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Health Expectations: Main Text File

Title: Delivery of supported self-management in remote asthma reviews: a systematic rapid realist review.

Short running title (less than 40 characters): Supported self-management in remote asthma reviews

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Statement of Authors' Contribution: EK undertook the data collection, extraction and synthesis. IS independently screened the data search and extracted 25% of the data to ensure reliability and validity. All authors (EK, IS, LS, KM, HP) contributed to data interpretation and critically revised the manuscript. All authors read and approved the final manuscript.

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Abstract:

Background: The COVID-19 pandemic forced health care systems globally to adapt quickly to remote modes of health care delivery, including for routine asthma reviews. A core component of asthma care is supporting self-management, a guideline-recommended intervention that reduces the risk of acute attacks, and improves asthma control and quality of life.

Objective: Following standard methodology for rapid realist reviews, we aimed to explore context and mechanisms for the outcomes of clinical effectiveness, acceptability and safety of supported self-management delivery within remote asthma consultations.

Expertise: An External Reference Group (ERG) provided expert advice and guidance throughout the study.

Search strategy: We systematically searched four electronic databases and, with ERG advice, selected 18 papers that explored self-management delivery during routine asthma reviews (specifically including telephone/video consultations).

Data extraction and synthesis: Data were extracted using Context-Mechanism-Outcome (C-M-O) configurations and synthesised into overarching themes using the PRISMS taxonomy of supported self-management as a framework to structure the findings. The ERG reviewed the data and provided expert direction.

Results: The review findings identified how support for self-management delivered remotely was acceptable (often more acceptable than in-person consultations), and was a safe and effective alternative to face-to-face reviews. In addition, remote delivery of supported self-management was associated with; increased patient convenience, improved access to and attendance at remote reviews, and offered continuity of care. Remote reviews could provide the core content of an asthma review, including remote completion of asthma action plans.

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Conclusion: Remote delivery of supported self-management for asthma was generally found to be clinically effective, acceptable, and safe with the added advantage of increasing accessibility. Our findings support the option of remote delivery of routine asthma care for those who have this preference, and offer healthcare professionals guidance on embedding supported self-management into remote asthma reviews.

PROSPERO Registration Number: CRD42020207543

Patient and Public Contribution: Patient and public contribution was provided by a representative of the Asthma UK Centre for Applied Research (AUKCAR) patient and public involvement (PPI) group. The PPI representative reviewed the findings, and feedback and comments were considered. This led to further interpretations of the data which were included in the final manuscript.

Keywords: Asthma, Supported Self-Management, Remote Consultation, Primary Care, Video consultations, Telephone consultations, PRISMS Taxonomy

Introduction

There are 339 million people living with asthma worldwide^[1]. Asthma is a variable condition and evidence-based guidelines (e.g., GINA^[2]; BTS/SIGN^[3]) highlight the importance of supporting people to recognise when their condition is deteriorating and to know how to adjust their treatment and/or seek medical advice in a timely and effective manner. Supported self-management is an approach that facilitates patients with long-term conditions (such as asthma) to have the knowledge, skills, and confidence to manage the physical, emotional and social impact of their condition(s)^[4]. The ‘overwhelming’ conclusion of evidence syntheses is that supported self-management for asthma improves asthma control, reduces exacerbations and hospital admissions, and improves patients’ quality of life^[5,6]. Despite this robust evidence, implementation in routine clinical care is challenging^[7].

Remote consulting, already promoted as a partial solution to growing challenges of health care delivery, was rapidly expanded in response to the worldwide COVID-19 pandemic^[8]. Within the United Kingdom (UK) general primary care, there was a dramatic shift away from face-to-face consultations to telephone, video and on-line consultations^[9]. In the months following UK COVID-19 lockdown in early 2020, only 11% of primary care general practice appointments were conducted face-to-face, suggesting that nearly 90% of patient-provider interactions took place via remote means^[10]. Remote consultations can potentially provide both benefits and challenges for patients and health professionals. Suggested advantages of remote consulting include; improving access to care for long-term conditions^[11], maximising the potential for supporting self-management^[12], overall acceptability, safety and effectiveness^[13,14] and improvements in asthma control^[15,16]. However, critics have raised concerns about the use of remote delivery of routine primary care due to variable evidence of suitability and the associated technical, clinical, and organisational policy challenges^[17].

Rationale for review

Published research regarding the delivery of supported self-management during remote asthma consultations is sparse and the speed of technological advance means it needs frequent updating.

Given the changing clinical context and national/international recommendations for implementing supported self-management^[2,3], providing guidance on this new approach to delivery is timely. Informing a UK-wide cluster randomised controlled trial, evaluating implementation of supported self-management (IMPLementing IMProved Asthma self-management as RouTine, IMP²ART), this research uses a Rapid Realist Review approach^[18-21] to explore the clinically effective, safe and acceptable delivery of supported self-management of asthma via remote routine reviews. Conducting a Rapid Realist Review will enable understanding not only about whether an intervention/approach works but how and in what clinical, demographic or organisational context.

Study objectives

Using realist methodology, we aimed to:

1. Identify and synthesise studies that evaluated and/or explored remote asthma consultations and the delivery of supported self-management.
2. Explore the context and mechanisms that have contributed to clinically effective, safe and acceptable delivery of supported self-management during remote asthma consultations.
3. Produce recommendations for best practice in the delivery of supported self-management during remote consultations for people with asthma.

Methods

Study design

Following Realist Review methodology^[18-21] to identify Context-Mechanism-Outcome (CMO) configurations within existing research, our review explored how supported self-management is delivered during routine remote asthma reviews. The study is reported in line with the RAMESES

Publication Standards for Realist Synthesis and Realist Reviews^[22]. We registered our protocol on the PROSPERO database (Registration No.: CRD42020207543).

Realist methodology

Devised by Pawson & Tilly ^[18,20,21], realist methodology is a theory-driven review process that focuses on understanding the interplay of an intervention's Context (C), Mechanisms (M) and Outcomes (O) and whether the intervention works (or not). Conducting realist research aims to answer the question 'what works, for whom, in what contexts, to what extent and most importantly how and why'^[18]. Realist methods are increasingly used within healthcare research due to their ability to support understanding of complex interventions. Within realist methodologies, a programme theory is the specific hypothesis about how an intervention causes the intended or observed outcomes and should be the central aspect of any realist evaluation or synthesis^[23]. Several varied theories are identified initially using a broad scope of existing literature to refine the purpose of the review and identify review questions. Programme theory formulation is subsequently an iterative process which progresses as the evidence is identified, assessed and synthesised, until an evidence-based saturation and conclusion has been reached^[20]. Pawson differentiates between realist evaluations - an approach used when conducting primary research, and realist synthesis - an approach used to synthesise secondary data^[20].

Rapid Realist Review

For this review, we used the rapid realist review approach described by Saul et al.^[19] (displayed in Figure 1) to apply a realist synthesis approach in a timely manner where there is an emerging evidence base for the subject area under review, whilst still preserving the core elements of realist methodology. An important feature of a rapid realist review is to engage an External Reference Group of experts, who provide informed direction to the data identification and theory development throughout the entirety of the review, and ensure the review is grounded in local context. We convened a multidisciplinary External Reference Group including researchers, clinicians (nurses and

GPs) and primary care respiratory experts. Members met twice during the review process, initially to provide feedback on the project scope and the full text articles proposed for inclusion. The group met again to review findings from the data extraction and advise on data synthesis.

Scoping the literature

The review took place between August 2020 and March 2021. One reviewer (EK) initially scoped relevant literature exploring delivery of routine asthma reviews via remote consultations. From this initial broad search, the research group created a preliminary programme theory. This process defined the scale of the research and ensured that the review focussed appropriately on the research questions. Although not an essential element of a rapid realist review, creation of programme theory is a recognised step in realist approaches^[18-21]. We therefore decided to adopt this approach within this review: the initial programme theory formed the basis of the iterative data collection, data extraction, data synthesis, and subsequent theory development stages, and the concluding programme theory allowed a final statement of the evidence to be produced.

Search process

The following databases were searched in October 2020 by EK: MEDLINE, Embase, PsychINFO, and the Cochrane Library. Key search terms that were likely to identify studies relevant to the research questions, and to address the purpose of the review were used (Supplementary File 1). We searched for qualitative, quantitative, mixed-method studies and grey literature published after 2000, to reflect contemporary remote consultation technologies, and the introduction in the UK of the Quality Outcomes Framework (QOF) in 2004 (which incentivised regular reviews for long-term conditions (LTCs) including asthma)^[24]. Using the PICOS Framework^[25], eligibility criteria were developed (Table 1), and studies that did not meet the inclusion criteria or were not published in the English language were excluded. Consistent with a realist synthesis approach, it was still possible for data beyond this framework to be included in the review, if the article contributed to the development of the review's programme theory. Documents were assessed iteratively individually, and collectively by the study

team, to determine whether the evidence provided was “*good enough and relevant enough*”^[21], to inform the creation of appropriate C-M-O configurations within the data. In line with the iterative approaches of realist methodologies, we used snowballing techniques (such as searching companion papers and citation tracking) for all included articles to ensure important texts were not overlooked. We also searched for additional relevant grey literature (e.g., policy documents, opinion pieces) from a variety of sources (including any suggested by the External Reference Group). The search process was iterative, overlapped with data extraction and analysis, and was directed towards the evidence gaps and finding explanatory information.

Selection and Appraisal of Documents

Titles/abstracts and potentially eligible full texts were independently screened by two reviewers (EK; IS), and disagreements resolved by discussion.

It was during this stage, that the first External Reference Group Meeting took place (November 2020) to review the list of full text articles and provide feedback on the importance of included papers and to suggest any other publications or research that might contribute data to the review. From the feedback provided by the group, any gaps in the literature were addressed by iteratively modifying the search terms/inclusion and exclusion criteria to capture any further relevant documents.

