prompts were used to elicit further information.
Step 3	Participants were asked if they had any questions before being debriefed by the researcher and thanked for taking part. They were then asked if they would be able to help recruit further participants.
Step 4	Recordings were stopped.

6.3.7 Data management

Participants were pseudo-anonymised so they were not identifiable, and all data was stored on a secure remote University server and accessed via a password protected computer. During all interviews, Dictaphones were used to record. In addition, for those who completed the interview using video conferencing software, the interview was both audio and video recorded using the facility available on the online platform used (e.g. Zoom© or Microsoft Teams©), but only the audio was used for analysis. Once the interview had been completed, the audio/video recording was saved immediately onto a password protected University system (Microsoft OneDrive©). The Dictaphone was stored in a locked cabinet on University premises or kept on person, until the audio was deleted. The audio was deleted from the Dictaphone once it had been transcribed and validated. Only the researchers, including the supervisory team involved with the project, had access to the Dictaphone and any raw data. Data transcription methods are detailed in Table 6.2 (Section 6.3.8.). No transcripts were returned to participants to comment on and/or corrections.

6.3.8 Data analysis

A framework analysis approach was used to structure the data (299), as detailed in Table 6.2.

Table 6.2: Stages of the framework analysis

Stage	Description
Stage 1: Transcription	The data underwent intelligent verbatim transcription. Where interviews had been completed on video conferencing software, the audio transcription that is automatically generated was used, and then edited to ensure accuracy. To further ensure accuracy, a random 20% of the transcripts was validated by KP.
Stage 2: Familiarisation	Familiarisation of the data was completed by listening to the audio-recordings and reading the transcripts to gain an overall impression of each interview prior to coding.
Stage 3: Initial coding	Initially 15% of the transcripts (n=5) were coded. The five transcripts chosen were considered conceptually rich and had representation from each participant group. These five transcripts, using NVivo 2020©, were first deductively aligned with the six Work System components of the SEIPS 2.0 model*. The data under each component then underwent inductive analysis to create codes within the data. This was done independently by AF and ED. A codebook was created simultaneously in NVivo© by AF and ED which contained descriptions of each code which were used for validation.
Stage 4: Developing a framework	Once the five initial transcripts were coded, AF and ED met to discuss, and create the framework that would be applied to the remaining transcripts.
Stage 5: Applying the framework	The framework was then applied to the remaining transcripts. If any changes or additions were made to the framework, ED was informed to check that these were appropriate.
Stage 6: Charting data into the framework matrix	NVivo 2020© was used to show the framework matrix by code and participant. Quotes considered particularly insightful and rich in detail were tagged during this phase.
Stage 7: Interpreting the data	Once all transcripts were placed within the framework, AF completed a thematic analysis to understand the connections and patterns within each component's codes. Analytical memos were used to help understand the data connections.

**The SEIPS 2.0 model chosen due to its relevance for complex healthcare contexts, focusing solely on the work system to facilitate an in-depth understanding of each individual component and the interactions between them*

6.3.9 The research team and reflexivity (as per COREQ checklist (292).

The research team comprised of a PhD student (AF), and three PhD supervisors (RN, ED, MB) with extensive experience in qualitative research methods in healthcare. As this study was part of their PhD project, the female PhD student was the sole researcher, and conducted all interviews. The researcher was qualified to an MSc level in research and had experience of conducting qualitative research methods and analysing qualitative data. Reflexivity techniques were employed to identify and manage any researcher bias. Self-reflection and validation of transcripts by a member of the supervisory team allowed adjustment of questions and/or probes when required (i.e. reviewing of pilot interview transcripts to minimise leading and biased delivery of questions).

The researcher was known to two participants, who were PhD colleagues (BM and DJ) involved in the piloting of study materials. Therefore, it is possible that pre-existing relationships could have affected their behaviour in their response to the questions, and in terms of suggestions to improve the interview guide. Participants were made aware before the interview started that the research was being conducted as part of the researcher's PhD project, and the broader goals for conducting the research.

6.4 Results

6.4.1 Demographics

Patients

Fourteen patients were recruited to take part in an interview (see Table 6.3) over the period November 2022 to March 2023. Interview duration with patients ranged from 32-73 minutes, with a mean duration of 49 minutes. Most patients were female (n=8, 57.1%) and aged between 60-65 years (n=5, 35.7%). The majority lived within the NHS Ayrshire and Arran health board (n=7, 50.0%) and mainly had experience of video technology for social purposes (n=13, 92.9%). For those who had experience, the technologies most commonly used were smartphones (n=9, 64.3%) and the Zoom© platform (n=9, 64.3%). No patients had experience of using video calls to speak to a pharmacist in either general practice or community pharmacy although some had used the technology to speak to other healthcare professional (n=5, 35.7%).

Table 6.3: Patient demographics (n=14)

Demographic		n (%)
Gender	Female	8 (57.1%)
	Male	4 (28.6%)
	Prefer to self-describe:	
	Male to female transgender	1 (7.1%)
	Asexuality	1 (7.1%)
Age (years)	24-29	0 (%)
	30-35	1 (7.1%)
	36-41	0 (0%)
	42-47	0 (0%)
	48-53	1 (7.1%)
	54-59	3 (21.4%)
	60-65	5 (35.7%)
	66-71	1 (7.1%)
	72-77	2 (14.3%)
	78 or older	1 (7.1%)
Geographical location (health board in which they live)	NHS Ayrshire and Arran	7 (50.0%)
	NHS Lanarkshire	2 (14.3%)
	NHS Highland	1 (7.1%)
	NHS Lothian	1 (7.1%)
	NHS Forth Valley	1 (7.1%)
	NHS Greater Glasgow and Clyde	1 (7.1%)
	NHS Western Isles	1 (7.1%)
Reason for previous experience with video technology	For social purposes	13 (92.9%)
	For attending professional events	8 (57.1%)
	For work meetings	6 (42.9%)
	For consultations with healthcare providers	5 (35.7%)
	For attending life events	3 (21.4%)
	For attending cultural events	2 (14.3%)
	Other (self-reported):	
	Watching live sport	1 (7.1%)
	Political meetings with other activists	1 (7.1%)
	Meetings for voluntary work	1 (7.1%)
Previous experience with type of video technology	Smartphone	9 (64.3%)
	Zoom©	9 (64.3%)
	Facetime©	8 (57.1%)
	Microsoft Teams©	6 (42.9%)
	Tablet device	5 (35.7%)
	Laptop	5 (35.7%)
	Personal computer	5 (35.7%)
	Social media "live"	3 (21.4%)
	Special video consultation equipment	1 (7.1%)

Pharmacists

Overall, 19 pharmacists were recruited to take part in the interviews (Table 6.4). Interview duration with pharmacists ranged from 31-59 minutes, with a mean duration of 39 minutes. Ten pharmacists worked in general practice (52.6%), six in community pharmacy (31.6%), and three across both settings (15.8%). Those pharmacists working in community pharmacy were mainly based in single independent pharmacies (n=3, 15.8%) or small chains consisting of two to four pharmacies (n=3, 15.8%). Most of the pharmacists were female (n=13, 68.2%), aged between 30-35 years (n=5, 26.3%), and worked in NHS Greater Glasgow and Clyde health board (n=5, 26.3%). Pharmacists had been qualified for a median of 17 years (IQR 9,22) and mainly had experience of using video technology for attending work meetings (n=18, 94.7%) or professional events (n=18, 94.7%) using laptops (n=18, 94.7%). Five (26.3%) pharmacists had experience of using video consultations with patients.

Table 6.4: Pharmacist demographics (n=19)

Demographic		n (%)
Gender	Female	13 (68.2%)
	Male	6 (31.6%)
Age (years)	24-29	3 (15.8%)
	30-35	5 (26.3%)
	36-41	3 (15.8%)
	42-47	3 (15.8%)
	48-53	2 (10.5%)
	54-59	3 (15.8%)
	60-65	0 (0%)
	66-71	0 (0%)
	72-77	0 (0%)
	78 or older	0 (0%)
Geographical location (health board in which they work)	NHS Greater Glasgow and Clyde	5 (26.3%)
	NHS Lanarkshire	4 (21.0%)
	NHS Grampian	3 (15.8%)
	NHS Lothian	3 (15.8%)
	NHS Forth Valley	1 (5.3%)
	NHS Dumfries and Galloway	1 (5.3%)
	NHS Fife	1 (5.3%)
	NHS Orkney	1 (5.3%)
Setting currently working in	General practice pharmacy	10 (52.6%)
	Community pharmacy	6 (31.6%)
	Both	3 (15.8%)
Type of community pharmacy	Single, independent pharmacy	3 (15.8%)
	Member of a small chain (2 to 4 pharmacies)	3 (15.8%)
	Member of a medium chain (5-30 pharmacies)	1 (5.3%)
	Member of a large chain (over 30 pharmacies)	2 (10.5%)
Reason for previous experience with video technology	For work meetings	18 (94.7%)
	For attending professional events	18 (94.7%)
	For attending life events	10 (52.6%)
	For consultations with patients	5 (26.3%)
	For attending cultural events	4 (21.0%)
Previous experience with type of video technology	Laptop	18 (94.7%)
	Microsoft Teams©	17 (89.5%)
	Zoom©	17 (89.5%)
	Smartphone	14 (73.7%)
	Facetime©	11 (57.9%)
	Tablet device	11 (57.9%)
	Personal computer	10 (52.6%)
	Social media live	4 (21.0%)
	Special videoconferencing equipment	1 (5.3%)
	Other (self-reported): Google Meet©	1 (5.3%)

Presence of non-participants – as per COREQ checklist (292).

Refusing to participate is not relevant, as the study required participants to opt in. No participants failed to turn up to their interview, no participants stopped taking part during the study, and no participants requested that we remove their data from the analysis.

6.4.2 Summary of all themes and sub-themes

Overall, there were six themes, derived from the Work System of the SEIPS 2.0 model: *person(s), tasks, tools and technologies, organisation, internal environment, and external environment*, with a number of sub-themes within each. Definitions for each theme are derived from the literature (110) (previously described in Chapter 5, Table 5.2) and will be outlined at the start of each section.

A summary of all themes and sub-themes can be seen in Figure 6.1. Note that as the premise of the SEIPS 2.0 model is that the person(s) is at the centre of the system, interacting with all other components, the *person(s)* theme will be discussed first.

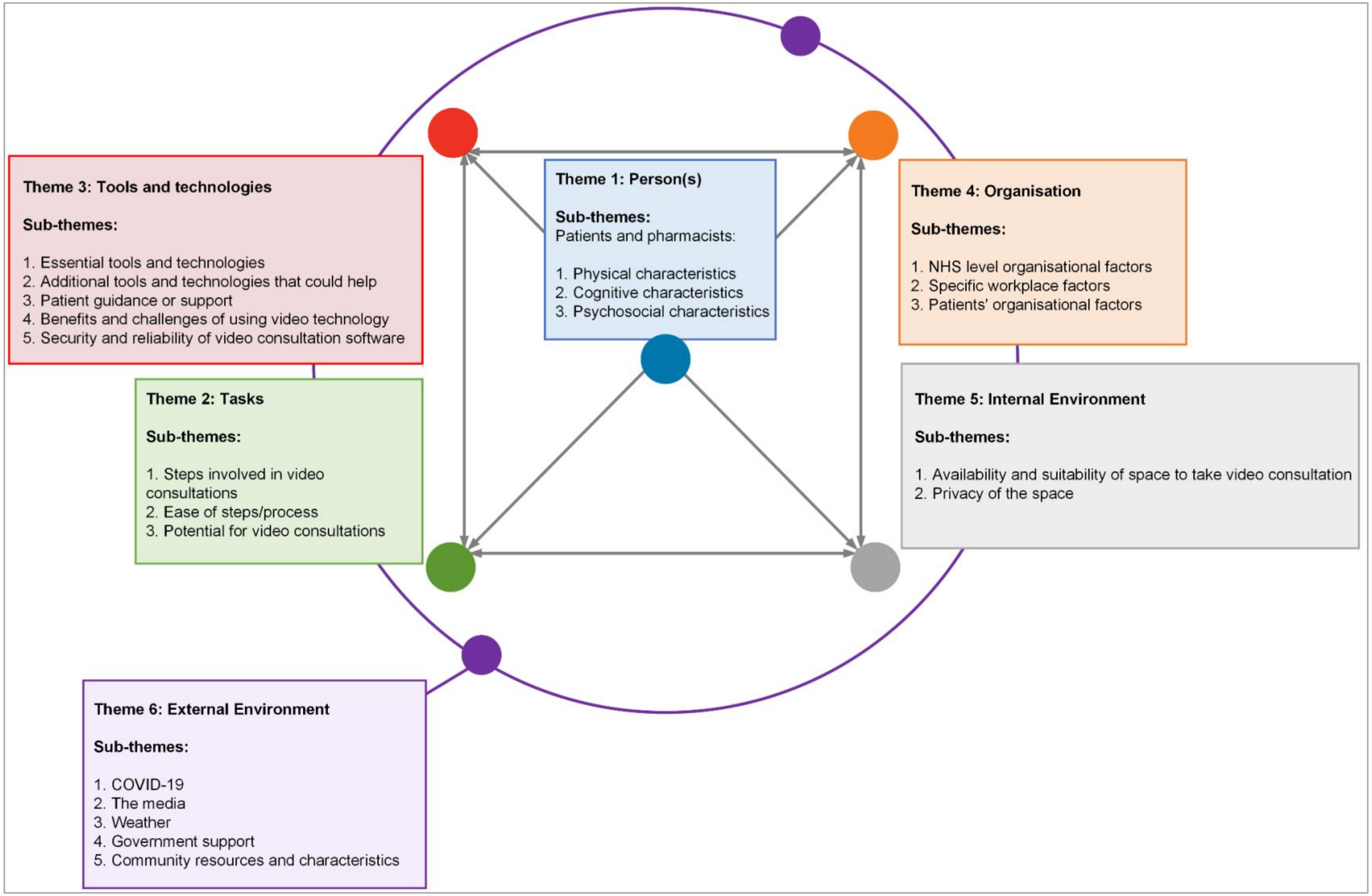


Figure 6.1: Summary of all themes and sub-themes

6.4.3 Theme 1: Person(s)

For this study, the *person(s)* theme was defined as the characteristics of the individual at the centre of the system, which can be a single individual (e.g. pharmacist or patient) or group (e.g. team, organisational unit). Individual characteristics include: physical characteristics (such as strength, weight, height); cognitive characteristics (including expertise and experience, etc.); and psychosocial characteristics (such as motivation, need, social status, etc.) (adapted from SEIPS 2.0 literature (110)).

The three main sub-themes for both participant groups were physical, cognitive and psychosocial characteristics. A summary of characteristics identified by patients, pharmacists or both are presented in Figures 6.2 (patient characteristics) and 6.3 (pharmacist characteristics). Pharmacists and patients reported similarly in terms of the patient characteristics deemed more and less compatible with video consultations, with only one additional characteristic reported by pharmacists. In contrast, for pharmacist characteristics there was a fairly even split between characteristics reported by both participant groups versus each group individually. For both participant groups, the majority of characteristics reported in terms of suitability of video consultations were psychosocial in nature, with physical characteristics cited the least often. Commonly cited characteristics (cited by >10 of the 33 participants) will be discussed in more detail. Note that the sub-themes will be discussed separately for patient and pharmacist characteristics.

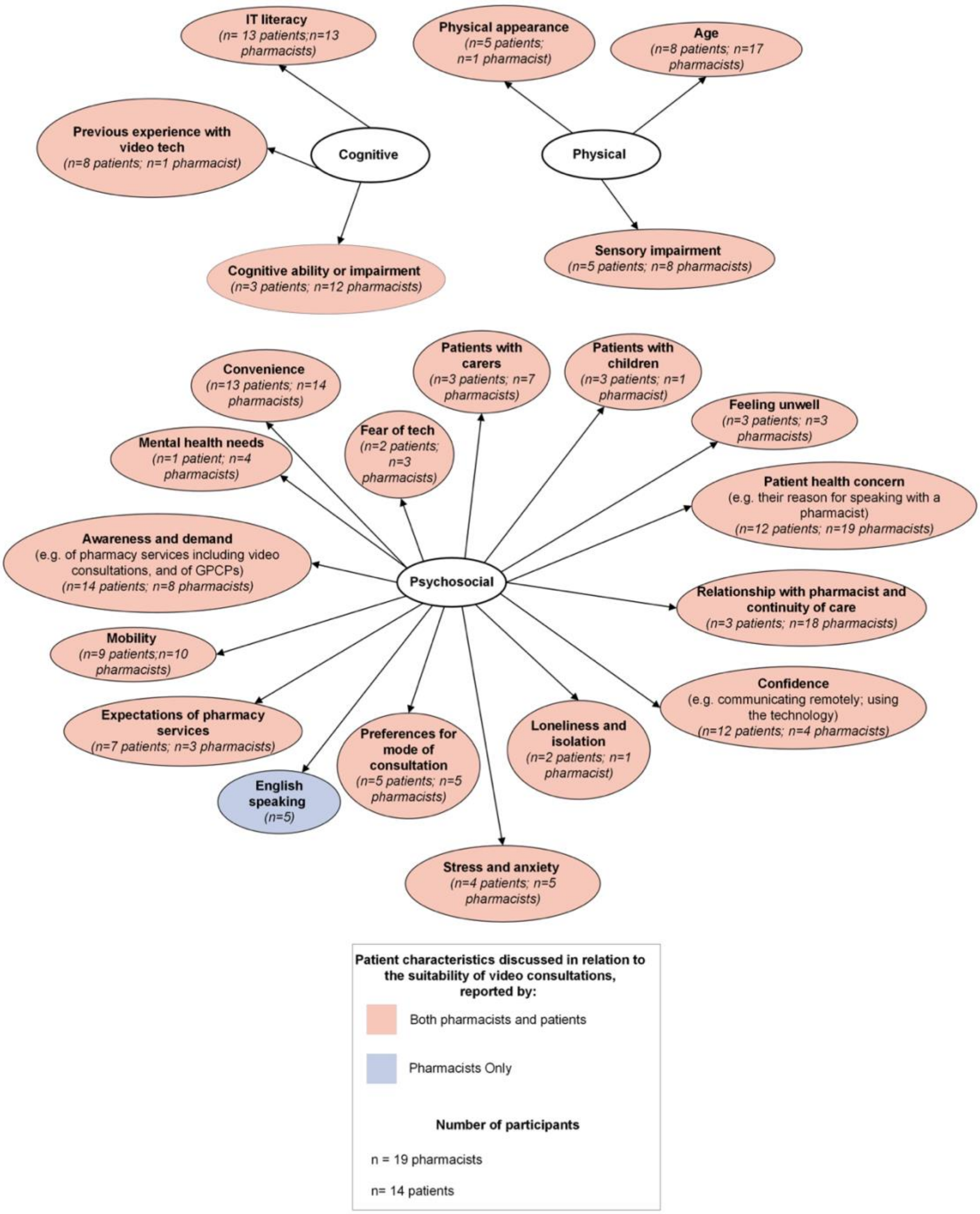


Figure 6.2: Patient characteristics discussed in relation to the suitability of video consultations

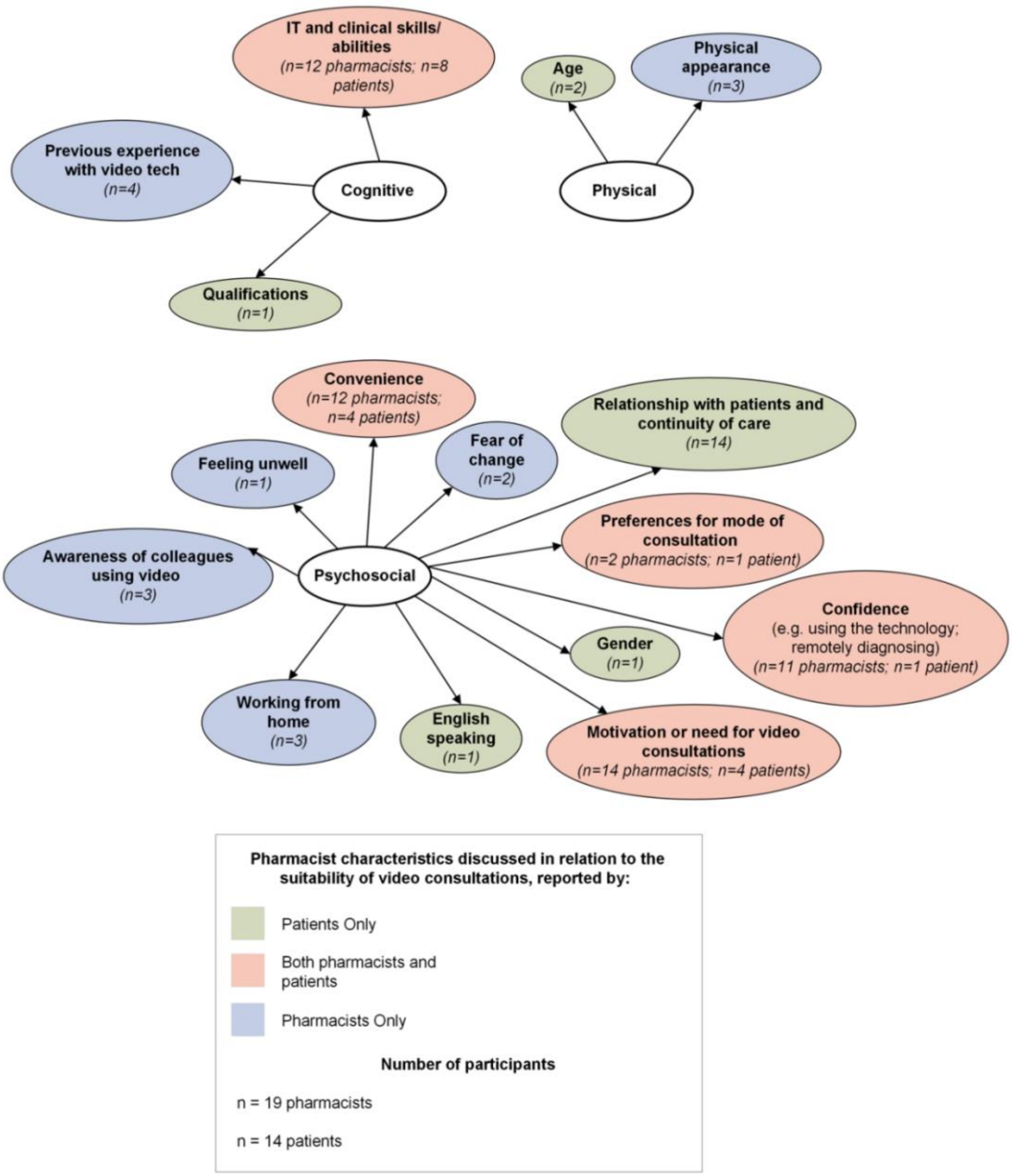


Figure 6.3: Pharmacist characteristics discussed in relation to the suitability of video consultations

6.4.3.1 Patient characteristics

All participants were asked if there was anything about themselves or the other participant group that would influence their choice to use video consultations, which led to a series of characteristics being cited. Figure 6.4 illustrates example patients for whom video consultations may or may not be suitable. The examples were developed using the commonly cited characteristics described in section 6.4.3. Note that these are examples designed to illustrate some of the characteristics mentioned, and the key points will be discussed in detail below with illustrative quotes.

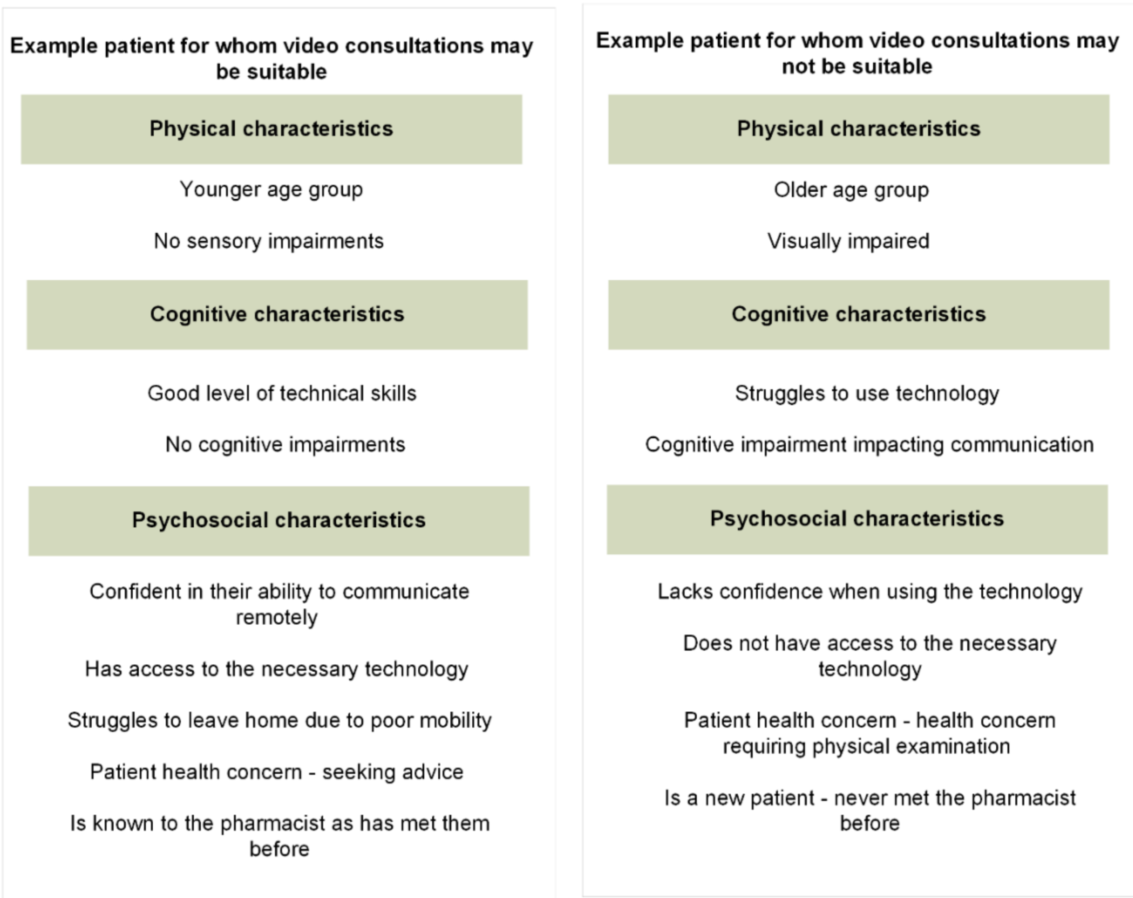


Figure 6.4: Example patients for whom video consultations may or may not be suitable

(i) Sub-theme: Physical characteristics

<u>Age</u>

Both patients and pharmacists felt video consultations may be better suited to a younger population due to differences in technical abilities and may be *"more up on their IT skills" (Community pharmacist 2, 19yrs qualified, NHS Grampian):*

> *"I would say that just being younger and having familiarity with technology would make me more likely to use it than someone like my parents who are a lot older and don't have that kind of awareness or technological literacy, compared to them I'd be far more likely to use it." (Patient 3, 30-35yrs, NHS Greater Glasgow and Clyde).*

However, some pharmacists recognised that this is not always the case and expressed the importance of not assuming older patients do not know how to use the technology.

<u>Sensory impairment</u>

Pharmacists had concerns around visually impaired patients struggling to use video, and these were confirmed by a patient participant who lives with a visual impairment themselves:

> *"I can't see them because I'm totally blind. If [the camera] was on you would be looking at the ceiling probably… the one time I did a Zoom© call, I had more people going 'we can't see you', and I have no idea which way I'm supposed to point the camera…aiming the camera is stressful because I don't see what's being seen, I have no sight at all" (Patient 13, 60-65yrs, NHS Lanarkshire).*

Although four pharmacists felt video consultations would not be suitable to use with hard of hearing patients, three patients and two pharmacists recognised the benefit of video over telephone consultations for patients who are hearing impaired as they could perhaps lip read or use the closed captions function, if available.

(ii) Sub-theme: Cognitive characteristics

IT literacy

Eleven pharmacists expressed the importance of, and concerns around, patients having the necessary IT skills to be able to use video consultations. Despite these concerns, all patients involved in the study felt they had adequate skills to use video consultations, which five patients related to their experience of work:

"one of my jobs was to teach computer applications so I've always been pretty up to date with technology." (Patient 10, 72-77yrs, NHS Ayrshire & Arran).

Cognitive ability or impairment

Pharmacists and patients recognised difficulties around using video consultations with patients with cognitive impairment:

"…we're both looking at a picture of ourselves [over a video call] and if that was somebody with dementia seeing somebody they wouldn't recognise…That could be really disorientating or disruptive." (Patient 1, 54-59yrs, NHS Ayrshire & Arran).

(iii) Sub-theme: Psychosocial characteristics

Mobility

Both pharmacists and patients recognised the benefit of video consultations for those patients who cannot leave their home due to limited mobility or other responsibilities:

"I think you would get a young mother with a young child who would be happy to phone and say 'I can't leave the house just now'…you'd get the same with the older person who would say I'm not fit enough to go out who would use it." (Patient 6, 78+, NHS Ayrshire & Arran).

Confidence

The majority of patients felt confident in their ability to communicate remotely, however one patient living with the effects of a head injury worried about going "*…off in a tangent, it [brain injury] can put me off talking to someone" (Patient 9, 60-65yrs, NHS Ayrshire & Arran).*

Although two pharmacists were unsure of how confident patients would be using the technology for video consultations, all patients felt confident, with two relating their confidence to using this type of technology during the COVID-19 pandemic. However, one patient highlighted that they may lose some confidence as they get older and technology advances.

Awareness and demand

Five pharmacists reported a lack of patient demand for video consultations both during and after the COVID-19 pandemic, with a sense that patients want face-to-face or telephone consultations:

"…coming out of the pandemic there's a lot of requests to be physically seen…people like to see somebody face-to-face, they like to have that interaction…I'm not sure patients on video count it as being seen" (Pharmacist 1 working in both settings, 11yrs qualified, NHS Greater Glasgow and Clyde, and NHS Highlands)

However, the majority of patients were unaware that video consultations are available to use with a pharmacist at all:

"I'm surprised… I am in regular contact [with the pharmacy]…we've had a lot of interaction and it's never been something that anyone's raised." (Patient 4, 60-65yrs, NHS Lothian).

Similarly, the majority of patients were unaware that pharmacists work in general practice.

Relationships and continuity

There were mixed opinions from pharmacists around using video consultations to speak to a new patient versus a patient that is already known to them. For the majority, it was the norm to speak to new patients every day:

"I work in a really busy community pharmacy…I see new people most days. Although we have a lot of regular patients, the majority I would say…I haven't met before so it doesn't faze me" (Community pharmacist 2, 19yrs qualified, NHS Grampian)

However, there was a sense from other pharmacists that using video consultations with patients they already know would be easier due to potentially more trust and less awkwardness.

<u>Patient health concern</u>

All participants were asked which health concerns they thought could be discussed and addressed over video consultations. Both participant groups put forward more concerns as appropriate for assessing over video consultations, than those they deemed as less appropriate for discussing over video consultation (Figure 6.5). However, there were more differences than commonalities between what health concerns patients and pharmacists felt were appropriate to assess over video. Although skin concerns were identified as suitable by the majority of participants, two pharmacists expressed concerns around image quality over video, as a *"…rash might be difficult to see…it depends on the definition of the screen and the pixels" (General practice clinical pharmacist (GPCP) 2, 9yrs qualified, NHS Lanarkshire).*

Similarly, opinions differed on the suitability for asthma reviews, with one pharmacist feeling it would only be appropriate for follow-ups:

"…if I've already seen them and I've done an inhaler or something like that, the follow up consultation could very easily be on a video consultation." (Pharmacist 3 working in both settings, 20yrs qualified, NHS Greater Glasgow & Clyde).

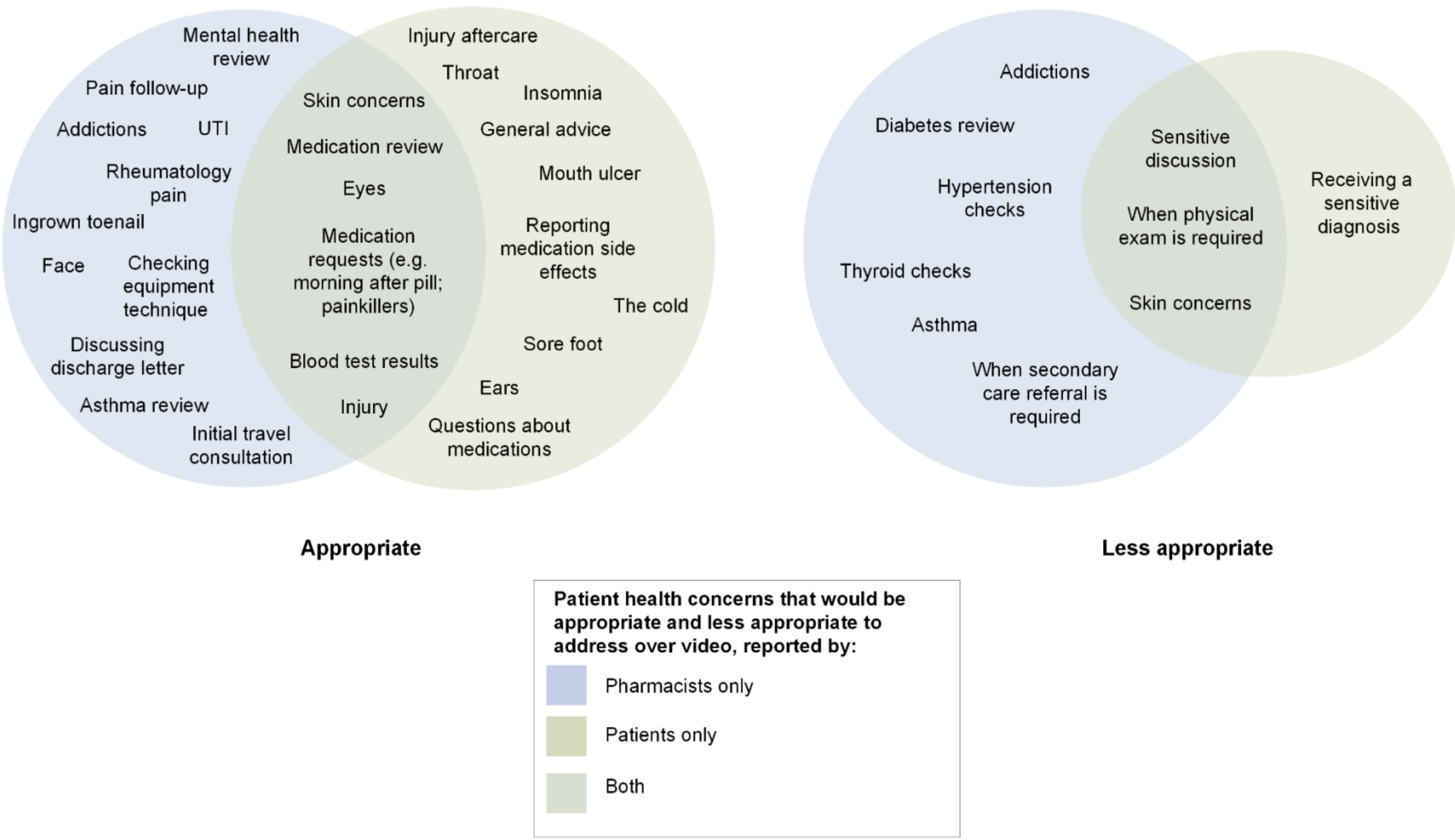


Figure 6.5: Patient health concerns that would be appropriate and less appropriate to address over video consultations

Convenience
For patients, the most commonly cited convenience factors related to not having to travel to the pharmacy in person, and worry about things such as: costs and finding a parking space; not having to take time off work to visit the pharmacy; and, for those with limited mobility, not having to leave their homes (See Figure 6.6 for patient convenience factors reported by patients and pharmacists).