Data extraction

To begin the data extraction phase, a template was devised focusing on C-M-O configurations that explored components of support for self-management, as defined by the Practical Systematic Review of Self-Management Support (PRISMS)^[26]. The PRISMS taxonomy was used as a framework during the data extraction phase by categorising C-M-Os into one of the 14 components of self-management support, to streamline the subsequent data synthesis processes. Examples of these components include ‘*A1. Information about condition and /or its management*’ and ‘*A2. Information about available resources*’. PRISMS components are further explained within Supplementary File 2. The data

extraction template also allowed for recording as to whether each C-M-O related to the 'acceptability, safety and clinical effectiveness' of supported self-management delivery during routine remote asthma consultations, in line with the project's aims and objectives.

C-M-O configurations were then extracted from all full text articles. Quantitative, qualitative or contextual data could be extracted from any part of selected papers. We continuously considered the relevance and rigour of each included C-M-O, and regularly discussed within the core research team (EK, KM; HP; LS) how individual extracts should be used to ensure appropriate inferences were made. Data extraction was completed by EK (25% was independently extracted by IS to ensure consistency of approach, reliability and validity. The independent extraction of data by the two authors (EK;IS) resulted in the same C-M-O configurations being extracted by both authors. i.e., each author identified the same outcome related to remote delivery of SSM in all papers and also connected the same context and mechanism to each outcome for all papers. How to optimally present the data (i.e., which data extract was used) and the interpretation of each C-M-O was discussed in detail until a consensus was reached.

Analysis and synthesis processes

We used the PRISMS taxonomy^[26] to structure our synthesis. The PRISMS meta-review highlighted the importance of supported self-management as a key component of high-quality care for people living with LTCs; concluding that health-care providers should promote a culture of actively supporting self-management as a routine, expected, and monitored aspect of care^[26]. Self-management is a broad concept applicable to different demographics of people living with a wide range of LTCs, and thus the support that can be provided is diverse. Use of the PRISMS taxonomy ensured we captured this breadth in a structured way.

To synthesise the findings all extracted C-M-Os were mapped against the PRISMS taxonomy components. We considered C-M-Os for each component of self-management and identified key themes within and across each component. Further we considered whether there was variance in the

frequency of delivery of each component. Following this we considered the association of C-M-Os to the outcomes of acceptability, clinical effectiveness and safety. Key themes were created from all C-M-O and taxonomy components until data saturation was reached. As External Reference Group members included clinicians currently delivering supported asthma self-management, their feedback ensured that the final findings and themes addressed any gaps in practice that the analysis had not represented.

Results

Selection of included studies

A total of 1519 articles were identified in the search, of which 15^[12,17,27-39] met the inclusion criteria and were included in this rapid realist review. The External Reference Group identified an additional three papers^[14,40,41]. Although these papers did not meet the PICOS inclusion criteria (two papers had only recently been published so was therefore missed within the initial search, and the other paper focused on telemonitoring rather than in person self-management delivery), they were still included due to their relevance to the review's aims. The PRISMA flow diagram^[42] illustrates the search strategy and results (Figure 2).

Study Characteristics

All 18 included studies were published between 2003 and 2020 and were undertaken in the UK (n=10), USA & Canada (n=7) and Italy (n=1). Eight of the included papers were systematic reviews (n=5) or meta-reviews (n=3), including data from a total of (n=366) unique primary studies represented within these systematic reviews. Eleven papers had the primary aim of exploring the use of remote consultations in routine asthma reviews. Of the three papers provided by the External Reference Group, one was a feasibility study and two were systematic reviews. Detailed study characteristics can be found in Supplementary File 2.

Main Findings

The data extraction process was completed for the 18 included articles (full C-M-O configurations can be found in Supplementary File 3). The PRISMS supported self-management components most commonly informed by C-M-O configurations were:

- A4: Regular clinical reviews
- A1: Information about condition and/ or its management
- A5: Monitoring of condition with feedback
- A3: Provision of/agreement on specific clinical action plans and or rescue medication
- A8: Provision of easy access to advice or support when needed

These components, in addition to other self-management strategies, have been explored through the data synthesis stage. Six key themes were identified which are described below, with an overarching C-M-O to outline the key conclusions of each theme (Table 2). Each theme presents findings from both an asthma patient and healthcare professional perspective, in addition to differences between the use of telephone and video consultations. Data saturation was reached for all themes.

Theme 1: Increased regular attendance and increased monitoring of patient

Patients: For patients with asthma, the increase in regular attendance at reviews conducted remotely was due to a number of advantages including increased convenience, time and cost savings for patients^[14,17,27,29,31,33]. Remote reviews were perceived as better at meeting patient needs and preferences compared to a standard face-to-face review, as they reduced barriers to treatment and eased access to routine care^[14,17,27,29,31,32,34-36,39,40]. Regular attendance at remote reviews and supported self-management delivery led to an increase in patient confidence and enablement in their asthma care^[33,36].

Professionals: Symptoms could be monitored, reviewed, interpreted, and acted on safely in remote consultations. Increased patient attendance at routine remote reviews created regular opportunities for healthcare professionals to provide feedback on monitored asthma symptoms to patients (e.g., monitoring peak flows and asthma triggers)^[27,28,30,34,38,39]. Additionally, the opportunity to maintain contact and on-going monitoring was one of the most commonly recognised advantages of remote consultations^[27,28,34]. Patients' medication and asthma action plans could be reviewed, reinforcing earlier detection of symptoms or deterioration and timely self-management^[38,39].

Video consultations: In addition to enabling feedback on monitored asthma symptoms or behaviours, video consultations had particular advantages for monitoring a patient's condition through systems such as 'document camera' or 'picture-in-picture' functions, which facilitated patients and professionals reviewing the contents of documents (e.g., asthma action plans) together^[27,30].

Telephone consultations: A number of articles supported telephone reviews as an efficient way of maintaining contact with asthma patients^[34,39]. Telephone consultations facilitated regular discussions and met patients' needs and preferences due to increased convenience, facilitating attendance at routine telephone reviews.

Theme 2: Opportunities to provide individualised information about asthma and asthma management

Patient: Video and telephone consultations were a safe and effective mechanism to facilitate the delivery of individualised information about asthma and its management, resulting in increased patient understanding of their condition^[27,31,33,35,37-41] and improved overall asthma control^[37]. Remote consulting provided opportunities for patients to learn about their condition^[32,36], and increased patient satisfaction with the mode of consultation^[27,31,33,40].

Professional: Use of video and telephone consultations were both recognised as effective communication strategies for healthcare professionals to provide individualised information, instructions, education and signposting of other essential resources to patients^[27,31,32,33,35,37-41].

Video consultations: Patients found video consultation technology visually appealing and engaging, enhancing understanding and asthma education (e.g., information about asthma triggers^[27,31,33,40]). Use of video technology facilitated greater discussion between patients and professionals^[27,31,33,40]. Recording functions allowed patients to record their review then re-watch, consolidate, and confirm the information discussed^[40].

Telephone consultations: Several studies supported the use of telephone consultations as an effective tool to deliver individualised information to patients^[35-37]. More specifically, telephone reviews were recognised as a timely^[39], effective and efficient means to provide information and transfer instructions to patients to manage their asthma.

Theme 3: Provision of convenient/flexible access to advice and support

Patients: Remote consultations provided more convenient and flexible access to advice and support for patients with asthma, compared to attending a face-to-face review^[34,39]. Particular groups who favoured the convenience and timeliness of remote consultations were patients who lived in rural communities^[27,30], patients whose lives were structured around work, study or childcare^[17], younger

patients who were more familiar with the use of technology^[29,33] and older, vulnerable patients with reduced mobility^[14,33]. Ease of access was particularly helpful for patients who noticed a change in symptoms or peak flow readings and were able to contact a healthcare professional promptly via remote consultation^[29]. Remote asthma consultations may potentially narrow socioeconomic inequalities in access to healthcare, by being more accessible to vulnerable groups^[14,33].

Professionals: Healthcare professionals may have more availability to conduct a remote video or telephone review, enabling them to respond more promptly than a face-to-face appointment may have offered^[12,27,29,35].

Video and telephone consultations: For some patients, telephone and video consultations were a preferred method of consultation, and patients were more likely to attend this type of review, leading to increased engagement^[34,39].

Theme 4: Enhanced healthcare professional-patient relationships and communication

Patients: Patients whose reviews were conducted with the same clinician each time (potentially facilitated by remote consultations), reported better health-related outcomes and greater satisfaction with the consultation^[28,30,31,34,37,40]. Benefits described included; increased shared decision making^[17,33,40], more discussion of personal preferences^[17,33], and increased attendance at reviews^[30]. Reviews conducted with the same clinician were seen to be particularly important to young people^[33] leading to more engagement and increased confidence in self-management strategies. The mechanism for this was the trust built during an existing relationship between professional and patient^[33].

Professionals: A number of studies suggested that when a relationship is already established between patient and professional, telephone and video technologies are a suitable platform to engage in shared decision making and discussion of self-management strategies. The existing relationship ensures the professional recognises changes in a person's condition due to their prior awareness of personal circumstances^[28,30,31,34,37,40].

Video consultation: Patients were able to discuss their asthma action plan with their health professional during remote reviews. Video-facilitated collaboration through technologies such as ‘screening sharing’ and ‘editing documents’ allowed the patient and professional to work together to personalise their action plan^[30,40]. Recording functions enabled patients to revisit their review and help consolidate the information delivered, to improve understanding of their asthma and how to manage their condition^[30,40].

Theme 5: Appropriate provision of specific practical asthma self-management strategies (action plans and inhaler technique)

Patients: Specific practical asthma self-management strategies can be effectively communicated, delivered and discussed during remote asthma reviews. An individualised, written asthma action plan can be successfully discussed via telephone or video consultation. Remote provision/discussion of an action plan leads to positive patient outcomes such as increased patient understanding^[27,28,31,34,37,38,40], improved control of their condition^[27,31,34,37,38], increased quality of life^[28], greater patient self-efficacy^[27], and allows patients who may not regularly attend face-to-face reviews to have their action plan reviewed^[34].

Professionals: The use of video and telephone consultations are an effective alternative for discussing a patient’s asthma plan, compared to face-to-face reviews. Discussion of individualised action plan information and medications can be safely reviewed to increase patient understanding of their condition, medication adherence, and how to recognise symptom deterioration. Professionals were able to demonstrate inhaler technique and provide education using the visual aids and tools of video consultation technologies effectively and safely^[27,39].