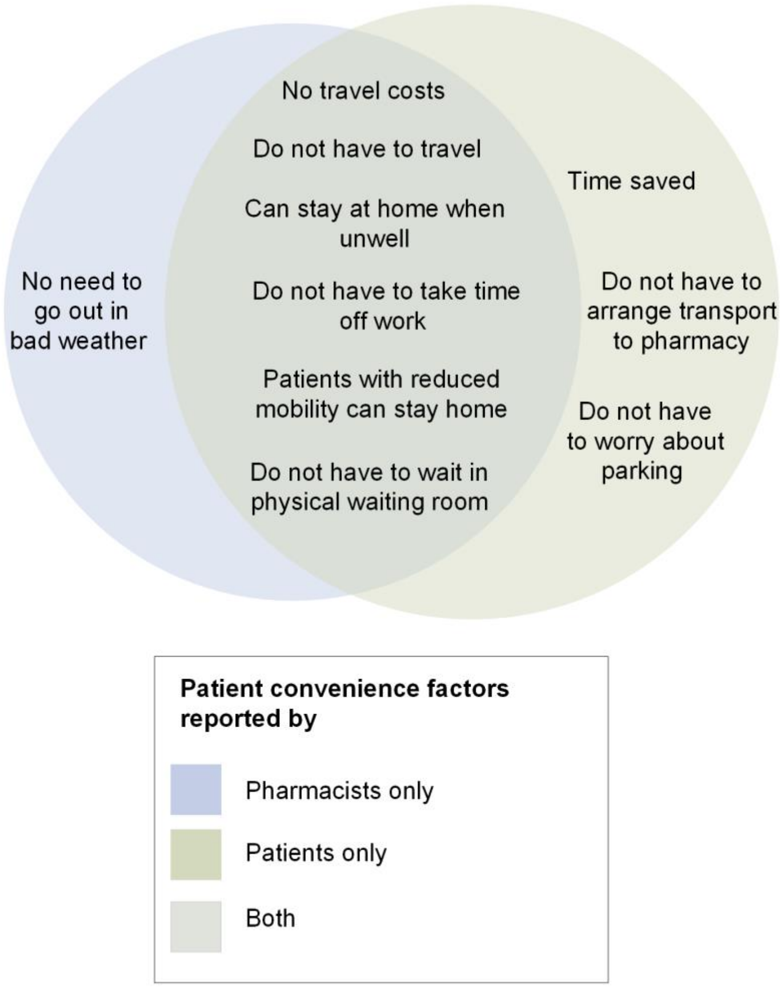


Figure 6.6: Patient convenience factors reported by patients and pharmacists

6.4.3.2 Pharmacist characteristics

All participants were asked if there was anything about themselves or the other participant group that would influence their choice to use video consultations, which led to a series of characteristics being cited. Figure 6.7 illustrates the type of pharmacist for whom video consultations may or may not be suitable. The examples were developed using the commonly cited characteristics described in section 6.4.3. Note that these are examples designed to illustrate some of the characteristics mentioned, and the sub-themes which will be discussed in detail below with illustrative quotes.

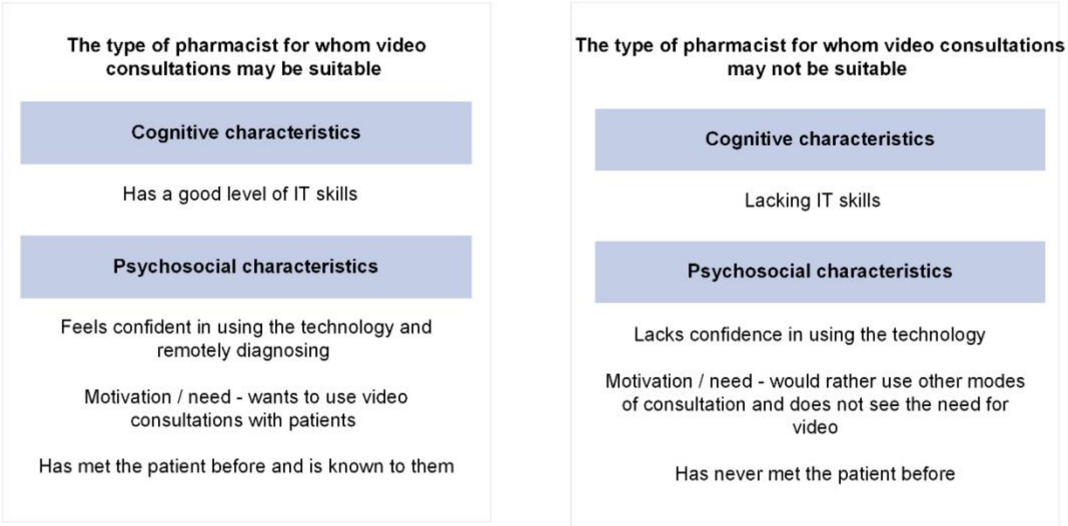


Figure 6.7: The type of pharmacist for whom video consultations may or may not be suitable

(i) Sub-theme: Cognitive characteristics

IT and clinical skills/abilities

Patients expected pharmacists to have the IT and clinical skills necessary for using video consultations, and the majority of pharmacists confirmed this:

"I would be quite happy to… I have experience of Teams© and Zoom©. I think the challenge would be for some…who haven't had the same exposure to it." (Community and general practice pharmacist 3, 20yrs qualified, NHS Greater Glasgow & Clyde).

However, two pharmacists expressed concerns about not having the skills to overcome certain IT issues such as loss of internet connection.

(ii) Sub-theme: Psychosocial characteristics

Motivation and need

Although some pharmacists said that they have had no need to use video consultations, even in remote areas of Scotland, others would like to use it going forward and driven by patient choice, as one General Practice Clinical Pharmacist (GPCP) explains:

"My choice about using them is solely driven by patient choice, so if the patient chooses it I have to do it" (GPCP 5, 20yrs qualified, NHS Fife).

Others felt there was no need for video consultations when telephone is available, as the process was perceived as much easier.

Confidence

Although the majority of pharmacists felt confident in their ability to use the technology, one pharmacist felt they would have been more confident if they had been exposed to it for longer pre-COVID-19 pandemic. On the other hand, when asked about their confidence in making diagnoses remotely, one pharmacist explained that this "*…would depend on conditions... and my confidence in dealing with those conditions" (Community pharmacist 5, <1yr qualified, NHS Grampian).*

Relationships and continuity of care

Patient opinions around speaking to a pharmacist they know versus one they do not know over video consultations were fairly evenly split, with some feeling speaking to an unfamiliar pharmacist would be fine as this was perceived as often the norm within healthcare:

"Nowadays you tend not to know the medical people, it's rare to get the same person again in any situation" (Patient 2, 48-53yrs, NHS Forth Valley).

Difficulties around seeing the same pharmacist were compared to the challenges faced when seeking consultations with GPs:

"…the problem is that if you want to see the same pharmacist again… might have the same problem as you do trying to see a GP…you're waiting two or three weeks for an appointment." (Patient 3, 30-35yrs, NHS Greater Glasgow & Clyde).

Three patients preferred the idea of already knowing the pharmacist as there would be a sense of trust. However, for others, their preference depended on whether the issues they needed addressed were acute, or whether it was for a chronic or more serious issue.

<u>Convenience</u>

For pharmacists, the most commonly cited convenience factors related to: reducing foot fall and infection risk, especially during the COVID-19 pandemic; not having to travel to patients' homes for consultations or to a central location for staff training; and, being able to get through patient appointments more quickly. On the other hand, the most commonly cited inconvenience factors related to: the lack of administrative support to set up appointments; and, the amount of time spent setting up the technology, which was also recognised as an inconvenience by patients. See Table 6.5 for illustrative quotes on these factors that affect the convenience and inconvenience of video consultations.

Table 6.5: Convenience and inconvenience factors for pharmacists

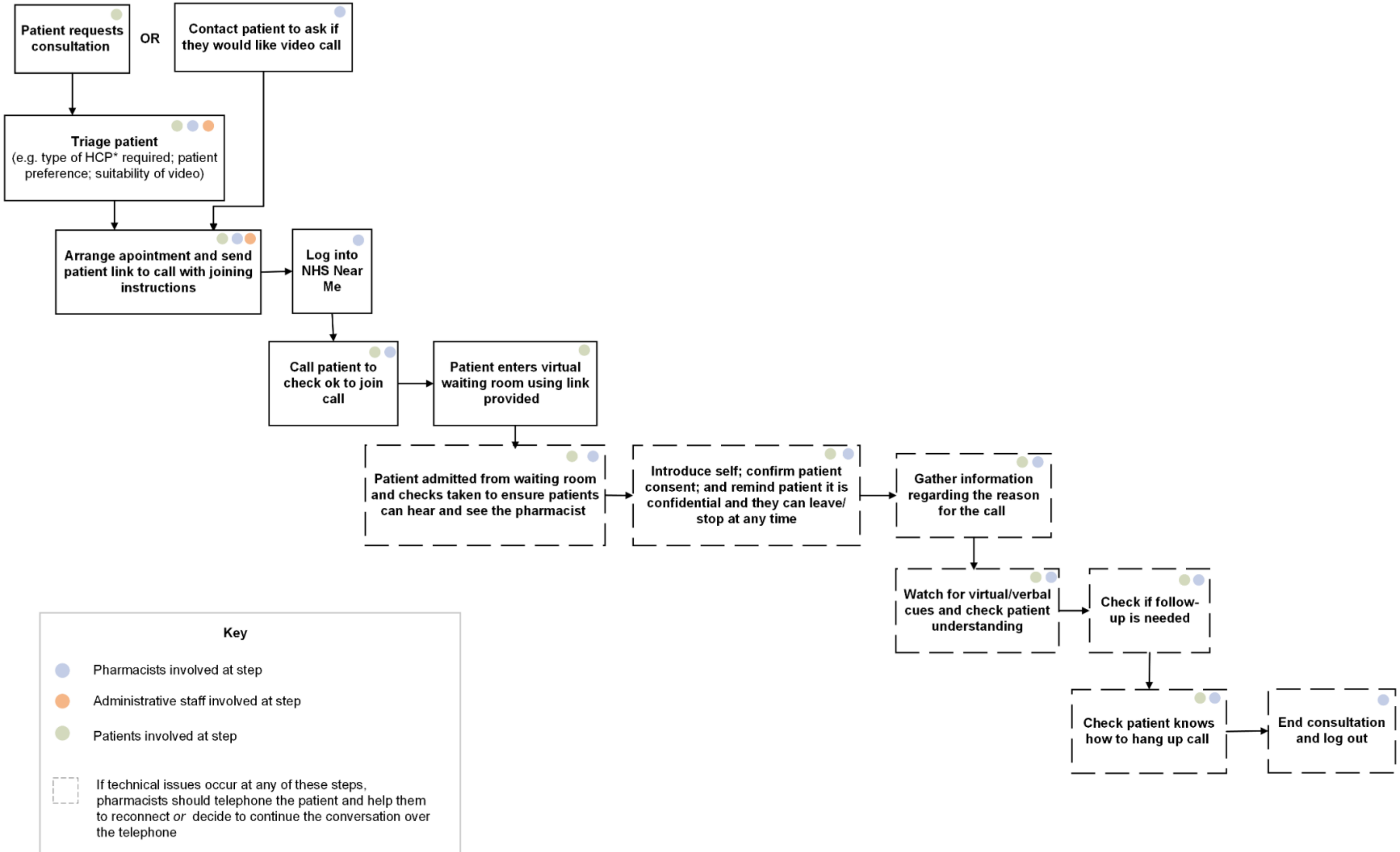
Convenience factors	**Illustrative quote**
Remote working	*"…very handy for me if I'm working from home, it's very convenient" (GPCP 2, 9yrs qualified, NHS Lanarkshire)*
Pre-planned appointments	*"There is a benefit to knowing when you have people coming in, if at a moment in time everything goes mad and you have a big queue, then you know, yes, it's very convenient to be able to plan your workload" (Community pharmacist 2, 19yrs qualified, NHS Grampian)*
Seeing patient face-to-face	*"It's very convenient for pharmacy as well, because there is a huge advantage to seeing a patient face-to-face versus on the phone" (Community pharmacist 6, 24yrs qualified, NHS Dumfries & Galloway)*
Quicker consultations	*"it would save a lot of time as well, it would get through patients a lot quicker" (Community pharmacist 5, <1yr qualified, NHS Grampian)*
Reduces travel	*"I'm not having to drive to the patients house as well as the carer, but we're getting the same output from it" (GPCP 6, 20yrs qualified, NHS Orkney)*
Reduces foot fall and infection risk in pharmacy	*"For ourselves as healthcare professionals there is benefit in terms of still with COVID in mind they [patients] aren't having to come down to the health centre, to a busy waiting area" (GPCP 8, 15yrs qualified, NHS Greater Glasgow & Clyde)*
Inconvenience factors	
No procedure for using video consultations	*"It would be convenient once set up or if there is a general procedure to do it but given that it's not set up or there is nothing in place, it would be quite inconvenient initially" (GPCP 9, 1.5yrs qualified, NHS Lanarkshire)*
No administrative support	*"It's fine when you've got that admin support but without that it's not convenient enough to use" (GPCP 6, 20yrs qualified, NHS Orkney)*
Time to set up	*"…in the time it takes to make a call, initiate a consultation, could you actually have done that over the phone" (Patient 4, 60-65yrs, NHS Lothian)*

6.4.4 Theme 2: Tasks

For this study the *tasks* theme was defined as a description of the characteristics of *tasks* undertaken by a person, and may vary in difficulty, complexity, ambiguity, sequence, or variety (adapted from SEIPS 2.0 literature (110)). The three main sub-themes found were: *the steps involved in video consultations; ease of steps or process; and potential for consultations.*

(i) Sub-theme: The steps involved in video consultations

When asked about their knowledge of the steps/process involved in having a video consultation, 63.2% (n=12) of pharmacists and 28.6% (n=4) of patients were able to comment. The series of 14 steps reported by these participants were used to develop a process map, illustrating the tasks involved for patients, pharmacists, and administrative staff (see Figure 6.8). Additionally, four pharmacists added that it is a *"…similar process to what we do for a face-to-face consultation" (Community and general practice pharmacist 2, 8yrs qualified, NHS Grampian; NHS Highlands)*.



**HCP = Healthcare professional*

Figure 6.8: The steps involved in video consultations

(ii) Sub-theme: Ease of steps or process

Pharmacists expressed their opinions around how easy they felt Near Me - the video consultation software used in Scotland - was to use. Although some felt *"there's just too many steps to it…you shouldn't need to read an instruction manual to be able to work it" (GPCP 6, 20yrs qualified, NHS Orkney)*, others felt the process was easy enough to use, however expressed concern for patients:

"Near Me is really quick to log into and everything. So for me, it doesn't really add anything to my workload…It's more the patient side, just making sure they're all set up" (GPCP 7, 5yrs qualified, NHS Lothian)

(iii) Sub-theme: Potential for consultations

Pharmacists spoke about the potential for video consultations to be used for certain tasks and questioned whether the consultations could be recorded. See Table 6.6 for examples provided by pharmacists on the types of consultations that would be suitable for video consultations.

Table 6.6: Potential for video consultations

Potential for consultations	**Illustrative quotes**
Triage	*"It could be a way of triaging a little bit, seeing if it's something that you need to see face to face or not" (GPCP 8, 15yrs qualified, NHS Greater Glasgow & Clyde)*
Contacting an interpreter	*"So the patient was with me in the consultation room, but there was an interpreter present over Teams©. Like it was a video call…that was really handy" (GPCP 9, 1.5yrs qualified, NHS Lanarkshire)*
Initial travel health consultation	*"…quite a lot of community pharmacies do travel health and could do that over video, do the initial consultation and then get them in for the physical vaccinations" (Community and general practice pharmacist 2, 8yrs qualified, NHS Highland)*
Follow-up	*"I have patients that will travel maybe 12 or 15 miles to see me, do you really need them to come back again? Possibly not…a quick catch up on a video consultation would save them that huge journey" (Community pharmacist 6, 24yrs qualified, NHS Dumfries & Galloway)*
Recording of video consultations	*"I don't know if these video consultations are recorded, I would kind of hope they are so that you could go back as a pharmacist to check what they've said in case you've missed something" (Community pharmacist 2, 19yrs qualified, NHS Grampian)*

6.4.5 Theme 3: Tools and technologies

For this study the *tools and technologies* theme was defined as objects that people use to do work or that assist people in doing work. This can include IT as well as physical tools and equipment (adapted from SEIPS 2.0 literature (110)). Five main sub-themes were found: *essential tools and technologies; additional tools and technologies that may help; patient guidance or support; benefits and challenges of video; and security and reliability of the video consultation software/platform.*

(i) Sub-theme: Essential tools and technologies

The first sub-theme was around the *tools and technologies* that patients and pharmacists considered essential for being able to use video consultations (see Figure 6.9 for a word cloud, where the largest words indicate the most frequently mentioned). Participants identified 19 essential *tools and technologies*, with a camera being the most cited technology (n=17), followed by mobile phone (n=16) and internet (n=15). Several *tools and technologies* were only mentioned by one participant, which included keyboard, mouse, screen sharing facilities, and a screen reader for visually impaired patients.

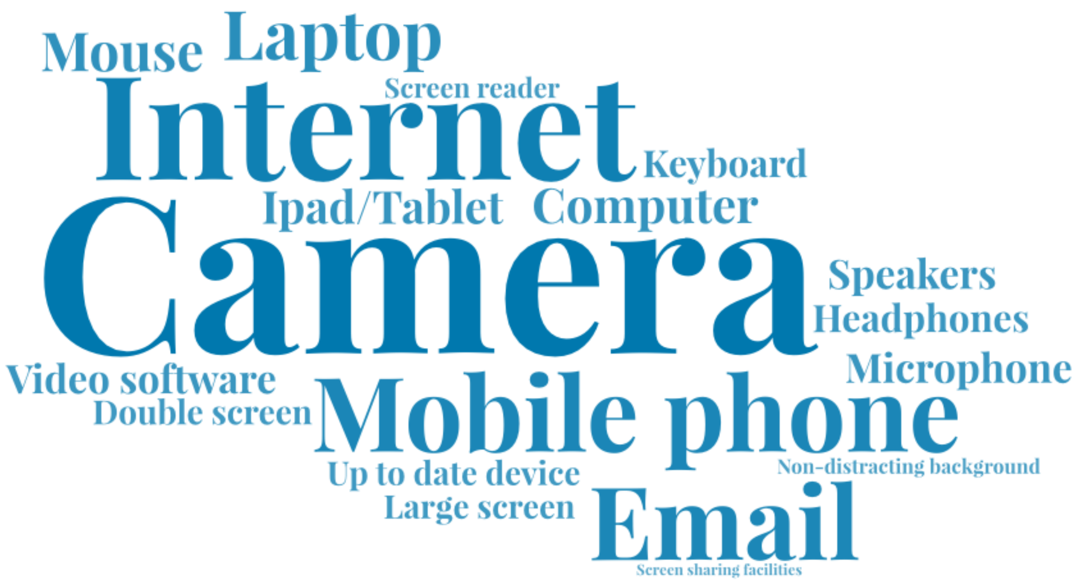


Figure 6.9: Technologies and tools specified by pharmacists and patients as essential for video consultations

(ii) Sub-theme: Additional tools and technologies that could help

The second sub-theme concerned *tools and technologies* which participants felt were not essential but could help them to use video consultations (See Table 6.7 for the *tools and technologies* participants suggested may help them to use video consultations, however are not essential). Participants identified eight additional *tools and technologies*, with the most commonly cited being suggestions for an electronic booking system and the use of headphones.

Table 6.7: Additional tools and technologies that could help participants to use video consultations

Additional tools and technologies	Illustrative quotes
For patients	
Appointment reminders	*"…it might be a good tool if you had a prompter of some sort…like when you make an appointment you have the phone alarm" (Patient 9, 60-65yrs, NHS Ayrshire & Arran)*
Keyboard	*"…a keyboard is not essential but it's nice to have…if I had a box of drugs in front of me and couldn't pronounce it I could type the drug name into the chat" (Patient 14, 54-59yrs, NHS Western Isles)*
Collar speakers	*"…I'm using a collar speaker, a speaker you wear around your neck…it's a lot easier because I'm hearing impaired, it's a lot easier controlling the volume. I can't use headphones as they trigger a migraine…[the collar speaker] is not essential but it certainly makes things easier." (Patient 13, 60-65yrs, NHS Lanarkshire)*
Auto-transcript	*"…if you could generate a transcript then they [patients] would have a copy of what you said because a lot of the time I feel like I'm telling people to write it down because they won't remember…they can refer back." (Community pharmacist 5, <1yr qualified, NHS Grampian)*
Electronic booking system	*"…I want to go online and be able to pick a slot that suited me, have a calendar that says there's 14 slots in this hour, rather than have to make a call" (Patient 4, 60-65yrs, NHS Lothian)*
For pharmacists	
Second screen	*"…if we could have two screens so we can see the patient on one and make notes on the other screen if that's possible." (GPCP 9, 1.5yrs qualified, NHS Lanarkshire)*
Patient equipment	*"For asthma, patients having their inhalers and a peak flow meter…a lot of the time people come to their appointments and don't have their inhalers. So that would be a benefit from being at home because they would have it in hand." (GPCP 3, 7yrs qualified, NHS Lothian)*
For both patients and pharmacists	
Headphones	*"Probably headphones would be very handy. I have headphones but not all patients will…it screens out noise if children are running about…I think if people could have headphones that would be a massive help." (GPCP 2, 9yrs qualified, NHS Lanarkshire)*

(iii) Sub-theme: Patient guidance or support

The third sub-theme related to the availability of support or guidance for patients using video consultations. Although pharmacists were aware of existing resources for patients using video consultations some felt more patient guidance was needed, and provided suggestions on how to support patients using video consultations:

"…a nice NHS Video, a simple animation on how to use the software on YouTube© or somewhere like that…give them a step by step easy to follow guide…if you embedded a video where there's already an existing app or within the NHS app" (Pharmacist 3 working in both settings, 20yrs qualified, NHS Greater Glasgow & Clyde).

(iv) Sub-theme: Benefits and challenges of video

The fourth sub-theme relates to the benefits and challenges for patients and pharmacists when using video consultations (See Figure 6.10 for commonalities and differences between participant groups). The most commonly cited benefit for pharmacists was *"Being able to see your patient…you get a lot of visual signals when dealing with somebody who is unwell" (Community pharmacist 3, 35yrs qualified, NHS Forth Valley and NHS Lanarkshire).*

For patients, the most commonly cited benefit related to being able to see the pharmacist on screen as *"…it helps if you could see somebody to explain things" (Patient 2, 48-53yrs, NHS Forth Valley)*. This was especially important for one patient living with a hearing impairment:

"I wear deaf aids… if it's on a video it's better because you can actually see the person that you're talking to…if I can see somebody I can talk to them, get body language, I know exactly what you're saying" (Patient 6, 78+yrs, NHS Ayrshire and Arran).

On the other hand, the most commonly cited barrier, experienced by both patients and pharmacists, was poor internet signal or connection. Although some pharmacists expressed issues at the pharmacy end with internet connection/signal, others felt the issue was mainly due to poor connections at the patient's end. However, the majority of patients felt their internet connection/signal was not a problem, although did recognise that this isn't the case for all.

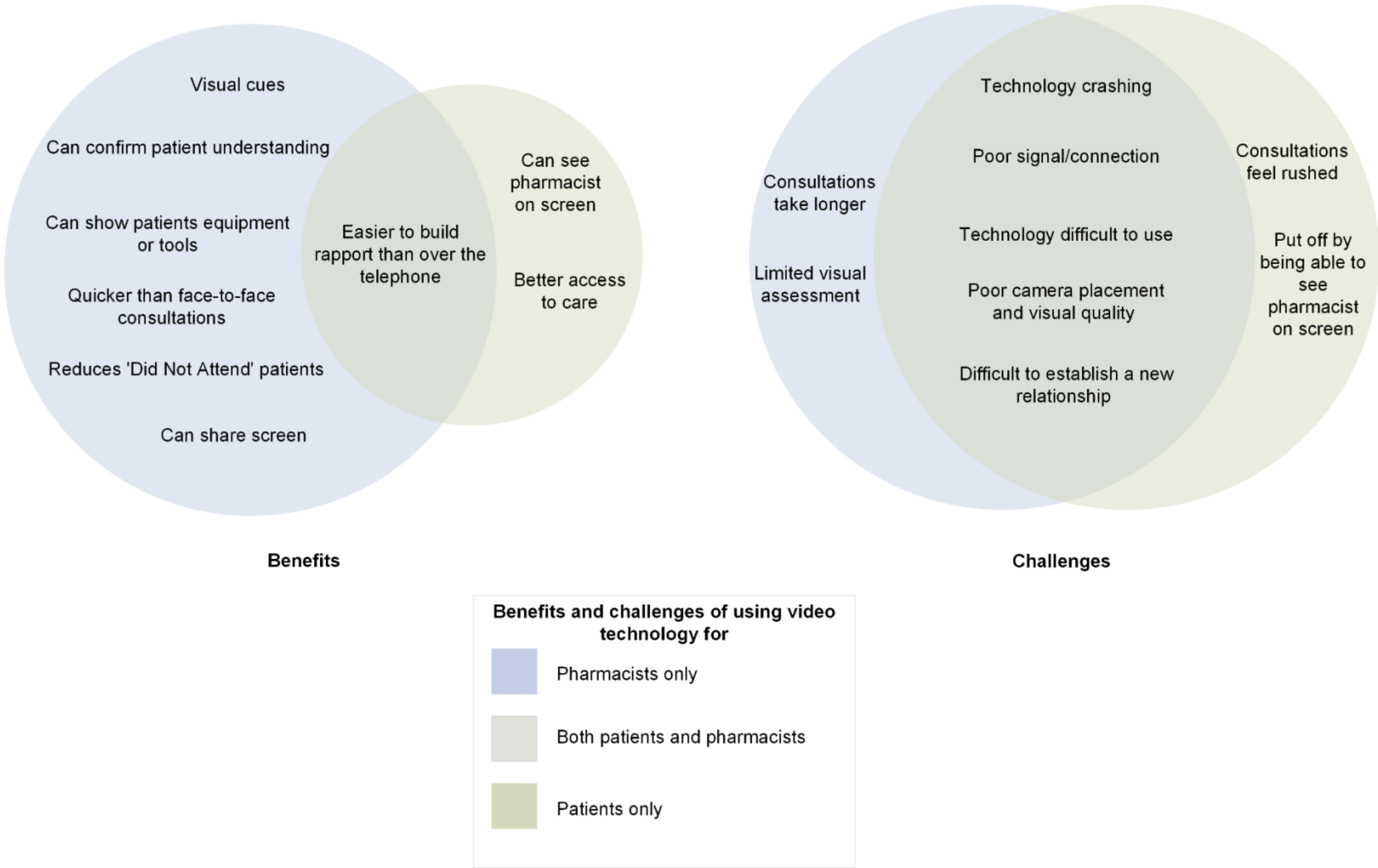


Figure 6.10: Benefits and challenges of using video consultations for each participant group

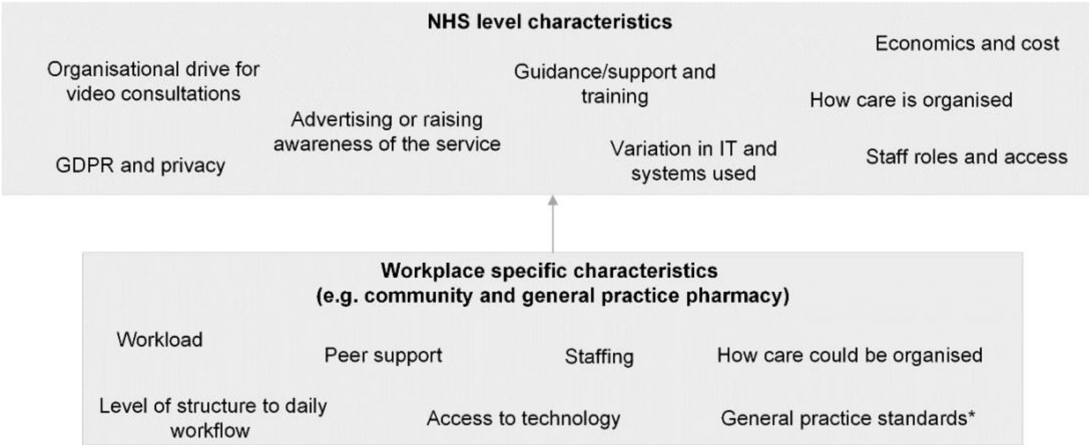
(v) Sub-theme: Security and reliability of the video consultation software/platform

The fifth sub-theme relates to concerns around the security and reliability of video consultation software. Pharmacists expressed the importance of, and concerns around, the security and reliability of the video consultation software/platform in order to protect patient confidentiality, and felt they needed to know more about the security before using. Additionally, one pharmacist who set out to use video consultations described an experience which made them question the security of their NHS-endorsed platform:

"I ended up joining somebody else's consultation with another patient, which is weird and I don't know what happened. It put me off because it didn't feel very secure. I contacted IT and they didn't know what happened, they said nothing happened according to the audit trail, but I clearly went into somebody else's consultation…I don't really fancy using this system if that's going to happen in the future" (GPCP 2, 9yrs qualified, NHS Lanarkshire).

6.4.6 Theme 4: Organisation

For this study, the *organisation* theme was defined as the structures external to a person (but often put in place by people) that organise time, space, resources, and activity. For patients this includes: communication infrastructure; living arrangements; family roles and responsibilities; work and life schedules; interpersonal relationships; culture; social norms and rules; financial and health-related resources. Within institutions, *organisation* factors can be characteristics of: work schedules and assignments; management and incentive systems; organisational culture; training, policies; and resource availability (adapted from SEIPS 2.0 literature (110)).The three main sub-themes include: *NHS level organisational characteristics; specific workplace (community and general practice) characteristics; and, patients' organisational characteristics.* See Figure 6.11 for an overview of the NHS and workplace specific characteristics.



** characteristic relevant to general practice pharmacy only*

Figure 6.11: NHS and workplace specific characteristics

(i) Sub-theme: NHS level organisational characteristics

There were eight characteristics within the NHS level organisational sub-theme, including: organisational drive for video consultations; guidance/support and training; economics and cost; variation in IT and systems used; General Data Protection Regulation (GDPR) and privacy; staff roles and access; advertising or raising awareness of services; and, how care is organised.

<u>Organisational drive for video consultations</u>
Although pharmacists recognised that the NHS views video consultations as having a place in healthcare, they also expressed that there is no push or encouragement to do this from above. Moreover, pharmacists were aware that they would need agreement from the NHS as an organisation if choosing to use video consultations due to organisational requirements:

"…you can't go rogue and decide just to do that [use video consultations], it's got to tie into the wants and needs of your team…there's specific activities that are done in agreement with the health board and practices, so it's got to meet their requirements." (Community pharmacist 4, 30yrs qualified; NHS Greater Glasgow & Clyde)

Guidance/support and training

Although the majority of pharmacists had been given access to, or were aware of, training and resources on the use of video consultations, others would like more guidance "*from above as to when they see it [video consultations] as beneficial, probably more importantly when it's not appropriate to do" (GPCP 8, 15yrs qualified, NHS Greater Glasgow & Clyde).* Moreover, pharmacists mentioned having IT support from their health board's IT department, however they experienced difficulties getting a hold of them and emphasised that quick responses from IT departments would be required for future use. Finally, although video was currently being used for training purposes, pharmacists felt it could be used more for peer review activities.

Economics and cost

Funding was a concern for community pharmacists as they had to consider the feasibility of paying extra staff to cover the service while pharmacists were on video consultations, as well as buying the necessary technology:

"…as a contractor we'd be looking at financially is it feasible. So do we need to buy new technology to make it better, do we need to update the technology we've got." (Community pharmacist 6, 24yrs qualified, NHS Dumfries & Galloway).

On the other hand, GPCPs recognised the economical and cost benefits of video consultations as it would reduce travel expenses, with pharmacists no longer travelling to patients' homes. Similarly, video consultations would overcome issues related to running in-person clinics, including heating costs. There was a perception from patients that the motivation for providing video consultations services would be driven by the potential to save or make more money from an organisational perspective.

Variation in IT systems endorsed by the NHS

Both pharmacists and patients emphasised the need for video consultations to take place on the same platform nationally, as they recognised there are a plethora of ways to communicate over video online. Additionally, there was a sense from pharmacists that the organisation would need to advocate for a single sign-in system and a cohesive approach nationally:

"…if anything makes the set up and utilisation more convoluted…we now have a single sign in with our organisation so our sign into our computer is the same username and password as for email, as for teams. But it's not the same for Near Me." (GPCP 6, 20yrs qualified, NHS Orkney)

Finally, pharmacists emphasised that the organisation would have to ensure the process of recording consultation outcomes in community pharmacy are standardised and match those used in general practice.

<u>General Data Protection Regulation (GDPR) and privacy</u>
Pharmacists and patients both mentioned the NHS's obligation to comply with GDPR, and had concerns around accessing and holding patient information such as email which is required to send out the video consultation link. Additionally, pharmacists worried about their own professional vulnerability over video consultations:

"…some people are afraid of putting yourself out there and being vulnerable…some patients when you're having difficult conversations might take that image so you feel a bit vulnerable…and we all know patients will put things on social media…so how do you protect your teams?" (Community and general practice pharmacist 1, 11yrs qualified, NHS Greater Glasgow & Clyde; NHS Highlands)

<u>Staff roles and access</u>
There was a sense from both participant groups that pharmacists are easier to access than GPs. One pharmacist related this to the delivery of the Pharmacist First Plus service in Scotland – where pharmacists with independent prescribing qualifications can provide additional support to patients with acute conditions.

"…an IP [independent prescriber] said patients are coming from far and wide to access Pharmacy First Plus because they know he's a prescriber and they can get an appointment with him quicker than they could get a GP appointment." (Community pharmacist 6, 24yrs qualified, NHS Dumfries & Galloway)

There were suggestions from a community pharmacist that video consultations could be conducted by not only pharmacists but technicians too as they are highly skilled and often answer patient queries in-person in the pharmacy or over the telephone.

Advertising or raising awareness of service

Patients spoke about the lack of advertising of video consultations in pharmacy, with some saying they would not know how to contact a pharmacist to arrange one. Those in regular contact with a pharmacy were surprised that video consultations had never been mentioned or offered by a pharmacist and made suggestions for advertising including: letters; posters or leaflets in pharmacy; text messages; advert on prescription slip; pharmacy website; television; advert on tv screen in general practice; radio; pharmacy Facebook© page; and general Facebook© adverts. Pharmacists reflected on the lack of advertisements:

"I can't say that I've been anywhere where I've been aware they've been making it known that it's an option. So how do the public know about it?" (Community pharmacist 3, 35yrs qualified, NHS Forth Valley; NHS Glasgow)

How care is organised

One pharmacist felt that asking patients to use their mobile phone data or internet for video consultations would go against the principles of free healthcare in NHS Scotland. For patients, the current in-person collection of prescriptions was seen as a barrier to the uptake of video consultations, unless a delivery service could be offered:

"…the only negative side about not being there is that if you need different medication you would then have to go out and get it as opposed to being there to get it…you have to make the journey there later." (Patient 2, 54-59yrs, NHS Ayrshire & Arran)

Furthermore, patients questioned whether the video consultation service would be delivered by individual local pharmacies, or by a central hub which connected patients to any available pharmacist in Scotland. There was a sense that a centralised service would result in quicker access.

(ii) Sub-theme: Workplace specific organisational characteristics

There were seven characteristics within the workplace specific organisational sub-theme. Six were common to both community and general practice pharmacy:

workload; peer support; access to technology; level of structure to daily workflow; staffing; and, potential structure for video consultations). The one additional characteristic for general practice pharmacy was around general practice standards.

Workload

Both patients and pharmacists mentioned that *"…community pharmacy is such a busy high workload area at this moment in time" (community and general practice pharmacist 3, 20yrs qualified, NHS Greater Glasgow & Clyde)*. Although community pharmacists recognised that video consultations could help with workload, they also raised concerns around fitting them around other daily tasks, including patients walking in seeking care/advice. In contrast, the majority of GPCPs did not perceive workload as a barrier to using video consultations in the future, as often they *"have ring fenced clinic time so it's not really a time burden" (Community and general practice pharmacist 2, 8yrs qualified, NHS Grampian; NHS Highland).*

Level of structure to daily workflow

The majority of pharmacists expressed that *"community pharmacy tends to be quite ad hoc in that people are just coming in off the street…it's unscheduled care" (Community and general practice pharmacist 2, 8yrs qualified, NHS Grampian; NHS Highlands).* Therefore, pharmacists are unable to predict their daily workload and availability to offer scheduled times for video consultations. In contrast, daily workflow for the majority of GPCPs was more scheduled than in community pharmacy, as appointments are already booked in advance for set clinic times. However, this was not the case for all, as two GPCPs reported their case load as being ad hoc, *"…in response to everything that turns up on that day" (GPCP 5, 20yrs qualified, NHS Fife).*

Peer support

Pharmacists reported a lack of peer support in community pharmacy in comparison to general practice as community pharmacists are often the sole clinician within the community pharmacy setting. However, one community pharmacist recognised the potential for video technology to *"…help pharmacists not feel so alone and to feel valued" (Community pharmacist 1, 35yrs qualified, NHS Lothian)* as they could use video to chat to other pharmacists on breaks about any concerns or issues that have been going on in the pharmacy. In contrast, GPCPs felt working as part of a larger team made peer support easier as colleagues were good at sharing, providing support, and facilitating regular peer reviews. Pharmacists recognised the potential for peers with experience of video consultations to demonstrate how to use the technology.