Video consultation: When professionals are communicating and demonstrating practical strategies such as inhaler technique via video consultation, patients were able to understand and learn from the instructions when the professional’s video camera was positioned from the waist up (allowing the demonstration to be fully visualised)^[27]. Similarly, healthcare professionals could review patients’

technique. Online screen-sharing technologies allowed patients and professionals to collaboratively edit asthma action plans during video consultations^[40]. This led to improved communication and avoided misunderstandings, and enhanced shared decision making between the individual and professional. The improved attendance at remote consultations enabled these specific skills to be reviewed with more patients ^[39].

Telephone consultation: Telephone consultations are a safe and effective alternative to face-to-face reviews to discuss and provide practical self-management advice and support. Individual asthma action plans can be discussed over the telephone and then converted into written versions and sent to patients after the consultation. This technique of discussions and provision of action plans were seen to significantly improve asthma control^[31,37].

Theme 6: Increased patient confidence and self-efficacy

Patient: Through the increased engagement with a remote consultation and prompt clinical input, patients felt more empowered and had up-to-date strategies to manage their condition^[27,31,33,35,36,38,39,41]. Patients also gained confidence in their self-management techniques from regularly attending remote reviews which may they have missed from non-attendance at a face-to-face review. Overall, this led to increased confidence in their understanding of how to identify impending attacks and in their ability to act appropriately^[12,38].

Overarching Synthesis

The overarching synthesis from the six key themes identified that, in relation to the review's key aims (to explore the safety, clinical effectiveness and safety of supported self-management delivery in remote asthma consultations); remote consultations were overall, more highly accepted than in-person consultations by many patients and professionals, and were an equally safe and effective alternative to face-to-face reviews. In only one instance were concerns raised about remote consulting (Godden & King^[29]), in particular with regards to clinical effectiveness and safety. Specifically,

uncertainties about effectiveness and the quality of interactions compared to face-to-face meetings were raised. One further study (Chongmelaxme et al.,^[28]) suggested there was no perceived improvement of control where telemedicine alone was received, although this is not suggestive of poorer results. An overview of all findings have been presented in Table 3.

Discussion

Summary of findings

We identified six themes using data from 18 articles to describe how supported self-management is delivered during remote asthma consultations. We identified positive benefits associated with remote asthma care including increased convenience, improved access (including for some vulnerable groups) and attendance at reviews, ability to conduct the core content of an asthma remotely (especially video reviews which enabled practical tasks such as checking inhaler technique), completion of asthma action plans (screen sharing or discussed with documents sent post-consultation), and continuity of care. Typically, these overrode any challenges associated with distance imposed by remote consultations, and patient's concerns about the quality of the interaction. Overall, our data suggest that for many patients and healthcare professionals, remote consultations are more highly accepted than in-person consultations, and were equally as effective and safe as face-to-face reviews.

Interpretation of findings of this study in relation to current literature

Guidelines for asthma management^[2,3] recommend that asthma should be monitored (often in primary care) by routine clinical review on at least an annual basis. Every asthma consultation is an opportunity to review, reinforce, and extend patient's knowledge and skills^[5]. Regular professional review is a core component of supported self-management^[26], with evidence of greater reductions in hospitalisations and emergency department visits in trials where the intervention includes regular review^[43,44]. The findings of this realist review show that using remote means to provide consultations

can increase patient engagement and attendance at asthma reviews [14,17,27,29-34,36,39]. Our realist synthesis suggests that one mechanism for the benefits of telehealth communications is the convenience of telephone or video consultations which facilitates attendance at reviews [14,17,27,29,30,33,34,39].

Providing patients with information and guidance for self-management of their asthma is an essential aspect of all routine reviews. Our findings highlight that the use of telephone and video consultations is an acceptable, effective and safe alternative to face-to-face consultations for providing patients with this information. Importantly, the partnership between the patient and professional should enable information to be discussed, understood and agreed upon between both the patient and professional. Such 'shared decision-making' can improve clinical outcomes and quality of life by actively engaging them in managing their own health^[45]. We found that telephone and video consultations have potential to be effective platforms that can facilitate shared decision making.

Asthma is a variable condition and some people with asthma may be well controlled and need very little support for many months. However, when symptoms are triggered, access to professional care needs to be flexible in timing and mode of delivery^[46]. As an alternative to face-to-face consultations, the findings of this study highlight that remote asthma reviews can provide flexible and convenient access to professional support enabling patients to be provided with appropriate and prompt clinical input. Such flexible access to their healthcare professionals promotes patients' confidence in their ability to self-manage their condition [12,27,31,33,35,36,38,39,41].

The provision of a personalised asthma action plan is an essential strategy in supporting people with asthma to take the right actions at the right time^[2,3,6,47]. People with asthma spend a matter of minutes in a routine review with their healthcare professional; the rest of the time, they are making their own decisions about their medications and when they should seek medical help. It is therefore essential that asthma reviews are used to agree what they should do if their asthma control deteriorates and

to empower them to take timely and appropriate action. Findings from this review highlight the acceptability, clinical effectiveness and safety of delivering action plans in remote routine reviews.

Kew and Cates^[34] in a Cochrane review concluded that there were no important differences between face-to-face and remote asthma reviews in terms of exacerbations, asthma control, or quality of life, though there was insufficient information to rule out differences in efficacy or safety. Consistent with the 'what/how/context' aims of a realist synthesis^[18-21], our findings extend the Cochrane review by identifying which aspects of supported self-management can be delivered via remote means, describing strategies that enable provision of video- or telephone consultations, and for whom and under what circumstances remote reviews may be most beneficial.

Kearney (2021)^[48] reflects on the fast pace at which UK NHS services have moved to remote care when the COVID-19 pandemic demanded social distancing, concluding that it will be essential for future health care services to '*do things differently*' in their approach to long-term conditions and the delivery of supported self-management. The report concludes that it is critical to plan carefully for the use of remote technologies, and to identify the best practice of self-management delivery at scale and in a sustainable way. The findings of our review provide the context and mechanisms for effective remote asthma supported self-management delivery.

Strengths and limitations

To our knowledge, we have conducted the first rapid realist review in the area of asthma supported self-management delivery via remote consultation. Our review is timely given the shift to remote care driven by the COVID-19 pandemic, and we explored the (rapidly expanding) use of video and/or telephone consultations, and systematically identified the perceived benefits and challenges of each mode of delivery in relation to each theme. Additionally, the findings are explored through the perspective of both the health professional and the patient. A final strength is that we utilised a robust realist methodology, that is gaining recognition for its contribution to healthcare research^[49].

A weakness of our study was the time constraints that we overcame by use of a rapid realist review. By design, our review was 'rapid', and we recognise that a more detailed approach such as a traditional realist synthesis may have revealed, challenged or confirmed some of the themes presented in the findings of this study, due to its ability to test presented theories. However, we believe our findings have been systematically constructed, and all feedback provided by the multidisciplinary External Reference Group was considered and actioned. Additionally, the use of the PRISMS taxonomy^[26] as a framework for analysis allowed the structure and interpretation to be grounded in the existing evidence-base. A weakness of realist methodology is the subjectivity of the data extraction, and the challenge of extracting unbiased C-M-Os. The primary research studies are generally not reported in line with Realist concepts (C-M-O Configurations) and therefore data extraction requires the researcher to interpret data to explore the context and mechanistic features of the research. In addition, we also acknowledge some limitations in the interpretation of the findings. Although every effort was made to ensure a non-biased approach to data extraction, we recognise that the included studies may be liable to publication bias with a focus on more successful components of their interventions, and favour reporting of positive or significant findings, resulting in an overly positive interpretation of the effects of remote consulting. To address this, we ensured our data extraction included all intervention outcomes (successful or not), and specifically highlighted where fewer positive findings were noted, although these were infrequent and insufficient to form a theme. For example, in Godden & King^[29] some professionals expressed concerns about the quality of remote consultations considering that they may not be as effective as face-to-face reviews. They described varied opinions on communicating key information remotely, as well as concerns about patient's willingness to accept new technologies. Although these negative opinions, were outweighed by the potential advantages of remote consultations in empowering people to manage their condition and enabling timely management of exacerbations, in the studies included in this review, this study does however raise the point that patient preference is always important to consider.

To increase reliability of findings we involved a second reviewer in the data extraction phase. The research team regularly discussed potential findings to ensure different perspectives were considered and resulted in a balanced interpretation of the data. The aim was to reach a consensus in interpretation, and this was achieved for all findings.

This review was completed during the COVID-19 pandemic period, but all studies included in the data, pre-dated the pandemic. Post-COVID research may present different findings as healthcare adapts to new models of asthma care. Additionally, we were dependent on the completeness of the included studies, so some potentially important contexts may not have been evaluated. For example, we did not have evidence to inform the role of remote support for self-management in the context of people living with disabilities, or ethnic minority groups potentially with language barriers. Future research should specifically explore remote supported self-management delivery for such groups.

We also acknowledge that although the review findings indicate either equivalence or greater benefit of remote self-management delivery, there will be individuals for whom face-to-face reviews are a preferred mode of health care delivery and communication. Additionally, we recognise that the 'safety' variable measured within this review has not been tested within a controlled trial. Although we found no indication that remote delivery of supported self-management caused harm, we would recommend future studies to explore this further.

Implications for future research and policy

Future research should explore how telecommunication can be implemented in ways that are most valued by patients and clinicians, to fit within the organisational and technical infrastructure of healthcare services and embrace the culture of delivering supported self-management^[33]. Asthma UK^[50] advocate that policy makers and innovators need to work together to develop a national effort towards delivering sustainable supported self-management and long-term implementation of improved patient-centred asthma care. The Asthma UK Centre for Applied Research (AUKCAR) is a collaborative network of applied asthma researchers, clinical and academic respiratory experts, as

well as PhD students and asthma patient representatives^[50]. Supported self-management is a key theme within the AUKCAR and the IMP²ART (IMPlimenting IMProved Asthma self-management As RouTine) programme of work has developed evidence-based, practical strategies to promote delivery of supported self-management in routine primary care^[51-53]. This Rapid Realist Review provides evidence-based findings of the underlying contexts and mechanisms in remote service provision that contribute towards effective supported self-management delivery during asthma reviews, which will be highlighted by the IMP²ART programme.

Conclusions

Even when the COVID-19 pandemic recedes, remote technologies will remain in everyday healthcare. This paper highlights new knowledge through the use of Realist methodology by understanding the existing mechanisms and the interplay within differing contexts, this paper has revealed how and why remote supported self-management for asthma can be effectively delivered. A core component of asthma care is supporting self-management, a guideline-recommended intervention that reduces the risk of acute attacks, and improves asthma control and quality of life. Across a broad range of contexts, remote consultations are highly accepted by both patients and professionals, and are as clinically effective and safe as face-to-face reviews to provide self-management support. Specific groups advantaged by remote consulting included those living in rural communities, or who had to fit their healthcare around work or domestic responsibilities, and those with reduced mobility. The findings of this rapid realist review can inform the conduct of remote asthma reviews, and implementation of supported self-management techniques into asthma care.

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Table 1: Inclusion and exclusion criteria for the Rapid Realist Review systematic database search, following the PICOS Framework^[25]

	Inclusion	Exclusion
Population	Adults or children with a diagnosis of asthma. Healthcare professionals who regularly deliver asthma care.	Participants with other long-term health conditions (unless the study presented data for people with asthma separately). Patients under severe asthma clinics (because they have specialist needs which may be different to the majority of primary care patients).
Intervention	Remote consultations (e.g., telephone/video consultations). Includes delivery of supported self-management.	Studies that use automated telehealth interventions (e.g., mobile apps or email consultations) and do not include personalised contact with a healthcare professional in real time. Interventions targeted at people under a severe asthma clinic. No remote consultation delivery.
Comparison	Trials that compare remote asthma care consultations versus standard face-to-face (in-person) reviews. Before- and after studies, assessing the implementation of remote reviews.	Trials that do not compare remote asthma care consultations versus standard face-to-face (in- person) reviews.
Outcomes	Delivery of a standard primary care asthma review.	Studies that do not present any form of self-management support.
Study design	Quantitative, qualitative, and mixed-method studies.	Studies that do not meet the study design inclusion criteria.

Table 2: Findings: Six Key Themes

Findings: Key Themes	Context - Mechanism - Outcomes (C-M-O) Configurations		
	Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;	Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)
1) Increased regular patient attendance and increased monitoring of patient	People with asthma scheduled for a routine review...	...who were provided with a review via telehealth technology (telephone/video consultation)...	...were more likely to attend their routine asthma review, and attend subsequent routine remote reviews ^[14,17,27,29-34,36,39] .
	Healthcare professionals (HCPs) conducting routine asthma reviews...	...via telephone/video consultation, with patients regularly attending routine remote reviews...	...have more opportunities to monitor a patient and provide regular support for self-management ^[27,28,30,34,38,39] .
	People with asthma whose routine review is conducted remotely...	...via video consultation...	... can have their condition and management successfully monitored, and the use of video can lead to increased patient attendance to regular routine reviews ^[27,30] .
	People with asthma, whose routine review is conducted remotely...	...via telephone consultation...	... can have their condition and management successfully monitored, and the use of the telephone can lead to increased patient attendance to regular routine reviews ^[34,39] .
2) Opportunities to provide individualised information about asthma and asthma management	People with asthma who are scheduled for a routine asthma review...	...via telephone/video call, in discussion with their health professional...	...can be provided with individualised information about their asthma, including education and principles of managing their condition ^[27, 31-33,35,37-41] .
	HCP conducting a routine asthma review...	...when review is conducted via remote technologies...	...are able to deliver individualised information about a patient's condition safely and effectively ^[27,31-33,35,37-41] .
	People with asthma whose routine review is conducted remotely...	...via video consultation with document sharing/recording functions...	...are able to understand and engage in personalised discussions and information regarding their asthma condition and management ^[27,31,33,40] .
	People with asthma whose routine review is conducted remotely...	...via telephone consultation...	...are able to understand and engage in personalised discussions and information regarding their asthma condition and management ^[35-37,39] .

3) Provision of convenient/flexible access to advice and support	For people with asthma...	...the availability of HCPs to conduct remote consultations (video/telephone consultation)...	...can provide patients with a timely and appropriate option to gain advice and support from HCPs regarding their condition ^[14,17,27,29,30,33,34,39] .
	HCPs conducting routine asthma reviews...	...when delivering review via remote consultation...	...can provide more convenient delivery of routine care for patients to access advice and support ^[12,27,29,35] .
	People with asthma...	...when a routine review is conducted via video consultation or telephone...	...may find the mode of consultation delivery more convenient and flexible to fit their everyday lives, resulting in increased and flexible access to advice and support ^[34,39] .
4) Enhanced healthcare professional-patient relationships and communication patients	People with asthma, scheduled for a routine asthma review...	...when a review is conducted with the same HCP each time...	...experience positive working relationships, which can be created and sustained, leading to positive patient outcomes ^[17,28,30,31,33,34,37,40] .
	When a HCP is conducting a routine remote asthma review...	...and there is an existing relationship between patient and professional...	...the professional is able to engage the patient in shared decision making and self-management strategies ^[28,30,31,34,37,40] .
	When an asthma patient's review is conducted remotely...	...and via video consultation...	...collaborative discussions and self-management strategies can be effectively communicated and discussed ^[30,40] .
5) Appropriate provision of specific practical asthma self-management strategies (action plans and inhaler technique)	People with asthma who are scheduled for a routine asthma review...	...that is conducted via telephone/video call, and includes a discussion/provision of a personalised asthma action plan...	...can experience increased understanding, enabling them to stay in control of their asthma, recognise symptoms of deterioration and what actions to take ^[27,28,31,34,37,38,40] .
	HCPs conducting a routine asthma review...	...when the review is conducted via remote consultation...	...can effectively communicate practical self-management advice (e.g., inhaler technique and action plans) and enable collaborative discussions with patients ^[27,39] .
	People with asthma whose review is conducted via video consultation...	...when provided with information on practical self-management strategies (asthma action plans/inhaler technique)...	...is able understand and engage in discussions regarding best use of these tools ^[27,39,40] .
	People with asthma whose review is conducted via telephone consultation...	...when provided with information on practical self-management strategies...	...is able to understand and engage in discussions regarding best practice of using these tools and then

Health Expectations: Main Text File

			HCP or patient is able to convert the information in written format ^[31,37] .
6) Increased patient confidence & self-efficacy	People with asthma who are scheduled for a routine asthma review...	...conducted via telephone or video consultation...	...can gain confidence to manage their own condition ^[12,27,31,33,35,36,38,39,41] .
<i>HCP = Healthcare Professional</i>			

Table 3: Synthesis of findings corresponding to key aims.

	Remote (video/telephone) versus face-to-face (in person) asthma consultations
Acceptability	(On average) higher levels of acceptability from both patients and professionals for remote delivery of asthma care.
Safety	Remote consultations were recognised as safe as providing a face-to-face review.
Clinical Effectiveness	Remote consultations were recognised as clinically effective as providing a face-to-face review.

Figure 1: The Rapid Realist Review Approach (Adapted from Saul et al.^[19])