Staffing

The majority of community pharmacists reported issues with staffing as a barrier to using video consultations. For video consultations to work they would require more than one pharmacist to be working in the pharmacy in order to cover remote and in-person services, which was rare:

"…you might have people already in a queue…do you drop those and say 'sorry I've got a video consultation'…it would sit better in pharmacies that have two pharmacists so the pharmacy can keep running while you're doing video consultations, and you can stick to the time because that would be better for the patients too" (Community pharmacist 2, 19yrs qualified, NHS Grampian)

Community pharmacists also mentioned that *"not a lot of pharmacies have a regular pharmacist" (Community and general practice pharmacist 1, 11yrs qualified, NHS Greater Glasgow & Clyde; NHS Highland)* and emphasised that not every locum would be happy to provide video consultation services, partly due to lack of experience. In contrast, only three GPCPs cited staffing as a barrier. In one practice, the lack of staff means pharmacists are *"…not running clinics, which is what Near Me lends itself really well to" (GPCP 5, 20yrs qualified, NHS Fife)*. Moreover, they highlighted the need for administrative staff within the practice to assist with setting up appointments, which is in contrast to the community pharmacy setting in which there are typically no administrative staff present.

Access to technology

The majority of community pharmacists reported not having access to the necessary technology for video consultations, as although some had access to computers *"most pharmacies don't have cameras, so you'd be using your phone (Community pharmacist 3, 35yrs qualified, NHS Forth Valley; NHS Greater Glasgow & Clyde).* Two GPCPs reported similar issues with accessing cameras in particular.

How care over video could be organised

Suggestions on how video consultations could work in community and general practice pharmacy varied, although there was a shared sense that appointments via video consultation would have to be scheduled rather than ad hoc. Community pharmacists felt *"…giving control to the community pharmacy teams is a vital part" (Community and general practice pharmacist 3, 20yrs qualified, NHS Greater Glasgow & Clyde)* as if patients could book themselves in online it may become difficult for the pharmacy to manage and could result in a full day of video appointments. Similarly, GPCPs preferred the idea of having a mix of video consultations, face-to-face and telephone appointments so *"…you're not just sitting at your desk for a long period of time looking at a screen." (GPCP 1, 32yrs qualified, NHS Lanarkshire).*

General practice standards

General practice pharmacists recognised that they would need to seek authorisation from their practice managers before embarking upon or adopting video consultations. The general practice policies and procedures would also need to be consulted. Those working across multiple practices recognised difficulties when practices felt differently about video consultations as *"…one might say we're all for it crack on, and another might say we're not keen we don't think it's appropriate…not sure it's something we want you to do" (GPCP 8, 15yrs qualified, NHS Greater Glasgow & Clyde).*

(iii) Sub-theme: Patient organisational characteristics

There were five characteristics within the patient organisational sub-theme, including: living arrangements; understanding of the role of pharmacy; financial aspects; access to the necessary technology; and social circle.

Living arrangements

Both patients and pharmacists recognised that video consultations would not be appropriate if patients had children or other family members in the background of the consultation. Where others might be present, pharmacists felt it would be important to confirm that the patient would be happy and feels safe enough to speak as *"…a big influence on what a patient says is often based on who is in the room" (GPCP 7, 5yrs qualified, NHS Lothian).* Additionally, GPCPs spoke about video consultations potentially being useful for patients living in care homes, as that is where GPs working in the same practice initially started using it.

Understanding of the role of pharmacy

Pharmacists felt that video consultations would increase the profile of pharmacy if patients could speak to a pharmacist, as there was a perception that currently the public do not understand what pharmacists do. In line with this, the majority of patients were *"…not sure what services a pharmacist can offer…is allowed to offer" (Patient 3, 30-35yrs, NHS Greater Glasgow & Clyde)* in comparison with other healthcare providers such as GPs, and therefore felt more guidance was needed.

Financial aspects

Both patients and pharmacists mentioned the benefit for patients saving money on fuel or transport to visit the pharmacy in-person, if consultations were done over video. However, both groups were also aware that those with a lower socioeconomic status were less likely to own or be able to afford the necessary tools or technologies:

"Lots of people might have burner phones where they don't have video capacity on it, as well as they're on pay as you go. If you're working with people who have got more financial stressors, less affluent…[internet] data is a big thing because it costs" (GPCP 10, 22yrs qualified, NHS Greater Glasgow & Clyde)

Additionally, patients raised concerns around having to finance any upgrades to their technology in the future to allow them to use video consultations, as often the technology is expensive.

Access to the necessary technology

Patients and pharmacists recognised the importance of patients having access to the necessary technology and highlighted that some patients *"…don't have the technology in order to do it [take a video consultation]" (GPCP 1, 32yrs qualified, NHS Lanarkshire).* Nevertheless, pharmacists recognised the potential for patients without access to technology to use free IT facilities within local libraries.

Social circle

Although some patients were aware of video consultations because of word of mouth and knew that speaking about video consultation services in social circles would encourage friends to also use it, one patient highlighted that men are less likely to bring it up in conversation:

"…the old and simple reason that men don't talk too much about the whole healthcare thing. So even if you had that kind of knowledge of video consultations, I doubt it's something that you would bring up" (Patient 3, 30-35yrs, NHS Greater Glasgow & Clyde)

6.4.7 Theme 5: Internal Environment

For this study the *internal environment* theme was defined as the physical environment that you work in/take the consultation in, and includes lighting, noise, vibration, temperature, physical layout, available space, and air quality (adapted from SEIPS 2 literature (110)). There were two main sub-themes for all participants: *availability and suitability of space to take video consultation, and privacy of the space.*

(i) Sub-theme: Availability and suitability of space to take video consultation

All community pharmacists said they had access to a consultation room, however those rooms varied in terms of number and size of rooms, and were not set up adequately for video consultations as often *"…we don't have any hardware of software in those rooms…no equipment" (Community and general practice pharmacist 3, 20yrs qualified, NHS Greater Glasgow & Clyde).* Additionally, one pharmacist expressed concerns about background noise from the rest of the pharmacy, however they suggested using a headset to block the noise out.

The majority of GPCPs said they had access to a quiet consultation room or office at work which they could use for taking video consultations. However, some couldn't *"…always guarantee which room I'll have access to on a certain day so it's hard to pre-arrange them [video consultations]" (GPCP 8, 15yrs qualified, NHS Greater Glasgow & Clyde),* as there was no guarantee the space would be suitable in terms of lighting or having the correct set-up. However, as discussed in the organisation theme, not all consultation rooms in their workplace were set up with computers and cameras. Moreover, one pharmacist suggested ensuring the background (virtual or physical) is neutral and non-distracting to the patient.

The majority of patients said they would take the video consultation at home, however others mentioned that they could take them in their car, a community space (e.g. the library) or at their place of work, perhaps booking small meeting rooms or private spaces. All patients felt the space they had available in their home for video consultations was adequately set up with a desk, chair, and technology with video capabilities. However, pharmacists were concerned about poor lighting in the patient's home causing issues with any visual assessment that may be required over camera.

(ii) Sub-theme: Privacy of space

Although pharmacists were concerned about patients not being able to find a quiet and private space to take the consultation, all patients said they would have access to a private room, or could ask family members to leave the room to allow them to have a confidential conversation.

Although the majority of GPCPs had access to a private space, others expressed concerns around the open-plan and hot desking environments they were expected to work in:

"…a hot desking environment is not appropriate to conduct video or telephone consultations…the space is very important for both the patient to feel like they are in a safe space and environment and their confidentiality is maintained but it's also important for the clinician to feel that they don't have to hold back on what to say" (GPCP 6, 20yrs qualified, NHS Orkney)

Patients expressed the importance of knowing that the community pharmacist would be in a private space/room and not taking the video consultation in the middle of the retail space or dispensary. Community pharmacists confirmed that any video consultation would be taken in the private consultation room they have available, however barriers would exist around the suitability of the room set up. For patients suggesting taking the consultation at work, it was important for them to be able to book a room to ensure confidentiality.

6.4.8 Theme 6: External Environment

For this study the *external environment* theme was defined as the macro-level societal, economic, ecological and policy factors outside an organisation. Factors such as the impact of budget and cost on quality of tools/tech used, societal expectations for patient and family preferences; local infrastructure (adapted from SEIPS 2 literature (110)). There were five main sub-themes found: *COVID-19; media; weather; government support and policies; and, the community and its resources.* Figure 6.12 shows the *external environment* sub-themes highlighted by participants. There were mixed opinions on the impact of the COVID-19 pandemic on uptake of video consultations, as pharmacists felt rapid implementation discouraged use. Pharmacists expressed the need for governmental support in providing adequate workspaces for GPCPs, and in raising the public's awareness of video consultations. Finally, participants recognised the potential for using community settings (e.g. libraries/community centres) to set up video consultation facilities, plans for which were put on hold due to the pandemic.

COVID-19

The majority of pharmacists recognised COVID-19 as the main driver for the roll out of video consultations, however rapid implementation of the service meant pharmacists experienced *"information overload" (GPGP 2, 9yrs qualified, NHS Lanarkshire)* regarding video consultations and chose to use the telephone instead. There was a sense that had the service been launched earlier and more gradually that uptake would have been better. Finally, both patients and pharmacists recognised the benefits of COVID-19 encouraging the use of video technology as it has increased familiarity and confidence.

The media

Pharmacists were aware of the impact that the media can have on the uptake of services such as video consultations, and expressed concerns around it:

"…the media doesn't help, they're telling everyone to go to your pharmacy but they're not saying in the advert 'but you might have to wait if they're busy'" (Community pharmacist 2, 19yrs qualified, NHS Grampian)

This added to the unpredictable nature of the service made implementation of video consultations more difficult. Similarly, pharmacists were aware that negative information in the media about video communications could discourage patients from using such services.

Weather

Both pharmacists and patients mentioned the benefit of video consultations during bad weather. Patients, particularly those who were elderly, at risk of falls or potentially road accidents when travelling to the pharmacy in-person, could avoid these risks by speaking to a pharmacist via video. Moreover, patients living in rural areas of Scotland are sometimes unable to attend the pharmacy in-person due to the weather.

"Where I live…it's a peninsula…it can actually be shut if the tides and wind go the wrong way…otherwise you get rocks chucked at your car by rocks in the waves…there are certain things you have to take into consideration living here that you might not have to on the mainland." (Patient 14, 54-59yrs, NHS Western Isles)

Government support

Pharmacists mentioned that more support is needed from the government in providing adequate spaces for pharmacists working in general practice, and secure infrastructure such as reliable internet connections (e.g. broadband in pharmacies). Additionally, pharmacists felt the government need to do more to raise patients awareness of video consultations in pharmacy by engaging with the public:

"…one of the hardest things is getting the public to know what's out there, and public health and Scottish Government have a key role to play in that." (Pharmacist working in both settings 3, 20yrs qualified, NHS Greater Glasgow & Clyde)

The community and its resources

Participants recognised the benefit of video consultations for patients living in remote and rural communities in Scotland, or those who live at a distance from their local pharmacy. Participants also highlighted the importance of considering the level of patient deprivation within the community and the risk of widening the digital divide:

"…people making these decisions don't realise the amount of digital poverty that is around…people are living on £10 a month bundles for their phone or internet and there is absolutely no way they can have a 40 minute conversation on video" (GPCP 1, 32yrs qualified, NHS Lanarkshire)

Both patients and pharmacists spoke about the potential for community spaces to be set up to facilitate video consultations, for example in community centres or libraries. Two pharmacists mentioned having plans to set up services in the community which were stopped due to COVID-19.

Figure 6.12: External Environment sub-themes

6.5 Discussion

6.5.1 Summary of results

This study sought to explore and synthesise the factors influencing use of video consultations, from both a pharmacist and patient perspective. The analysis was conducted to provide an understanding of why video consultations are and are not used in community and general practice pharmacy in Scotland. A total of 33 participants (14 patients, 19 community and general practice pharmacists) took part in semi-structured interviews between November 2022 and March 2023. The data were categorised into themes using the six components of the SEIPS 2.0 Work System as a framework *(person(s), tasks, tools and technologies, organisation, internal environment, external environment)* with data placed under the most proximally related component. Within the *person(s)* theme, both participant groups outlined patient and pharmacist physical, cognitive, and psychosocial characteristics they deemed more or less suited for using video consultations, with psychosocial characteristics being the most commonly cited (Figures 6.2 & 6.3). Both agreed on the majority of patient characteristics deemed more and less compatible with video consultations, whereas for pharmacist characteristics, there was a fairly even split between characteristics reported by both participant groups versus each individually. Within the *tasks* theme, participants outlined a series of 14 steps involved in the video consultation process (Figure 6.8), however only 12 pharmacists and four patients had enough knowledge of the process to comment. Pharmacists had mixed opinions on how easy the video consultation process was, expecting the process to be too difficult for patients, however easy enough for themselves. Within the *tools and technologies* theme, participants outlined a series of *tools and technologies* (Figure 6.9) as being essential for them to use video consultations, with suggestions for other non-essential however potentially helpful, technologies (Table 6.7). Interestingly, there were more reported benefits than challenges to using video technology, for both patients and pharmacists (Figure 6.10). All participants outlined a series of organisational characteristics that influence their use of video consultations, across three organisational levels (Figure 6.11 shows two of these levels). At the patient level, both participant groups highlighted a lack of patient understanding of the role of pharmacy. Moreover, at the NHS level, pharmacists expressed a lack of organisational drive for video consultations, and the need for further guidance on when it is and is not appropriate to use video consultations. Workload, level of structure to daily workflow and staffing were cited by both community and general practice pharmacists, however presented as barriers more often in community pharmacy than in general practice. Moreover, there were differences between the space available for community and general practice pharmacists within the *internal environment* theme, particularly in terms of privacy. Lastly, there were mixed opinions around the impact of the COVID-19 pandemic within the *external environment* theme, however, both community and GP pharmacists agreed that more government support is required to provide workspaces for GPCPs and engage with the public to raise the profile of video consultations in pharmacy. Finally, all participants discussed the potential for private video consultation facilities to be set up in community spaces.

Using the six headings – *person(s), tasks, tools and technologies, organisation, internal environment, and external environment* - derived from the SEIPS 2.0 Work System and utilised for the framework analysis, this discussion reviews the findings in the context of the wider evidence base.

6.5.1.1 Person(s)

Findings within the *person(s)* theme related to the characteristics of the individuals at the centre of the system. Three main sub-themes were found under *person(s): physical characteristics; cognitive characteristics; and psychosocial characteristics.*

i) Psychosocial characteristics

Pharmacists in this study perceived a lack of patient demand for video consultations, however patients expressed that they were not aware the service was available to use with pharmacists. This is consistent with the secondary analysis conducted in Chapter 5 which found that a lack of service demand for teleconsultations was linked to a lack of patient awareness in general practice (69). Furthermore, when assessing the acceptance of video consultations by patients (n=371) in general practice in Germany during the COVID-19 pandemic, Esber et al (2023) found only 8.1% (n=30) of participants had been offered video consultations, and 58.1% (n=215) were not aware it was a possibility. Esber and colleagues go on to state that it is necessary to raise awareness and knowledge of video consultations (215).

All patients (n=14) in this study reported feeling confident in their ability to use video consultation technology. These findings are relatively in line with a survey conducted in Scotland as part of an evaluation of Near Me, which reported 78.7% (n=3167/4025) of patients felt confident in their ability to use video calls (284). Interestingly, pharmacists in this study reported feeling confident in their ability to use video consultation technology, which is not consistent with other published literature on community (300, 301) and hospital pharmacy (300). For example, in MacLure et al's (2018) study assessing the digital literacy and experiences of pharmacy staff, the majority of pharmacists reported a lack of confidence when using IT (300). However, this difference in pharmacists' level of confidence may reflect the timing at which these studies were conducted. For example, during the five year gap between MacLure et al's research and the current study, the COVID-19 pandemic caused the rapid upscaling of digital technologies including video for healthcare, work, and personal/social reasons to minimise the risk of spreading infection (302). Despite only five pharmacists in this study having experience of video consultations with patients, the majority of pharmacists (n=18, 94.7%) had used video for work meetings and professional or life events, which is likely to have been due to pandemic restrictions.

Although all participants suggested more health concerns as appropriate than less appropriate for assessment over video, there were more differences in what health concerns each participant group felt were appropriate versus those they agreed on (Figure 6.5). These differences in opinion may reflect the expansion of video consultation use for a wider range of health concerns during the COVID-19 pandemic (303). Additionally, differences in the range of health concerns may be due to variability in guidance concerning when video may or may not be appropriate, which is discussed within the *organisation* theme. All participants agreed on the suitability of video consultations for health concerns not requiring physical examination, which corroborates the results of the secondary analysis in Chapter 5. As pharmacists are considered medicines experts it is not surprising that participants in this study deemed medication reviews, requests or questions about medication, suitable situations in which video consultations could be used (65). Additionally, participants had mixed opinions on the suitability of video consultations for asthma, with a sense that video would only be suitable for follow-up instead of the initial consultation. This reflects the results of the secondary analysis as patients and primary care providers in Chapter 5 agreed that video consultations were better suited to follow-up appointments instead of new health concerns for any condition. Finally, the majority of participants deemed skin concerns suitable for assessing over video, which is consistent with Chapter 5 secondary analysis. However, two pharmacists in this study expressed concerns about the quality of the image over video. Their concerns illustrate the interrelatedness between themes as assessment of skin concerns relies on having access to good quality tools and technologies.

ii) Cognitive characteristics

It is not surprising, given the reliance on IT for video consultations, that both participant groups recognised the importance of all individuals involved having the necessary IT skills. Despite pharmacists expressing concerns around patients not having the necessary IT skills to use video consultations, all patients in the study reported the opposite, with some relating their skills to experience of using technology at work. Interestingly, primary care providers in the Chapter 5 secondary analysis also recognised the importance of having the skills to use video consultations, however, did not report any concerns around patients not having such skills. On the other hand, patients' inability to use the necessary technology was recognised by patients as a major barrier to the widespread adoption of video consultations in the Near Me public engagement exercise (284). This difference in opinion regarding patients IT skills may relate to the study population. For example, the primary recruitment strategies for the current study required participants to have access to the internet or social media sites in order to register their interest in the research (e.g. via email or completing the online screening questionnaire). It is therefore not surprising that all patient participants felt they had the necessary IT skills for using video consultations.

iii) Physical characteristics

There was shared agreement that video consultations would be better suited to a younger population, which echoes the wider literature concerning pharmacists and GPs (164, 304, 305). For example, Wanderas et al's (2023) review highlighted that video consultations were significantly more likely to be used by younger patients and their GPs than older patients (304). However, despite the majority of pharmacists in Thomas et al's (2022) study assuming video consultations would be too difficult for older patients, some pharmacists recognised that they could be underestimating older patients' level of technical skills (305). This reflects the opinion of pharmacists in the current study as they highlighted the importance of not assuming every older patient is less suited to using video consultations, as this may not be the case.

A pre-pandemic evaluation of Near Me identified visual and audio impairment as existing patient conditions which could affect their ability to use video consultations (303), which mirrors the findings of the current study. Patients and pharmacists in this study shared concerns regarding visually impaired patients ability to use video consultations, however there were mixed opinions on the suitability of using video consultations with hard of hearing patients. Similar to the pre-pandemic evaluation, participants in this study recognised the possibility for hard of hearing patients to lip read or use a closed captions function, if available (303).

6.5.1.2 Tasks

Findings within the *tasks* theme related to the *tasks* or steps undertaken by a person, which varied in difficulty, complexity, and variety. The three main sub-themes found were: *the steps involved in video consultations; ease of steps or process; and potential for consultations.*

Participants were asked about their knowledge regarding the process involved in taking a health-related video consultation, and only 63.2% (n=12) of pharmacists and 28.6% (n=4) of patients were able to comment. When comparing the steps outlined by participants (Figure 6.8) to the NHS guidance on how to use Near Me , some steps involving patients (*e.g. the ability for patients to self-select a Near Me consultation link on the pharmacy's website; patients entering their details before the call; the presence of a refresh button to use when the video lags*) and pharmacists (*e.g. the pharmacy team receiving an alert that a patient has arrived in the virtual waiting area; and, a record of the consultation is made in the usual pharmacy system*) were not mentioned (306, 307). However, given that the primary focus of the study was not around developing a process map of the steps involved in video consultations, it is not surprising that some steps are missing. Variability in pharmacists reporting of the process may also be due to the flexibility of the existing Near Me guidance. For example, the guidance states that the clinical pathway provided should be used as a template to inform the creation of standard operating procedures within pharmacies (306). Process maps can depict how work is being performed in practice (i.e. "work as done") depending on how the maps are constructed (308, 309). However in this study, the process map was developed based on discussions with a sample of stakeholders with limited knowledge of the process. Therefore, it is likely that the process map does not accurately represent "work as done", instead representing "work as imagined", presenting an opportunity for future research to build upon these findings.

Despite having mixed concerns on how easy they felt the video consultation process was for themselves, the majority of pharmacists felt the process would be too difficult for patients. Interestingly, these concerns were not shared by patients, which echoes the wider literature on the use of Near Me in Scotland. For example, the pre-pandemic evaluation of the platform outlines that patients found the video consultation process easy, which mirrors feedback from 92% (n=22,592) of patients in a more recent end of video-call survey conducted by the Scottish Government (285, 303).

6.5.1.3 Tools and technologies

Findings within *tools and technologies* related to the objects that people use to do work or that assist people in doing work. There were five sub-themes: *essential tools and technologies; additional tools and technologies that may help; patient guidance or support; benefits and challenges of video; and the security and reliability of the video consultation software/platform.*

Existing Near Me guidance on the *tools and technologies* required for video consultations mentions needing a device with video capabilities and a stable and reliable internet connection (310, 311). Interestingly, participants in this study outlined further *tools and technologies* they considered essential for being able to use video consultations (Figure 6.9). For example, the patient requires to have an email address or mobile phone with an active number for receiving the link to the video call; pharmacists proposing that two screens are needed to allow note taking whilst on the call; and, screen sharing to show patients equipment. Moreover, patients with sensory impairments required additional technologies in order for them to use video consultations (e.g. screen reader and larger screen for visually impaired patients, and a collar speaker for a hard of hearing patient). Furthermore, a series of additional *tools and technologies* were deemed by participants as non-essential, however potentially helpful for using video consultations. For example, pharmacists suggested the use of auto-transcript for patients to help recall of consultation advice/outcomes. Research has highlighted that patients often receive large amounts of new information and medical advice at a single consultation, and in order for them to adhere to this advice they must be able to recall it afterwards. However, studies have shown that most patients do not fully understand or memorise the advice (312), therefore, having the ability to provide an auto-transcript could potentially improve patients' recall post-consultation.

Participants outlined a number of benefits and challenges to using video technology. Despite the majority being hypothetical due to participants' limited experience of video consultations for pharmacy consultations, the findings are consistent with the wider literature. Key benefits *(e.g. pharmacists and patients being able to see each other; visual cues and an ability to confirm patient understanding and/or show patients how to use equipment; easier to build rapport than over the telephone*) and challenges (*e.g. limited visual assessment; technology crashing; poor signal/connection and visual quality; difficult to establish new relationships; consultations rushed compared to face-to-face*) identified in this study mirror those outlined in a secondary analysis conducted in Chapter 5. Moreover, benefits including improved access, the presence of visual cues, the ability to show patients equipment, and the potential to reduce 'Did Not Attend' patients were consistent with research assessing pharmacists' perspectives on the benefits and challenges of tele-pharmacy (313), and the factors influencing uneven use of telehealth in pharmacy (305).

6.5.1.4 Organisation

Findings within the organisational theme related to the structures external to patients and pharmacists (but often put in place by people) that organise their time, space, resources, and activities. There were three sub-themes: *NHS level characteristics; workplace specific characteristics, and patient level organisational characteristics.*

i) NHS level characteristics

Pharmacists expressed a lack of organisational drive for the use of video consultations in everyday practice, and recognised that they would need to obtain organisational agreement to use the service due to requirements set by the health board and wider organisation. This perceived lack of organisational drive is surprising given the strategic drive and policy support both pre and post pandemic (13, 303). For example, the Scottish Government stated in the NHS Recovery Plan 2021-2026 that £3.4 million a year will continue to be provided to facilitate the scale up of Near Me (13). Pharmacists' perceptions around the lack of organisational drive could relate to the health board within which they work. For example, reflections from Wherton et al

(2021) in the pre-pandemic phase of implementation include being struck by the asymmetrical model of service development, with video consultation enthusiasts in some health boards and a lack of them in others (303). Despite recognising the benefits of the Scottish government's flexible approach, allowing local professionals to decide on how to implement the service, Wherton and colleagues also recognised that the lack of a centrally mandated policy meant that despite success in some areas of Scotland, most services offered few to no video appointments (303). Furthermore, recognition that agreement must be obtained from the organisation when choosing to use video consultations in practice aligns with guidance provided by Near Me for pharmacists. For example, the guidance states that health boards are required to inform pharmacies of any regional arrangements that differ from what is described in the guidance documents, to ensure if pharmacies are following the guidance they are also fitting with the health boards criteria/plan (306).

Despite being aware of some resources, pharmacists in the study expressed that more guidance should be provided from the organisation as to when video consultations are and are not appropriate for use with patients. This need for further guidance was surprising as the Scottish Government alongside Near Me and pharmaceutical/medical bodies have provided guides comprising examples of clinical criteria which may or may not be appropriate for assessment over video (306, 314-316). Pharmacists expressing a need for more guidance may be due to the variety of existing guidance, as the contrasting levels of detail provided could be generating uncertainty in users. For example, the Scottish Government have provided speciality-specific guidance for pharmacists working in the community (306), whereas, the Royal Pharmaceutical Society provide more generic pharmacy guidance on using telephone and video consultations (316). Additionally, the guidance provided by the General Pharmaceutical Council focuses specifically on prescribing whilst using remote consultations (315).

ii) Workplace specific characteristics

Although both pharmacist groups mentioned workload, it was more of a barrier for community pharmacists than GPCPs. There was shared recognition between patients and pharmacists around community pharmacy being a high workload area, and shared concerns about how video consultations would fit in with existing tasks. This is reflected in studies across the UK (317); Australia (318); Canada (319); and, Lebanon (320). Similarly, incorporating video consultations around daily tasks was recognised as a major barrier for the majority of community pharmacists. This may be due to the unpredictable nature of community pharmacy services as a walk-in service. Nonetheless, issues around unscheduled care in community pharmacy may be alleviated by plans for some services to be offered on an appointment basis in future. The Pharmacy 2030 Vision for Community Pharmacy sets out that by 2030 community pharmacists will spend most of their day consulting with patients, and although most will be on a walk-in basis (in person and online) to maintain the accessibility that community pharmacy is known for, some consultations will be provided by appointment to help manage pharmacists' workload (23). Therefore, a move from fully unscheduled to part-scheduled care may be a lever to the adoption video consultation services.

All pharmacists in this study recognised the barrier that lack of staffing poses on their ability to use video consultations, however staffing was more of a barrier in community pharmacies which often do not have regular pharmacists working in them. Moreover, community pharmacists rarely have more than one pharmacist working each day. Participants therefore emphasised the need for service re-design to ensure at least two pharmacists are working each day, in order to provide virtual and in-person on demand services. The reported issues around staffing in community pharmacy were corroborated with the wider evidence base. For example, Scotland has seen a reduction in the number of community pharmacists, trainee pharmacists, and pharmacy technicians since 2020 (321), and an increased number of pharmacy closures due to ongoing staffing issues (322, 323). It is believed that shortages in community pharmacy may be partly due to the additional roles created for pharmacists in general practice, creating a shift in the workforce (324).

iii) Patient level organisational characteristics

Both patients and pharmacists reported a lack of patient understanding concerning the role of pharmacists, with patients expressing the need for further guidance on what services pharmacists could or were allowed to offer. This lack of patient understanding is somewhat consistent with the wider evidence base. For example, whilst assessing patients' perceptions and experiences of the medication review process, McCahon et al (2022) found that patients were unfamiliar with the roles and responsibilities of pharmacists within general practice (325). However in contrast, Kelly et al (2014) explored the publics knowledge of the role of community pharmacists and found respondents had a good understanding, with widespread recognition that pharmacists' roles involved more than counting pills (326). This difference in patients understanding may relate to whether patients had interacted with pharmacy services recently or not. For example, patients were eligible to participate in the current study and Kelly et al's (2014) study if they had experience of using pharmacy services. However, Kelly and colleagues stipulated that patients' experience had to have been in the last 12 months (326), which this study did not.

6.5.1.5 Internal environment

Findings within the *internal environment* theme related to the environment that patients and pharmacists take the consultation in and included aspects such as lighting, physical layout, and available space. Three main sub-themes were found: *availability and suitability of space to take video consultations, and privacy of the space.*

There were clear differences between the privacy of the available spaces for pharmacists in this study to take video consultations. All community pharmacists had access to a private consultation room for video calls - albeit without the necessary equipment – whereas GPCPs' experiences were mixed, with some expected to work in open-plan and hot-desking environments. Issues with access to a designated private space for pharmacists in general practice extends to the wider literature. For example, studies investigating the integration of GPCPs in England have found pharmacists sharing spaces with other staff members to be fairly common (327, 328). Alshehri et al (2021) reported that 46% (n=89) of pharmacists were working in a private room, whereas 32% (n=63) were in a shared office, 13% (n=26) working at a hot desk, whilst the remaining (n=17) had not been provided with a designated workspace (328). Moreover, pharmacists in Australia reported lack of clinical space as a barrier to working in general practice, illustrating that issues around workspace extend outside of the UK healthcare system (329).

6.5.1.6 External environment

Findings within the *external environment* theme related to the macro-level factors outside an organisation (e.g. societal expectations; local infrastructure). Five main sub-themes were found: *COVID-19; media; weather; government support and policies; and, the community and its resources.*

The majority of pharmacists reported COVID-19 as the main driver for the roll out of video consultations, which is consistent with the wider literature. For example, over 71.4% (n=40) of pharmacists in Park et al's (2022) Canadian study expressed similarly, that the pandemic contributed to the incorporation of tele-pharmacy services in current practice (208). These results are not surprising given that start of the pandemic brought a call for healthcare to move to a remote model of care, when appropriate, to reduce the risk of spreading infection and adhere to physical distancing restrictions (330). However, the nature of the pandemic required video consultation services to be rapidly implemented which pharmacists felt discouraged their use. There was a sense that had the service been implemented earlier and more gradually that uptake would have been better. The need for gradual implementation aligns with the importance of adopting a human factors perspective to ensure the service or technology is implemented in a way that best fits the end users. The review in Chapter 4 identified approaches which could be used to support implementation of video consultations in community and general practice pharmacy, including: *exploring the differences in implementation between different contexts; understanding the requirements for implementation; understanding the factors influencing implementation (e.g. facilitators and barriers); and conducting observations during implementation to identify and amend any operational issues.*

There were two key areas where participants felt more support would be needed from the government. Illustrating the interrelatedness between the internal and *external environment* themes, participants expressed that more support would be needed from the government in providing adequate spaces for GPCPs to work in if video consultations are to be used in practice. Although the Scottish Government have facilitated implementation of the pharmacotherapy service in Scotland - ensuring every GP practice in Scotland has access to a pharmacist - their strategy does not state any requirement for practices to provide pharmacists with a dedicated and/or private workspace (19). Moreover, the pharmacotherapy service programme aims to enable pharmacists to fully utilise their skills sets (331) – however without an adequate space to work in, pharmacists in this study felt their role was limited as consultations with any patients would inappropriate due to being unable to protect confidentiality when sharing workspaces with other staff members. One of the driving factors behind conducting the 2020 public engagement exercise on Near Me was the government's aim to raise the public's awareness of video consultation services (284). Despite this, there was a sense from pharmacists in this study that the government need to do more to raise awareness of video consultations in pharmacy by engaging with the public. The previous engagement exercise was conducted during the COVID-19 pandemic when patients were being urged to use remote forms of care to reduce the risk of spreading infection and adhere to physical distancing restrictions (284, 330). Patients may assume that services such as video consultations are no longer needed post-pandemic, and therefore a future engagement piece may be beneficial to remind the public of the remote options available and the benefits of using them.

Patients in this study highlighted the potential for community spaces (e.g. libraries; community centres) to be set up to facilitate video consultations, and pharmacists mentioned existing plans for community video consultation facilities, which were put on hold due to the pandemic. However, despite the delays caused by COVID-19, there were 55 hubs set up across Scotland by November 2022, providing private spaces in the community for patients to take video consultations (332).

6.5.2 Strengths and limitations

To the best of the researcher's knowledge, this is the first study providing a detailed insight into the factors influencing the use of video consultations in community and general practice pharmacy in Scotland. The study involved participants from a mixture of urban and rural Scottish health boards to provide an evidence base of the factors influencing use across Scotland.

The study has illustrated how a human factors model (SEIPS 2.0) can be used to assess each component of a work system for its influence, highlighting specific components presenting as barriers. As outlined in Chapter 5, the interrelatedness of the SEIPS 2.0 Work System components can be viewed as a strength, however researchers may have different perspectives on which component is most proximally related to each of the findings. Therefore, the interrelated nature of the model may also be viewed as a challenge, as often it is difficult for findings to be linked to one component only. For example, issues around workspaces in general practice relate to the internal environment, however this point is raised again when discussing the need for external government support to improve this issue. Nevertheless, any differing opinions or challenges during analysis were mitigated against by the validation process conducted during the framework analysis, which involved one validator (ED) who is experienced in qualitative analysis methods.

Despite the benefits of using the SEIPS 2.0 Work System to inform interview schedule development and data analysis, a potential limitation in the application of only part of the model must be highlighted. As outlined in Chapter 2, Processes and Outcomes within healthcare services are continually reviewed to allow for adaptations to be made to work system components and/or processes, to improve system performance and wellbeing. Due to focusing solely on the Work System, the findings of this study do not provide insight into potential adaptations that may be taking place. Future researchers interested in applying the SEIPS 2.0 model should consider this limitation.

A strength of the study is that the defined data saturation level (i.e. a minimum of 10 interviews per participant group, stopping when a further three consecutive interviews provide no new themes) was met for patients and GPCPs. Despite experiencing difficulties in recruiting a minimum of 13 community pharmacists, data saturation was still achieved. Difficulties recruiting community pharmacists were somewhat expected. Discussions with participating community pharmacists highlighted that pharmacists do wish to participate in research; however, their workload and restricted time does not allow it, which is reflective of published evidence. For example, Crilly and colleagues (2017) explored the barriers preventing community pharmacists from engaging in research and found lack of time as a major barrier (333). Nonetheless, all efforts were made to recruit as close to 13 community pharmacists as possible, with recruitment continuing until June 2023.

The researcher aimed to recruit a balanced sample of participants based on a number of pre-defined criteria (see Section 6.3.4.) such as: age; gender; geographical location; and experience with video consultations. Due to low levels of interest from community and general practice pharmacists in comparison with patients, the researcher was only able to purposefully select patient participants. On reviewing answers to the patient screening questionnaire, the only criteria that could be balanced for was geographical location. Nonetheless, a strength of this study is that there was representation from 10 of the 14 Scottish territorial health boards, for both patients and pharmacists, despite being unable to purposefully select pharmacists.

Although the focus on obtaining both patient and pharmacist perspectives is viewed as a strength, the limitations of the sample must also be acknowledged as additional key stakeholders could have differing opinions. Firstly, pharmacists work alongside other members of the multidisciplinary team, who could play a key role in delivering video consultation services. For example, administrative staff within the general practice may be responsible for raising awareness of video consultations and arranging appointments, and pharmacy technicians and/or support staff within the community setting are likely to provide advice to patients. Moreover, carers may have different experiences and/or opinions of video consultations to that of patients. As it was not possible to recruit a wider sample of participants within the scope of this thesis, it highlights an opportunity for future research to build on the methods of this study to understand the generalisability of the results.

A notable limitation of the study is the risk of selection bias, whereby the recruitment method resulted in a sample of patients who had access to the internet and/or social media sites. Thus, it is possible that the results to not reflect the opinions or experiences of patients who do not have access. This risk could have been mitigated by broadening the scope of the study to also recruit patients who did not have access to the internet. Although this was not possible within the scope of this thesis, it presents an opportunity for future research to apply the learning from this study.

The researcher coded community and general practice pharmacist data together during analysis. However on reflection, doing so may have resulted in over simplification of the findings as community and general practice pharmacy settings differ in many ways (as outlined in Chapter 1). Therefore, it may have been beneficial to code data separately in order to understand contextual differences in more depth, which is something that future researchers should consider.

As the majority of participants had not engaged with video consultations, the researcher questioned on reflection the appropriateness of the term “use” when “adoption" may have been more appropriate. Despite the terms often being used interchangeably in the literature, similar research exploring digital health technologies for the elderly emphasises the importance of these terms being considered separately (334). Frishammar et al (2023) refer to adoption as the "binary choice of selecting a technology for use or not", whereas usage refers to the post adoption stage where the technology is being utilised by a person or organisation (334).