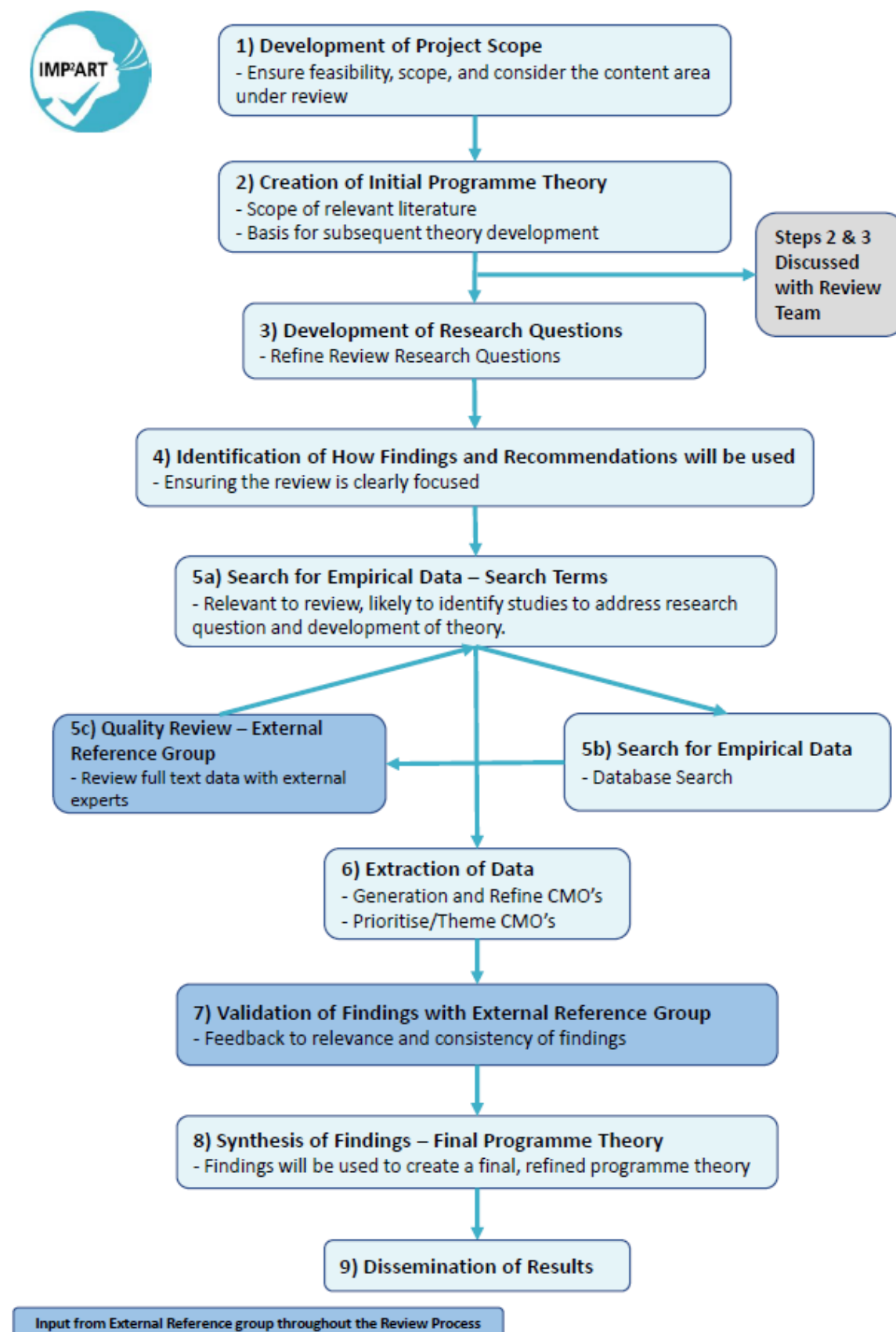
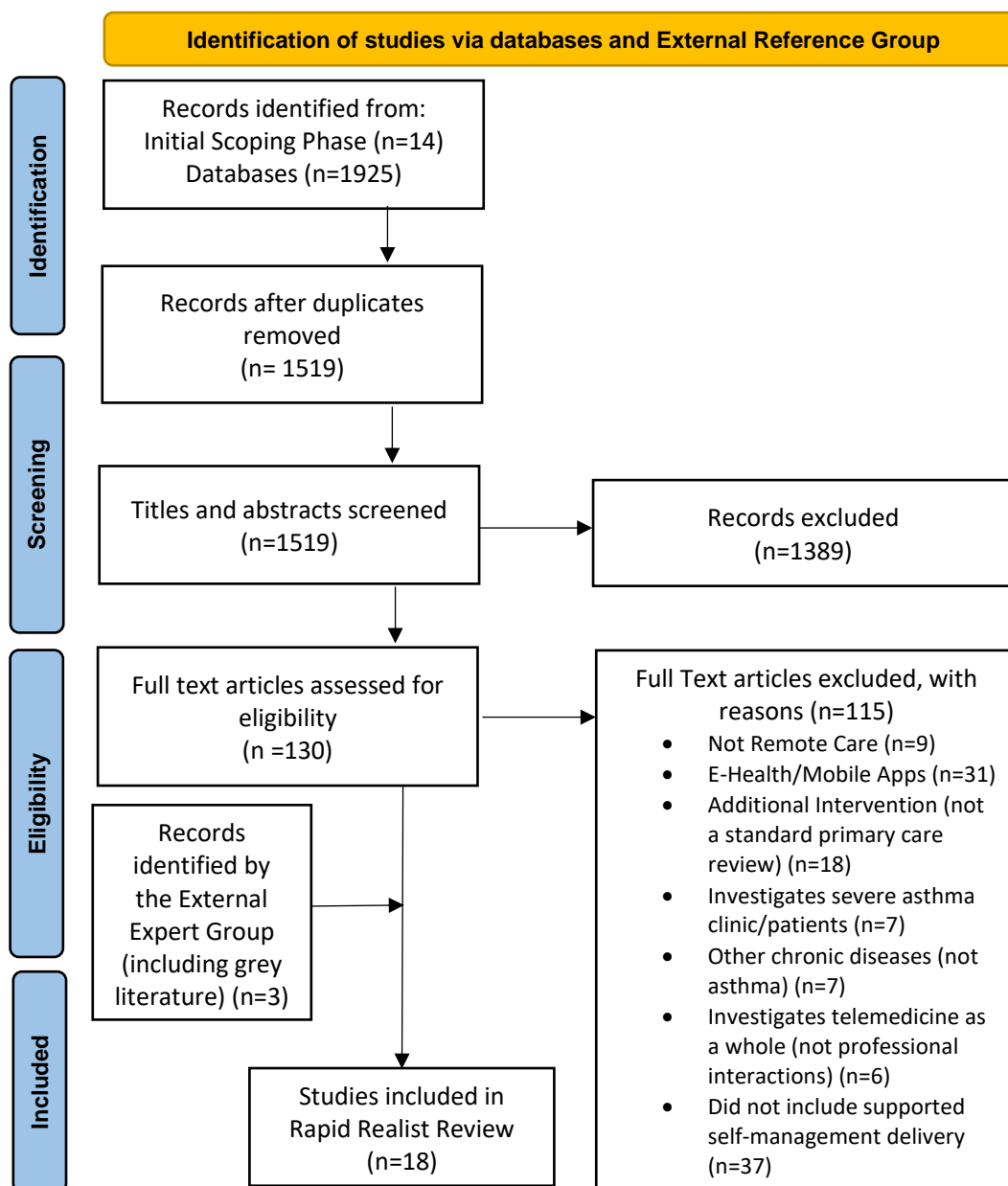


Figure 2: Search strategy and results^[42]



Supplementary File 1: Data Search Strategy Including Search Terms and Databases

1) Database: Ovid MEDLINE(R) 1946 to September Week 4 2020		
#	Searches	Results
1	Asthma, Aspirin-Induced/ or Asthma, Occupational/ or Asthma/ or Asthma, Exercise-Induced/ or Asthma-Chronic Obstructive Pulmonary Disease Overlap Syndrome/ or asthma.mp.	161522
2	telecommunications/ or telemedicine/ or remote consultation/ or telephone/ or videoconferencing/ or "health care (non mesh)"/	43517
3	1 and 2	369
2) Database: Embase 1980 to 2020 Week 40		
#	Searches	Results
1	experimental asthma/ or moderate persistent asthma/ or extrinsic asthma/ or mild intermittent asthma/ or asthma-chronic obstructive pulmonary disease overlap syndrome/ or nocturnal asthma/ or severe persistent asthma/ or thunderstorm asthma/ or intrinsic asthma/ or asthma/ or allergic asthma/ or asthma.mp. or mild persistent asthma/ or occupational asthma/ or exercise induced asthma/	281162
2	telecommunication/ or teleconference/ or teleconsultation/ or telemedicine/ or telephone interview/ or telehealth/	78477
3	1 and 2	953
3) Database: APA PsycINFO 1987 to September Week 4 2020		
#	Searches	Results
1	asthma/	4184
2	exp Professional Consultation/ or exp Videoconferencing/ or exp Telemedicine/ or exp Technology/	219084
3	1 and 2	138
4) Database: Cochrane Library , Date Run: 05/10/2020 16:17:50		
#	Searches	Results
1	(asthma):ti,ab,kw (Word variations have been searched) with Publication Year from 2000 to 2020, in Trials	22372
2	remote consultation with Publication Year from 2000 to 2020, in Trials	513
3	telemedicine with Publication Year from 2000 to 2020, in Trials	3857
4	teleconference with Publication Year from 2000 to 2020, in Trials	163

5	video conference with Publication Year from 2000 to 2020, in Trials	2417
6	remote care with Publication Year from 2000 to 2020, in Trials	2072
7	telecare with Publication Year from 2000 to 2020, in Trials	413
8	telephone with Publication Year from 2000 to 2020, in Trials	17866
9	#2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8	24847
10	#1 AND #9	506

Supplementary File 2: Summary Study Characteristics of Included Studies

Reference	Study Design	Study Location	No. of Participants / Studies	Mode of Remote Delivery	Outcomes Assessed	PRISMS Components of CMOs	Key Findings/ Outcomes (of CMO configurations)	Relevance to Safety, Clinical Effectiveness & Acceptability
Brown W, Schmitz T, Scott DM, Friesner D. Is Telehealth Right for Your Practice and Your Patients With Asthma? <i>Journal of Patient Experience</i> . 2017;4(1):46-49. doi:10.1177/2374373516685952	Cohort Pilot Study	United States of America	18 asthma Patients	Telehealth with real-time communication (telephone & video consultations)	Patient satisfaction with telemedicine experience survey	A1, A3, A4, A5, A11	Telehealth resources are an acceptable and convenient means to deliver asthma education and regular routine reviews for patients in a rural, medically underserved community. Through use of graphics and pictures during the video consultation, patients facilitated greater discussion and perceived retention of information about common asthma triggers. Written asthma action plans provided via telehealth can help increase patient self-efficacy to use their action plans. This study acknowledged patients were able to recognise their early warning symptoms and review details of their action plans, resulting in taking relief medication. Professionals are able to review documents provided by patients e.g., asthma symptom diary, and are able to provide feedback to the patient via remote technologies. Video consultations facilitated demonstration of inhaler technique when the camera was positioned from the waist up.	Acceptability & Clinical Effectiveness
Chongmelaxme B, Lee S, Dhippayom T, Saokaew S, Chaiyakunapruk N, Dilokthornsakul P. The Effects of Telemedicine on Asthma Control	Systematic Review and Meta-Analysis	United States of America, United	22 studies	Tele-consultations & tele-case management	Asthma Control and Asthma	A3, A5	Improvements in patient quality of life were found when tele-case management was used, in comparison to all other tele-medicine approaches.	Clinical Effectiveness

Reference	Study Design	Study Location	No. of Participants / Studies	Mode of Remote Delivery	Outcomes Assessed	PRISMS Components of CMOs	Key Findings/ Outcomes (of CMO configurations)	Relevance to Safety, Clinical Effectiveness & Acceptability
and Patients' Quality of Life in Adults: A Systematic Review and Meta-analysis. <i>The Journal of Allergy and Clinical Immunology: In Practice</i> . 2019;7(1):199-216.e11. doi:10.1016/j.jaip.2018.07.015		Kingdom, Asia, Europe			Patient's Quality of life		The tele-case management study included: collaborative patient's self-management, monitoring patient's health status, interactive communication and provision of an action plan.	
Donaghy E, Atherton H, Hammersley V, et al. Acceptability, benefits, and challenges of video consulting: a qualitative study in primary care. <i>British Journal of General Practice</i> . 2019;69(686):e586-e594. doi:10.3399/bjgp19x704141	Qualitative Study (semi-structured interviews with patients and clinicians)	United Kingdom	21 asthma patients and 13 clinicians	Video consultations	Patients and clinicians' experiences of video consultations	A4, A8, A9	Opportunities for remote reviews resulted in increased patient attendance to their regular review (easier access to advice and support). Continued, existing doctor-patient relationships facilitated greater communication and shared decision making between patient and healthcare professionals for self-management decisions.	Acceptability & Clinical Effectiveness
Godden DJ, King G. Rational development of telehealth to support primary care respiratory medicine: patient distribution and organisational factors. <i>Primary Care Respiratory Journal</i> . 2011;20(4):415-420. doi:10.4104/pcrj.2011.00063	Qualitative Study (semi-structured interviews with clinicians)	United Kingdom	20 clinicians	Telehealth	Clinician perspectives of telehealth	A8, A4	Interacting with patients via different technologies, which they are comfortable with, can work more conveniently for patients, and they are therefore more likely to attend their routine review. Telemonitoring and conducting routine reviews (via telephone or video), can result in people with asthma being more proactive with their self-management, as they are able to contact a healthcare professional for a more convenient and timely review (identification of early exacerbations).	Acceptability & Safety

Reference	Study Design	Study Location	No. of Participants / Studies	Mode of Remote Delivery	Outcomes Assessed	PRISMS Components of CMOs	Key Findings/ Outcomes (of CMO configurations)	Relevance to Safety, Clinical Effectiveness & Acceptability
Goodridge D, Marciniuk D. Rural and remote care. <i>Chronic Respiratory Disease</i> . 2016;13(2):192-203. doi:10.1177/1479972316633414	Literature Review	Canada	Not applicable	Telehealth	Explores implementation of telehealth in rural and remote settings	A5, A6, A7	Remote technologies can promote patient-centred care by facilitating communication between patients and supporting self-management with provider feedback. The American Medical Association supports prescribing medicine over remote consultations, provided that the patient and healthcare professional have an existing relationship.	Acceptability, Clinical Effectiveness & Safety
Greenhalgh T, Shaw S, Wherton J, et al. Real-World Implementation of Video Outpatient Consultations at Macro, Meso, and Micro Levels: Mixed-Method Study. <i>Journal of Medical Internet Research</i> . 2018;20(4):e150. doi:10.2196/jmir.9897	Mixed Methods Study	United Kingdom	24 clinician interviews, 30 videotaped remote consultations and 17 audiotaped face-to-face consultations	Video consultations	Good practice and implementation of video consultations	A4, A8	Patients showed greater engagement, improved self-management, overall control, and a significant reduction in 'did not attend' rates when attending remote consultations. Remote consultations allows prompt clinical input, and improved patient confidence in self-management.	Acceptability & Clinical Effectiveness
Gruffydd-Jones K, Hollinghurst S, Ward S, Taylor G. Targeted routine asthma care in general practice using telephone triage. <i>British Journal of General Practice</i> . 2005;55(521):918-23.	RCT	United Kingdom	194 asthma patients	Telephone consultations	Asthma Control, NHS costs, Quality of life, Exacerbations	A1, A3, A4	Remote consultations significantly improve access to routine care. Patients are more likely to receive their annual review if conducted via telephone. Increased patient understanding of individual condition, shared decision making between patient and professional, and provision of action plan.	Acceptability & Clinical Effectiveness

Reference	Study Design	Study Location	No. of Participants / Studies	Mode of Remote Delivery	Outcomes Assessed	PRISMS Components of CMOs	Key Findings/ Outcomes (of CMO configurations)	Relevance to Safety, Clinical Effectiveness & Acceptability
Hanlon P, Daines L, Campbell C, McKinstry B, Weller D, Pinnock H. Telehealth Interventions to Support Self-Management of Long-Term Conditions: A Systematic Metareview of Diabetes, Heart Failure, Asthma, Chronic Obstructive Pulmonary Disease, and Cancer. <i>Journal of Medical Internet Research</i> . 2017;19(5). doi:10.2196/jmir.6688	Meta-Review	United States of America, Europe, Asia, Oceania	53 systematic reviews (232 RCTs)	Telehealth	Effective self-management support	A1, A3, A5	There are little or no significant differences in the provision of supported self-management components (PRISMS) between remote and face-to-face care for asthma (different for other long-term conditions). Remote care is a safe alternative mode of delivery of self-management support (meta-analysis results).	Clinical Effectiveness
Ignatowicz A, Atherton H, Bernstein CJ, et al. Internet videoconferencing for patient-clinician consultations in long-term conditions: A review of reviews and applications in line with guidelines and recommendations. <i>Digital Health</i> . 2019;5. doi:10.1177/2055207619845831	Review of Reviews	Not stated	35 review articles (systematic, meta-review and literature reviews)	Video conferencing (only asthma outcomes were assessed)	Summarises existing reviews use of internet video conferencing and patients with long-term conditions (patient satisfaction/ patient outcomes)	A1, A4, A8, A9	Implementation of videoconferences for routine asthma reviews can reduce barriers to treatment and increase convenience for patients. Improved relationship between patient and professional, which lead to more frequent contact with the specific clinician who is known to the patient and likely to know particular young patient's personal circumstances and what is important to them. Provision of patient education during routine video consultations can increase patient satisfaction and improve health outcomes.	Acceptability & Clinical Effectiveness
Kew KM, Cates CJ. Home telemonitoring and remote feedback between clinic visits for asthma. <i>Cochrane Database of Systematic Reviews</i> . Published online August 3, 2016.	Systematic Review	United Kingdom, United States of America, Netherlan	6 studies including 2100 participants	Remote consultations using technology (telephone,	Safety and efficacy of remote vs face-to-face asthma consultations	A3, A4, A5, A6	Remote asthma consultations provides an unobtrusive and efficient way of maintaining contact with patients. Remote check-ups may not disrupt a person's life in the way a regular clinic visit might and may serve to enhance	Acceptability & Clinical Effectiveness

Reference	Study Design	Study Location	No. of Participants / Studies	Mode of Remote Delivery	Outcomes Assessed	PRISMS Components of CMOs	Key Findings/ Outcomes (of CMO configurations)	Relevance to Safety, Clinical Effectiveness & Acceptability
doi:10.1002/14651858.cd011714.pub2		ds, Denmark		video consultations).			self-management behaviours such as keeping a personalised action plan up to date and adherence to medications.	
Pinnock H. It's good to talk... ... but do I really need to see you? The potential of telephone consultations for providing routine asthma care. Primary Care Respiratory Journal. 2003;12(3):79-80. doi:10.1038/pcrj.2003.50	Editorial Response	United Kingdom	Not applicable	Telephone consultations vs face-to-face	The potential of telephone consultations for providing routine asthma care	A1, A2, A4, A8, A14	Telephone reviews help overcome the barrier of access to care which may otherwise take up a lot of patient's time to access a clinic. Patients can be provided with information regarding their asthma and management of their asthma, are able to be signposted to supporting literature/websites for available resources and can be provided with advice and support around health and lifestyle e.g., stopping smoking, via telephone consultation.	Acceptability, Clinical Effectiveness & Safety
Pinnock H, Adlem L, Gaskin S, Harris J, Snellgrove C, Sheikh A. Accessibility, clinical effectiveness, and practice costs of providing a telephone option for routine asthma reviews: phase IV controlled implementation study. British Journal of General Practice. 2007;57(542):714-22.	Before-and after implementation study	United Kingdom	1809 asthma patients in 1 UK practice	Telephone consultations vs face-to-face	Uptake of telephone reviews (impact on review rates), asthma morbidity and cost to practice	A1, A4	Patients provided with a routine telephone review offer a stable 'maintenance' phase of monitoring, during which self-management assumes precedence. In turn, can increase patient's confidence in managing their own condition.	Clinical Effectiveness
Raju JD, Soni A, Aziz N, Tiemstra JD, Hasnain M. A patient-centered telephone intervention using the asthma action plan.	Prospective cohort study	United Kingdom	48 adult patients with asthma	Telephone consultations vs face-to-face	Demonstrate the utility of action plan implementation by phone	A1, A3, A4	Asthma control can not only be assessed via telephone, but also significantly improved when the action plan is discussed with the healthcare professional during routine reviews.	Acceptability & Clinical Effectiveness

Reference	Study Design	Study Location	No. of Participants / Studies	Mode of Remote Delivery	Outcomes Assessed	PRISMS Components of CMOs	Key Findings/ Outcomes (of CMO configurations)	Relevance to Safety, Clinical Effectiveness & Acceptability
Family medicine. 2012;44(5):348-50.					to improve asthma control		Asthma control can not only be assessed via telephone, but also significantly improved when the action plan is discussed with the healthcare professional during routine reviews.	
Van Gaalen JL, Hashimoto S, Sont JK. Telemanagement in asthma. Current Opinion in Allergy & Clinical Immunology. 2012;12(3):235-240. doi:10.1097/aci.0b013e328353370	Review	United Kingdom	Not applicable	Tele-management for asthma	Developments in tele-management for the management of people with asthma	A1, A3, A5, A8	Use of telemedicine provides patients with the tools to self-manage and gain control over their condition (self-monitoring, patient is able to detect and respond to symptom worsening and can easily contact a professional). Use of telemedicine enables proactive individual patient care through the provision of a personalised asthma action plan.	Clinical Effectiveness
Vitacca M, Comini L, Scalvini S. Is teleassistance for respiratory care valuable? Considering the case for a “virtual hospital.” Expert Review of Respiratory Medicine. 2010;4(6):695-697. doi:10.1586/ers.10.75	Editorial Response/ Expert Review	Italy	Not applicable	Teleassistance for respiratory care	Teleassistance in providing respiratory care	A1, A4, A5, A6, A11	Results in quick transmission of information and clinical data in real-time, thus leading to greater continuity of care. Can provide active education and support. Use of monitoring via telemedicine can result in earlier detections of symptoms exacerbations. As these measures may be missed by a patient who would not visit a practice for a face-to-face review.	Clinical Effectiveness
Hamour O, Smyth E, Pinnock H. Completing asthma action plans by screen-sharing in video-consultations: practical insights from a feasibility assessment. npj Primary Care Respiratory Medicine. 2020;30(1). doi:10.1038/s41533-020-00206-8	Feasibility Assessment	United Kingdom, Canada, Switzerland	10 participants	Video consultations	Practicality, feasibility and utility of using screen-sharing technologies to complete asthma action	A1, A3, A9	Patients felt editing the document with the clinician collaboratively improved communication and avoided misunderstandings. It also enhanced shared decision making between the individual and professional.	Acceptability, Clinical Effectiveness & Safety