6.5.3 Future directions

The study has provided an evidence base of factors influencing patients use of video consultations with pharmacists; however, it is unclear whether the results reflect the opinions and experiences of patients who do not have access to the internet or social media due to the recruitment methods used. Future research could adapt the methods used in this study to explore the factors influencing use in a sample of patients who do not have access to the internet or social media sites.

Furthermore, the study has highlighted an interesting gap as pharmacists perceive a lack of patient demand for video consultations, when patients are unaware the service is available. Future work could focus on developing and circulating service advertisements and communications using the suggestions made by participants in this study.

Despite not intending to develop a process map, based on participant knowledge of the consultation process, the study has provided a starting point for future researchers to explore the consultation process in more depth. One particular method which lends itself to mapping complex work environments such as healthcare is Hierarchical Task Analysis (231). Through document analysis and real-world observations of routine work, the method facilitates an understanding of the variations between "work as imagined" versus "work as done". It would be beneficial for future research to conduct a Hierarchical Task Analysis to understand how video consultations are actually used in practice. Ashour et al (2021) conducted similar work examining work-as-imagined vs work-as-done in the dispensing process in three community pharmacies in the UK (335).

The rapid implementation of video consultations as a response to the COVID-19 pandemic was identified as a barrier by pharmacists. As discussed, gradual or iterative implementation would have been beneficial for ensuring the service was implemented in a way that fitted each context and the users. Any future efforts to implement video consultations in pharmacy could utilise the approaches and methods outlined in Chapter 4 to facilitate successful implementation and identify any potential barriers.

Finally, it is clear that despite the availability of guidance/resources concerning when video consultations may or may not be appropriate to use with patients, that pharmacists feel more guidance is required. As discussed, this need for more guidance may be due to the variety of existing guidance and the contrasting levels of detail provided across them causing uncertainty. Future research could examine and compare the existing guidance for pharmacists in Scotland to provide an overview of any requirements and examples of when video consultations could be used, whilst identifying key commonalities and differences.

6.5.4 Conclusion

This study used a human factors systems model to synthesise the factors influencing patient and community and general practice pharmacists use of video consultations in Scotland. The results identified a series of patient and pharmacist characteristics that influence use of video consultations, with the majority being psychosocial in nature. Psychosocial characteristics highlighted interesting differences between participant groups, such as, the differences between pharmacists' perceived lack of patient demand and patients' lack of awareness; and the health concerns deemed appropriate and inappropriate for assessment over video. The results have provided an overview of the *tools and technologies* that participants deemed essential in order to use video consultations, and an insight into the steps involved in the consultation. Moreover, despite there being more reported benefits than challenges to using video consultations for all participant groups, the study has shown that engagement with video consultations in pharmacy remains low. This limited engagement may relate to patients reporting being unaware of pharmacists' roles and responsibilities, therefore being unsure what health concerns about which they could speak to a pharmacist. Furthermore, the study has highlighted ongoing workflow and staffing issues in community pharmacy, and workspace requirements in general practice that require attention if video consultations are to be incorporated into pharmacy services in the future. Finally, the findings suggest that the variety of existing guidance on using video consultations may be causing uncertainty in pharmacists, which is reflected in their reported need for more guidance. It would be beneficial for future work to provide an overview of existing guidance and any key commonalities and differences between them in order to facilitate pharmacists' decision making around when to use video consultations, and inform future guideline development.

Chapter 7: Assessing the guidance available to pharmacy professionals in primary care working in Scotland for the use of video consultations: a scoping review and content analysis

7.1 Introduction

The vision for future pharmacy services states that by 2030 pharmacists working in Scotland will use digital technology to provide services remotely, including the use of Near Me to provide video consultations (23). However, despite widespread availability of the Near Me platform in Scotland, engagement with video consultations in both community and general practice pharmacy remains limited (64) (Chapters 5 & 6). In order to understand why, a study completed for this PhD (Chapter 6) explored patient and pharmacist perspectives on the use of video consultations in Scotland, examining the data through the lens of human factors. Participants in the study recognised the convenience of video consultations for improving patient access to care, reducing the need to travel, and providing an opportunity for pharmacists to offer scheduled care to help manage workload. Moreover, pharmacists recognised that as highly skilled personnel, pharmacy technicians could also deliver video consultations, as they regularly handle patient queries in person or over the telephone. However, despite being aware of existing resources, pharmacists expressed a need for more guidance at an organisational level on when video consultations may or may not be appropriate to use with patients. As outlined in Chapter 6, governing and professional pharmacy bodies alongside the Scottish Government have developed resources ranging from speciality (e.g. for community pharmacists) (306) and task-specific (e.g. prescribing remotely) (315), to general guidance for any pharmacist on the use of video consultations (316). Given the differing levels of detail provided across resources depending on their specificity, this may be contributing to uncertainty in pharmacists when deciding whether to use video consultations or not.

Therefore, the next stage of this PhD involved a scoping review to provide an overview and synthesis of existing resources, referring to the use of video consultations relevant to pharmacists working in primary care settings in Scotland. Although there are published studies which consider the suitability of video consultations for certain patient groups or health concerns, pharmacists identified the need for guidance from organisational bodies. The benefits of taking a systems approach to the development of guidelines in healthcare is recognised, as it helps to understand and represent the complexities of healthcare systems (336-339).

7.2 Aims and objectives

The aim of this study is to provide an overview of the existing resources relevant to pharmacists working in primary care in Scotland for the use of video consultations, with the following objectives:

- Provide a summary of existing video consultation resources relevant to pharmacists working in primary care in Scotland
- Identify and synthesise the components of the Work System represented in each resource, using an established human factors systems model (SEIPS 2.0).

7.3 Methods

This scoping review utilised a search strategy, selection process, and data collection method with the Preferred Reporting Items for Systematic Reviews and Meta-analysis for Scoping Reviews (PRISMA-ScR) 2020 checklist used as a guide to report these methods. This methodology has been used previously (340).

7.3.1 Eligibility criteria

As pharmacists in Chapter 6 identified a need for further guidance from organisational bodies, a grey literature search of organisations, technology services, and government/health boards, relevant to Scotland was conducted to identify existing guidance and resources. As previous reviews have reported a lack of published evidence and low levels of usage of video consultations in primary care before 2010, the search will focus on resources published from 2010 onwards (62). Table 7.1 outlines the inclusion and exclusion criteria that were used.

Table 7.1: Eligibility criteria

Inclusion criteria	Exclusion criteria
Policies, guidance, procedures, protocols, strategies, or professional communications mentioning video consultation use in pharmacy in written, audio or video formats.	Research articles published in academic journals; opinion pieces; commentaries; discussion articles; letters; and blog opinion pieces.
The resource is applicable to primary care pharmacists (i.e. either explicitly mentions that the resource is for pharmacists or pharmacy staff or would be relevant to any healthcare professionals).	The resource is aimed specifically/explicitly at pharmacists or other professionals working in secondary or tertiary care, or resources aimed at specific healthcare professionals (e.g. GPs) in any setting.
Accessed from/published by pharmacy organisations/technology services/government or health boards in Scotland or by UK organisations with jurisdiction in Scotland (See Table 7.2).	Jurisdiction beyond Scotland.
Resources in English and published or made available after 2010.	Resources not available in English and published or made available before 2010.

7.3.2 Information sources

Searches were conducted between 4th - 6th October 2023 using Google's$^{©}$ Programmable Search Engine to select relevant resources from the websites of both pharmacy-specific organisations, as well as technology services and government/health boards that provide relevant resources (Table 7.2). Where resources provided links or references to additional resources that were relevant to primary care pharmacists working in Scotland and met the inclusion criteria, these were also included.

The researcher chose to use the Google© search engine based on University guidance on searching for grey literature, specifically on organisations' websites (341), and the wide use of Google© for published reviews. For example, Godin et al (2015) used Google© to conduct targeted website searches as part of a systematic review of grey literature on existing guidelines for school breakfast programmes in Canada (342). Similarly, Janamian et al (2016) used Google© advanced search capabilities during a systematic review of grey literature to identify primary care quality improvement tools and resources (343).

Table 7.2: Organisations and platforms searched for resources

Pharmacy organisations	URL
General Pharmaceutical Council	https://www.pharmacyregulation.org
Community Pharmacy Scotland	https://www.cps.scot
NHS Community Pharmacy Scotland	https://www.communitypharmacy.scot.nhs.uk
Association of Pharmacy Technicians	https://www.aptuk.org
Royal Pharmaceutical Society	https://www.rpharms.com
Technology services	**URL**
Near Me	https://www.nearme.scot
Attend Anywhere	https://www.attendanywhere.com
National Video Conferencing Service	https://www.video consultation.scot.nhs.uk
Turas Learn	https://learn.nes.nhs.scot
Government/health boards	**URL**
Scottish Government	https://www.gov.scot
Technology Enabled Care	https://tec.scot
Public Health Scotland	https://publichealthscotland.scot
Healthcare Improvement Scotland	https://www.healthcareimprovementscotland.org
NHS Education for Scotland (NES)	https://www.nes.scot.nhs.uk
NHS Ayrshire and Arran	https://www.nhsaaa.net
NHS Fife	https://www.nhsfife.org
NHS Forth Valley	https://nhsforthvalley.com
NHS Grampian	https://www.nhsgrampian.org
NHS Greater Glasgow & Clyde	https://www.nhsggc.scot
NHS Dumfries & Galloway	https://www.nhsdg.co.uk
NHS Borders	https://www.nhsborders.scot.nhs.uk
NHS Shetland	https://www.nhsshetland.scot
NHS Highlands	https://www.nhshighland.scot.nhs.uk
NHS Orkney	https://www.ohb.scot.nhs.uk
NHS Western Isles	https://www.wihb.scot.nhs.uk
NHS Lothian	https://www.nhslothian.scot
NHS Lanarkshire	https://www.nhslanarkshire.scot.nhs.uk
NHS Tayside	https://www.nhstayside.scot.nhs.uk/index.htm

7.3.3 Search strategy

The websites detailed in Table 7.2 were screened for resources published or made available between 2010 and October 2023, using the search terms in Table 7.3. As the advanced search option within Google© only permits 32 words per search, the Programmable Search Engine was used to create synonyms that were included when a series of key words were searched for (344). This ensured all search terms in Table 7.3 were included in the search. The search strategy was developed by creating terms under three areas: video consultations, guidance resources, and pharmacy. Search terms were informed by previously completed reviews (61, 304, 345-348), and by searching for MESH terms on Medline and Embase databases. The final search strategy was validated by colleagues within the department, including the supervisory team and two pharmacists (NW and DJ). Searches were limited to results from only the aforementioned sources in Table 7.2, by inserting website links for each into the Programmable Search Engine. This process was done individually for each organisation. Any linked resources contained within relevant resources were included for analysis if they met the inclusion criteria (Table 7.1).

Table 7.3: Search terms and synonyms

Health care professionals search terms and synonyms	
Pharmacist	Community pharmacist OR chemist OR community pharmacy OR community pharmacy services OR retail pharmacy OR dispensary OR general practice pharmacy OR general practice clinical pharmacist OR clinical pharmacist OR clinical pharmacy
Pharmaceutical service	Pharmacy technicians OR pharmacy professionals OR pharmacy OR pharmacies
Healthcare professionals	Healthcare worker OR healthcare provider OR healthcare personnel OR primary care provider OR clinician OR healthcare practitioner OR health personnel
Guidance search terms and synonyms	
Guidance	Guideline OR policy OR procedure OR principles OR protocol OR strategy OR plan OR method OR framework OR tool
Guide	Process OR approach OR best practice OR good practice OR model OR recommendation OR standard OR programme OR toolkit OR checklist
Regulations	Code of practice OR manual
Video consultations search terms and synonyms	
Video consultations	Video calls OR video consulting OR video conferencing OR teleconsultations OR tele-consultations OR telemedicine OR telepharmacy OR tele-pharmacy OR remote consultations OR telehealth
Tele-health	Synchronous communication OR real time communication OR e-health OR ehealth OR digital consultation OR NHS Near Me OR Near Me OR NHS Attend Anywhere OR Attend Anywhere
Healthcare professionals AND Guidance AND Video consultations	

7.3.4 Selection process

Searches were conducted on each website to identify resources for inclusion. A random 20% of websites were independently searched by KP to ensure consistency. The level of agreement was calculated and a percentage of 80-90% was considered good, and 90%+ considered excellent (145). If a good or excellent level of agreement was achieved, screening continued. However, if the agreement level fell below 80%, a further 10% of studies would be screened, and ED would be consulted.

7.3.5 Data charting and synthesis

To facilitate the charting process, information within resources which were not available in a downloadable document (e.g. guidance written on web pages) were copied and pasted verbatim into a Microsoft Word© document or saved as PDF documents. Similarly, any audio or video-based resources (e.g. podcasts or instructional videos) were transcribed into a Microsoft Word© document, and 20% of transcripts were checked for accuracy. Screenshots from videos were included when appropriate to supplement transcripts (e.g. when the speaker was referring to an image shown on screen). Information from a random 20% of the resources was independently charted by KP to ensure consistency. Any differences were discussed to reach a consensus. If a consensus could not be reached, ED would be consulted.

A data charting template was created using Microsoft Excel© to summarise the resources, including (Table 7.4)

Table 7.4: Data charted to summarise resources

Types of data charted
• Title • Publisher • Year of date of publication • Type of resource (e.g. policy, strategy, protocol etc) – *as explicitly stated within the title or main body of the resource* • The intended audience - If *not explicitly stated within the title or main body of the resource, the assumption was that the resource was intended for any healthcare professional.*

Details of the included resources were collated in a table and a summary provided, including percentages where applicable.

A second charting template was created via a deductive content analysis, using the six components of the SEIPS 2.0 Work System (Table 7.5). The charting template was created using NVivo© software (version 1.7.1). The data charted for objective two was any information within the identified resources which could be considered guidance, or content promoting or supporting the use of video consultations, relevant to the six SEIPS 2.0 components. To aid the identification of relevant content from the resources, a set of operational definitions were used (see Table 7.5). Operational definitions were informed by the SEIPS model, the secondary analysis in Chapter 5 and the interview study in Chapter 6. The definitions were not exhaustive to allow new concepts to be identified.

Table 7.5: Operational definitions of SEIPS 2.0 Work System components

Work System component	Component definitions from SEIPS 2.0 (110)	Operational definitions*	
Person(s)	The individual at the centre of the system can be a single individual (e.g. primary care provider or patient) or group (e.g. team, organisational unit). Individual characteristics include physical characteristics – strength, weight, height; cognitive characteristics: expertise, experience; Psychosocial characteristics: motivation, needs, social status.	**<u>Patient characteristics</u>** Guidance may include (for example any reference to): **Relevant physical characteristics** • Age • Any physical impairments **Relevant cognitive characteristics** • IT literacy • Health literacy • Cognitive ability or impairment **Relevant Psychosocial characteristics** • Health concerns which may or may not be appropriate to assess over video *(e.g. medication requests, skin concerns)* • Awareness and demand for the service • Mobility (e.g. patients' ability to leave home due to abilities or other responsibilities) • Continuity of care, or whether a patient undergoing a video consultation is new or familiar to the pharmacy/pharmacist • Confidence or comfort in using ehealth technologies • Convenience for patients • Potential emotional impact or emotional needs of patients (e.g. might find video calls more or less stressful than telephone or face-to-face).	**<u>Healthcare professional characteristics</u>** Guidance may include any reference to, for example: **Relevant physical characteristics** • Age **Relevant cognitive characteristics** • IT literacy • Clinical skills and abilities **Relevant Psychosocial characteristics (for example):** • Staff confidence or comfort levels in using the technology, generally as well as in relation to remotely diagnosing • Continuity of care, or whether the pharmacist is known to the patient or not (i.e. continuity of care) • Convenience for pharmacist/pharmacy • Potential emotional impact or emotional needs of pharmacists (e.g. might find video calls more or less stressful than telephone or face-to-face).

Work System component	Component definitions from SEIPS 2.0 (110)	Operational definitions*
Tools and Technologies	These are objects that people use to do work or that assist people in doing work. This can include IT as well as physical tools and equipment	Guidance may include any reference to, for example: • Any reference to technological requirements for using video consultations (e.g. specific equipment) • A list of technologies that are not essential but could help or enhance the process of using video consultations • Links to IT help and/or further training tools or supporting resources for using video consultations • Any reference to the benefits and/or challenges to using video consultation technology • Any references to data security and privacy.
Tasks	Description of characteristics of tasks. Undertaken by person and may vary in difficulty, complexity, ambiguity, sequence or variety.	Guidance may include (for example, any reference to): • Descriptions of the processes that could be followed when using video consultations • Specific tasks that video consultations could be used for (e.g. triage; follow-up).
Organisation	Patients: Communication infrastructure; living arrangements; family roles and responsibilities; work and life schedules; interpersonal relationships; culture; social norms and rules; financial and health-related resources Pharmacists: Organisational conditions such as: work schedules and assignments; management and incentive systems; organisational culture; training; policies; resource availability; team work; communication and work relationships.	Guidance may include: **Relevant factors that organise patients time, space, resources and activities (for example, any reference to):** • Patients' financial resources and/or the costs related to using video consultations • Patients' family life and/or responsibilities, flexibility of daily schedule, friends, own beliefs, living arrangements, understanding of the role of pharmacy. **Relevant organisational characteristics (for example any reference to):** • Organisational requirements for video consultations (e.g. staffing or work schedule, or workload requirements) • Pharmacists' roles and responsibilities • The financial costs to the organisation • Practice standards/policies that should be adhered to • Advertising of the video consultation service (e.g. advice on how to, or resources which can be used to advertise).

Work System component	Component definitions from SEIPS 2.0 (110)	Operational definitions*
Internal Environment	Refers to the physical environment and includes lighting; noise; vibration; temperature; physical layout; available space; and air quality.	Guidance may include (for example, any reference to): • The availability and/or suitability of the space that pharmacists and/or patients to have video consultations • The privacy of the available space.
External Environment	Refers to macro-level societal, economic, ecological and policy factors outside an organisation. Factors such as the impact of budget and cost on quality of tools/technologies used; societal expectations for patient and family preferences; and local infrastructure	Guidance may include (for example, any reference to): • Legal requirements relating to video consultations • Government support (e.g. support provided for delivering the service; links to government support which can be accessed) • Local resources (e.g. public transport, community video consultation facilities) • Wider public health concerns • Community characteristics (e.g. level of patient deprivation; remote and rural patients).

**informed by the results of Chapters 5 and 6*

Synthesis

A count of the number of resources containing information relevant to all six components and only specific components were summarised, identifying any gaps across the Work System.

Once the data from the resources was deductively charted under the six SEIPS 2.0 components, inductive content analysis methodology was used to synthesise the Work System components considered across each of the resources (146, 349). The analysis identified where similar topics are covered and highlighted commonalities and inconsistencies between resources regarding those particular topics (e.g. inconsistencies in what the resources deem appropriate reasons to conduct video consultations, or inconsistencies in the recommended processes involved).

7.4 Results

7.4.1 Resource selection

The search of websites published between 2010 and October 2023 identified 1,890 resources to be screened, 94 of which were included (see Figure 7.1 for the full flow chart of the studies included). The percentage of agreement for the screening was 98%, indicating an excellent level of agreement.

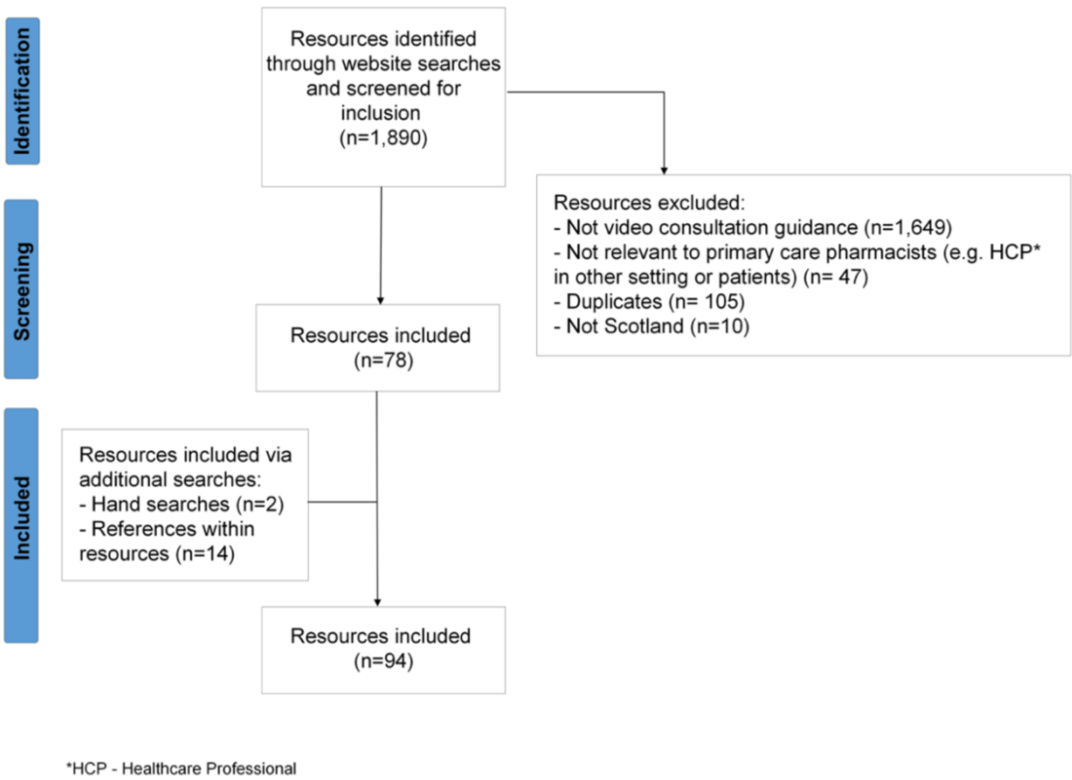


Figure 7.1: PRISMA flow chart showing the number of resources identified at each stage of the search

7.4.2 Summary of the resources

All 94 resources were published or made available from 2010, with the majority (n=62, 66%) published from 2020 onwards. Most were published by the Scottish Government and NHS health boards (n=58, 61.7%), but the majority (n=31, 33%) were published by Scottish Government (SG) and Technology Enabled Care (TEC). Twenty-four (25.5%) were published by technology services, the majority of which by Near Me (n=10, 10.6%) and the NHS-based National Video Conferencing Service (NVCS) (n=10, 10.6%). Twelve (12.8%) resources were published by pharmacy organisations: five (5.3%) by the Royal Pharmaceutical Society (RPS); four (4.3%) from the General Pharmaceutical Council (GPhC); and three (3.2%) from NHS Community Pharmacy Scotland (CPS).

The majority (n=64, 68.1%) of resources were appropriate for any healthcare professional, with the remainder explicitly developed for or aimed at either: all pharmacy personnel (n=12, 12.8%); general practice teams (n=6, 6.4%); community pharmacy teams (n=4, 4.3%), any primary care provider (n=3, 3.2%); NHS health board staff generally and community pharmacy contractors (n=2, 2.1%); and one (1.1%) each for: all professionals with prescribing responsibilities; students in all clinical settings; and trainees and trainers using Near Me as part of work placements. The majority of resources could be defined as strategies (n=16, 17%), informational videos (n=12, 12.8%), and webpages (n=12, 12.8%). The full characteristics of the resources included in the review are displayed in Table 7.6.

Table 7.6: Summary of resources

Resources by organisation type	Year	Resource type	Intended audience
PHARMACY ORGANISATIONS			
Royal pharmaceutical Society (RPS)			
Tackling health inequalities: delivering accessible pharmaceutical care for everyone **(350)**	2023	Strategy	All pharmacy personnel
Pharmacy 2030: a professional vision **(65)**	2022	Vision	All pharmacy personnel
Remote consultations: conducting phone or video consultations **(316)**	2021	Webpage	All pharmacy personnel
Pharmacy 2030: a vision for community pharmacy **(23)**	2021	Vision	Community pharmacy teams
Pharmacy 2030: a professional vision for general practice pharmacy **(66)**	2021	Vision	General practice pharmacy teams
General Pharmaceutical Council (GPc)			
Providing safe and effective treatment: selecting the appropriate mode of consultation when assessing a person's needs **(351)**	2022	Principles	All pharmacy personnel
High level principles for good practice in remote consulting and prescribing **(352)**	2019	Principles	All professionals with prescribing responsibilities
In practice: Guidance for pharmacist prescribers **(353)**	2019	Guidance	All pharmacy personnel
Guidance for registered pharmacies providing pharmacy services at a distance, including on the internet **(354)**	2019	Guidance	All pharmacy personnel
NHS Community Pharmacy Scotland (CPS)			
Fife Integrated Pharmacy Strategy - Update for Community Pharmacy **(355)**	2020	Newsletter	Community pharmacy personnel
Near Me - Video consultations **(356)**	Unknown	Webpage	Any healthcare professional
National Guidance for Near Me **(357)**	Unknown	Webpage	Any healthcare professional
TECHNOLOGY SERVICES			
National Video Conferencing Service (NVCS)			
Clear browser Cache **(358)**	Unknown	Short user guide	Any healthcare professional
Easy cache clearing for Edge **(359)**	Unknown	Short user guide	Any healthcare professional
Switching cameras on mobile devices **(360)**	Unknown	Short user guide	Any healthcare professional
Adding an extra participant into a patient/clinician call **(361)**	Unknown	Short user guide	Any healthcare professional

Resources by organisation type	Year	Resource type	Intended audience
Content sharing within a call **(362)**	Unknown	Short user guide	Any healthcare professional
Consult Now: enabling and use **(363)**	Unknown	Short user guide	Any healthcare professional
Group calls/consultations **(364)**	Unknown	Short user guide	Any healthcare professional
Microsoft Teams©: preventing problems **(365)**	Unknown	Short user guide	Any healthcare professional
How to change the email address used by near me **(366)**	Unknown	Short user guide	Any healthcare professional
Enable call queue indicators for callers **(367)**	Unknown	Short user guide	Any healthcare professional
Near Me			
Using Near Me with Callers **(368)**	2022	Video	Any healthcare professional
Quick tour of the near me learning resources **(369)**	2022	Video	Any healthcare professional
Send Text or email from waiting area **(370)**	2021	Video	Any healthcare professional
Near me: setting up a GP practice **(371)**	2020	Video	GP practice teams
Near Me: Service Provider/Clinician Training **(372)**	2020	Video	Any healthcare professional
Near Me Overview **(373)**	2020	Video	Any healthcare professional
Using Attend Anywhere in Clinic **(374)**	2020	Video	Any healthcare professional
Near Me: Waiting Area Administration **(375)**	2020	Video	Any healthcare professional
Myth busting near me **(376)**	2020	Video	Any primary care provider
Near Me – Video appointments **(377)**	Unknown	Webpage	Any healthcare professional
Attend Anywhere			
Get Started Guide **(378)**	Unknown	Web page	Any healthcare professional
Interface and screens **(379)**	Unknown	Web page	Any healthcare professional
How to Guides **(380)**	Unknown	Web page	Any healthcare professional
Troubleshooting **(381)**	Unknown	Web page	Any healthcare professional
Turas Learn			
Video consultation checklist for clinicians **(382)**	Unknown	Checklist	Any healthcare professional
Near Me video consulting **(383)**	Unknown	Webpage	Any healthcare professional
Checklist for near me in GP practices **(384)**	Unknown	Checklist	General practice teams
Remote consulting - additional resources **(385)**	Unknown	Webpage	Any healthcare professional

Resources by organisation type	Year	Resource type	Intended audience
GOVERNMENT AND HEALTH BOARDS			
Scottish Government (SG)			
Care in the Digital Age: Delivery Plan 2023-24 **(386)**	2023	Delivery plan	Any healthcare professional
Realistic Medicine: A Fair and Sustainable Future **(387)**	2022	Report	Any healthcare professional
Healthcare framework for adults living in care homes - my health - my care - my home **(388)**	2022	Strategy	Any healthcare professional
Scottish Government Winter Resilience Overview 2022-2023 **(389)**	2022	Strategy	Any healthcare professional
Climate Emergency & Sustainability Strategy **(390)**	2022	Strategy	Any healthcare professional
Care in the Digital Age: Delivery plan 2022 to 2023 **(391)**	2022	Delivery plan	Any healthcare professional
Evaluation of the Near Me video consulting service in Scotland during COVID-19, 2020 **(392)**	2021	Report	Any healthcare professional
NHS Recovery Plan 2021-2026 (13)	2021	Strategy	Any healthcare professional
Digital Health and Care Strategy (12)	2021	Strategy	Any healthcare professional
Women's Health Plan 2021-2024 **(393)**	2021	Strategy	Any healthcare professional
Implementation of NHS Near Me in community pharmacy - guidance **(394)**	2020	NHS Circular	NHS Boards and community pharmacy contractors
Implementation of NHS Near Me in community pharmacy **(395)**	2020	NHS Circular	NHS Boards and community pharmacy contractors
Additional pharmaceutical services NHS pharmacy first Scotland - directions and service specification **(396)**	2020	NHS Circular	Pharmacy personnel delivering the NHS Pharmacy First Service
Near Me Public Engagement (Full report) **(284)**	2020	Report	Any healthcare professional
Shaping the Future Together - Report of the remote and rural general practice working group **(397)**	2020	Report	General practice teams
Recover, Restore, Renew. Annual report 2020- 2021 **(398)**	2020	Report	Any healthcare professional
Protecting Scotland's Future: The Government's Programme for Scotland 2019-2020 **(399)**	2019	Strategy	Any healthcare professional
Achieving excellence in pharmaceutical care: a strategy for Scotland (19)	2017	Strategy	Any pharmacy personnel
Technology Enabled Care (TEC)			
Near Me Test Call checklist **(400)**	2022	Checklist	Any healthcare professional
Video Consultations for Adults with Incapacity - Assessment of capacity to consent **(401)**	2021	Guidance	Any healthcare professional

Resources by organisation type	Year	Resource type	Intended audience
Guidance for practice-based learning placements using Near Me **(402)**	2021	Guidance	Trainers and trainees using Near Me during placement
Near Me Video Appointment Service: National Equality Impact Assessment **(403)**	2021	Report	Any healthcare professional
Digital Citizen Delivery Plan 2021/2022 **(404)**	2021	Delivery plan	Any healthcare professional
Ongoing resilience for Coronavirus: Use of near me video consulting in pharmacy **(306)**	2020	Guidance	Community pharmacy personnel
Improving the use of near me video consulting in GP practices **(314)**	2020	Guidance	General practice teams
Near Me: summary of the 12-week scale up for COVID-19 **(405)**	2020	Report	Any healthcare professional
Near Me in the "new normal" health and care service **(406)**	2020	Guidance	Any healthcare professional
Publicising your Near Me service **(407)**	Unknown	Guidance	Any healthcare professional
Consent to take part in a video consultation **(408)**	Unknown	Guidance	Any healthcare professional
Can Near Me help you and your patients? Applying learning from high Near Me users in primary care **(409)**	Unknown	Report	Any primary care provider
Consult Now **(410)**	Unknown	Webpage	Any healthcare professional
NHS Highland			
Joint Strategic Plan 2022-2025 **(411)**	2022	Strategy	Any healthcare professional
North Skye 'Post-COVID' position statement and plan for progression **(412)**	2021	Delivery plan	Any healthcare professional
Remobilise, recover, redesign **(413)**	2021	Strategy	Any healthcare professional
Be My Guest Ep4 - NHS Highland Near Me **(414)**	Unknown	Podcast	Any healthcare professional
Healthcare Improvement Scotland (HIS)			
Primary Care Resilience Webinar 10: Greener Primary Care Services **(415)**	2022	Video	Any primary care provider
Primary care webinar: managing patient care with technology and learning from primary care - services response to covid-19 **(416)**	2020	Video	General practice teams
Response to queries from primary care resilience Webex 1 **(417)**	2020	Webpage	Any primary care provider
NHS Borders			
Pharmaceutical Care Services Plan 2021-2024 **(418)**	2021	Delivery plan	Any pharmacy personnel
Pharmaceutical Care Services Plan 2019/2020 **(419)**	2019	Delivery plan	Any pharmacy personnel
Pharmaceutical Care Services Plan 2018/2019 **(420)**	2018	Delivery plan	Any pharmacy personnel
NHS Forth Valley			
Our system-wide remobilisation plan (October 2021- March 2022) **(421)**	2021	Delivery plan	Any healthcare professional
Community Pharmacy Development Team - Briefing **(422)**	2020	Briefing	Community pharmacy staff
Shaping the Future - NHS Forth Valley Healthcare Strategy 2016-2021 **(423)**	2016	Strategy	Any healthcare professional
NHS Fife			

Resources by organisation type	**Year**	**Resource type**	**Intended audience**
Population health and wellbeing strategy 2023-2028 **(424)**	2023	Strategy	Any healthcare professional
NHS Fife Digital and Information Strategy 2019-2024 **(425)**	2019	Strategy	Any healthcare professional
NHS Grampian			
Clinical Educators and Students undertaking a virtual practice-based learning placement or remote clinical consultations **(426)**	2022	Guidance	Students in all clinical settings
Service Transformation through Digital: a Strategy 2020-2025 **(427)**	2020	Strategy	Any healthcare professional
NHS Lanarkshire			
Pulse Online: Technology Enabled Care Podcast **(428)**	2021	Podcast	Any healthcare professional
Remote consultations: new ways of practicing during and beyond the covid-19 pandemic **(429)**	2020	Guidance	Any healthcare professional
NHS Orkney			
Clinical Strategy 2022-2027 **(430)**	2022	Strategy	Any healthcare professional
Re-mobilisation Plan 4 **(431)**	2021	Delivery plan	Any healthcare professional
NHS Education for Scotland (NES)			
NHS Near Me Webinar for Pharmacy Teams **(432)**	2020	Video	All pharmacy personnel
NHS Dumfries and Galloway			
Local Delivery Plan 2017/2018 **(433)**	2017	Delivery plan	Any healthcare professional

7.4.3 SEIPS 2.0 Work System components

The majority (n=31, 33%) of resources contained information relevant to only one of the six Work System components, with only four (4.3%) resources – by the GPhC (353), NES (432), and TEC (306, 314) - containing information relevant to all six components. Overall, the *tools and technology* (n=62, 66%) and the *tasks* (n=48, 51.1%) components were the most represented across all resources, with the *internal environment* component being the least represented (n=17, 18.1%) (Table 7.7). Across all components other than *tasks*, the SG or TEC resources were represented most.

Table 7.7: Resources by Work System component (themes) and sub-themes

Themes: Work System components	Sub-theme(s)	Organisations, technology services, and government/health board references*
Person(s) (n=42; 44.7%)	Patients' cognitive characteristics	**Pharmacy organisations:** RPS (316, 350); GPhC (351, 353) **Government/health boards:** SG (388); TEC (401, 403)
	Patients' physical characteristics	**Government/health boards:** SG (388, 396, 397); TEC (314, 403); HIS (415, 416); NHS Highland (414); NES (432)
	Patients' psychosocial characteristics	**Pharmacy organisations:** RPS (23, 316, 350);GPhC (351-353) **Technology services**: Near Me (368, 371, 373, 376) **Government/health boards:** SG (284, 387, 388, 392, 394-398); NHS Grampian (427); NHS Orkney (430); HIS (415-417); TEC (306, 314, 403, 406, 407, 409); NES (432); NHS Highland (414); NHS Lanarkshire (428, 429)
	Healthcare professionals' psychosocial characteristics	**Pharmacy organisations:** RPS (316) **Technology Services:** Near Me (371, 373, 376) **Government/health boards:** SG (284, 392, 394, 395, 397); TEC (306, 314, 402, 406); NHS Highland (414); HIS (416); NHS Grampian (427); NES (432)
	Involvement of patients and healthcare professionals in the development of resources	**Pharmacy organisations:** RPS (23, 65, 66, 350) **Government/health boards:** SG (12, 19, 393, 397); TEC (306, 314); NHS Orkney (430); NHS Fife (424)
Tools and technologies (n=62; 66%)	Benefits and challenges of video consultations	**Pharmacy organisations:** RPS (65, 316) **Technology services:** Near Me (376, 377) **Government/health boards:** NES (432); NHS Orkney (430); NHS Lanarkshire (428, 429); HIS (415, 416); TEC (306, 314, 403, 409); SG (284, 387, 388, 392, 398)
	Resources for publicising	**Technology services:** Near Me (407)
	Technological requirements	**Pharmacy organisations**: GPhC (352, 353); NHS CPS (422); RPS (316) **Technology services**: Near Me (368, 371, 373, 374, 376, 377); NVCS (358); Attend Anywhere (378); Turas Learn (382, 384) **Government/health boards**: SG (395, 397); TEC (306, 314, 402, 403, 405, 406); HIS (417); NHS Grampian (426); NES (432)
	Confidentiality, privacy and data security	**Pharmacy organisations:** GPhC (351) **Government/health boards:** TEC (402); NHS Grampian (426)
	Signposting to other resources	**Pharmacy organisations**: GPhC (351-354); RPS (65, 316) **Technology services:** Near Me (369, 371, 373, 376, 377); NVCS (359, 367); Turas Learn (382-385)

Themes: Work System components	Sub-theme(s)	Organisations, technology services, and government/health board references*
		Government/health boards: NHS CPS (356, 357); NES (432); NHS Grampian (426, 427); NHS Lanarkshire (429); NHS Forth Valley (422); NHS Borders (419, 420); HIS (415-417); TEC (306, 314, 400, 402, 404-406, 408-410); SG (12, 284, 387, 388, 392, 394, 395)
Tasks (n=48; 51.1%)	Tasks which may or may not be appropriate for conducting over video	**Government/health boards:** SG (396); TEC (306, 314); HIS (416, 417)
	The steps to follow when setting up for video consultations	**Pharmacy organisations:** GPhC (352-354) **Technology services:** Near Me (368, 371-373, 375-377); NVCS (358, 359, 365-367); Attend Anywhere (378-380); Turas Learn (382, 384); **Government/health boards:** SG (395); TEC (306, 314, 400, 402, 405, 406); NHS Forth Valley (422); HIS (417); NHS Grampian (426); NHS Lanarkshire (429); NES (432)
	The steps to follow when using video consultations	**Pharmacy organisations**: GPhC (351-353) **Technology services**: NVCS (360-364); Attend Anywhere (379-381); Turas Learn (382); Near Me (368, 370-372, 374, 376) **Government/health boards**: TEC (306, 314, 401, 402, 408, 410); HIS (417); NES (432); NHS Lanarkshire (429); SG (387); NHS Grampian (426)
Organisation (n=43; 45.7%)	Patients' financial resources	**Pharmacy organisations:** GPhC (350) **Government/health boards:** HIS (417); NES (432); TEC (403)
	Patients' living arrangements	**Government/health boards:** SG (388, 396); TEC (409); HIS (415)
	Patients' access to the necessary technology	**Pharmacy organisations:** RPS (316) **Technology services**: Turas Learn (382) **Government/health boards**: TEC (403)
	Healthcare professionals' roles and responsibilities	**Pharmacy organisations**: RPS (23); GPhC (352, 353) **Technology services:** Near Me (376) **Government/health boards**: TEC (409); HIS (415); NES (432)
	Organisational strategies and standards for use	**Government/health boards:** NHS Highlands (411-413); NHS Fife (355, 424, 425); NHS Borders (418-420); NHS Orkney (430, 431); NHS Forth Valley (421, 423); NHS Grampian (427); NHS Dumfries and Galloway (433)
Internal Environment (n=17; 18.1%)	Privacy of the space available for video consultations	**Pharmacy organisations:** RPS (23); GPhC (353) **Technology services:** Near Me (368, 374, 377); Turas Learn (382) **Government/health boards:** SG (284, 392); TEC (306, 314, 402, 403); NHS Grampian (426); NES (432)

Themes: Work System components	Sub-theme(s)	Organisations, technology services, and government/health board references*
	Suitability of the space available for video consultations	**Pharmacy organisations:** GPhC (354); **Technology services:** Near Me (368, 374, 377); Attend Anywhere (378); Turas Learn (382); **Government/health boards:** SG (392); TEC (402, 409); NHS Grampian (426); NES (432)
External environment (n=34; 36.2%)	Carbon footprint	**Technology services:** Near Me (376, 377) **Government/health boards:** SG (388, 392, 398); TEC (306, 314, 406); HIS (415, 416); NHS Orkney (430); NES (432)
	Patients' geographical location	**Government/health boards:** SG (387); TEC (403); HIS (416); NES (432)
	Governmental strategies and recommendations	**Government/health boards**: SG (12, 13, 19, 284, 386-393, 395, 397-399); TEC (404, 405)
	Following relevant regulations	**Pharmacy organisations:** RPS (350); GPhC (352, 353) **Government/health boards:** TEC (401); NHS Grampian (426)
	Digital exclusion	**Pharmacy organisations:** RPS (350) **Technology Services:** Near Me (376) **Government/health boards:** TEC (403)

***** *CPS – NHS Community Pharmacy Scotland*
GPhC – General Pharmaceutical Council
HIS – Healthcare Improvement Scotland
NES – NHS Education for Scotland
NVCS – National Video Conferencing Service
RPS – Royal Pharmaceutical Society
SG – Scottish Government
TEC – Technology Enabled Care

Below is a synthesis of the resources described using the SEIPS 2.0 model. The results are presented under each of the six headings with sub-themes within (Table 7.7), which were derived from the inductive content analysis.

7.4.3.1 Person(s)

Forty-two (44.7%) resources contained information relevant to the *person(s)* component, including: patient and pharmacist characteristics in relation to the suitability of video consultations; and the involvement of patients and healthcare professionals in the development of the resources (Table 7.7).

(i) Patients' cognitive characteristics

The resources considered patients' cognitive characteristics , including their cognitive abilities and the impact of any learning disabilities (316, 350, 351, 353, 388, 401, 403), and their IT skills (316, 403), in relation to using video consultations. Two equality focused resources recognised the benefit of video consultations for patients with learning disabilities, potentially for those with Autism who may find healthcare environments difficult due to overstimulation (350, 403). However, the National Equality Impact Assessment outlined how patients with learning disabilities may experience barriers to service access, especially if patient information around the service is designed with a lack of inclusivity (403). GPhC guidance outlined the importance of ensuring patients have the communication abilities to participate in video consultations (351). Moreover, resources stressed the importance of the healthcare professionals making an assessment to ensure patients have the capacity to consent to video consultations and partake in treatment decisions (316, 351, 353, 401), and provided best practice principles to guide decision making (401). Although content within resources recognised the benefits of remote care for those with cognitive decline due to better access and reduced travel (388), two resources provided examples of when (and with whom) remote care is not appropriate, including: consulting with patients with incapacity; and patients lacking the necessary IT skills, as they are likely to experience difficulties when using the technology (316, 403).

(ii) Patients' physical characteristics

The resources considered patients' physical characteristics in relation to taking part in video consultations, including their mobility (314, 388, 396, 397, 403, 415, 416, 432) and sensory impairments (414). In recognising that patients with reduced mobility experience difficulties in attending appointments in person, all resources agreed on the appropriateness of video consultations for patients with reduced mobility, including frailty in older patients. An NHS Highland radio show on the use of Near Me described ways in which the technology can be set to ensure hard of hearing patients benefit from using video consultations, including the use of Google's© speech-to-text for live captions (414):

"I've tried it with a patient that is hard of hearing, and he said it was excellent because he could read everything I was saying there and then…he didn't have to try and explain that he couldn't hear me. It was dead simple for him to use" (NHS Highland, Be My Guest Inverness Hospital Radio Podcast) (414).

(iii) Patients' psychosocial characteristics

Thirty-three (35.1%) resources considered patients psychosocial characteristics in relation to taking part in video consultations, including: patient convenience factors; patient choice/preferences; patients requiring carers; non-English-speaking patients; and patients' health concerns/needs for video consultations (Table 7.7)

Convenience factors:

Guidance outlined a series of convenience factors for patients using video consultations (Table 7.8). The most commonly cited convenience factors included reducing the spread of infections and supporting physical distancing (e.g. COVID-19) (n=13). There were no inconvenient factors for patients reported across the resources.

Table 7.8: Patient convenience factors

Patient convenience factors	Resources
Reducing the spread of infections (e.g. COVID-19	(284, 316, 368, 376, 388, 392, 394, 395, 398, 403, 417, 427, 430)
Not having to take time off work/school to attend for an appointment	(306, 314, 376, 387, 397, 398, 403, 406, 414, 417, 430, 432)
Reduced travel	(23, 306, 314, 316, 368, 387, 388, 392, 403, 406, 414, 430)
Saves time	(316, 376, 403);
Easier to attend for patients' requiring carers help	(306, 314, 388, 403, 406)
Saves money	(388, 417)

Patient choice/preferences:

The importance of considering patient choice/preferences was recognised across the resources, with emphasis on providing video consultations as a choice for patients to allow them to be at the centre of their care (306, 314, 350, 351, 353, 376, 407, 409, 428). The National Equality Impact Assessment outlined the importance of video consultations being offered as an option alongside face-to-face appointments, especially for those patients who may find themselves in domestic violence situations, where appointments from home would not be appropriate (403).

Patients requiring support from carers:

Video consultations could be beneficial for patients requiring carers, as it reduces the need to organise carers to take them to in person appointments and allows carers to be involved in and support discussions around the ongoing care (314, 409, 415).

Non-English speaking patients:

The benefit of video consultations for non-English speaking patients was recognised, as there is the potential for language interpreters to be involved in consultations (403, 414). However, TEC guidance also recognised the potential for barriers for non-English speaking patients, if resources around the use of video consultations are designed with a lack of inclusivity (403).

Patient health concerns/needs:

Guidance considered the suitability of patients' health concerns/needs for assessment over video consultation (Table 7.9). Although the prescribing of medicines was deemed appropriate in some resources, it was also equally deemed inappropriate in others for the prescription of certain medicines (e.g. antimicrobials;

opioids; laxatives; gabapentin; non-surgical cosmetic products), unless safeguards are in place.

Table 7.9: Health concerns/needs deemed more and less appropriate for assessment over video consultations

Health concerns/needs appropriate for assessment over video	**Resources**
Medication review or advice	(306, 314, 394, 395, 397, 409, 415, 416, 432)
Mental health	(314, 409, 414-416, 432)
Respiratory conditions (e.g. asthma)	(314, 373, 376, 416, 432)
Long-term condition management	(314, 406, 409, 415)
Prescribing of medicines	(306, 353, 394, 395)
Skin concerns	(314, 416, 432); (388)
COVID-19 cases	(314, 371, 429)
Diabetes	(314, 376, 415)
Smoking cessation	(306, 394, 395)
Unwell patients unable to leave home	(373, 396, 417)
Contraception services	(306, 314)
Pain	(306, 314)
Assessment of children	(314, 409)
Cardiovascular disease	(314)
Epilepsy	(314)
Eye concerns	(432)
Gout	(314)
Hypertension	(314)
Irritable bowel disease	(314)
Menopause	(314)
Neurological conditions	(409)
Post or pre op review	(314)
Sore throat	(314)
Test results	(416)
Wound care	(388)
Substance misuse	(306)
Health concerns/needs less appropriate for assessment over video	**Resources**
Prescribing of specific medicines	(306, 351-353)
When physical examination is required	(306, 432)
When urgent care is required	(316)

(iv) Pharmacists psychosocial characteristics

Seventeen (18.1%) resources considered pharmacists' psychosocial characteristics in relation to video consultations including: convenience factors; and assumptions about patients (Table 7.7).

Convenience factors:

Guidance considered convenience factors for pharmacists, with the most commonly cited being the ability to work remotely/from home (Table 7.10).

Table 7.10: Pharmacist convenience factors

Convenience factor	Resources
Enables remote/home working	(306, 314, 371, 373, 397, 402, 406, 416)
Reduces spread of infections (e.g. COVID-19)	(306, 314, 316, 376, 392, 394, 395, 402, 427)
Saves time	(314, 316, 414, 427)
Reduces need to travel	(306, 376, 392, 397, 402)
Helps with staff shortages as remote workers can fill in	(373)

Assumptions about patients:

The importance of healthcare professionals not making assumptions about the types of patients who may or may not be able to use video consultations (e.g. older patients) was mentioned in the guidance (284, 432).

(v) Stakeholder involvement in resource development

Thirteen resources (13.8%) explicitly mention involving stakeholders in the development process, by engaging with: members of the community and groups of patients (350, 393, 397, 424, 430); healthcare professionals from different health and social care backgrounds (19, 23, 65, 66, 314, 350, 424, 430); other relevant governing or professional bodies (23, 65, 66, 306, 314, 350, 352, 397); and organisational partners (12, 424). Four described the methods used for obtaining stakeholder input, including: focus groups (66, 350, 430); surveys via email, messages, and telephone calls (23, 66, 350, 430); interviews (430); and meeting attendance with experts (350).

7.4.3.2 Tools and technologies

Sixty-two (66%) resources contained information relevant to the *tools and technologies* component, including: the benefits and challenges of video consultations; resources for publicising; technological requirements; confidentiality, privacy and data security; and signposting to other resources (Table 7.7).

(i) Benefits and challenges

Resources outlined the benefits of video consultations (Table 7.11). The most commonly cited benefits were: allowing multiple people to join the call (n=11) (e.g. students on placement but at remote location; patients family members/carers; other members of the multidisciplinary team); and the presence of visual cues (n=7). On the other hand, the most commonly cited challenges were: patient and healthcare professionals' lack of digital skills (n=2); and access to the necessary technology (n=2).

Table 7.11: Benefits and challenges of using video consultation technologies as a tool

Benefits	Resources
Allows multiple people to join the consultation	(65, 314, 377, 387, 388, 398, 403, 416, 428, 430, 432)
Visual cues	(314, 376, 377, 415, 416, 429, 432)
Improves patient access to services	(284, 306, 376, 392, 416)
Easier to build rapport than over the telephone	(316, 416, 432)
Widens understanding of patients' home context	(415, 416)
Patients can show medications or equipment	(415)
Challenges	**Resources**
Technology may be more difficult for patients to use in comparison to telephone	(316)
Lack of access to the technology (patient and healthcare professional access)	(284, 409)
Patient and healthcare professional lack of digital skills	(284, 409)
Connectivity issues	(284)

(ii) Resources for publicising

Near Me have produced a resource which can be used by professionals when publicising the availability of the service. This includes official Near Me images which can be incorporated into posters or leaflets and short film clips/case studies which can be shared (407).

(iii) Technological requirements

Twenty-five (26.6%) resources identified technological requirements regarding internet browsers, connections, devices, and medical records access (Table 7.7). Although six resources state that Near Me can be used on Google Chrome© or Safari© browsers only (306, 373, 395, 422, 426, 432), six highlighted that Microsoft© Edge (the new Internet Explorer) can also be used (358, 376-378, 402, 417). Four resources state the preference for the use of wired broadband or WIFI connections before using personal mobile phone data (306, 378, 395, 426), however all three connections are recognised as options. Resources also mentioned the minimum download/upload speeds required for a sufficient connection (306, 314, 377, 378, 395, 402, 422, 426).

The types of devices recommended for video consultations (Figure 7.2) included: computers; laptops; tablets; and mobile phones (306, 373, 376-378, 382, 384, 395, 403, 406, 417, 422, 426, 432). Twelve resources stated that devices must have speakers, a microphone and a camera (306, 368, 373, 374, 378, 382, 384, 395, 405, 417, 422, 432). Three suggest using USB devices, as built in audio/visual capabilities are of poor quality in comparison (368, 374, 378).

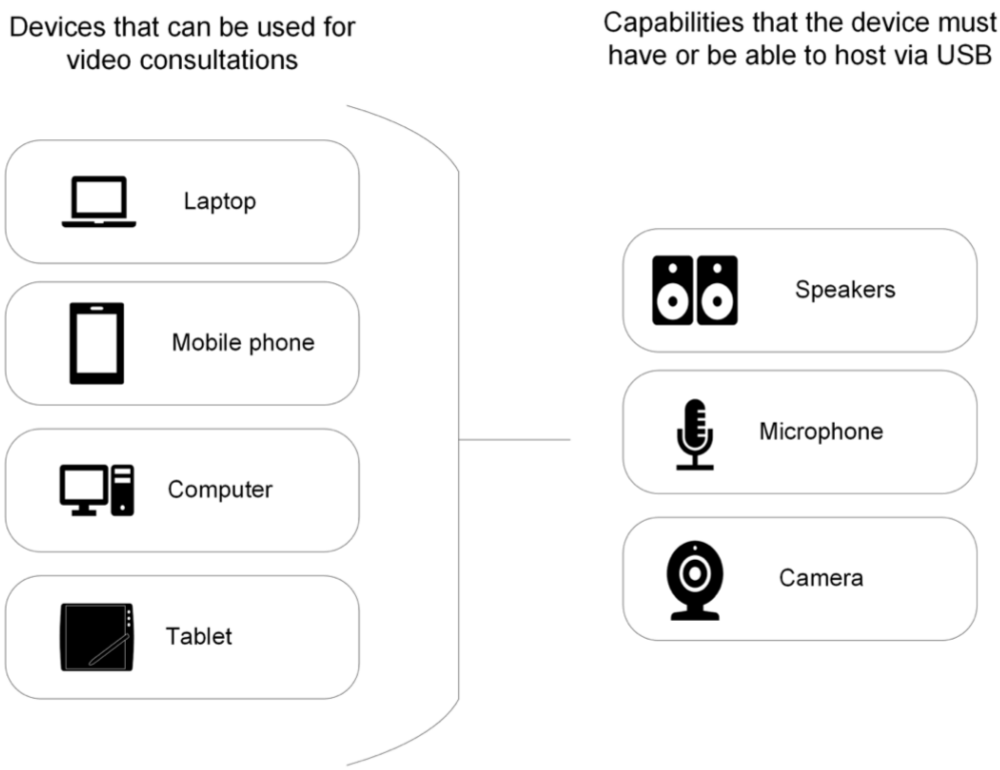


Figure 7.2: Devices that can be used for video consultations, and the necessary capabilities

There was a recognised need for healthcare professionals to have access to the patients' medical records normally used for face-to-face consultations (306, 316, 352, 353, 371, 382, 384, 397, 432). Video consultations were deemed not appropriate for use when there is limited access to records, especially if prescribing as there are potential patient safety risks (316, 352, 353). However, the remote and rural general practice working group highlighted that *"video consulting is the easy part, ensuring the clinician has full read-write access to the appropriate information can be more difficult"* (397).

(iv) Confidentiality, privacy and data security

Resources stipulated that decisions to use video consultations should be based on the ability to maintain patients' confidentiality and privacy (351, 402, 426), and emphasised the need to ensure relevant regulations are adhered to. Regulations are discussed further in the *external environment* section.

(v) Signposting to resources

Forty-six (48.9%) resources explicitly signposted to other guidance within them (Table 7.7), with the majority signposting to Near Me (n=25) and TEC (n=20) resources. The most commonly cited Near Me resources were: the Near Me website (n=15); the Using Near Me with Callers' video (n=7); and the Clinician/Service Provider Training video (n=7). Twenty resources cited TEC guidance within them, with the most commonly cited resources being the guidance section of TEC website (n=11) and the general Near Me section of TEC website (n=8).

Moreover, resources published by pharmacy organisations signposted to guidance not included in the review due to not meeting the eligibility criteria. Despite being designed for GPs, the General Medical Council (GMC) (268) remote consultation guidance was signposted to by RPS (316) and GPhC (351, 352, 354). Similarly, RPS (316) signposted to the Royal College of General Practitioners (RCGPs) guidance and top tips on using video consultations (434), which is specifically for GPs, not pharmacists. Furthermore, an NHS Lanarkshire resource signposted to video-based guidance for healthcare professionals working in NHS England (429).

7.4.3.3 Tasks

Forty-eight (51.1%) resources provide guidance relevant to the *tasks* component, including: the appropriateness of *tasks* for conducting over video consultation; and the steps to follow when setting up for and using video consultation technology (Table 7.7).

(i) Appropriateness of tasks for conducting over video

Resources outlined *tasks* which they deemed appropriate for conducting over video consultations, including: Pharmacy First Service (306, 396); triage process (314, 416); follow-up (306, 314); contacting interpreters (416, 417); clinical supervision (306, 314); and multidisciplinary reviews (314). In contrast, two Scottish Government NHS circulars on the implementation of video consultations in community pharmacy highlighted that video consultations would not be appropriate for conducting *tasks* that are commercial activities, aimed at profitable gain (394, 395).

(ii) Steps for setting up video consultations

Thirty-two (34%) resources provide step-by-step advice on how to set up for using video consultations, focusing on the technical and process set up (Table 7.7).

Technical set up:

Resources provided step-by-step advice on the technical set-up for video consultations (Table 7.7). A summary of the areas covered in the resources is displayed in Table 7.12, presented in the chronological order in which they would occur in practice. The most commonly cited advice on technical set up referred to: testing the technology before use (n=10); and logging into a Near Me account and accessing the waiting area (n=8).

Table 7.12: A summary of technical set up advice in resources (n=26)

Stage of technical set up	Summary of advice	Resources
Apply for waiting area	In order to use Near Me, healthcare professionals must apply to access a waiting area from the National Video Conferencing Service website. Once processed, an invite to create an account will be sent.	(371, 395, 422, 432)
Create and manage account	Advice provided on how to create and manage a Near Me account, including: • how to change the email address used by Near Me • how to set up a user profile (i.e. name, job role, upload profile image, time zone) • how to change the account password • how to use each of the different interface screens (e.g. default screens where work is performed; information and settings; and call screens).	(366, 378, 379, 432)
Log into account and access waiting area	Advice provided on: • How to log into a Near Me account to access the waiting area, using a link provided • How to view the waiting area and who is in it • How to view more than one waiting area if access to more than one is provided • The use of the optional “keep me signed in for today” button, as without checking the box, the system will log out after ten minutes of inactivity • Considering whether the use of a shared computer is appropriate.	(306, 314, 368, 371, 372, 378, 426, 432)
Settings within the waiting area	Advice on setting up of waiting areas, including: • Enabling call queue indicators for patients • Amending waiting area opening times • Adding other healthcare professionals to the waiting area • Customisation of the patient information leaflet available in the waiting area • Adding a relevant logo to patients’ screens • Editing of the message that patients will see on screen when entering waiting area.	(367, 375, 379, 417, 432)
Minimising Microsoft Teams © and clearing browser cache	Advice on improving the quality of the call, including: • Minimising the Microsoft Teams© application in the background • Clearing browser cache on devices used for video consultations.	(358, 359, 365)
Ensure access to medical records	Advice stating healthcare professionals must have access to the patient’s medical records before using video consultations.	(306, 314, 352, 353, 382)
Test the technology	Advice provided on testing the technology before a consultation, which can be done: • Via a link provided for the Near Me website • With patients via a test call.	(306, 314, 372, 377, 380, 382, 400, 402, 432)

Figure 7.3 provides an example of the waiting area screen that healthcare professionals see when logging in to the Near Me platform.

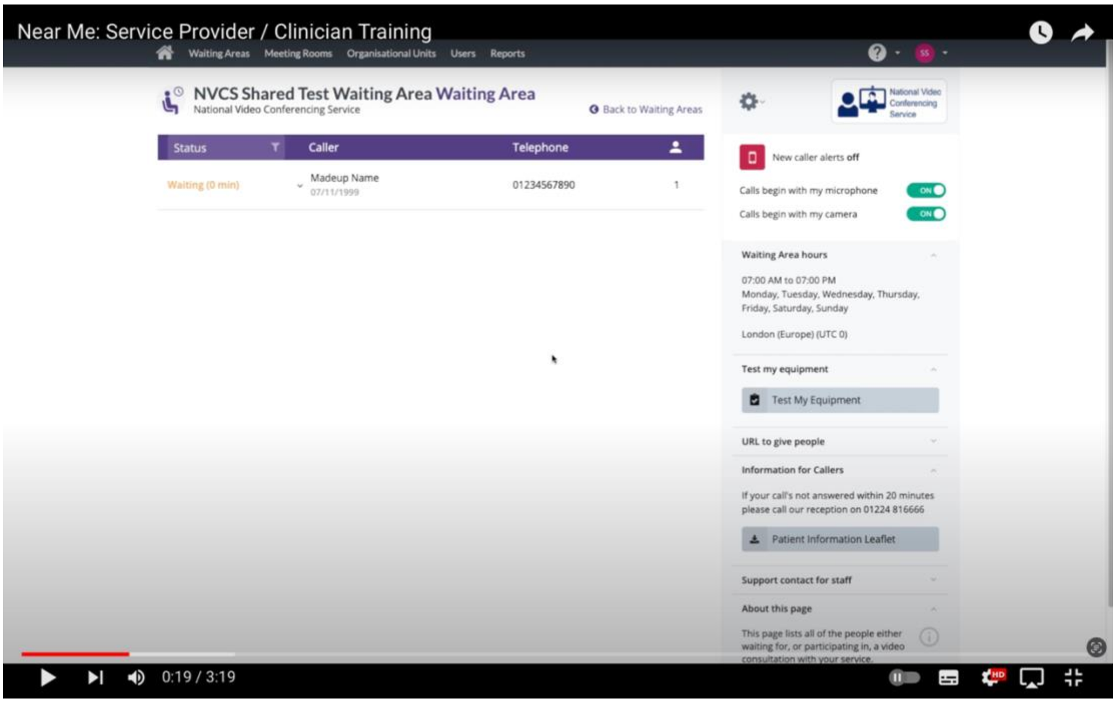


Figure 7.3: Example of the waiting area screen that healthcare professionals see after logging in to Near Me

Figure taken directly from (372).

Process set up:

Guidance emphasised the importance of organisations' ensuring there are standard operating procedures (SOPs) in place before using video consultations (306, 314, 354, 371, 373, 376, 384, 405, 406, 432). There were four key steps that should be defined within SOPs, which are described in Table 7.13. The most commonly reported step to define within SOPs involves deciding if appointments will be scheduled or unscheduled, and how patients will arrive for their video consultation (e.g. triage process, sharing patient information and link for call) (n=9).

Table 7.13: Steps healthcare teams should define when developing standard operating procedures (SOPs) for video consultations

Steps to define in SOPs	Description of step	Resources

How the appointment will be scheduled (or not) and how the patient will arrive	Healthcare professionals' must decide if video consultations are offered on a scheduled or unscheduled basis:
	• Scheduled
	   o Practice staff would advise patient on the criteria and make an appointment for them, providing them with the link.
	   o Reception staff would need to monitor the waiting area and mark patients as arrived in the clinical system, sending an alert to healthcare professionals, or healthcare professionals directly monitor waiting area themselves
	• Unscheduled
	   o Patients could be directly triaged via Near Me and offered on a first come first serviced basis
	   o Or patients could be offered Near Me on a first come first served basis where patients enter the waiting room and would be seen as they arrive.
	
	Patients will require access to relevant information (e.g. clear criteria on suitability for video consultation and times the service is available) and a simple way to enter the system. The preferred method is to put this information and a start call button on a website, which brings patients into a virtual waiting area. If there is no website available, other options include the link being sent via email, text, or letter.
		(306, 314, 371, 373, 376, 384, 405, 406, 432)

Clinical templates	Clinical systems should be altered to create codes which clearly distinguish video consultations from face-to-face and telephone consultations. Suggestions are also made around developing clinical templates to show when healthcare professionals have video appointments available.	(314, 371, 373, 376, 384)
Follow-up and patient notes	Healthcare teams should plan for how the outcomes of the consultation will be followed-up. Plans should also be made for how notes from the consultation will be stored.	(314, 371, 376, 384, 426, 432)
Contingency plans	Healthcare teams need to have plans for what to do if the video consultation fails, which could include switching to the telephone or face-to-face, or re-arranging the consultation for another time.	(306, 314, 371, 376, 384, 406)
Additional risk assessments and audits	Risk assessments should be conducted before any pharmaceutical services are provided remotely, with continual audits to ensure services are being delivered effectively.	(354)

(iii) Steps to take during the video consultation

Resources provided advice on the steps to take during the process of using video consultations with patients, which are presented in Figure 7.4 and described in more detail in Table 7.14, presented in the chronological order in which they would occur in practice.

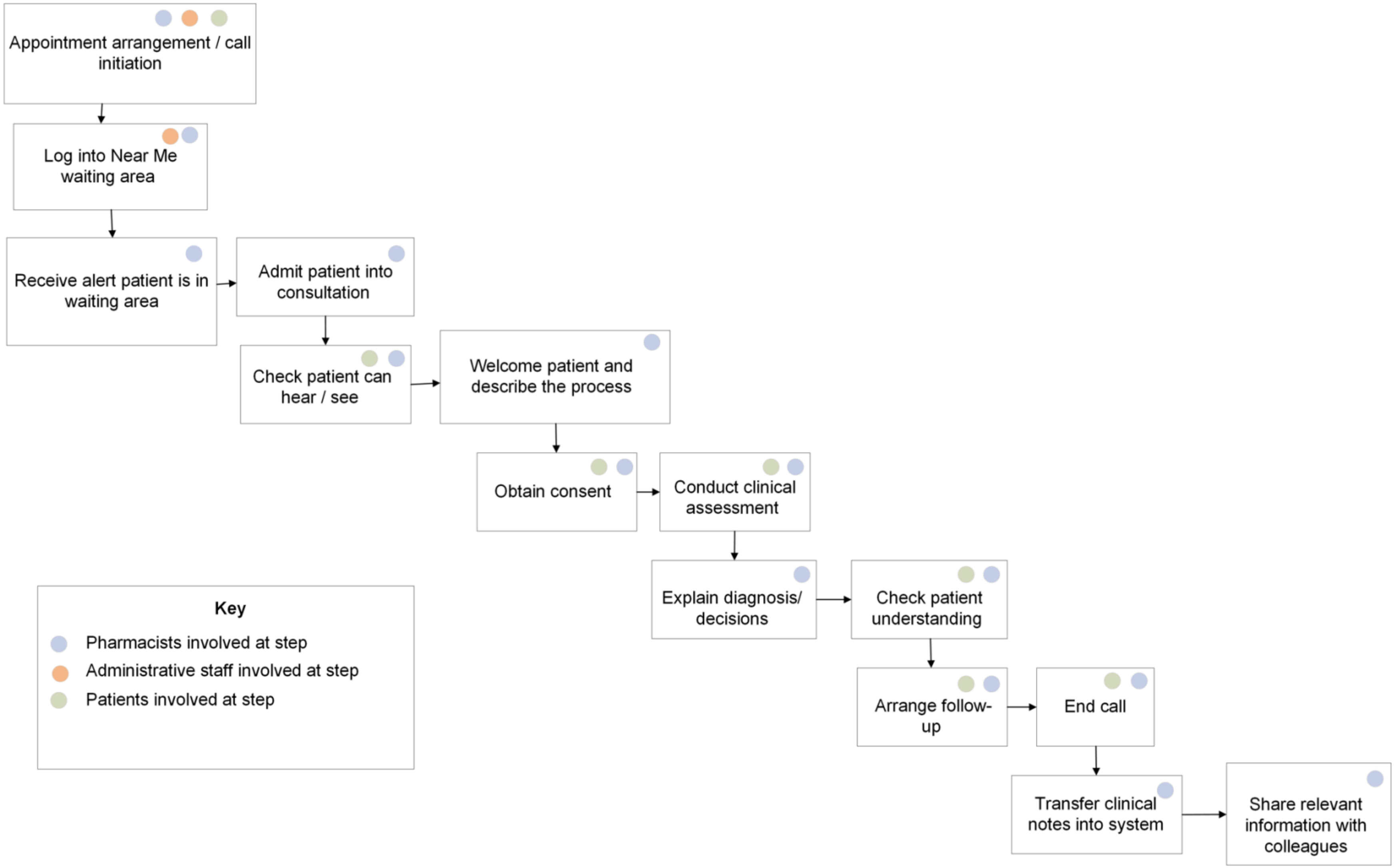


Figure 7.4: Steps to take during video consultations

Table 7.14: Steps to take during video consultations

Steps to take during video consultations	Description of tasks at each step	Resources

Appointment arrangement/call initiation	• Patient or representative of the patient may contact requesting appointment, or healthcare professional or administrative staff may identify patient for review
	• Patient is triaged
	  ○ Checking background information, health concerns, and access to technology to determine suitability of video consultations
	  ○ Triage may happen over Near Me or telephone depending on service set up
	• If unscheduled, open access care then calls may be answered without initial triage
	• Ensure patient has been sent patient information leaflet (paper or online version)
	• Confirm suitable date and time for appointment, and ensure patient has been sent link to call
	• Patient will enter virtual waiting area with link provided.
		(306, 314, 351, 353, 370, 380, 382, 417, 429, 432)

Log into Near Me	• Healthcare professionals must be logged onto the system and be able to see the waiting area.	(306, 314, 371, 372, 374, 426, 432)
Receive waiting area alert	• Healthcare professionals should receive an alert (either from administrative staff or the system) to inform them that their patient has arrived in the waiting area.	(306)
Admitting patient into call	• When the healthcare professional is ready, they need to click the join call button beside the patients' name in the waiting area • If the healthcare professional is not ready to take the call, they can send messages to patients in the waiting area.	(306, 368, 372, 374, 432)

Welcome patient and describe the process	• Healthcare professionals should check that patients can hear and see them, before introducing themselves, their role and registration details. Others in the room at either end of the call should also be introduced.
	• Patients' name and date of birth should be confirmed, as well as confirming patients are in a comfortable and confidential space
	• Ensure patients understand the video consultation process. This includes informing the patient that:
	  ○ the consultation will be recorded with consent
	  ○ clinical notes will be taken and stored as is usual
	  ○ diagnoses will only be made if it is safe to do so remotely
	  ○ due to looking at patient information on/off screen, eye contact may vary
		(306, 352, 353, 382, 426, 429)

Steps to take during video consultations	Description of tasks at each step	Resources
	• Inform patients of the contingency plan if the call fails – usually to continue by telephone.	
Obtain consent	• Gain verbal consent whilst following relevant mental capacity law and codes of conduct (e.g. recognising that may need to obtain consent from someone other than the patient) • Awareness that consent is an ongoing process and can change at any point.	(352, 353, 382, 401, 402, 408, 426, 429)
Conduct clinical assessment	• Carry out the clinical assessment as would normally be done face-to-face.	(306, 314, 352, 382, 429)
Explain reasoning for diagnosis or treatment	• Healthcare professionals should explain why any decisions have been made (e.g. reason for not prescribing or changing medications) • All options should be given to patients, including the option to decline treatment • Patients should be aware of the risks involved with any treatment decision/diagnosis.	(352, 353)
Check understanding	• Healthcare professionals should check the patients' understanding of any outcomes, and ask if the patient has any further questions.	(382, 429)
Arrange follow-up	• Follow-up arrangements made (e.g. if patient is being prescribed medication, where and when will this be collected; any follow-up appointments or referrals).	(306, 314, 352, 353, 382, 429)
End call	Healthcare professionals can: • End the call but must inform the patient they are leaving, and ensure the patient knows how to end the call • End the call for all participants.	(368, 372, 374, 382, 429)
Transfer notes into system	• Record discussions had, and any decisions made, in the patients' medical record as soon as possible to ensure patient safety and continuity of care.	(306, 314, 352, 353, 402, 426)
Share relevant information with colleagues	• Relevant information about the patient should be shared with colleagues and other health and social care professionals involved in the patients care, to support ongoing monitoring and treatment.	(352)
Additional steps/advice		

Using tools within the call	• Resources provide advice on how to:
	    o Change microphone and camera settings, turning them on and off
	    o Sharing files or screens
	    o Refreshing the call
	    o Sending messages via the chat box
	    o Changing the background that patients can see
		(360-362, 368, 372, 376, 379, 380, 432)

Steps to take during video consultations	Description of tasks at each step	Resources
	○ Asking patients to flip the camera on their device to potentially achieve a clearer image	
Technical issues	• Resources provide advice on overcoming technical issues during a video consultation. Suggestions include: ○ Refreshing the call screen ○ Re-starting the browser ○ Using telephone as a back-up when video fails completely.	(374, 381, 402, 426, 429)
In specific scenarios	• Resources provide advice for using in specific scenarios, including: ○ The use of the Consult Now feature within Near Me when transferring to video during a telephone consultation ○ Assessment of long-term and acute conditions ○ Group consultations ○ Patients living in care homes ○ COVID-19 cases ○ When clinical students are using near me as part of their placement.	(314, 363, 364, 368, 380, 387, 410, 426, 429)

7.4.3.4 Organisation

Eleven (11.7%) resources considered patients' organisational factors, including: patients' financial resources; patients' living arrangements; and patients access to the necessary technology (Table 7.7 & Figure 7.5).