Reference	Study Design	Study Location	No. of Participants / Studies	Mode of Remote Delivery	Outcomes Assessed	PRISMS Components of CMOs	Key Findings/ Outcomes (of CMO configurations)	Relevance to Safety, Clinical Effectiveness & Acceptability
(Identified by External Reference Group)					plans remotely		Patients can revisit their review, and help consolidate the information delivered during to better understand their asthma and how to manage their condition. Online screen-sharing is a practical approach to joint completion of asthma action plans.	
Paré G, Moqadem K, Pineau G, St-Hilaire C. Clinical Effects of Home Telemonitoring in the Context of Diabetes, Asthma, Heart Failure and Hypertension: A Systematic Review. <i>Journal of Medical Internet Research</i> . 2010;12(2):e21. doi:10.2196/jmir.135 (Identified by External Reference Group)	Systematic Review	United States of America, Europe, Asia	62 studies	Telemonitoring/teleconsultation	Clinical effects associated with home telemonitoring programmes in the context of chronic diseases	A5, A9	During remote consultations, patients are able to actively participate in their own care and as such, consultations may result in fewer asthma related symptoms, and improved overall asthma control.	Acceptability & Clinical Effectiveness
Thiyagarajan A, Grant C, Griffiths F, Atherton H. Exploring patients' and clinicians' experiences of video consultations in primary care: a systematic scoping review. <i>BJGP Open</i> . Published online March 17, 2020:bjgpopen20X101020. doi:10.3399/bjgpopen20x101020 (Identified by External Reference Group)	Systematic Scoping Review	United Kingdom, United States of America	7 studies	Video consultations	Patients and professionals' experiences of video consultations in primary care	A8	Remote consultation (specifically video consultations) can lead to improved access to support. Video consultations may be more convenient for patients, but is not considered superior to a face-to-face consultation.	Acceptability

*Only data relevant to the current review extracted.

Abbreviations: CMOs = Context-Mechanism-Outcome Configuration; PRISMS = Practical Reviews In Self-Management Support; RCT = Randomised controlled trial.

PRISMS^[26] Components Explained:

A1. Information about condition and /or its management

A2. Information about available resources

Reference	Study Design	Study Location	No. of Participants / Studies	Mode of Remote Delivery	Outcomes Assessed	PRISMS Components of CMOs	Key Findings/ Outcomes (of CMO configurations)	Relevance to Safety, Clinical Effectiveness & Acceptability
<p>A3. Provision of/agreement on specific clinical action plans and/or rescue medication A4. Regular clinical review A5. Monitoring of condition with feedback A6. Practical support with adherence (medication or behavioural) A7. Provision of equipment A8. Provision of easy access to advice or support when needed A9. Training/rehearsal to communicate with healthcare professionals A10. Training/ rehearsal for everyday activities A11. Training/ rehearsal for practical self-management activities A12. Training/ rehearsal for psychological strategies A13. Social support A14. Lifestyle advice and support (Full definitions can be found within Table 5).</p>								

Supplementary File 3: Full C-M-O configurations from identified articles

No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness/ or Acceptability?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;	Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)			Resource
1	Brown, W., T. Schmitz, D. M. Scott and D. Friesner (2017). "Is Telehealth Right for Your Practice and Your Patients With Asthma?" Journal of patient experience 4(1): 46-49.	Participants with asthma in a rural, medically underserved community	Introduction of telehealth technology (audio/video links) as a resource to conduct regular asthma reviews	Positive - Participants found the telehealth technology convenient	Telehealth resources are an acceptable and convenient means to deliver asthma education and regular routine reviews for patients in a rural, medically underserved community.	Acceptability	A1. Information about Condition and/or its management (asthma education) A4. Regular Clinical Review
		Participants with asthma in a rural, medically underserved community	Provision of written asthma action plan via telehealth technology (audio/video link)	Empowered self-efficacy of patients has a direct impact on health behaviour change	Written asthma action plans provided via telehealth can help increase patient self-efficacy to use their action plans. This study acknowledged patients were able to recognise their early warning symptoms and review details of their action plans, resulting in taking relief medication.	Clinical Effectiveness	A3. Provision of/agreement on specific clinical action plans and/or rescue medication
		Participants with asthma in a rural, medically underserved community	Telehealth technology (video consultation) to review inhaler technique. (Camera should be positioned from waist up to recognise non-verbal cues)	Positive – increases patients’ comfort and understanding	Patients and professionals were clearly able to see demonstration of inhaler technique when camera is positioned from waist up.	Clinical Effectiveness	A11. Training/ Rehearsal for practical self-management (inhaler technique)

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		Participants with asthma in a rural, medically underserved community	Telehealth technology (video consultation) to review documents provided by patients (Additional advantages of the system such as 'document camera' or 'picture-in-picture' functions)	Positive – increased collaboration and understanding between patient and professional	Professional is able to review documents provided by patients e.g., asthma symptom diary, and able to provide feedback to the patient.	Clinical Effectiveness	A5. Monitoring of Condition with Feedback
		Participants with asthma in a rural, medically underserved community	Telehealth technology (video consultation), use of graphics and pictures through video conferences to enhance instruction and understanding about asthma triggers	Positive – Patient finds the consultation more 'visually appealing' and engaging	Through use of graphics and pictures during the video consultation, patients facilitated greater discussion and perceived retention of information about common triggers.	Clinical Effectiveness	A1. Information about Condition and/or its management (asthma education)

No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness/ or Acceptability?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;				Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)
			Resource	Reaction/Response			
2	Chongmelaxme, B., S. Lee, T. Dhippayom, S. Saokaew, N. Chaiyakunapruk and P. Dilokthornsakul (2019). "The Effects of Telemedicine on Asthma Control and Patients' Quality of Life in Adults: A Systematic Review and Meta-analysis." The Journal of Allergy & Clinical Immunology in Practice 7(1): 199-216.e111.	Adults with asthma receiving a routine review	Use of 'tele-case management' approaches (healthcare professional interactions with patients) to conduct routine asthma review	Positive	This paper highlighted a significant improvement in patient quality of life when tele-case management was used, in comparison to all other tele-medicine approaches. The tele-case management study included: 'collaborative patient's self-management, monitoring patient's health status, interactive communication and provision of an action plan'. (pg. 209)	Clinical Effectiveness	A5. Monitoring of condition with feedback A3. Provision of/ agreement on specific clinical action plans and or/ rescue medication
		Adults receiving telemedicine review for asthma	Telemedicine review for asthma control (combined telemedicine)	Improved asthma control, Improved quality of life	Results of this study also suggest that the duration of intervention might affect the treatment effects of telemedicine. We found that the studies with telemedicine delivered for at least 6 months had higher proportions of patients with significant improvements in asthma control and patients' quality of life compared with the studies with less than 6 months (p16)	Clinical Effectiveness	A1. Information about condition and /or its management A3. Provision of/agreement on specific clinical action plans and/or rescue medication A5. Monitoring of condition with feedback

		Adults receiving telemedicine review for asthma	Telemedicine review for asthma control (single)	No improvement in control Improved quality of life	Tele-case management was the only effective single telemedicine for the improvement of patients' quality of life. We believe that this is because most tele-case management incorporated several medical supportive managements, including a collaborative patients' self-management, monitoring patients' health status, interactive communication, and an action plan provision. (p11)	Clinical Effectiveness/ Acceptability	A1. Information about condition and /or its management A3. Provision of/agreement on specific clinical action plans and/or rescue medication A5. Monitoring of condition with feedback
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No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness/ or Acceptability?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;	Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)			
			Resource	Reaction/Response			
3	Donaghy, E., H. Atherton, V. Hammersley, H. McNeilly, A. Bikker, L. Robbins, J. Campbell and B. McKinstry (2019). "Acceptability, benefits, and challenges of video consulting: a qualitative study in primary care." British Journal of General Practice 69(686): e586-e594.	For patients with a long-term condition, whose lives are structured around work, study or childcare	The opportunity to have a routine review conducted via remote consultation	Positive patient convenience, time and cost savings	Increased attendance for patients to their regular review (easier access to advice and support).	Acceptability	A8. Provision of easy access to advice and support when needed/ A4 Regular clinical Review
		Patients with a long-term condition	Routine review for condition conducted via remote consultation with a professional they have an existing relationship with (or have had previous consultations with)	Positive, patient feels more comfortable, rapport is already existing	Improved doctor-patient relationships results in better communication and shared decision making between patient and healthcare professional for self-management decisions.	Acceptability / Clinical Effectiveness	A9. Training /rehearsal to communicate with healthcare professionals

No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness/ or Acceptability?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;	Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)			
			Resource	Reaction/Response			
4	Godden, D. J. and G. King (2011). "Rational development of telehealth to support primary care respiratory medicine: patient distribution and organisational factors." Primary Care Respiratory Journal. 22.	Person with asthma measuring their peak flow and notice a difference in reading	Availability of HCP via video or telephone consultation to review symptoms	Seeking help from a professional	Telemonitoring and conducting routine reviews (via telephone or video), can result in people with asthma being more proactive with their self-management as they are able to contact a health professional for a more convenient and timely review (Identification of early exacerbations).	Safety	A8. Provision of easy access to advice or support when needed
		A young person with asthma, who regularly uses technology	Routine asthma review conducted via remote consultation	Positive, comfortable with using the technology	Interacting with patients via different technologies which they are comfortable with, can work more conveniently for patients, and are therefore more likely to attend their routine review.	Acceptability	A4. Regular Clinical Review
		Telehealth for adults	Telehealth appointment	Expediate appointments	The potential for telemonitoring to identify early exacerbations of disease was also noted	Safety/ Clinical Effectiveness	A5. Monitoring of condition with feedback A1. Information about condition and /or its management
		Telehealth for adults	Telehealth appointment	Professional response: Concern about quality of interaction vs face to face	For videoconferencing and remote monitoring there were uncertainties about effectiveness and the quality of interactions compared to face-to-face meetings or consultations that affected confidence, particularly with life threatening illness.	Safety/ Clinical Effectiveness	