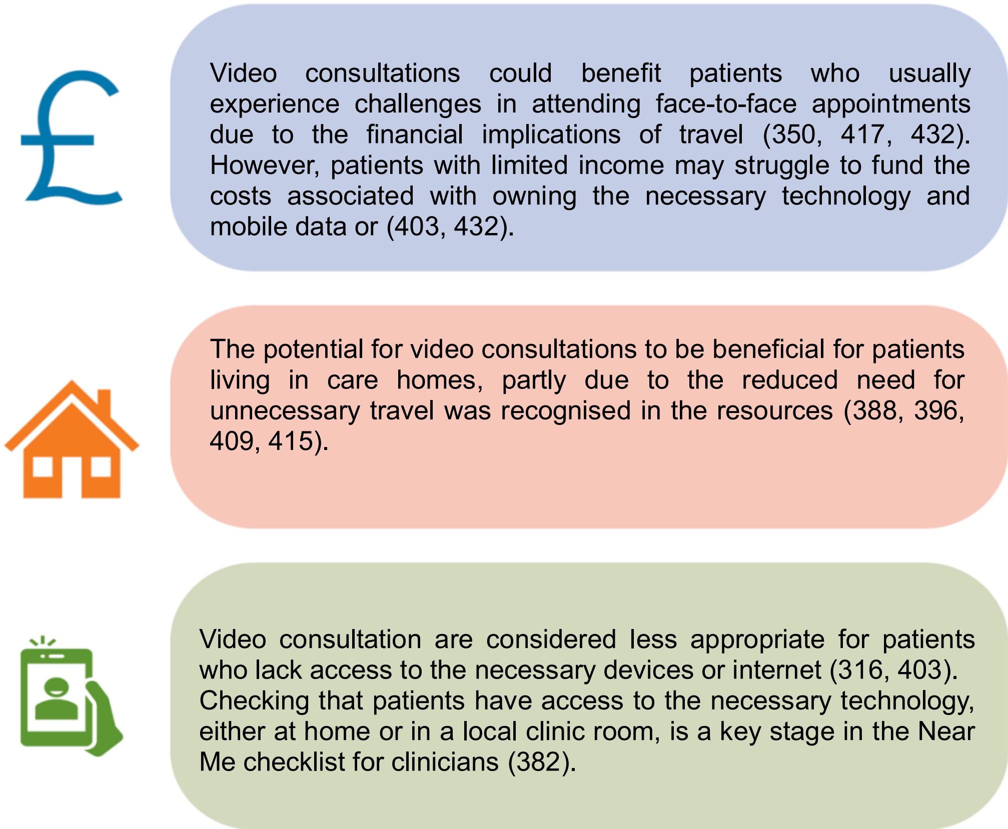


Figure 7.5: Patient organisational factors

Twenty-seven (28.7%) resources consider the NHS level organisational factors, including healthcare professionals' roles and responsibilities and organisational strategies and standards for use (Table 7.7)

(i) Healthcare professionals' roles and responsibilities

Resources outlined key healthcare professional roles and responsibilities when using video consultations, including: checking patient identity and capacity (352, 353); identifying and managing any concerning behaviours/patients at risk (352); any decision making (e.g. prescribing or deprescribing) (353); ensuring patients are aware of any risks involved in their treatment (353). Moreover, the importance of the administrator/receptionist role in raising patients' awareness of the service was also recognised (376, 409, 415). Finally, the RPS's Vision for community pharmacy and the NES webinar on Near Me in pharmacy, state that delivery of video consultations should not be limited to only pharmacists (23, 432) (Figure 7.6).

> *"… it doesn't just have to be the pharmacist who engages with patients [over video consultations]…your pharmacy team take phone calls; they do a lot of face-to-face consultations depending on the range of skills and qualifications your team have. It's a team resource, not just the pharmacist"*

NHS Education for Scotland, NHS Near Me for Pharmacy Teams Webinar (2020)

Figure 7.6: Quote from an NHS Education for Scotland resource regarding healthcare professionals' roles and responsibilities

(ii) Organisational strategies and standards for use

Although all organisational strategies (n=18) focused on the uptake of video consultations (Table 7.7), some set out specific plans in relation to implementation, such as: enhancing access to remote and rural patients (419, 420); improving access to the necessary technology and support needed for delivering the service (23, 66, 419, 420); reducing digital exclusion (411); transforming professional development (66) and expansion of roles within pharmacy to deliver video consultations (23). Of those stating a timescale for delivery, the majority were one year (n=6) (413, 419-421, 431, 433) and five year plans (n=5) (423-425, 427, 430). The importance of adhering to and meeting a variety of organisational standards when delivering video consultations was emphasised throughout the guidance, including: board level security and patient confidentiality standards (426); NHS contractual arrangements (e.g. minor ailments service (306)); and general standards for registered pharmacies (354).

7.4.3.5 Internal environment

Seventeen (18.1%) resources considered the *internal environment*, including the privacy, and the suitability of the space available for healthcare professionals and patients taking a video consultation (Table 7.7)

(i) Privacy of the available space

Video consultations should be taken a private space/area, to ensure patient privacy and confidentiality (23, 284, 306, 314, 353, 368, 374, 377, 382, 392, 402, 403, 426, 432). However, difficulties in healthcare professionals and patients establishing private spaces was recognised as a challenge for the uptake of video consultations (392, 403), especially for patients living with others or in situations of domestic violence (403).

(ii) Suitability of available space

In order for the space available for video consultations to be suitable, the space should be well-lit (377, 378, 382, 402, 426). Healthcare professionals should ensure the background is neutral, including not having anything in view that would allow identification of the healthcare professional or their family members, and ensuring any electronic backgrounds are professionally appropriate (368, 374, 382, 402, 426, 432). Finally, the space requires to be set up with the necessary IT, (354, 382, 409, 432), however the Near Me evaluation recognises this can be challenging (392).

7.4.3.6 External environment

Thirty-four (36.2%) resources contain information relevant to the *external environment* component, including: carbon footprint; patients' geographical location; governmental strategies and recommendations; following relevant regulations; and digital exclusion (Table 7.7).

(i) Carbon footprint

Resources recognised the potential for video consultations to improve the services' carbon footprint due to the reduction in travel for patients and healthcare professionals (306, 314, 376, 377, 388, 392, 398, 406, 415, 416, 430, 432).

(ii) Patients' geographical location

Several resources described how video consultations can be beneficial for improving access to patients living in remote and rural communities, who often struggle to attend appointments in-person (387, 403, 416, 432). Additionally, the GPhC provide guidance for UK based health professionals considering working for service providers overseas, and prescribing to patients overseas (352).

(iii) Government level strategies and recommendations

Although all government level strategies (n=18) focus generally on the widespread implementation and use of video consultations, some focus on specific patient groups or health concerns, such as: patients living in care homes (19, 388, 389, 404); patients living remotely and rurally (19, 397); women's general health concerns/needs (391, 393); and patients with frailty, breathlessness, or survivors of abuse (399). Twelve strategies outline timescales for delivery, with the most common being one-year (n=8) plans (386, 387, 389, 391, 398, 399, 404).

Strategies outlined additional plans in working towards the upscaling of video consultations, including: addressing digital exclusion (12, 284, 386); encouraging a cultural shift to embrace technology use (397); continual development of community hubs (13); raising awareness of services and improving patient information (284); incorporating Near Me into higher education programmes and producing relevant learning materials (404); reducing travel and environmental impact (386, 390); and improving the ability to delivery group consultations/treatment options (386, 391, 398).

(iv) Following relevant regulations

Healthcare professionals are required to follow relevant clinical and national regulations when using video consultations with patients. For example: resources outlined the laws and codes of conduct around equality (350); professionals working outside of the UK or prescribing to patients outside of the UK (352, 353); and for ensuring patients have mental capacity to consent to using the service (352, 401).

(v) Digital exclusion

In recognising potential barriers to access, guidance stipulates a need to guard against digital exclusion when offering video consultations as part of a service, by providing them as an option (350, 376, 403) (Figure 7.7).

"…as we move into an increasingly digital age, pharmacy services must guard against digital exclusion by ensuring that everything provided digitally – from Apps and QR codes for information to prescription ordering systems and remote consulting – also has a non-digital option for the people who cannot access digital tools."

Royal Pharmaceutical Society, Tackling health inequalities: Delivering accessible pharmaceutical care for everyone (2023)

Figure 7.7: Quote on digital exclusion from Royal Pharmaceutical Society resource

7.5 Discussion

This scoping review aimed to provide an overview of the existing guidance and resources relevant to pharmacists working in primary care in Scotland for the use of video consultations. It is hoped that the results will provide an evidence base illustrating the variety of existing resources, and the commonalities and differences between those provided by health, policy and pharmacy professional organisations/bodies. Overall, there were 94 resources included in this review produced between 2010-2023 (Figure 7.1). The majority of resources were published from 2020 onwards (n=62, 66%), and published by health policy organisations and health boards (n=58, 61.71%), with less from pharmacy (n=12, 12.8%) and technological (n=24, 25.5%) organisations (Table 7.6). The majority of resources (n=64, 68.1%) were intended or suitable for any healthcare professional, with only 12 (12.8%) aimed specifically at all pharmacy personnel in primary and secondary care settings, four (4.3%) at community pharmacy teams, three (3.2%) at any primary care provider, two (2.1%) at community pharmacy contractors, and one (1.1%) for all professionals with prescribing responsibilities (Table 7.6). The majority of resources could be defined as strategies (n=16, 17%), informational videos (n=12, 12.8%), and webpages (n=12, 12.8%), and less were labelled explicitly as guidance documents (n=11, 11.7%). The results were structured to provide an evidence base illustrating the consideration for each of the six components of the Work System *(i.e. person(s), tools and technologies, tasks, organisation, internal environment, external environment)* within the resources (Table 7.5 for definitions and Table 7.7 for results). Only four resources (4.3%) contained information relevant to all six components of the SEIPS 2.0 Work System, with the majority (n=31, 33%) of resources having content relating to only one of the six components. The majority of resources (n=42, 44.7%) contained information relevant to the *person(s)* component, with component least represented in the resources being *internal environment* (n=17, 18.1%) (Table 7.7). Resources considered patient and pharmacist characteristics in relation to the suitability of video consultations, and detailed stakeholder involvement in the development process (Section 7.4.3.1). The benefits and challenges of (Table 7.11), and technical requirements for, using video consultations were outlined, and resources signposted to both appropriate and inappropriate guidance (Section 7.4.3.2). In relation to the *tasks* component, step-by-step guidance was provided on the technical (Table 7.12) and process (Table 7.13) set-up for video consultations, with resources emphasising the importance of organisations developing individual SOPs. Similarly, guidance suggested the steps to take when using video consultations (Figure 7.4 & Table 7.14), and recommended the types of *tasks* which could be delivered over video (e.g. triage) (Section 7.4.3.3). The roles and responsibilities of healthcare professionals were outlined and organisational strategies for upscaling video consultations in practice described (Section 7.4.3.4). Moreover, the need to consider patients' financial situation and living arrangements when offering video consultations was recognised (Figure 7.5). Guidance stipulates the need for consultations to be taken in a private and suitable space, and suggests the use of neutral backgrounds to avoid exposing identifiable information about the professional (Section 7.4.3.5). Finally, the environmental benefits of video consultations were recognised, alongside the need to guard against digital exclusion when integrating video consultations into practice (Section 7.4.3.6. & Figure 7.7). Using the six headings from the SEIPS 2.0 Work System, this discussion reviews these results in the context of the wider evidence base. Strengths and limitations of the review and recommendations for future research will be discussed, and conclusions drawn.

7.5.1 Summary of resources

As most of the resources were published in 2020 (n=23, 24.5%), this is likely due to the increased drive for the use of video consultations during the COVID-19 pandemic (39, 40). It is also not surprising that the majority of resources were published by the SG (n=18, 19.2%) given that it is responsible for healthcare policy and NHS funding in Scotland (28). Similarly it is not surprising that a large proportion (n=13, 13.8%)

were published by TEC, given that Near Me worked collaboratively with TEC to develop national guidance that should be utilised when setting up video consultations in practice (435).

The primary care pharmacists who participated in the field work in Chapter 6 of this thesis highlighted that despite being aware of some available guidance, more was needed on when video consultations may and may not be appropriate to use with patients. This need for further guidance may relate to the majority of resources identified in this review being intended for any healthcare professionals, with much less developed or targeted specifically for pharmacy personnel, and only nine published by pharmacy organisations. This small number of resources published by pharmacy organisations is surprising given that early work on video consultation services in Scotland occurred in primary care pharmacy (67). On the other hand, the expressed need by participants for further guidance may relate to the variety of types of resource that are available (e.g. guidance, checklists, reports, videos, strategies) potentially causing confusion, which would corroborate with the wider evidence base. Sandbaek et al (2021) co-designed a video consultation guide (a webpage and downloadable file) and checklist (downloadable file) with GPs and patients in Denmark. When evaluating GPs' experience with the guide they had limited knowledge of the relationship and potential duplication between all three of the resources, which resulted in the materials being perceived as redundant instead of helpful (436). Nevertheless, it is reassuring to have identified step-by-step videos on how to use video consultations in this review, as pharmacists in Chapter 6 said they would like opportunities to observe someone using a video consultation system. The review identified three checklists for using video consultations (382, 384, 400). The presence of short checklists reflects Sandbaek et al's (2021) finding that a key barrier for GPs using guidelines was a lack of time to read long documents, emphasising the benefit of guidance in the form of shorter checklists (436). Moreover, the benefits of checklists in healthcare environments where high cognitive load may increase the risk of patient harm is recognised in the wider human factors literature (437).

7.5.2 SEIPS 2.0 Work System components

By using the SEIPS 2.0 Work System model, the review has illustrated the content in the identified resources that aligns to each of the components, and therefore provides insight into the requirements or information that may be considered when developing video consultation guidance to ensure a whole systems approach is taken. Despite the majority of resources (n=31, 33%) containing information relevant to only one of the SEIPS 2.0 Work System components (Table 7.7), a small number (n=4, 4.3%) resources contained information relevant to all six components of the Work System (306, 314, 353, 432), which is reassuring. More encouraging is the fact that two (2.1%) of the resources considering all six components are the widely cited TEC national guidance resources on using video consultations in general practice and community pharmacy. This potentially illustrates that one of the leading bodies within government focusing on the digital transformation of healthcare using technologies such as video are supporting a whole systems approach when developing relevant guidance.

What follows is a synthesis of the key results from this review in relation to the six Work System components, discussed in relation to the wider evidence base.

7.5.2.1 Person(s)

The review identified a number of physical, cognitive, and psychosocial characteristics for patients and healthcare professionals represented in the resources, which are similar to those outlined by participants in Chapter 6, with the psychosocial characteristics being the most commonly cited. Interestingly, UNICEF guidance on the use of both synchronous and asynchronous teleconsultations in primary care in Romania discusses similar characteristics, by stating that healthcare professionals should consider patients' cognitive, physical and mental states when deciding on the suitability of teleconsultations (44).

(i) Psychosocial characteristics

Ten (10.6%) resources outlined the importance of the decision to use video consultations being somewhat led by patient choice/preference, as this aligns with the focus of general health related and specific pharmacy related strategies in Scotland on providing person-centred care (12, 13, 19, 438). For example, the 2021 Digital Health and Care Strategy states that "*A person-centred approach to digital health and care is also one that promotes choice*". Moreover, the SG's Achieving Excellence in Pharmaceutical Care Strategy highlights that person-centred care in pharmacy is achieved by *"…balancing a person's preferences and expectations alongside the provision of evidence-based interventions".*

Twenty-three (24.5%) resources comprised content on the suitability of patients' health concerns/needs for assessment over video consultation (Table 7.9). However, it is important to note that the resources explicitly mention that the health concerns given are examples of when video consultations may or may not be appropriate to use, as organisations are expected to develop their own SOPs with clear clinical criteria which can be followed by staff. Healthcare professionals are expected to follow the procedures whilst using their clinical judgement when deciding if a video consultation is appropriate for each patient's needs. Similar to NHS England guidance on the use of video consultations in community pharmacy (439) and Community Pharmacy England's guidance on the delivery of the "New Medicines Service" (440), four (4.3%) resources identified in this review outline that video consultations are appropriate when patients need the prescription of medicines. Contrastingly, four resources identified in this review stipulated that the prescribing of medicines was less appropriate for certain medications unless safeguards are in place. This is reflected elsewhere, for example, in NHS England's guide for the use of video consultations in primary care which also cites the General Pharmaceutical Council guidance and recommendations that safeguards must be in place when prescribing certain medicines (271, 351-353).

Similar to pharmacists' perspectives explored in Chapter 6 (Section 6.4.3.1), two (2.1%) resources identified provided advice on the importance of healthcare professionals not making assumptions about the types of patients that may or may not be suitable to use video consultations (e.g. older patients). This is consistent with recommendations made elsewhere (271). For example, NHS England guidance on using video consultations in primary care emphasises the need for an inclusive approach, by recommending that healthcare professionals challenge their assumptions regarding patients' characteristics (e.g. age and social class; 'able' patients; ability to speak English; and psychological wellbeing), to ensure equity of access (271).

(ii) Physical characteristics

Nine (9.6%) resources made reference to patients' physical characteristics, including physical mobility and sensory impairments, in relation to the use of video consultations. Consistent with the perspectives of patients and pharmacists explored in Chapter 6, eight (8.5%) resources in this review outlined the benefits of video consultations for patients with reduced mobility, who may otherwise struggle to attend in-person appointments. Moreover, participants interviewed in Chapter 6 suggested that video consultations could be beneficial for hard-of-hearing patients, as they could potentially lip read or use a closed captions function, if available on the platform. Although there is no closed caption function within Near Me, an NHS Highland radio show (414) described how the Near Me technology can be set up to ensure hard of hearing patients benefit from video consultations, including the use of Google's© speech-to-text for live closed captions. Having access to technological functions such as closed captions, to enable hearing impaired patients to use video consultations, is consistent with guidance outside of the UK. For example, guidance for healthcare professionals working in primary care in Romania states that technical features of video consultations should be appropriate and responsive to the different needs of patients, including those with impairments (44).

(iii) Cognitive characteristics

Consistent with patient and pharmacist perspectives explored in Chapter 6, two (2.1%) resources recommended ensuring patient have the necessary IT skills if they are to use video consultations (316, 403). Moreover, whilst participants interviewed in Chapter 6 recognised difficulties around using video consultations with patients with cognitive impairment, two (2.1%) resources in this review described the potential for video consultations to be beneficial for patients with learning disabilities, as well as those with autism who could find healthcare environments over-stimulating (350, 403).

Four (4.3%) resources stressed the importance of healthcare professionals ensuring patients have the capacity to consent to video consultations and partake in treatment decisions, with Technology Enabled Care providing specific guidance on assessing capacity in adult patients (401). Interestingly, despite providing separate guidance on capacity aimed at all healthcare professionals, TEC's advice for pharmacists working in general practice and community pharmacy does not explicitly mention the need to conduct an assessment of capacity (306, 314). Given that resources from GPhC (351, 353) and RPS (316) do explicitly mention the need to ensure capacity, this could cause confusion for pharmacists attempting to use video consultations in practice due to the inconsistent messaging.

The WHO's global guidance outlines that the first step to implementing teleconsultations is to establish a team of diverse stakeholders to be involved in the development process (441). Similarly and specific to Scotland, the Scottish Intercollegiate Guideline Network (SIGN), which produces evidence-based clinical practice guidelines in Scotland, emphasises the importance of consulting a multidisciplinary group of lay and professional members (442). Although it is encouraging that 13 (13.8%) resources do mention the involvement of stakeholders in the process of developing the resources in question, this small number suggests there is room for improvement. Moreover, the involvement of stakeholders in the development of resources is seen elsewhere in the wider evidence base (436, 443). For example, Sandbaek et al (2021) involved patients, GPs and other general practice staff in the coproduction of a tool to assist the implementation of video consultations into GP practices in Denmark (436). Similarly, when assessing Australian pharmacists' use of video consultation guidelines, Mill et al (2021) highlighted the importance of involving students, interns and pharmacists in the design of any video consultation resources to ensure stakeholder needs are met (443).

7.5.2.2 Tools and technologies

Resources containing information relevant to the *tools and technologies* component of the SEIPS 2.0 Work System model contained content in relation to the benefits and challenges of video consultations such as: the technological requirements for using video consultations; and signposting to additional guidance. Given that technology is necessary for, and can facilitate, the video consultation process, it is not surprising that the tools and technology component was the most represented in relation to the information contained within the resources (n=62, 66%) (Table 7.7). A series of benefits and challenges of using video consultations were identified from the resources (Table 7.10), the majority of which were similar to those identified by participants in Chapter 6 (Figure 6.10). However, one unique benefit identified from resources related to how video consultations can allow multiple people to join the consultation (e.g. family members/carers; students on placement; other members of the multidisciplinary team), which was not represented in the Chapter 6 results. Moreover, one (1.1%) resource from the review highlighted the benefit of gaining a greater understanding of the patients' home context as a result of conducting video consultations. This is seen in a 2021 evidence briefing on the impact of remote consultations on personalised care in England, where the Personalised Care Institute recognised the added contextual information that video consultations allow as clinicians can see patients' home context and meet the patients' family (who may be providing positive or negative support) (254).

Similar to Powers et al's (2021) review of human factors considerations in telehealth guidelines for patients, 25 (26.6%) resources had content outlining a series of technological requirements, including specifications for internet browsers, internet connections, and devices (130). Additionally, nine (9.6%) resources in this review had information outlining the need for pharmacists to have access to patient medical records, which is consistent with NHS England and NHS Wales guidance on the use of video consultations in community pharmacy (439, 444) and guidance for GPs working in Australia (445).

Forty-six (48.9%) resources explicitly signposted to other guidance within them. It is reassuring that the majority signposted to Near Me or TEC resources given that Near Me is the platform used to host video consultations in Scotland, and TEC hosts the national guidance on using Video consultations, developed collaboratively with Near Me (435). Interestingly, four (4.3%) resources published by pharmacy organisations signposted to guidance that was not included in the review due to being designed for GPs, and therefore not meeting the eligibility criteria. For example, guidance by the GMC – the UK regulator for doctors - was cited in four pharmacy resources despite the guidance explicitly stating *"The flow chart below may help doctors…"* (268). Similarly, an NHS Lanarkshire resource signposted to video-based guidance for healthcare professionals' working in England (429). The video states that patient consent is assumed when the patient clicks to enter the video consultation (446). As healthcare professionals in Scotland are still required to obtain informed consent at the start of a video consultation, signposting to guidance stating otherwise could cause confusion or uncertainty. Similarly, pharmacists could experience confusion when being signposted to guidance developed for doctors.

7.5.2.3 Tasks

Resources containing information relevant to the *tasks* component considered: the technical and process set up; the steps to take when using video consultations; and the *tasks* which video consultations could be used to deliver. Similar to Powers et al's (2021) review of patient guidelines in the US (130), this review has identified 32 (34%) resources providing step-by-step guidance on the technical set-up for video consultations (Table 7.11). Understandably, the technical set-up outlined in the resources is similar to that of Near Me guidance for outpatient settings, as Near Me is the nationally approved platform for hosting video consultations in Scotland (447). On the other hand, in NHS England there are a variety of video consultation platforms approved for use (448), therefore guidance on the technical set up for video consultations in healthcare settings differ slightly to the steps outlined in Table 7.11, depending on the platform used.

Similar to teleconsultation implementation guidance by WHO (441), the review identified 10 (10.6%) resources containing content on the importance of organisations developing SOPs on the use of video consultations, covering four key steps that should be defined when developing SOPs (Figure 7.4). The steps identified are consistent with evidence seen elsewhere (439, 444, 449). For example, guidance for community pharmacists working in NHS Wales outlines the need to define: how appointments will be scheduled/how patients will access the service, including the need for clear clinical criteria; clinical templates; how clinical information is documented on pharmacy systems; contingency plans (444). Interestingly, NHS Wales guidance provides additional suggestions on developing contingency plans beyond the technical issues Identified in this review. For example, when appointments are running late, how will the patient be notified, or what is the process for patients turning up in the waiting room without an appointment (444).

Nineteen (20.2%) resources provided guidance on eleven steps to take during the process of using video consultations, which reflect other guidance elsewhere and in other contexts (271, 439, 445, 446) (Figure 7.6 & Table 7.12). Similar to resources in this review, NHS England's guidance for video consultations in primary care: outlines various methods for appointment arrangement/call initiation; highlights the entering of patients into a waiting area until the clinician joins them on the call; described checking of patient identify and obtaining consent; and provides detail on explaining the process to patents, including any limitations of video consultations (271). NHS England guidance initially outlined the need to obtain informed consent at the start of a call (271), similar to Scottish guidance, however more recent guidance for NHS England stipulates that patient consent is implied when the patient enters the call (446). Interestingly, the methods for appointment arrangement/call initiation differ slightly to those specified for healthcare professionals in Scotland. For example, resources in this review suggest that patients could be triaged over the telephone or via Near Me, whereas in NHS England, guidance suggests the use of online messaging, online forms, in addition to telephone (271). Finally, guidance for GPs working in Australia outlines similar steps to those identified in this review, such as: professionals introducing themselves and anyone else in the room; verifying patient identity and obtaining informed consent; arranging any follow-up, and documenting the appointment on the appropriate clinical system (445).

The secondary analysis in Chapter 5 of this thesis identified that patients feel less attention is given to them over video consultation than face-to-face, which they related partly to the lack of eye contact from primary care providers glancing back and forth to their computer screen (177). It is therefore reassuring that the guidance identified in this review suggests healthcare professionals explain this potential loss of eye contact due to consulting results/clinical system on another screen, or the placement of the camera, when describing the process to patients (Table 7.12). Finally, five (5.3%) resources described a series of tasks which were deemed appropriate for conducting over video consultations, some of which are consistent with those suggested by patients and pharmacists in Chapter 6. For example, the triage process, follow-up, and contacting interpreters were all tasks identified in Chapter 6, with the addition of delivering the Pharmacy First Service and conducting clinical supervision or multidisciplinary reviews outlined in this review.

7.5.2.4 Organisation

Resources containing information relevant to the *organisation* component discussed both patient-level organisational characteristics including patients' living arrangements and financial situation; and NHS-level characteristics including healthcare professionals' roles and responsibilities and organisational strategies for the uptake of video consultations. Four (4.3%) resources highlighted the potential for video consultations to be beneficial for patients living in care homes, partly due to reduced travel, which is reflective of the wider evidence base. For example, guidance for healthcare professionals using teleconsultations in Romania recognised the suitability of video consultations for patients living in care homes (44), which is reflective of the perspectives of pharmacists in Chapter 6 (Section 6.4.6).

Moreover, resources recognised the need to consider: patients' financial situation (n=2, 2.1%) in relation to whether they had the funds for technology and an internet connection; and if they had access to up to date technology that would facilitate video consultations (n=3, 3.2%). This is consistent with patient and pharmacist perspectives in Chapter 6.

Seven (7.5%) resources contained guidance or information on healthcare professionals' roles and responsibilities when using video consultations in practice, which are somewhat consistent with the sub-themes in Chapter 6. For example, two (2.1%) resources in this review outline the potential for video consultation delivery to extend beyond the pharmacist, and to allow other pharmacy personnel to provide advice to patients over video consultations (23, 432), which mirrors a suggestion made by one community pharmacist participant in Chapter 6 (Section 6.4.6). Furthermore, when discussing staffing, pharmacists who participated in the Chapter 6 interviews outlined the need for administrative/reception staff in assisting with the setting up of video consultation appointments (Section 6.4.6). Although resources in this review recognise the involvement of administrative/reception staff in the arrangement of appointments (Table 7.12), emphasis is also made in the resources on the importance of their role for raising patients' awareness of video consultation services (Section 7.4.3.4).

Eighteen (19.2%) resources could be defined as organisational strategies and standards for the use of video consultations. Interestingly, pharmacists who participated in the Chapter 6 interviews felt that although the NHS recognise video consultations as having a place in healthcare, they perceived there to be no active encouragement from the NHS at an organisational level to use video consultations (Section 6.4.6). This perceived lack of encouragement is therefore surprising given this review has identified both general healthcare strategies for the use of video consultations across different health boards (411-413, 427), as well as pharmacy specific visions for widespread video consultation integration (23, 65, 66), which were accessible online at the time of the interviews.

7.5.2.5 Internal environment

Seventeen (18.1%) resources in the review contained information relevant to the *internal environment* component, such as the privacy and suitability of the space available for video consultations (Section 7.4.3.5). Guidance within fourteen (14.9%) resources described the need for video consultations to be taken in a private space, which is consistent with the advice in both NHS Wales and NHS England's video consultation guidance for community pharmacists, Powers et al (2021) review of patient telehealth guidance, and UNICEF's guidance on teleconsultations in primary care in Romania (44, 130, 439, 444). Two (2.1%) resources recognised the potential difficulties for healthcare professionals establishing a private space, which is reflective of the results in Chapter 6, where some general practice pharmacists reported not having access to a private space, and being expected to deliver consultations from a hot-desking, open-plan environment (Section 6.4.7).

Eleven (11.7%) resources contained advice on the suitability of the space from which video consultations would be conducted, including ensuring that a professionally appropriate and neutral (physical or virtual) background is used. This is somewhat consistent with an article in the RPS' journal, where Barnett et al (2020) highlight how pharmacy teams can practice remote consultations successfully, and suggest the use of a neutral background to reduce the likelihood of the patient becoming distracted (450). The justification for this in the resources found in this review was to protect the healthcare professional and avoid exposing any identifiable details (e.g. via family photos in the background), yet a pharmacist who participated in the interviews in Chapter 6 stated this was for the patient's benefit, so as not to distract them during the video consultation (Section 6.4.7).

7.5.2.6 External environment

Twelve (12.8%) resources in the review contained information around the potential for video consultations to improve the carbon footprint of healthcare services due to the reduction in travel, which is consistent with the wider guidance and evidence (439, 444). For example, community pharmacy guidance in NHS England and NHS Wales also highlights the benefit of video consultations to help meet environmental imperatives in the move towards net-zero and greener health services (439, 444). It is reassuring that video consultation guidance is highlighting the environmental benefits of remote care across the UK, as one of the WHO's Sustainable Development Goals focuses on reducing the number of deaths as a result of environmental pollution, by investing in areas such as reduced and cleaner travel (451).

Only three (3.2%) resources identified in the review explicitly recognised the need to guard against digital exclusion when using video consultations, which is reflective of the results in Chapter 6, as patients and pharmacists expressed concerns about video consultations widening the digital divide (Section 6.4.8). Although it is surprising that only three resources explicitly mention this, 10 (10.6%) resources did advocate for video consultations being offered as a choice to patients alongside non-digital options, which would help to mitigate against patients experiencing digital exclusion. Finally, given that the main use of Near Me services before the COVID-19 pandemic was focused on the rural and remote island areas of Scotland (452), it is surprising that only four (4.3%) resources in this review discussed patients' geographical location in relation to the benefits of video consultations for those living in remote and rural communities.

7.5.3 Strengths and limitations

To the best of the researcher's knowledge, this is the first review using the SEIPS 2.0 Work System to provide a framework upon which to map the guidance available to pharmacists working in Scotland on the use of video consultations in primary care. The review has illustrated how each component of a Work System can be considered when developing guidance.

As outlined in previous chapters, the interrelatedness of the SEIPS 2.0 Work System is a strength in that it recognises interactions between components within a system. However, as the findings of the review can often relate to more than one component, it is expected that there may be differing views on the coding of the resource content, and to which component of the Work System model should they be aligned. However, any differing opinions were resolved during validation which involved two additional researchers with experience of qualitative analysis methods using the SEIPS 2.0 model. As detailed in the methods (7.3), KP coded 20% of resources and 98% agreement was achieved on the coding, with a member of the supervisory team (ED) reviewing the final coding before write-up.

The review was limited to resources accessed from/published by health policy/health boards, professional organisations or technological platforms, and therefore did not include any research articles, opinion pieces, commentaries or other documentation published in academic journals. However, the decision to exclude resources from academic journals was in response to the results of Chapter 6, as pharmacists highlighted a need for more guidance at an organisational level on when video consultations may or may not be appropriate to use. Moreover, the review was limited to resources published or made available from 2010 onwards, which was based on a previous review suggesting engagement with video consultations in primary care was limited before then (62). It is unlikely that expanding the search to before 2010 would have yielded any extra results, as the majority were published after 2020 and the earliest resource identified was published in 2016. Finally, whilst the review was limited to Scotland, comparison of the results to the wider literature suggests that findings are somewhat transferable to other regions of the UK and other countries.

The review was limited to resources identified using the Google© search engine only, and therefore may have missed resources that can only be accessed using other engines. For example, search engines Bing© and Yahoo© have been used in the literature. Moreover Bellefontaine & Lee (2013) and Giustni (2019) highlight the potential benefit of using Yahoo© alongside Google©, as Yahoo© has the capability to remove duplicates, which Google© does not (453). Finally, as IT devices provided by the NHS may be set up with NHS-endorsed internet search engines which are different to Google©, it is possible that the review did not capture all resources available to primary care pharmacists. Nonetheless, the results of this review can be used as a resource in the future for pharmacists looking to access guidance on using video consultations.

7.5.4 Future directions

The review has indicated that the majority of resources contain information or guidance which relate to only one of the Work System components. It is hoped that the results of this review, and insights from pharmacists in Chapter 6, will encourage a systems perspective to be taken by policy and health-boards to consider all six components, by illustrating the type of information that could be covered in relation to each component.

The review has identified that only a small number of resources were explicit in their involvement of stakeholders in the development process. As outlined in Chapter 1, organisational SOPs are often not adhered to, in part due to the lack of user-centred design (i.e. involvement of users and their perspectives) (35). Guidance on designing effective and usable work procedures for healthcare teams emphasises the importance of ensuring the needs, wants, preferences, capabilities, and limitations, of the people who will use the resource are priority throughout the development process (35). By doing so, the procedures will be easier to use and enhance the likelihood of adherence. Therefore, those developing video consultation guidance in the future should consider how the findings from this review compare to the perspectives of those carrying out the work in Chapter 6. For example, although guidance identified in this review suggested the long term management of hypertension as an appropriate condition to assess remotely, pharmacists in Chapter 6 deemed video consultations less appropriate for this condition (Figure 6.5). Similarly if providing guidance on advertising video consultation services, guidance could utilise the suggestions made by patients in Chapter 6 (e.g. information on prescription slips, advert on GP waiting room television, radio, pharmacy Facebook© page) (See section 6.4.6.). Furthermore, as the *internal and external environmen*t components are the least represented in the resources, it would be beneficial for future guidance to consider participant perspectives in Chapter 6 on what requirements or information needs to be considered in relation to these components (See section 6.4.7). For example, pharmacists expressed concerns about background noise in a busy pharmacy, emphasising the need for contingency plans to deal with this possibility. Finally, although the resources identified in this review emphasise the need for organisations to develop individual SOPs, the need to involve key stakeholders in this process should be made clear. In supporting this, resources could signpost to guidance on developing SOPs in a user-centric way (35).

Recent dialogue with members of the Near Me team (Beswick, M. and Cooper, R., August 2023) highlighted that the TEC guidance for specialities including community and general practice pharmacy are currently being updated. This scoping review has provided a summary of the existing guidance available to primary care pharmacists working in Scotland, and it is hoped that the results can inform these future resources. Furthermore, although TEC's specific community and general practice pharmacy guidance contained information relevant to each of the six Work System components, the results may indicate additional considerations within each component which had not yet been considered.

Finally, this review identified a series of pharmacy-based resources signposting to guidance that was specifically for GPs, and Scottish health board resources signposting to guidance for healthcare professionals working in England. As it is possible that signposting to resources that would not be relevant to Scottish pharmacists working in primary care could cause confusion or uncertainty, and possibly act as a barrier to video consultation use, future guidance development should consider the appropriateness of any signposting within.

7.5.5 Conclusion

This review used a human factors systems model to identify and synthesise guidance available to primary care pharmacists working in Scotland, on the use of video consultations. The results illustrated consideration for patient and pharmacists' characteristics in relation to using video consultations, with the majority being psychosocial in nature. Despite resources detailing patient health concerns/needs that may be appropriate, or not, for video consultations, the key message is that these are given as examples, and organisations should develop individual SOPs comprising specific clinical criteria that professionals can use to aid decision making. The review identified signposting within resources to inappropriate guidance (e.g. designed for professionals in England and specific guidance for doctors) which could cause confusion and act as a barrier to uptake by Scottish pharmacists. Moreover, the results have provided a detailed overview on how to set-up for and use video consultations which could be helpful for pharmacists planning to use video consultations in the future. In line with previous Chapters, guidance has emphasised the importance of ensuring patients and healthcare professionals have access to a private and suitable space for taking video consultations. Furthermore, the results indicate that the government and relevant organisations recognise the risk of digital exclusion, and plans are in place to reduce the potential for inequalities in access to care. Finally, it would be beneficial for future development of guidance on the use of video consultations to take a systems perspective to ensure any requirements in relation to each component of a system is included for completeness, and that guidance is appropriate for pharmacists working in a Scottish context.

Chapter 8: General discussion and implications of findings

This chapter summarises the findings from this thesis and describes the potential implications of the findings. Moreover, the chapter discusses the strengths and limitations of the research, and provides recommendations for future research. Stage 1 synthesised previous human factors applications to teleconsultations in primary care. Stage 2 explored the factors influencing patient and primary care providers' use of teleconsultations. Stage 3 involved interviewing patients and primary care pharmacists in Scotland to understand the factors influencing their use of video consultations. Finally, Stage 4 provided an overview of existing guidance for primary care pharmacists working in Scotland on the use of video consultations.

8.1 Discussion of key findings

Stage 1

As the integration of human factors into primary care has been slow in comparison to secondary care settings (61, 123), Stage 1 of this thesis involved a systematic scoping review which aimed to identify and synthesise applications of approaches and methods to the use of teleconsultations in primary care. The review identified 70 studies in total, the majority of which were set in general practice, with a smaller number set in other areas such as community pharmacy. None of the included studies explicitly mentioned human factors or ergonomics in their main text, which is consistent with the wider evidence base (142, 143). Furthermore, none of the studies were considered to have taken a human factors approach due to focusing primarily on understanding the experiences, opinions, and shortcomings of the person(s) interacting with the technology, without considering the influence of the wider system. The review identified 20 approaches, the majority of which focused on evaluating components of the Work System or types Outcomes at the Use stage, with a smaller number of studies applying approaches at earlier stages of development (Design or Implementation). The most commonly applied approaches for evaluating components of the Work System at the Use stage included: assessing users' intentions and willingness to use; understanding the factors influencing use of teleconsultations; and evaluating the suitability of teleconsultations. Similar approaches have been applied in the development of other healthcare technologies (454-456). For example, Li et al (2023) explored older adults' intentions for using remote monitoring technologies, using the Unified Theory of Acceptance and Use of Technology (UTAUT) – a model also identified in this review (454). Consistent with the wider literature on synchronous and asynchronous teleconsultations, the review found evaluating user satisfaction as a commonly applied approach to assess Outcomes of use (241, 243). Identification of a large number of studies evaluating use presented an opportunity to conduct further analyses to develop an evidence base of the factors influencing use. Moreover, this evidence base could be used to explore use in other settings where engagement with the technology is limited despite the potential benefits (e.g. pharmacy) (64, 250).

Stage 2

Stage 2 of this thesis involved a secondary analysis of the studies evaluating Use in Stage 1 (n=34) to identify and synthesise factors influencing patient and primary care providers' use of teleconsultations. The analysis identified 36 and 39 factors influencing patient and primary care providers' use, respectively. The data were first organised through an inductive thematic analysis, where the majority of factors were personal and organisational in nature, with a smaller number of factors related solely to the infrastructure. A deductive content analysis aligned the factors under the Work System of the SEIPS 2.0 model. Overall, the majority of factors fit within the *person(s)* component, which may be reflective of the lack of human factors adopted by the studies in Stage 1. Therefore, the results of this secondary analysis focus primarily on the person(s) within the system (i.e. patients and primary care providers) and their strengths / shortcomings. Nevertheless, the analysis identified benefits for patients and primary care providers, which are consistent with the wider literature (457-459). For example, in their review on the nature of teleconsultations in the UK, O'Cathail et al (2020) similarly reported the potential for teleconsultations to improve patients' access to the healthcare system, by providing care at a time and place that is convenient, without the need to travel. Moreover, in line with findings from Almathami et al's systematic review on barriers and facilitators to teleconsultations, primary care providers in this secondary analysis emphasised that teleconsultations allow for more flexibility, and easier to manage work schedules (458). However, there remains uncertainty from primary care providers in this analysis about whether teleconsultations add to or alleviate their pre-existing workload, which is reflective of other published literature (459, 460). Finally, as the potential risks of digital exclusion are recognised at policy level (461-464), it is reassuring that primary care providers in this analysis highlighted the importance of continuing to consider that teleconsultations can restrict access for certain patients.

Stage 3

Stage 3 of this thesis focused on exploring the lack of engagement with video consultations in primary care pharmacy services in Scotland (64, 250). Fourteen patients and 19 pharmacists (10 general practice clinical pharmacists; six community pharmacists; and three working in both settings) were interviewed (November 2022 – June 2023) to understand the factors influencing their use of video consultations. Interview schedules were informed by the results of Stage 2 and the SEIPS 2.0 Work System, to ensure the whole system was considered for its influence beyond the person(s) component. Overall, only five pharmacists had experience of using video consultations with patients, which is reflective of other published evidence on the use of video technology in primary care pharmacy in Scotland (64, 69). Pharmacists perceived a lack of patient demand for video consultations, which is inconsistent with patient feedback during the 2020 Near Me public engagement exercise (139). However, patients were in fact unaware that video consultation services were available, highlighting the need for additional advertising and/or patient engagement, using methods suggested by patients in Section 6.4.6. Participants agreed on the majority of patient characteristics deemed more and less compatible with video consultations. When discussing which patient health concerns could be assessed over video, the majority of participants identified skin concerns as suitable. However, others did express concerns around image quality and the potential of misdiagnosis, which is reflective of the wider literature. For example, in their national evaluation of video consultations in Scotland, Wherton et al (2021) found skin lesions to be unsuitable due to variable image quality (303). Clinicians in their study suggested that patients upload a high quality image, taken in good light, as it allows the image to be stored and shared with specialists, if required (303). Although having access to a private space for taking video consultations was not an issue for the majority of participants, some general practice pharmacists reported concerns around having to work in open-plan, hot desking environments where patient confidentiality could not be protected over video. Moreover, reflective of the wider literature on digital health technologies, pharmacists reported a lack of organisational drive for the uptake of video consultations (465, 466). Finally, despite being aware of some existing resources, pharmacists expressed a need for further guidance on when to use video consultations with patients, which is somewhat consistent with the wider evidence base. For example, clinicians delivering video-based psychological therapy in England reported a variety of additional training and support needs, and made suggestions for how this could be provided (e.g. troubleshooting guides, step-by-step videos, one-to-one tutorials) (467). However, their needs related to the technical aspects of the consultation only, and did not concern when to use the technology with patients (467).

Stage 4

Stage 4 involved a scoping review and content analysis of existing resources relevant for primary care pharmacists working in Scotland on the use of video consultations. The review identified 94 resources on video consultations, the majority of which were published by the Scottish Government (SG) or Technology Enabled Care (TEC). The SEIPS 2.0 Work System was used for the content analysis to understand the extent to which existing guidance contained information relevant to each component. The majority of resources contained information relevant to only one Work System component, with only four resources containing information relevant to all six. Moreover, the majority of resources contained information relevant to the *tools and technologies* component, and similar to Powers et al's (2021) review of patient telehealth guidelines, there was a lack of consideration for *environmental* components/requirements (130). The resources provide guidance on how to set up for video consultations, including the key areas to define when developing SOPs. Moreover, although the resources contained information on the types of patient health concerns that could be assessed over video, the key message was that these are given as examples, and any clinical criteria must be defined in organisational SOPs. The high level areas of guidance identified in the review are somewhat consistent with pharmacy guidance across the UK (439, 468, 469). For example, guidance in England and Wales on the use of video consultations similarly focus on: the benefits of video consultations; patients' characteristics suitable for video consultations; the technical and security requirements and set up; the areas to define in SOPs; the steps to take during the call; and the consent process (439, 469). Despite suggesting that remote consultations are not suitable for using with patients with disabilities, similar to resources in this review, NHS England guidance recognises the potential benefit for some patients with sensory impairments (e.g. patients' with hearing impairments could use the chat function or lip read). Notably, the consent processes differ across the UK, as in Scotland patient consent must be obtained verbally at the start of the conversation (352, 382), whereas in England consent is assumed when patients click to enter the call (439). Finally, the review found four resources from pharmacy bodies signposted to guidance designed for GPs, and one Scottish health board resource signposted to guidance for healthcare professionals working in NHS England, which could be causing uncertainty and confusion in pharmacists looking to use video consultations.

Key interactions between teleconsultation work system components

Generally, there are three key elements to a video consultation – the *person(s)* interacting, the *organisation* providing the service, and the *tools and technologies* facilitating the consultation. However, the benefit of using a systems model such as SEIPS 2.0 is that it encourages the consideration of the influence of the wider system. For example, the *tasks* that the individual might conduct over video, the space in which the interacting person(s) take the consultation in, and any *external environment* influences such as governing regulations or community resources. At points throughout this thesis, data were categorised under, and results discussed in relation to, the most proximally related component for simplicity of write-up. However, there were some key interactions occurring between work system components that will be discussed below:

First is the interaction between the healthcare system (represented by the *organisation* component) and the government (represented by the *external environment* component. As NHS Scotland is overseen and delivered by the Scottish Government, the interactions between these two components are essential for the effective delivery of services such as video consultations. Pharmacists in Stage 3 emphasised the need for government to take a stronger role in helping to raise the profile of video consultations in pharmacy, by increasing their engagement with the public. Stage 4 addressed pharmacists' expressed need for further guidance by summarising the existing resources. The results highlight the importance of the government and the influence it will have on how organisations will use the technology, as the majority of resources available to pharmacists in Scotland were provided either by Scottish Government in general, or the technology branch within (TEC). Additionally, whilst resources signposted to a variety of other guidance within, the national Near Me guidance developed by TEC was some of the most commonly cited, further illustrating the significance of government-developed guidance for delivering video consultation services. Furthermore, illustrating an additional interaction with the *internal environment* within the organisation is the expressed need from pharmacists in Stage 3 for additional government support in providing work spaces within general practices for GPCPs, to allow them to fully utilise their clinical skill set (a key aim of pharmacotherapy service) and protect patient confidentiality.

Other key interactions are those between the *person(s), organisation, and the tools and technologies* factors. As outlined in Stages 2 and 3, there are a number of patient and provider characteristics which are believed to influence their ability to use the technology such as: IT skills; general cognitive ability; and specific patient health concerns. However, providers' decisions around the types of patient and/or health concerns that are appropriate when using video consultations are also influenced by organisational SOPs, which according to the results of Stage 4, will provide criteria to follow. An additional interaction can be considered here, as government level guidance (linked to *external environment*) will provide example SOPs for organisations to adapt to fit each individual context (Stage 4).

Notably, when addressing the potential risk of widening the existing digital divide, the interaction between the *person(s),* their *organisational factors* and the *tools and technologies* must be considered. For example, patients may have the necessary IT skills for using the technology, and their health concern might be suitable for assessing over video, but if they lack the funds to buy the necessary infrastructure they are likely to experience exclusion. The results of Stage 3 illustrate this interaction, as one patient expressed concerns around being unable to afford to upgrade their technology to allow them to use video consultations, as often the technology is expensive (Section 6.4.6.).

Finally, as highlighted by pharmacists in Stage 3 (Section 6.4.6.), their ability to use video technology is dependent on *the tools and technologies* that are endorsed by the *organisation* for which they work, and the relevant practice standards and policies regarding that technology, and the general delivery of services. Moreover, the *organisation* extends beyond the overarching NHS at the macro level, to the meso level organisations such as chain pharmacies/multiples, and individual community pharmacies as micro organisations. Consequently, pharmacists working in multiple practices (and therefore, multiple organisations) reported difficulties when practices have different policies on using video consultations (Section 6.4.6.).

8.2 Implications for policy and practice

The results of this thesis have been iteratively fed back to members of the Near Me team in SG, and are helping to support plans the ongoing implementation of Near Me in healthcare. The results of Stage 3 were fed back (August 2023) to inform the Near Me team of the key barriers stopping primary care pharmacists from being able to use video consultations in practice. During this call the researcher was made aware of plans for updating the current national TEC speciality-specific guidance on the use of Near Me in Scotland. The results of Stage 4 of this thesis have provided an evidence base of the types of information and requirements that could be considered when developing guidance on the use of video consultations. On submitting this thesis, the researcher sent a summary brief of the key results from the latter stage of the thesis for the Near Me team (see Appendix 7 for SBAR). Importantly, it would be beneficial for future efforts to develop or update guidance to also seek the involvement of relevant stakeholders.

One of the key aims of Scotland's Digital Health and Care Strategy (2021) (12) (Section 1.2.1) outlines that all citizens will have access to digital information, tools and services that they need to help maintain and improve their health and wellbeing. The results of this thesis suggest that further work is required in achieving this aim. For example, pharmacists in Stage 3 perceived a lack of patient demand, whereas patients were unaware that the service was available at all. Participants in Stage 3 made suggestions on how to advertise the service that could be adopted by future implementers, and the Near Me website provide resources for advertising video consultation services (Stage 4). Participants in Stage 3 discussed the use of community hubs for video consultations, and resources in Stage 4 outlined plans for the continual development of these facilities. These results suggest that progress is being made towards the Digital Health and Care Strategy's plans for services to take place outside of traditional healthcare settings, including community hubs.

The Directors of Pharmacy Scotland (DoPS) have released their 2023 strategic framework – recovery, renewal, and transformation - for general practice pharmacy excellence in Scotland (470). The framework outlines overarching plans for pharmacists and pharmacy technicians taking on more clinical roles by contributing more directly to patient care, whilst utilising evolving digital solutions. There are three key themes within the framework, focusing on improving overall patient care:

1. Optimising service design and continuous improvement
2. Developing a sustainable pharmacy workforce
3. Utilisation of digital, data and innovation

It is believed that the results of this thesis could provide support in working towards achieving some of the aims within these themes. Within the first theme, the framework outlines plans for optimising the use of technology to expand service provision and improve patient experience. The results of this thesis provide a basis to start understanding what is needed in each context in order to optimise the use of video consultations as part of service design. Moreover, the thesis illustrates the benefit of adopting a systems perspective to ensure any new technology or service is embedded into each context in a way that best fits the end users and the environmental restrictions/capabilities.

Interestingly within the second theme, the framework focuses on maximising the opportunities offered by increasing experiential learning placements to attract trainee pharmacists into general practice. Stage 4 of this thesis identified guidance on the use of video consultations as part of virtual placements for students in all clinical settings (426). Video consultations could be used going forward to maximise the opportunities for pharmacists. As service models are continually evolving with the increasing use of technologies to deliver healthcare services, it is important to ensure students are exposed to, and able to work with, these technologies to provide safe and effective care (426).

Part of the third theme focuses on engagement with citizens when developing and implementing digital technologies in pharmacy services. The results of this thesis have provided examples of ways in which this can be achieved. For example, the review in Stage 1 identified approaches involving obtaining patient perspectives in the Design, Implementation, and evaluations of Use of teleconsultations. Similarly, Stage 3 outlined how a systems perspective can be taken to use qualitative methods like interviews to explore in-depth the facilitators and barriers influencing use. Finally, Stage 4 highlighted that key stakeholder groups can be involved in the development process when designing guidance on the use of video consultations.

The third theme also outlines plans for general practice pharmacy teams to be leaders in the adoption of evolving digital technologies across pharmacy services in Scotland. In order to be achieve this, future implementers will be required to address some of the key barriers outlined in this thesis, for example the lack of space in practice meaning that technologies such as video consultations cannot be used without compromising patient confidentiality. To aid this process, the aforementioned summary brief comprising key results from this thesis was disseminated to the Scottish Pharmacist and Prescribing Advisers Association (SP3AA) group (Appendix 8 for SBAR).

8.3 Strengths and limitations

As the discipline of human factors is in its infancy in primary care (61, 123), a strength of this thesis is that it has somewhat addressed some this gap in the literature. It is hoped that the results of this thesis will provide an evidence base which can be consulted by primary care providers or researchers looking to integrate human factors into the development of technologies and any related resources (e.g. guidance). However, the lack of applications and knowledge of human factors in healthcare was a challenge in this thesis. For example, no studies in the Stage 1 review explicitly mentioned human factors or ergonomics in their main text, despite using approaches and methods that fit within the premise of the discipline. Although this resulted in relying on the researcher's subjective knowledge of human factors when deciding which studies to include, this is a common requirement in the wider literature and therefore is not considered a limitation. Moreover, any risk of the results being influenced by the subjectivity of this process was mitigated against by the involvement of a second reviewer in the validation process. Finally, the search strategy used to identify studies was informed by the methods of a previous review of human factors in primary care, which had been approved by a team of human factors specialists (61).

A further strength of this thesis was the use of a human factors systems model throughout. Given the complexities of healthcare, the SEIPS 2.0 model was used to ensure each area of the Work System within healthcare settings was considered for its influence at each stage of research. Using the same model throughout each stage of the thesis, including study material development and analysis, has added to the evidence base by providing examples of how the SEIPS 2.0 model can be used at each stage when developing and/or evaluating healthcare technologies. However, despite the interrelatedness of each Work System component being considered as a strength of the model, the challenge around data being relevant to more than one component should be recognised. In these instances, such as in the development of the interview schedules for Stage 3 where data is categorised under only the most proximally related component, researchers' subjective opinions may differ. However, this challenge was mitigated against at each stage of analysis in this thesis by a validation process, involving a second and sometimes third researcher.

The results of Stage 1 informed the latter stages of this thesis, which can be viewed as a strength. Firstly, as the majority of studies focused on evaluating use, it presented an opportunity to analyse these studies further, to develop an evidence base of factors influencing use, which could be applied in other settings where engagement with teleconsultations is limited (e.g. pharmacy). Secondly, interviews being the most commonly used data collection method in the review informed the decision on the methodology for Stage 3. Finally, although the SEIPS 2.0 model was not identified in the review as a human factors model used previously, Donabedian's Structure-Process-Outcome and The Socio-technical Model were, suggesting the usefulness of a model that considers the whole system. Finally, six studies in the review conducted a documentary analysis – which informed the decision to focus on analysing existing video consultation guidance for pharmacists in Stage 4.

The use of qualitative methods in this thesis was considered a strength, as it facilitates an in-depth understanding of patients' and healthcare professionals' perspectives on the use of teleconsultations. However, the subjective nature of qualitative research means that the data analysis processes can be influenced by researchers' subjective opinions, as previously mentioned in relation to the SEIPS 2.0 model. Nonetheless, the potential for researcher bias was mitigated against by conducting validation processes at each stage of analysis.

The development of interview schedules for Stage 3 was informed by the definitions of the SEIPS 2.0 model and the results of the secondary analysis in Stage 2. Therefore, the selection of interview questions and structure of the schedules was not based on ideas formulated by the researcher, which could have been influenced by the subjective bias of the researcher. Moreover, as the interview schedules were developed using the SEIPS 2.0 model, this meant that the analysis of interview data could involve coding the data back onto the model for completeness.

Although Stage 3 obtained multiple stakeholder perspectives, the recruitment strategy posed a risk of selection bias due to recruiting patients who had access to the internet or social media sites. It is therefore possible that the results of Stage 3 are not reflective of the wider sample of patients who do not have access to the internet/social media sites. Although this risk could have been mitigated against by broadening the recruitment strategy, it was not possible to do so in the scope of this thesis. However, there may be opportunities for future research to build on the results of Stage 3 to address this limitation.

An additional strength of this thesis was the consideration for a variety of key stakeholders and their perspectives. The review in Stage 1 identified how approaches and methods had been used previously to understand how patients and primary care providers interact with teleconsultations, and led to a secondary analysis in Stage 2 which identified a series of factors influencing their use. The interview study in Stage 3 sought input from patients and community and general practice pharmacists. Although it could be considered a limitation that the set data saturation number (minimum of 10 interviews, stopping after a further 3 revealed no new themes) was not achieved for community pharmacists, the researcher deemed data saturation to have been reached, due to similar themes arising from the six interviews with community pharmacists. It is important to highlight that efforts to recruit community pharmacists continued until June 2023 despite patient and general practice pharmacist recruitment being complete by January 2023. Recruitment efforts for community pharmacists included: multiple entries into community pharmacy newsletters; emailing past participants to forward on study details; social media posts; and recruitment of University academics also working as locum community pharmacists. Moreover, limited engagement from community pharmacists was not surprising, given that similar patterns are evident in the wider literature (333). Finally, the review in Stage 4 was conducted in response to pharmacists' perspectives highlighting the key need for more guidance. Although patient and pharmacist characteristics in relation to each component of the Work System were considered in the review (Stage 4) no stakeholder input was obtained, which is something that future research could focus on.

8.4 Future research recommendations

As discussed, the findings of this thesis have addressed some gaps in the literature around the applications of human factors in primary care, and the lack of evidence on video consultation use in primary care pharmacy in Scotland. Nevertheless, there are areas of research that still need to be explored.

As the integration of human factors into healthcare is likely to continue, any further exploration of the discipline in healthcare research would be valuable to add to the evidence base. Future healthcare and digital transformation strategies should strive to better embed human factors into: higher education curriculum; training modules for healthcare professionals; and healthcare research and service models. Furthermore, the review in Stage 1 should be updated to provide an up-to-date evidence base illustrating how human factors can be applied to the development of teleconsultations in primary care. Equally, the methods used in the review could be adapted to explore the development of other healthcare technologies from a human factors perspective.

As roles and responsibilities of pharmacy personnel evolve and expand in the future, it will be important to understand the perspectives of the wider pharmacy team on the use of video consultations. For example, RPS's 2030 Visions for future pharmacy services outline plans to expand the role of pharmacy technicians to involve more patient-facing clinical encounters (23, 65, 66). Stage 3 of this thesis focused only on obtaining input from pharmacists working in community and general practice pharmacy. However, as the role of technicians evolves, it would be beneficial to explore their perspectives in more detail and identify any areas of the current Work System that could be presenting as barriers to their use.

It is unclear whether the results of Stage 3 are reflective of the opinions of patients without access to the internet or social media sites due to the adopted recruitment strategy. Future research could build on the results of this thesis to explore factors influencing use in a population of patients without access. The recruitment methods used in Stage 3 would require amendments to avoid use of the internet, which could include displaying physical posters in healthcare settings and other community buildings, attending patient groups to circulate study details, and having pharmacists informing patients about the study, for example.

Resources identified in Stage 4 outlines a series of steps that could be taken when using video consultations. However, the guidance states that individual SOPs should be developed for use in each context. Future work could focus on exploring the individually developed SOPs to understand how effectively they are used in practice, and whether they are designed with the relevant stakeholders in mind to make it a useable tool. One method that could be particularly useful for this type of investigation is a Hierarchical Task Analysis method, as it allows for identification of the differences between “work as imagined” versus “work as done” - which involves assessing the gap between how work is planned/expected to be done or how people think they work, versus how the task actually unfolds in practice (471). This type of analysis helps to identify where deviations occur in a process, potentially identifying opportunities to improve the efficiency of SOP use and overall service performance, by aligning their expectations around SOP use with the realities of the current work environment. Similar methods have been used recently by Ashour et al (2021) to identify gaps between how dispensing in community pharmacy in NHS England is imagined through SOPs, and how dispensing is actually completed in practice (335).

Any future development of guidance on the use of video consultations in pharmacy could build on the results of the review in Stage 4. For example, it could be beneficial to validate the results with key stakeholders, to understand if the guidance relevant to each of the six SEIPS 2.0 Work System components is important, or if there is any key information or requirements missing. There are a number of consensus methods, such as Nominal Group Technique and Delphi technique, which could provide a systematic approach to synthesising the detail provided in video consultation guidance and the opinions of key stakeholders. Arakawa and Bader (2022) highlight that consensus methods are commonly used for the development of clinical guidelines in a variety of healthcare settings (472).

8.5 Final conclusion

As healthcare services are becoming increasingly digitised, it is important to understand how these technologies are developed for, and fit within, healthcare systems. Although the discipline of human factors is well suited for this type of research, evidence of applications in primary care have been limited thus far. However, this thesis has provided an overview and evidence base on how human factors can be applied to the development of teleconsultation technologies. Furthermore, it has explored the lack of engagement with video consultations in Scottish primary care pharmacy services, and outlined key barriers which must be addressed if future implementation is to be successful. This thesis has made progress in addressing pharmacists' need for further guidance on using video consultations by providing an overview of existing resources and the commonalities and differences between them. Future efforts could build on the results of Stage 4 of this thesis by involving key stakeholders in the development of guidance through the use of consensus methods. As guidance states that organisations must develop individual SOPs for using video consultations, future efforts should focus on understanding how effectively SOPs reflect actual work processes. Finally, as human factors can support in improving both system performance and patient related outcomes, efforts to integrate the discipline into healthcare services and research should be driven by clear organisational and governmental strategies.

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Chapter 10: Appendices

Appendix 1: Types of search terms and syntax used on each database

Database (website used)	Types of terms used	Syntaxes
Medline (Ovid)	MESH terms/key terms	• '.tw.' – limit search to title and abstract • 'OR' – includes either both or one of the terms • 'AND' – Includes both terms • 'Adj*n*' – words need to be adjacent within *n* words of each other regardless of order. • '*' – to search all forms of the word
Embase (Ovid)	EMtree terms/key terms	• '.tw.' – limit search to title and abstract • 'OR' – includes either both or one of the terms • 'AND' – Includes both terms • 'Adj*n*' – words need to be adjacent within *n* words of each other regardless of order. • '*' – to search all forms of the word
PsycINFO (EBSCO)	Key terms	• W*n* – finds the words if they are within *n* of each other in order typed. • N*n* - finds the words if they are within *n* of each, regardless of order. • '*' – to search all forms of the word • '(…)' • 'OR' – includes either both or one of the terms • 'AND' – Includes both terms
Ergonomics abstract (EBSCO)	Key terms	• W*n* – finds the words if they are within *n* of each other in order typed. • N*n* - finds the words if they are within *n* of each, regardless of order. • '*' – to search all forms of the word • '(…)' – exact phrase searching • 'OR' – includes either both or one of the terms • 'AND' – Includes both terms
Engineering village (Elsevier)	Key terms	• '(…)' – exact phrase searching • 'OR' – includes either both or one of the terms • 'AND' – Includes both terms • 'NEAR/*n*' - finds the words if they are within *n* of each, regardless of order.

Appendix 2: Full search strategy for Medline (OVID)

#	Searches	Results
1	Human factor* research.tw.	123
2	Human factor*.tw.	6954
3	ergonomics/ or "task performance and analysis"/	42516
4	Ergonomic*.tw.	10396
5	(Task* performance* and analysis).tw.	2110
6	Macro ergonomic*.tw.	18
7	Occupational Health/	34830
8	Psychology, Industrial/	1665
9	Human engineering.tw.	148
10	Occupational health.tw.	14222
11	((cognitive or industrial or organisational) adj1 psychology).tw.	1659
12	Resilience engineering.tw.	51
13	(Safety adj1 science).tw.	133
14	accident prevention/ or "hazard analysis and critical control points"/ or patient harm/ or patient safety/ or safety management/ or accidents, occupational/	66413
15	(Accident* adj2 prevention).tw.	1486
16	(Patient adj2 harm).tw.	2063
17	(Patient* adj2 safety).tw.	37798
18	(Safe* adj1 manage*).tw.	4588
19	occupational accident*.tw.	1177
20	"Quality of Health Care"/	74815
21	(Quality adj1 health*care).tw.	3080
22	(Safe* adj2 culture*).tw.	3164
23	Open culture*.tw.	105
24	Just culture*.tw.	164
25	(Hazard* analysis and critical control point*).tw.	625
26	(Workplace adj2 (Fatigue or stress)).tw.	544
27	Alert fatigue.tw.	233
28	(Work* adj1 stress*).tw.	3995
29	(Cognitive adj1 (workload or effort or load)).tw.	3521
30	Workaround*.tw.	385
31	(Human* adj1 performance*).tw.	2473
32	(Performance adj2 variability).tw.	1060
33	Human-centred.tw.	128
34	(Human adj2 centred).tw.	144
35	User-Computer Interface/	38190
36	User-centred.tw.	386
37	(User adj2 centred).tw.	391
38	(Resource* adj2 availability).tw.	4591
39	(Hazard* adj2 assessment*).tw.	2047
40	systems analysis/ or systems integration/	15329
41	Workflow/	6492
42	(System* adj2 analysis).tw.	40828
43	(System* adj2 integration*).tw.	2898
44	Workflow*.tw.	28429
45	Work* system*.tw.	1466
46	Sociotechnical system*.tw.	228
47	Sociotechnical*.tw.	636
48	(Complex adj2 system*).tw.	22939
49	(Organis* adj2 system*).tw.	2053
50	System* engineering.tw.	792

51	(System* adj2 design).tw.	15402
52	(System* adj2 resilience).tw.	422
53	(Systems adj1 centred).tw.	39
54	(systems adj1 thinking).tw.	937
55	((Unplanned or unexpected) adj2 system* adj2 condition*).tw.	0
56	(Safety adj1 assessment*).tw.	8090
57	(Safety adj2 climate).tw.	1087
58	(Risk adj2 assessment).tw.	72566
59	Incident* report*.tw.	2642
60	Standard operat* procedure*.tw.	3133
61	Work as done.tw.	4251
62	Work as imagined.tw.	23
63	risk management/ or safety management/	38420
64	Diagnostic Errors/	38509
65	medical errors/ or medication errors/	30365
66	(Safety adj1 management).tw.	1477
67	Medic* error*.tw.	10319
68	Diagn* error*.tw.	3996
69	Error*.tw.	325077
70	(Risk adj2 management).tw.	16147
71	(Adverse adj1 event*).tw.	176601
72	Human* error*.tw.	2439
73	(Error* adj1 report*).tw.	1967
74	Ethnographic analysis.tw.	162
75	Task* analysis.tw.	1147
76	Process map*.tw.	670
77	Mapping.tw.	181241
78	Flow chart*.tw.	1607
79	(Usability adj1 test*).tw.	1236
80	Human* performance model*.tw.	20
81	(User* adj2 analysis).tw.	980
82	(Error* adj2 analysis).tw.	3802
83	(Work* adj2 analysis).tw.	6414
84	Hierarchical task* analysis.tw.	94
85	(healthcare failure mode and effect analysis).tw.	48
86	The sociotechnical systems theor*.tw.	28
87	Systems Engineering Initiative for Patient Safety.tw.	89
88	SEIPS.tw.	86
89	Human Factors framework.tw.	19
90	Safety-I.tw.	65
91	Safety-II.tw.	74
92	Leavitts organi*ational model.tw.	5
93	Reasons accident causation model.tw.	5
94	(Community Health Integration through Pharmacy Process and Ergonomics Redesign).tw.	1
95	CHIPPER.tw.	39
96	SHEEP model.tw.	1840
97	Systems thinking for everyday work model.tw.	0
98	Participatory design.tw.	536
99	1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 or 44 or 45 or 46 or 47 or 48 or 49 or 50 or 51 or 52 or 53 or 54 or 55 or 56 or 57 or 58 or 59 or 60 or 61 or 62 or 63 or 64 or 65 or 66 or 67 or 68 or 69 or 70 or 71 or 72 or 73 or 74 or 75 or 76 or 77 or	1234009

	78 or 79 or 80 or 81 or 82 or 83 or 84 or 85 or 86 or 87 or 88 or 89 or 90 or 91 or 92 or 93 or 94 or 95 or 96 or 97 or 98	
100	Pharmacies/	8258
101	Pharmac*.tw.	788325
102	Community pharmac*.tw.	7406
103	Drug store*.tw.	405
104	Retail pharmac*.tw.	678
105	Dispensar*.tw.	5311
106	Family Practice/ or General Practice/	75900
107	General Practitioners/	8542
108	General practi*.tw.	83466
109	Family practi*.tw.	9899
110	Physicians, Family/	16549
111	Family physician*.tw.	15100
112	Physicians, Primary Care/	3778
113	GP*.tw.	191080
114	Family doctor*.tw.	4799
115	Doctor* surger*.tw.	128
116	Primary Health Care/	81800
117	Primary health care.tw.	22812
118	Primary care*.tw.	126232
119	Community Health Centers/	7267
120	Community health cent*.tw.	4240
121	Health cent*.tw.	32823
122	Health care facilit*.tw.	7583
123	Home Care Services/ or Home Care Agencies/	35681
124	home health care.tw.	2673
125	Home care services.tw.	1581
126	Home healthcare.tw.	1410
127	Residential Facilities/	5599
128	Nursing homes.tw.	16619
129	care homes.tw.	2782
130	long term care.tw.	21638
131	residential care.tw.	3618
132	aged care facilit*.tw.	1198
133	Assisted Living Facilities/	1464
134	Assisted living facilities.tw.	590
135	assisted care facilit*.tw.	12
136	Intermediate Care Facilities/	708
137	Nursing Homes/	36149
138	Residential home*.tw.	1011
139	Ambulatory Care/	44426
140	Ambula* care*.tw.	9614
141	Ambulance personnel*.tw.	374
142	Paramedic*.tw.	8414
143	Community Health Nursing/	19661
144	Community health nursing*.tw.	832
145	Community care*.tw.	4902
146	Community Health Services/	32248
147	Community health service*.tw.	1298
148	Dentistry/	35680
149	Dentist*.tw.	74850
150	Dental Clinics/	2753
151	Dent* clinic*.tw.	5465
152	Dental Health Services/	4142

153	Dental health service*.tw.	549
154	Dental Care/	21799
155	Dent* care*.tw.	13028
156	Dental Hygienists/	5762
157	Dental Assistants/	4559
158	Dent* assistant*.tw.	1393
159	Dental hygienist*.tw.	2717
160	Optometry/	5528
161	Optometrists/	120
162	Community Pharmacy Services/	4897
163	Optometr*.tw.	4989
164	Pharmacy Technicians/	773
165	Pharmacists/	17856
166	Clinicial pharmac*.tw.	0
167	NHS 24.tw.	21
168	NHS 111.tw.	63
169	NHS direct.tw.	275
170	Out of hours.tw.	2134
171	24-7 healthcare.tw.	1
172	100 or 101 or 102 or 103 or 104 or 105 or 106 or 107 or 108 or 109 or 110 or 111 or 112 or 113 or 114 or 115 or 116 or 117 or 118 or 119 or 120 or 121 or 122 or 123 or 124 or 125 or 126 or 127 or 128 or 129 or 130 or 131 or 132 or 133 or 134 or 135 or 136 or 137 or 138 or 139 or 140 or 141 or 142 or 143 or 144 or 145 or 146 or 147 or 148 or 149 or 150 or 151 or 152 or 153 or 154 or 155 or 156 or 157 or 158 or 159 or 160 or 161 or 162 or 163 or 164 or 165 or 166 or 167 or 168 or 169 or 170 or 171	1582927
173	Telemedicine/	28501
174	Telemedicine*.tw.	13328
175	Tele-medicine*.tw.	127
176	Teleconsult*.tw.	1480
177	Tele-consult*.tw.	130
178	Tele-health*.tw.	171
179	Telehealth*.tw.	6136
180	Telepharmacy*.tw.	102
181	Tele-pharmacy*.tw.	7
182	Telecommunications/	4923
183	Telecommunication.tw.	2471
184	Tele-communication*.tw.	12
185	Videoconferenc*.tw.	2603
186	Video-conferenc*.tw.	1012
187	Video consult*.tw.	472
188	Remote Consultation/	5202
189	Remot* consult*.tw.	428
190	e-health.tw.	2350
191	Ehealth.tw.	3081
192	Real-time.tw.	279339
193	Real time.tw.	279339
194	Synchronous* communicat*.tw.	56
195	e-consult*.tw.	207
196	Econsult*.tw.	154
197	Electronic* consult*.tw.	262
198	Electronic communicat*.tw.	1482
199	e-advice.tw.	4
200	Telephone/	12317
201	Telephone*.tw.	62335
202	Telephon* consult*.tw.	1000

203	Live chat.tw.	26
204	Text Messaging/	3481
205	Text messag*.tw.	4700
206	SMS.tw.	6443
207	Online consult*.tw.	210
208	173 or 174 or 175 or 176 or 177 or 178 or 179 or 180 or 181 or 182 or 183 or 184 or 185 or 186 or 187 or 188 or 189 or 190 or 191 or 192 or 193 or 194 or 195 or 196 or 197 or 198 or 199 or 200 or 201 or 202 or 203 or 204 or 205 or 206 or 207	400994
209	99 and 172 and 208	3722
210	limit 209 to dt=20100101-20210519	2537
211	limit 210 to (English language)	2469

Appendix 3: COREQ checklist

COREQ (COnsolidated criteria for REporting Qualitative research) Checklist

A checklist of items that should be included in reports of qualitative research. You must report the page number in your manuscript where you consider each of the items listed in this checklist. If you have not included this information, either revise your manuscript accordingly before submitting or note N/A.

Topic	Item No.	Guide Questions/Description	Reported on Page No.
Domain 1: Research team and reflexivity			
Personal characteristics			
Interviewer/facilitator	1	Which author/s conducted the interview or focus group?	143-144
Credentials	2	What were the researcher's credentials? E.g. PhD, MD	143-144
Occupation	3	What was their occupation at the time of the study?	143-144
Gender	4	Was the researcher male or female?	143-144
Experience and training	5	What experience or training did the researcher have?	143-144
Relationship with participants			
Relationship established	6	Was a relationship established prior to study commencement?	143-44
Participant knowledge of the interviewer	7	What did the participants know about the researcher? e.g. personal goals, reasons for doing the research	143-144
Interviewer characteristics	8	What characteristics were reported about the inter viewer/facilitator? e.g. Bias, assumptions, reasons and interests in the research topic	143-144
Domain 2: Study design			
Theoretical framework			
Methodological orientation and Theory	9	What methodological orientation was stated to underpin the study? e.g. grounded theory, discourse analysis, ethnography, phenomenology, content analysis	142
Participant selection			
Sampling	10	How were participants selected? e.g. purposive, convenience, consecutive, snowball	239-140
Method of approach	11	How were participants approached? e.g. face-to-face, telephone, mail, email	140-141
Sample size	12	How many participants were in the study?	144-146
Non-participation	13	How many people refused to participate or dropped out? Reasons?	147-148
Setting			
Setting of data collection	14	Where was the data collected? e.g. home, clinic, workplace	137
Presence of non-participants	15	Was anyone else present besides the participants and researchers?	N/A
Description of sample	16	What are the important characteristics of the sample? e.g. demographic data, date	144-146
Data collection			
Interview guide	17	Were questions, prompts, guides provided by the authors? Was it pilot tested?	137-138, 139
Repeat interviews	18	Were repeat inter views carried out? If yes, how many?	N/A
Audio/visual recording	19	Did the research use audio or visual recording to collect the data?	142
Field notes	20	Were field notes made during and/or after the inter view or focus group?	142
Duration	21	What was the duration of the inter views or focus group?	144-145
Data saturation	22	Was data saturation discussed?	139-140
Transcripts returned	23	Were transcripts returned to participants for comment and/or	142

Topic	Item No.	Guide Questions/Description	Reported on Page No.
		correction?	
Domain 3: analysis and findings			
Data analysis			
Number of data coders	24	How many data coders coded the data?	143
Description of the coding tree	25	Did authors provide a description of the coding tree?	N/A
Derivation of themes	26	Were themes identified in advance or derived from the data?	143
Software	27	What software, if applicable, was used to manage the data?	143
Participant checking	28	Did participants provide feedback on the findings?	N/A
Reporting			
Quotations presented	29	Were participant quotations presented to illustrate the themes/findings? Was each quotation identified? e.g. participant number	147-183
Data and findings consistent	30	Was there consistency between the data presented and the findings?	147-183
Clarity of major themes	31	Were major themes clearly presented in the findings?	148
Clarity of minor themes	32	Is there a description of diverse cases or discussion of minor themes?	147-183

Developed from: Tong A, Sainsbury P, Craig J. Consolidated criteria for reporting qualitative research (COREQ): a 32-item checklist for interviews and focus groups. *International Journal for Quality in Health Care*. 2007. Volume 19, Number 6: pp. 349 – 357

Once you have completed this checklist, please save a copy and upload it as part of your submission. DO NOT include this checklist as part of the main manuscript document. It must be uploaded as a separate file.

Appendix 4: Screening Questionnaires

Pharmacists

The series of questions you are about to complete is to help us recruit participants from specific groups. Based on your answers, **you may or may not** be selected for an interview as we are aiming to recruit from a broad range of participants. I'd like to remind you that if you are not selected for an interview, the answers you give to this series of questions will be deleted and won't be used in the write up of the study.

Do you have any previous experience with using video technology for **any** purpose (e.g. for meetings, consultations, social purposes – contacting friends) (Please select all that apply)

☐ For work meetings

☐ For consultations with patients

☐ For social purposes (e.g. talking with a friend one-on-one or as a group)

☐ For attending professional events (e.g. online conferences, virtual webinars)

☐ For attending life events (e.g. weddings, memorial services)

☐ For attending cultural events (e.g. virtual concerts, "lives" with celebrities etc.)

☐ Other (please specify): ____

☐ I have never used video for any professional/social purpose

If you have used video for any professional or personal/social reasons before, what kinds of technologies (both equipment and software/apps/platforms) have you used? Select all that apply:

☐ Smartphone

☐ Tablet device

☐ Laptop

- [ ] PC
- [ ] Special videoconferencing equipment
- [ ] MS Teams
- [ ] Zoom
- [ ] FaceTime
- [ ] Social media "live" (e.g. Facebook©, Instagram©)
- [ ] Other (please specify):

____

- [ ] I have never used video for any professional or personal/social purpose

---

To enable us to know who has completed this information, and for organising a suitable date/time for the interview, please provide your name and telephone number (or email address if you prefer):

Name:

____

Telephone number (leave this blank if you would prefer to provide an email address):

____

Email address:

____

What type of interview would you prefer. Please choose **one:**

- ◯ Telephone
- ◯ Video (using MS Teams or Zoom)
- ◯ Face-to-face (e.g. at your workplace or on the University of Strathclyde campus)

Are there any days or the week or times of day that suit you best for an interview? If so, please write below:

____

Would you be willing to take part in future research related to this project? If yes or maybe, the research team may contact you via email in the future to ask if you would participate in the next phase of this research.

- ◯ Yes
- ◯ No
- ◯ Maybe

What is your gender *(please select)*

- ◯ Male
- ◯ Female
- ◯ Non-binary
- ◯ Prefer not to say
- ◯ My gender isn't listed above (please self-describe):

____

What age are you? (Please select the appropriate age group)

- ◯ 18-23
- ◯ 24-29
- ◯ 30-35
- ◯ 36-41
- ◯ 42-47
- ◯ 48-53
- ◯ 54-59
- ◯ 60-65
- ◯ 66-71
- ◯ 72-77
- ◯ 78 or older
- ◯ Prefer not to say

What NHS Health Board(s) do you work in? (Please select all that apply)

- [ ] NHS Ayrshire and Arran (e.g. East, North and South Ayrshire
- [ ] NHS Shetland
- [ ] NHS Tayside (e.g. Dundee City, Angus, Perth & Kinross)
- [ ] NHS Western Isles (e.g. Outer Hebrides, Stornoway)
- [ ] NHS Borders (e.g. Melrose, Hawick, Peebles, Kelso, Duns)
- [ ] NHS Dumfries & Galloway (e.g. Langholm, Stranraer, Kirkonnel, Caprspharin)
- [ ] NHS Fife (e.g. Kirkcaldy, Dunfermline, Glenrothes)
- [ ] NHS Forth Valley (e.g. Clackmannanshire, Falkirk, Stirling)
- [ ] NHS Greater Glasgow & Clyde (e.g. Inverclyde, Renfrewshire, East Renfrewshire, Glasgow City, East Dunbartonshire, West Dunbartonshire)
- [ ] NHS Grampian (e.g. Aberdeen, Aberdeenshire, Morayshire)
- [ ] NHS Highland (e.g. North & West - Caithness, Sutherland, Lochaber, Skye, Lochalsh, Wester Ross, Inner Moray Firth - Inverness, Nairn, Mid Ross, Badenock and Strathspey; Argyll and Bute)
- [ ] NHS Lanarkshire (e.g. North and South Lanarkshire)
- [ ] NHS Lothian (e.g. Edinburgh, Midlothian, East Lothian, West Lothian)
- [ ] NHS Orkney

- [ ] I don't know
- [ ] Prefer not to say

Do you currently work in general practice or community pharmacy?

- ○ General practice
- ○ Community pharmacy
- ○ Both

Display This Question:

If Do you currently work in general practice or community pharmacy? = Community pharmacy

Which of the following statements best describes the type of community pharmacy in which you currently work? *(Please choose **one**)*

- [ ] Single, independent pharmacy
- [ ] Member of a small chain (2 to 4 pharmacies)
- [ ] Member of a medium chain (5-30 pharmacies)
- [ ] Member of a large chain (over 30 pharmacies)

Display This Question:

If Do you currently work in general practice or community pharmacy? = Both

Which of the following statements best describes the type of community pharmacy in which you currently work? *(Please choose* ***one****)*

- ☐ Single, independent pharmacy
- ☐ Member of a small chain (2 to 4 pharmacies)
- ☐ Member of a medium chain (5-30 pharmacies)
- ☐ Member of a large chain (over 30 pharmacies)

How many years' experience do you have in your current role?

____

How long have you been qualified as a pharmacist?

____

Thank you, we will be in touch to let you know if you are going to be invited for an interview.

End of Block: Screening questionnaire

Patients

Start of Block: Screening questionnaire

The series of questions you are about to complete is to help us recruit participants from specific groups. Based on your answers, **<u>you may or may not</u>** be selected for an interview as we are aiming to recruit from a broad range of participants. I'd like to remind you that if you are not selected for an interview, the answers you give to this series of questions will be deleted and won't be used in the write up of the study.

Do you have any previous experience with using video technology for **<u>any</u>** purpose (e.g. for meetings, consultations, social purposes – contacting friends) (Please select all that apply)

☐ For work meetings

☐ For consultations with healthcare providers

☐ For social purposes (e.g. talking with a friend one-on-one or as a group)

☐ For attending professional events (e.g. online conferences, virtual webinars)

☐ For attending life events (e.g. weddings, memorial services)

☐ For attending cultural events (e.g. virtual concerts, "lives" with celebrities etc.)

☐ Other (please specify): ____

☐ I have never used video for any professional/social purpose

---

Have you ever used video consultations to communicate with a pharmacist working in **community pharmacy (i.e. a high street chemist or instore pharmacy)?**

○ Yes

○ No

○ Not sure/ can't remember

Have you ever used video consultations to communicate with a pharmacist working in **general practice (GP or Doctors surgery)?**

- ○ Yes
- ○ No
- ○ Not sure/ can't remember

If you have used video for any professional or personal/social reasons before, what kinds of technologies (both equipment and software/apps/platforms) have you used? Select all that apply:

- ☐ Smartphone
- ☐ Tablet device
- ☐ Laptop
- ☐ PC
- ☐ Special videoconferencing equipment
- ☐ MS Teams
- ☐ Zoom
- ☐ FaceTime
- ☐ Social media "live" (e.g. Facebook©, Instagram©)
- ☐ Other (please specify): ________________________________
- ☐ I have never used video for any professional or personal/social purpose

To enable us to know who has completed this information, and for organising a suitable date/time for the interview, please provide your name and telephone number (or email address if you prefer).

Name:

Telephone number (leave this blank if you would prefer to provide an email address):

Email address:

What type of interview would you prefer. Please choose **one:**

- ◯ Telephone
- ◯ Video (using MS Teams or Zoom)
- ◯ Face-to-face (e.g. at your workplace or on the University of Strathclyde campus)

Are there any days or the week or times of day that suit you best for an interview? If so, please write below:

Would you be willing to take part in future research related to this project? If yes or maybe, the research team may contact you via email in the future to ask if you would participate in the next phase of this research.

- Yes
- No
- Maybe

What is your gender *(please select)*

- Male
- Female
- Non-binary
- Prefer not to say
- My gender isn't listed above (please self-describe):

____

What age are you? (Please select the appropriate age group)

- 18-23
- 24-29
- 30-35
- 36-41
- 42-47
- 48-53
- 54-59
- 60-65
- 66-71

◯ 72-77

◯ 78 or older

◯ Prefer not to say

What NHS Health Board(s) do you live in? (Please select all that apply)

☐ NHS Ayrshire and Arran (e.g. East, North and South Ayrshire

☐ NHS Shetland

☐ NHS Tayside (e.g. Dundee City, Angus, Perth & Kinross)

☐ NHS Western Isles (e.g. Outer Hebrides, Stornoway)

☐ NHS Borders (e.g. Melrose, Hawick, Peebles, Kelso, Duns)

☐ NHS Dumfries & Galloway (e.g. Langholm, Stranraer, Kirkonnel, Caprspharin)

☐ NHS Fife (e.g. Kirkcaldy, Dunfermline, Glenrothes)

☐ NHS Forth Valley (e.g. Clackmannanshire, Falkirk, Stirling)

☐ NHS Greater Glasgow & Clyde (e.g. Inverclyde, Renfrewshire, East Renfrewshire, Glasgow City, East Dunbartonshire, West Dunbartonshire)

☐ NHS Grampian (e.g. Aberdeen, Aberdeenshire, Morayshire)

☐ NHS Highland (e.g. North & West - Caithness, Sutherland, Lochaber, Skye, Lochalsh, Wester Ross, Inner Moray Firth - Inverness, Nairn, Mid Ross, Badenock and Strathspey; Argyll and Bute)

- [ ] NHS Lanarkshire (e.g. North and South Lanarkshire)
- [ ] NHS Lothian (e.g. Edinburgh, Midlothian, East Lothian, West Lothian)
- [ ] NHS Orkney
- [ ] I don't know
- [ ] Prefer not to say

Thank you, we will be in touch to let you know if you are going to be invited for an interview.

End of Block: Screening questionnaire

Appendix 5: Interview schedules

<table>
<tr><td colspan="4" align="center"><u>Patient schedule</u>

Introductory statement:
Hi, my name is Aimee Ferguson, and I am a PhD researcher at the University of Strathclyde. We are running a study to learn more about what influences whether patients use video consultations to speak to their pharmacist. What we mean by video consultations are live appointments which take place between a patient and healthcare professional using video, as opposed to speaking to them face-to-face or over the telephone.

As mentioned in the Information Sheet, you do not have to have used video consultations to take part in the study so don't worry if you haven't. I am asking patients to share their experience, knowledge, and opinions on this. We believe it should take no longer than 1 hour.

Thank you for agreeing to participate. I'd like to remind you that you do not have to take part, you can choose to end the interview at any point. Any information you provide during the interview will be anonymised, meaning that it cannot be linked to you.
Just to remind you, this interview will be recorded. Do you have any questions before we begin recording? <<Answer qs then start recording>></td></tr>
<tr><th colspan="2">QUESTIONS</th><th>PROMPTS</th><th>NOTES</th></tr>
<tr><td colspan="3">General Questions</td><td></td></tr>
<tr><td>1</td><td>If have used with pharmacist
"I can see from your questionnaire answers that you have used video consultations before with a (community/GP pharmacist). Can you tell me more about that."

If haven't used with pharmacist:
"I can see from your questionnaire answers that you haven't used video consultations before with a pharmacist. Can you tell me more about this"</td><td>If have used with one type of pharmacist
• Reason for not having used with other type of pharmacist

If have used with another type of professional
• Reason for having used with another health care professional (e.g. nurse, medic) and not a pharmacist</td><td></td></tr>
<tr><td>2</td><td>"What do you think about using video consultations to speak to a pharmacist?"</td><td>Have used before:
• For example - Is it a good/bad thing? Why do you think this?

Haven't used before:</td><td></td></tr>
</table>

	Explain, if patients unsure of why pharmacist would need to use VIDEO CONSULTATION: Some pharmacists now have consultations with patients to review their medicines, or to prescribe for clinical conditions. Then ask… "If a pharmacist was to discuss your medicine with you, what do you think about that happening over a video call?"	• Awareness of service being available (awareness of service)	
3	"In which situations would you use/like to use video consultations to speak to a pharmacist?"	• Setting (community, GPCP) • Reason for contact (tasks)	
Tools and technology			
4	"We're now going to discuss the tools and technologies needed for video consultations. What I mean by this is any object that you would use, this could be technology based, paper based, or other equipment/materials. "What sort of tools and technologies would you say are **essential** for a video consultation?"	• Equipment • Technology • Email • Mobile phone	
5	"What tools and technologies may not be essential but would **help** you to use video consultations?"	• Performance of the technology (tech performance) • Being able to see pharmacist on screen (visual cues)	
Internal environment			
6	"Tell me about where you would take the video consultation?"	• Where you take the call (home, work etc) • The space- suitable / comfortable • Privacy of the space (privacy of available space)	
Person			

7	"Is there anything about yourself that you feel might affect your choice to use video consultations?"	• Age • Stress in relation to using video compared to other types of consult • General health • Confidence in explaining reason for call • IT skills/abilities	
8	"How would/do you feel about speaking to a pharmacist you don't already know over video consultations?" (HCP-patient relationship)		
9	"How about speaking to a pharmacist you do already know or have a relationship with. How would/do you feel about that?" (HCP-patient relationship)		
10	"What do you think about the pharmacists' abilities in delivering their services through video consultation?"	• How skilled are they/do you feel they would be at video consultation • What (has been/do you think would be) their attitude towards them? (HCP attitude)	
11	"Is there anything else in relation to the pharmacist(s) that you feel may affect your use of video consultations?"		
Tasks			
12	**If have used before:** "Talk me through having a video consultation, what steps are involved? (for example, from requesting the consultation through to an outcome/diagnosis)" **If haven't used before:** "What is your knowledge of the process of having a video consultation, if at all?"	**If haven't used before:** • Leaflets • Family members	
13	**If have used or are aware of process:** "Is there anything about any parts of that process we've discussed that affect whether you choose to use video consultations or not, if at all?"		
14	"Do you have any opinions on how convenient, or not, video consultations are?"	• Cost savings • Travel / parking	

	(convenience)	• Disruption to day	
Organisation			
15	"We've been speaking about what's involved in video consultations and how convenient they are, can you tell me about getting an actual appointment ?" (slot/time to speak to)	• Ease of getting an appointment (appointment availability) • Waiting time for appointment (waiting times) • See preferred pharmacist/seen before (continuity of care)	
16	"Is there anything else about the pharmacy service that you feel affects your choice of whether or not you use video consultations?"		
17	"Thinking about your day-to-day life, is there anything that affects whether you choose to use video consultations?"	• Family life • Flexibility • Friends • Your own beliefs/experiences	
External environment			
18	"So, we've spoken about the factors related to yourself and the pharmacy services. Is there anything outside of this which affects your choice to use video consultations?" ***If needed:*** *By this I mean things which can't be controlled by yourself or the pharmacy such as wider societal beliefs or pressures, the government, resources in your local area*	• Public health adverts/guidance on using health services • Local facilities (e.g. transport) • Health concerns • Things to do with government • Pressures or beliefs from wider society	
Additional questions			
19	"Are video consultations something you'd consider using with a pharmacist in the future?"	• Yes • No • Maybe • Not sure	

20	"Is there anything else at all that you feel affects your use of video consultations that we haven't already covered?"		
21	"Would you like to ask anything before we finish up?"		

Debrief
Thank you for taking part. As I previously said, the information you have given will remain anonymous and will never be traceable to you. You can contact myself or the Chief Investigator using the email addresses on the Participant Information Sheet if you have any questions.

Lastly, before I let you go, can you think of anyone you know who uses a pharmacy that may be interested in taking part in this research? If so, please could you forward the advert on to them. Thank you again for your time.

Pharmacist schedule

Introductory statement:

Hi, my name is Aimee Ferguson, and I am a PhD researcher at the University of Strathclyde.
We are running a study to learn more about what influences pharmacists' use of video consultations to speak to patients. I am asking pharmacists working in general practice and community pharmacy to share their experience, knowledge, and opinions on this. The interview should take no longer than 1 hour.

If haven't used video consultations before: As mentioned in the Information Sheet, you do not have to have used video consultations to take part in the study so don't worry if you haven't.

Thank you for agreeing to participate. I'd like to remind you that you do not have to take part, you can choose to end the interview at any point. Any information you provide during the interview will be anonymised, meaning that it cannot be linked to you.

Just to remind you, this interview will be recorded. Do you have any questions before we begin recording? <<Answer Qs then start recording>>

	QUESTIONS	PROMPTS	NOTES
General Questions			
1	**Used with patient:** " I can see from your questionnaire answers that you have done a video consultation before with patients. Can you tell me more about that." **Haven't used with patient:** "I can see from your questionnaire answers that you haven't done a video consultation before with patients. Can you tell me more about this"		
2	"What do you think about using video consultations to speak to patients?"	**Have used:** • For example – is it a good/bad thing? Why do you think this?	
3	"When would you consider having a consultation with a patient over video?"	• Reason for contact (tasks)	
Tools and technology			
4	"Were now going to discuss the tools and technologies needed for video consultations. What I mean by this is any object or software that you would use, this could be technology based, paper based, or other equipment/materials." "What sort of tools and technologies would you say **are essential** for a video consultation?"	• Equipment • Technology • Mobile phone • Email	
5	"What sort of tools and technologies may not be essential but would help you do a video consultations?"	• Performance of the technology (tech performance)	

		• Being able to see patient on screen (visual cues)	
Internal environment			
6	"Tell me about where you would make the video consultation?"	• Where you take the call (home, work etc) • The space- suitable / comfortable • *If never work in same space – what is the space in general like*	
Person			
7	"Is there anything about yourself that you feel might affect your choice to use video consultations?"	• Abilities in general • Verbal and cognitive abilities	
8	"Is there anything about the patient which would influence whether or not you would use video consultations?"	• Verbal and cognitive abilities (patient verbal and cog abilities) • Patient abilities in general	
9	"How would/do you feel about speaking to a patient you don't already know over video consultations?" (HCP-patient relationship)		
10	"How about speaking to a patient you do already know or have a relationship with. How would/do you feel about that?" (HCP-patient relationship)		
Tasks			
11	**If have used before:** "Talk me through having a video consultation, what steps are involved? (for example, from the patient requesting the consultation through to an outcome/diagnosis)"		

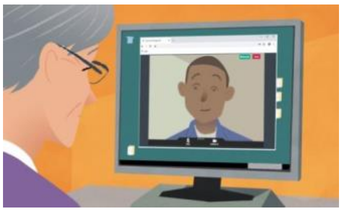
	If haven't used before: "What can you tell me about your knowledge of the process involved in video consultations?"		
12	**If have used or are aware of this process:** "Is there anything about any parts of that process we've discussed that affects whether you choose to use video consultations or not, if at all?"		
13	"Do you have any opinions on how convenient, or not, video consultations are?" (convenience)	• Pharmacist • Patient • The practice / pharmacy	
Organisation Before I ask this next question, I just want to remind you that you will not be identifiable from anything that you say as your responses will be anonymised			
14	"We've just been speaking about what's involved in video consultations and how convenient they are. Tell me about anything related to the organisation (health service/pharmacy or general practice itself) that affects whether or not you use video consultations"	• Workload (workload) • Job roles and responsibilities (implications for job role/responsibilities) • Support given (business support/drivers) • Appointment availability (appointment availability) • Peer support	
External environment			
15	"We've just been talking about your workplace/organisation. Is there anything broader than this environment which affects your choice to use video consultations?" *Use prompts as examples if needed*	• Public health • External support (external financial support) • Things to do with government	
Additional questions			

16	"Are video consultations something you'd consider using with patients in the future?"	• Yes – WHY? • No • Maybe • Not sure	
17	"Is there anything else at all that you feel affects your use of video consultations that we haven't already covered?"		
18	"Would you like to ask anything before we finish up?"		

Debrief
Thank you for taking part. As I previously said, the information you have given will remain anonymous and will never be traceable to you. You can contact myself or the Chief Investigator using the email addresses on the Participant Information Sheet if you have any questions. Lastly, before I let you go, can you think of any pharmacists you know working in general practice or community pharmacy that may be interested in taking part in this research? If so, please could you forward the advert on to them. Thank you again for your time.

NHS patients – we need your help to develop digital pharmacy services for the future

University of Strathclyde Glasgow



We're interested in why you do (or do not) use video consultations to speak to a pharmacist

Who are we looking for?

We are looking for patients who have used a community pharmacy and/or spoken with a pharmacist based within a GP surgery, and use the internet/social-media sites. You do not need to have used video consultations in order to take part in this study.

What will you be asked to do?

After completing a short questionnaire, a researcher from the University of Strathclyde will contact you to arrange a suitable time for the interview. The interview will last no longer than 1 hour and during it you will be asked why you do or do not use video consultations to speak with a pharmacist.

Want to know more?

Email Aimee at: a.ferguson@strath.ac.uk

OR

Scan the QR code

Do you want to help develop digital pharmacy services for the future?

We want to know how you feel about using video consultations to communicate with patients

Who are we looking for?
We are looking for pharmacists working in community pharmacy and general practice in Scotland.
You do not need to have experience of using video consultations to take part.

What will you be asked to do?
You will be asked to take part in an interview (video, telephone or face-to-face) with a researcher from the University of Strathclyde which will last no longer than 1 hour. During the interview you will be asked why you do or do not use video consultations with patients.

Want to know more?

Email Aimee at: a.ferguson@strath.ac.uk

OR
Scan the QR Code below

Appendix 7: SBAR to Scottish Government Near Me team

Guidance relevant to primary care pharmacists in Scotland on the use of video consultations

From: Aimee Ferguson – PhD candidate at the University of Strathclyde

Situation

Recent dialogue with members of the Near Me team (Beswick, M. and Cooper, R. August 2023) highlighted that Technology Enabled Care guidance for specialties including community and general practice pharmacy are currently being updated. Results from the following PhD project could inform this update.

Background

The first part of the PhD explored use/non-use of video consultations in primary care pharmacy in Scotland through interviews with patients and pharmacists. Despite being aware of some existing guidance and training, pharmacists expressed a need for further guidance on when video consultations may be appropriate, or not, to use with patients. This SBAR focuses on the final chapter of the PhD, which involved a scoping literature review to provide an overview of existing guidance available to pharmacists on the use of video consultations, from a whole-systems perspective. This meant assessing the extent to which the identified resources contained information related to each component of the current work system – the people, tools and technologies, tasks, organisation, internal environment, and external environment.

Assessment

The review identified 94 resources, most (n=62, 66%) of which were published from 2020 onwards. The majority were published by Scottish Government and NHS Scotland health boards (n=58, 61.7%), with less by technology services (i.e. Attend Anywhere; Near Me; National Video Conferencing Services; Turas Learn) (n=24, 25.5%)) and pharmacy organisations (n=12, 12.8%). The majority (n=64, 68.1%) were appropriate for any healthcare professional, with less aimed specifically at pharmacy personnel (n=19, 20.2%). Finally, the majority of resources could be defined as strategies (n=16, 17%), informational videos (n=12, 12.8%) and webpages (n=12, 12.8%).

- Key areas focused on in the guidance include: the technical requirements (e.g. suitable devices, internet browsers and connection speeds); step-by-step advice on setting up the technology and developing standard operating procedures (SOPs); and step-by-step advice on how to use video consultations.
- Resources detailed the importance of considering patient choice/preference, providing video as an option to patients to ensure they are at the centre of their care.
- Only 13 (13.8%) of 94 resources explicitly mentioned involving stakeholders in the process of developing video consultation guidance.
- Resources detailed patient health concerns/needs that may be appropriate (or not) for assessing over video consultations. However, the key message in these resources is that these are given as examples, and organisations should develop individual SOPs comprising specific clinical criteria that professionals can use to aid decision making:
    - Although the prescribing of medicines was deemed appropriate for video consultations in some resources, it was also equally deemed inappropriate in others for the prescription of certain medicines (e.g. antimicrobials; opioids; laxatives; gabapentin; and non-surgical cosmetic products) unless safeguards are in place.
    - Contrasting opinions were also evident in the aforementioned interview study, when discussing the suitability of video consultations for skin concerns and asthma reviews.
- Resources signposted to other guidance within them:
    - The most commonly cited resources were: the Near Me and Technology Enabled Care websites; three informational videos provided by Near Me (hosted on YouTube©); and the national Technology Enabled Care guidance on Near Me.
    - Resources published by pharmacy organisations (including the Royal Pharmaceutical Society and General Pharmaceutical Council) signposted to guidance developed specifically for doctors. Moreover, a resource provided by an NHS Scotland health board signposted to guidance for healthcare professionals working in NHS England, where patient consent processes are different.
- Only 17 (18%) of 94 resources provided guidance on the space in which professionals may conduct video consultations. These resources stipulate that

video consultations should be taken in a private, well-lit space. Resources stated that professionals should ensure there is nothing in the background during the call that would allow identification of the healthcare professional, and any electronic backgrounds used should be professionally appropriate.

Recommendations

- Inappropriate signposting within resources to less relevant resources or guidance could be causing confusion or uncertainty in pharmacists and possibly acting as a barrier to video consultation use. It is recommended that when developing future guidance, the appropriateness of any signposting within is considered. Where guidance is developed for/aimed at any healthcare professional, any signposting within should clearly state which group of professionals to whom it is relevant.
- It would be recommended that the researcher liaises with the Near Me team working on updating the current guidance as additional insight could be provided. A further discussion to present the full findings of this project in more detail would be beneficial
- To maximise the relevance of guidance for those intending to use the technology (i.e. patients and professionals), it is recommended that a variety of stakeholders are involved in the guidance development process. Although only 13 resources mention the involvement of stakeholders in their development, other resources could have involved stakeholders without explicitly stating so. Any stakeholder involvement in resource development should be made clear, so as to signpost the applicability of the resource for a particular setting or group of stakeholders.
- Whilst working with key stakeholders from each relevant context, it is recommended that the development team work towards providing a standardised set of guidelines regarding the conditions that are, and are not, appropriate for assessing or discussing over video consultations. It is clear that there is variation in opinions regarding the suitability of video consultations for certain conditions, and it is recommended that future work seeks to address this lack of consensus and clarity. Having a set of conditions that are agreed on by key stakeholders would be beneficial in providing equity of care for patients across Scotland. Individual organisational SOPs could build upon the agreed set of conditions, adding more if appropriate for the setting and the professionals working within.

Appendix 8: SBARs sent to the Scottish Practice Pharmacist and Prescribing Advisers Association

Factors influencing the use of video consultations in primary care pharmacy services in Scotland

To- The Scottish Practice Pharmacy & Prescribing Advisers Association
From: Aimee Ferguson – PhD candidate at the University of Strathclyde (February 2024)

Situation

Despite the availability of video consultation facilities (Near Me) in Scotland, engagement with the technology has been limited in primary care pharmacy services in Scotland, both before and during the COVID-19 pandemic. Results from the following PhD project highlight key barriers that must be addressed if video consultations are to be used by primary care pharmacists as part of routine practice.

Background

This study explored the use/non-use of video consultations in primary care pharmacy in Scotland through interviews with patients and pharmacists. A whole systems perspective was adopted to ensure interview schedules assessed each component of the current work system for its influence (i.e. the people, tools and technologies, tasks, organisation, internal environment, and external environment).

Assessment

A total of 14 patients and 19 pharmacists (n=10 general practice clinical pharmacists (GPCPs); n=6 community pharmacists; n=3 working in both settings) were interviewed (November 2022 to March 2023). No patients had experience of using video calls to speak to a pharmacist in either general practice or community pharmacy, whereas five (26.3%) pharmacists (n=3 GPCPs, n=1 community pharmacist, n=1 working in both settings) had experience of using video consultations with patients.

- Pharmacists perceived a lack of patient demand for video consultations, however patients were unaware that the service was available.
- Patients and pharmacists spoke about the lack of advertising of video consultations, with some patients saying they would not know how to contact a pharmacist to arrange one.
    - Patients made suggestions on how the service could be advertised including: letters; posters or leaflets in pharmacy; text messages; advert on prescription slip; pharmacy website; television; advert on tv

screen in general practice; radio; pharmacy Facebook© page; and general Facebook© adverts.

- Patients lacked an understanding of the role of pharmacists and questioned the boundaries over what they would speak to their pharmacist regarding instead of their GP.
- Having access to a private space for hosting video consultations was not an issue for most participants. However, some GPCPs expressed concerns around working in open plan hot desking environments, where patient confidentiality cannot be protected, and interruptions are likely. Pharmacists mentioned that more support is needed from the government in providing adequate spaces for pharmacists working in general practice.
- The clinical needs that both patients and pharmacists reported as most suitable for video consultations included medication reviews, medication queries, and skin concerns. However, some participants expressed concerns around assessing skin remotely as poor quality IT could hinder the examination. Pharmacists had differing opinions on the suitability of video for asthma-related consultations, with some reporting that it would only be suitable for follow-ups and not initial consultations.
- Despite being aware of some existing resources and training, pharmacists expressed a need for further guidance on when video consultations may or may not be appropriate to use with patients.
- Not having access to the necessary technology was an issue for all community pharmacists and some GPCPs.
- Pharmacists suggested that video consultations could be conducted by not only pharmacists but technicians too as they are highly skilled and often answer patient enquiries in-person and over the telephone.
- GPCPs highlighted the need for administrative staff within the practice to assist with setting up video appointments.
- GPCPs working across multiple practices recognised difficulties when practices felt differently about the use of video consultations.

Recommendations

- The results have highlighted an interesting gap as pharmacists perceive a lack of patient demand for video consultations, when patients are unaware that the service is available. It is recommended that future work focuses on developing and circulating service advertisements and communications using the suggestions made by participants in this study.

- It is recommended that any future efforts to embed video consultations into general practice pharmacy services addresses the highlighted workspace requirements in order to protect patient confidentiality.
- As pharmacists expressed a need for further guidance despite being aware of available resources, it was beneficial to understand what resources exist currently. A scoping review of existing guidance relevant to pharmacists working in primary care in Scotland, on the use of video consultations has subsequently been recommended. One aim was to identify any inconsistencies across resources that could be causing confusion and/or uncertainty in pharmacists looking to use video consultations. The final chapter of this PhD addressed this recommendation (see relevant SBAR on the following pages.

<u>Guidance relevant to primary care pharmacists in Scotland on the use of video consultations</u>

To- The Scottish Practice Pharmacy & Prescribing Advisers Association
From: Aimee Ferguson – PhD candidate at the University of Strathclyde (February 2024)

Situation

Recent dialogue with members of the Near Me team (Beswick, M. and Cooper, R. August 2023) highlighted that Technology Enabled Care guidance for specialties including community and general practice pharmacy are currently being updated. Results from the following PhD project could inform this update.

Background

The first part of the PhD explored use/non-use of video consultations in primary care pharmacy in Scotland through interviews with patients and pharmacists. Despite being aware of some existing guidance and training, pharmacists expressed a need for further guidance on when video consultations may be appropriate, or not, to use with patients. This SBAR focuses on the final chapter of the PhD, which involved a scoping literature review to provide an overview of existing guidance available to pharmacists on the use of video consultations, from a whole-systems perspective. This meant assessing the extent to which the identified resources contained information related to each component of the current work system – the people, tools and technologies, tasks, organisation, internal environment, and external environment.

Assessment

The review identified 94 resources, most (n=62, 66%) of which were published from 2020 onwards. The majority were published by Scottish Government and NHS Scotland health boards (n=58, 61.7%), with less by technology services (i.e. Attend Anywhere; Near Me; National Video Conferencing Services; Turas Learn) (n=24, 25.5%)) and pharmacy organisations (n=12, 12.8%). The majority (n=64, 68.1%) were appropriate for any healthcare professional, with less aimed specifically at pharmacy personnel (n=19, 20.2%). Finally, the majority of resources could be defined as strategies (n=16, 17%), informational videos (n=12, 12.8%) and webpages (n=12, 12.8%).

- Key areas focused on in the guidance include: the technical requirements (e.g. suitable devices, internet browsers and connection speeds); step-by-step advice on setting up the technology and developing standard operating procedures (SOPs); and step-by-step advice on how to use video consultations.

- Resources detailed the importance of considering patient choice/preference, providing video as an option to patients to ensure they are at the centre of their care.
- Only 13 (13.8%) of 94 resources explicitly mentioned involving stakeholders in the process of developing video consultation guidance.
- Resources detailed patient health concerns/needs that may be appropriate (or not) for assessing over video consultations. However, the key message in these resources is that these are given as examples, and organisations should develop individual SOPs comprising specific clinical criteria that professionals can use to aid decision making:
  - Although the prescribing of medicines was deemed appropriate for video consultations in some resources, it was also equally deemed inappropriate in others for the prescription of certain medicines (e.g. antimicrobials; opioids; laxatives; gabapentin; and non-surgical cosmetic products) unless safeguards are in place.
  - Contrasting opinions were also evident in the aforementioned interview study, when discussing the suitability of video consultations for skin concerns and asthma reviews.
- Resources signposted to other guidance within them:
  - The most commonly cited resources were: the Near Me and Technology Enabled Care websites; three informational videos provided by Near Me (hosted on YouTube©); and the national Technology Enabled Care guidance on Near Me.
  - Resources published by pharmacy organisations (including the Royal Pharmaceutical Society and General Pharmaceutical Council) signposted to guidance developed specifically for doctors. Moreover, a resource provided by an NHS Scotland health board signposted to guidance for healthcare professionals working in NHS England, where patient consent processes are different.
- Only 17 (18%) of 94 resources provided guidance on the space in which professionals may conduct video consultations. These resources stipulate that video consultations should be taken in a private, well-lit space. Resources stated that professionals should ensure there is nothing in the background during the call

that would allow identification of the healthcare professional, and any electronic backgrounds used should be professionally appropriate.

Recommendations

- Inappropriate signposting within resources to less relevant resources or guidance could be causing confusion or uncertainty in pharmacists and possibly acting as a barrier to video consultation use. It is recommended that when developing future guidance, the appropriateness of any signposting within is considered. Where guidance is developed for/aimed at any healthcare professional, any signposting within should clearly state which group of professionals to whom it is relevant.
- It would be recommended that the researcher liaises with the Near Me team working on updating the current guidance as additional insight could be provided. A further discussion to present the full findings of this project in more detail would be beneficial
- To maximise the relevance of guidance for those intending to use the technology (i.e. patients and professionals), it is recommended that a variety of stakeholders are involved in the guidance development process. Although only 13 resources mention the involvement of stakeholders in their development, other resources could have involved stakeholders without explicitly stating so. Any stakeholder involvement in resource development should be made clear, so as to signpost the applicability of the resource for a particular setting or group of stakeholders.
- Whilst working with key stakeholders from each relevant context, it is recommended that the development team work towards providing a standardised set of guidelines regarding the conditions that are, and are not, appropriate for assessing or discussing over video consultations. It is clear that there is variation in opinions regarding the suitability of video consultations for certain conditions, and it is recommended that future work seeks to address this lack of consensus and clarity. Having a set of conditions that are agreed on by key stakeholders would be beneficial in providing equity of care for patients across Scotland. Individual organisational SOPs could build upon the agreed set of conditions, adding more if appropriate for the setting and the professionals working within.