No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness/ or Acceptability?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;	Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)			
			Resource	Reaction/Response			
5	Goodridge, D. and D. Marciniuk (2016). "Rural and remote care." Chronic Respiratory Disease 13(2): 192-203.	GP practices in rural and remote communities	Providing telehealth care (remote monitoring and remote consultations) for asthma patients	Positive patient outcomes (relationship with professional and increased supported self-management)	Can promote patient-centred care by facilitating communication between patients and supporting self-management with provider feedback.	Clinical Effectiveness/ Acceptability	A5. Monitoring condition with feedback
		Use of Remote Consultations for a routine asthma review	Prescribing medication using telemedicine technologies, (when a relationship is already established between patient and provider)	Increase in prescribing	The American Medical Association supports prescribing medicine over remote consultations, provided that the patient and health professional already have an existing relationship.	Safety	A6. Practical Support with adherence (medication or behavioural) A7. Provision of equipment

No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness/ or Acceptability?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;				Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)
			Resource	Reaction/Response			
6	Greenhalgh, T., S. Shaw, J. Wherton, S. Vijayaraghavan, J. Morris, S. Bhattacharya, P. Hanson, D. Campbell-Richards, S. Ramoutar and A. Collard (2018). "Real-world implementation of video outpatient consultations at macro, meso, and micro levels: mixed-method study." Journal of medical Internet research 20(4): e150.	Patients with a long-term condition, and a history of defaulting from appointments	Offered their routine review via video conference	Improved patient engagement and attendance rates	Patients showed greater engagement, improved self-management, overall control and a significant reduction in 'did not attend' rates.	Clinical Effectiveness	A4. Regular clinical review
		Vulnerable or 'hard to reach' patients with a long-term condition	Availability of video consultations to request a virtual encounter with a health professional	Improved patient confidence	Allows prompt clinical input, and improved patient confidence in self-management,	Acceptability / Clinical Effectiveness	A8. Provision of easy access to advice or support when needed

No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness/ or Acceptability?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;	Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)			
			Resource	Reaction/Response			
7	Gruffydd-Jones, K. and S. Ward (2005). "Targeted routine asthma care in general practice using the telephone triage." European respiratory journal 26(Suppl 49): Abstract No. 4264.	People with asthma attending their routine review (within a semi-rural GP Practice)	Availability of telephone consultations to conduct routine review in comparison to face-to-face reviews	Increased patient engagement	Significantly improving access to routine care. Patients are more likely to receive their annual review if conducted via telephone. (35% increase in telephone vs clinic group).	Acceptability	A4. Regular Clinical Review
		People with asthma whose routine review is conducted via telephone	Nurse and patient formalise the individualised asthma action plan and advice on what to do if asthma control deteriorated. Written version of the plan is then sent to patient	Increased patient engagement, understanding of their condition and how to recognise deterioration	Increased patient understanding of individual condition, shared decision making between patient and professional and provision of action plan.	Clinical Effectiveness	A3. Provision of/agreement on specific clinical plans and/or rescue medication A1. Information about condition and /or its management

No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness/ or Acceptability?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;				Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)
			Resource	Reaction/Response			
8	Hanlon, P., L. Daines, C. Campbell, B. McKinstry, D. Weller and H. Pinnock (2017). "Telehealth Interventions to Support Self-Management of Long-Term Conditions: A Systematic Metareview of Diabetes, Heart Failure, Asthma, Chronic Obstructive Pulmonary Disease, and Cancer." Journal of medical Internet research 19(5): e172.	Patient with asthma	Provided with a telehealth review (telephone or video consultation) for their routine asthma review (including education support, telemonitoring, provision of action plan)	Positive/Neutral – No differences in patient outcomes between telehealth and face-to-face care for self-management delivery	There are little or no significant differences in the provision of supported self-management components (PRISMS) between remote and face-to-face care for asthma (different for other long-term conditions). Remote care is a safe alternative mode of delivery of self-management support (meta-analysis results).	Clinical Effectiveness	A1. Information about condition and/ or its management A3. Provision of/ agreement on specific clinical action plans and or/rescue medication A5. Monitoring of condition with feedback

No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness/ or Acceptability?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;				Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)
			Resource	Reaction/Response			
9	Ignatowicz, A., H. Atherton, C. J. Bernstein, C. Bryce, R. Court, J. Sturt and F. Griffiths (2019). "Internet videoconferencing for patient–clinician consultations in long-term conditions: A review of reviews and applications in line with guidelines and recommendations." Digital health 5: 2055207619845831.	A patient with asthma scheduled routine review	Review is conducted via videoconference	Meets patient needs and preferences	Implementation of videoconferences as a means for routine asthma reviews can reduce barriers to treatment and increase convenience for patients.	Acceptability	A4. Regular Clinical Review A8. Provision of easy access to advice or support when needed
		A patient with asthma scheduled routine review	Review is conducted via videoconference and provision of patient education during review	Increased patient individualised understanding and knowledge of condition	Provision of patient education during routine video consultations can increase patient satisfaction and improve health outcomes.	Clinical Effectiveness	A1. Information about condition and/ or its management
		A young person with a long-term condition, scheduled for a routine review	Review is conducted via videoconference with the same clinician each time	More personalised care tailored to the young person’s preference and building of relationship with professional	Improved relationship between patient and professional, which lead to more frequent contact with the specific clinician who is known to the patient and likely to know particular young patient’s personal circumstances and what is important to them.	Acceptability / Clinical Effectiveness	A4. Regular Clinical Review A8. Provision of easy access to advice or support when needed A9. Training/ Rehearsal to communicate with healthcare professionals

No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness/ or Acceptability?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;	Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)			
			Resource	Reaction/Response			
10	Kew, K. M. and C. J. Cates (2016). "Remote versus face-to-face check-ups for asthma." Cochrane Database of Systematic Reviews(4).	Patients with asthma, attending a regular routine review	Routine review conducted via remote consultation (telephone or video review, including personalised contact with a health professional)	Increased convenience and engagement of patients in attendance and self-management strategies	Provides an unobtrusive and efficient way of maintaining contact with patients. Remote check-ups may not disrupt a person’s life in the way a regular clinic visit might and may serve to enhance self-management behaviours such as keeping a personalised action plan up to date and adherence to medications.	Acceptability / Clinical Effectiveness	A5. Monitoring of Condition with Regular Feedback A3. Provision of/ Agreement on specific clinical action plans and/ or rescue medication A4. Regular clinical review A6. Practical Support with adherence (medication or behavioural)

No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness/ or Acceptability?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;				Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)
			Resource	Reaction/Response			
11	Pinnock, H. (2003). "It's good to talk... but do I really need to see you? The potential of telephone consultations for providing routine asthma care." Primary care respiratory journal 12(3): 79-80.	A patient with asthma scheduled for a routine asthma review	Provided with a telephone review instead of face-to-face review	Patients are impressed by the convenience of telephone reviews	Telephone reviews help overcome the barrier of access to care.	Acceptability/ Clinical Effectiveness	A4. Regular Clinical Review A8. Provision of easy access to advice or support when needed
		A patient with asthma scheduled for a routine asthma review	Provided with a telephone review instead of face-to-face review and discussed individual medication and self-management with health professional	Patient is provided with knowledge and information of how to manage their individual condition	Patient can be provided with information regarding their asthma and management of their asthma (A1), are able to be signposted to supporting literature/websites for available resources (A2) and can be provided with advice and support around health and lifestyle (A14) e.g., stopping smoking, via telephone consultation.	Safety/ Clinical Effectiveness	A1. Information about condition and/ or its management A2. Information about available resources A14. Lifestyle advise and support

No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness/ or Acceptability?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;				Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)
			Resource	Reaction/Response			
12	Pinnock, H., L. Adlem, S. Gaskin, J. Harris, C. Snellgrove and A. Sheikh (2007). "Accessibility, clinical effectiveness, and practice costs of providing a telephone option for routine asthma reviews: phase IV controlled implementation study." British journal of general practice 57(542): 714-722.	A patient with asthma scheduled for a routine asthma review	Provided with a telephone review instead of a face-to-face review	Increased confidence and enablement in individual asthma care	Patients provided with a routine telephone review offer a stable 'maintenance' phase of monitoring, during which self-management assumes precedence. In turn, can increase patient's confidence in managing their own condition.	Clinical Effectiveness	A1. Information about condition and/ or its management A4. Regular clinical review
		Adults with asthma for routine review (Asthma care was provided by five asthma-trained nurses across the two practice sites. Asthma clinics offered a range of appointment times throughout the week, and these were supplemented with opportunistic arrangements to suit patient availability)	Telemedicine appointment with nurse	Increase in update of appointment/ Increased confidence and self-management	Cost-effective method.	Clinical Effectiveness/ Acceptability	A4. Regular clinical review

No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness s/ or Acceptability ?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;	Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)			Resource
13	Raju, J. D., A. Soni, N. Aziz, J. D. Tiemstra and M. Hasnain (2012). "A patient-centered telephone intervention using the asthma action plan." Family medicine 44(5): 348-350.	Patients with clinically diagnosed uncontrolled asthma	Contacted by a health professional via telephone, personalised asthma action plan discussed and developed to adjust medication	Individual asthma control improved (assessed by Asthma Control Score)	Asthma control can not only be assessed via telephone, but also significantly improved when action plan is discussed with healthcare professional during routine review.	Clinical Effectiveness / Acceptability	A1. Information about conditions and / or its management A3. Provision of/ agreement on specific clinical action plans and/ or rescue medication
		Adults with asthma - university-based family medicine residency clinic. Patients were contacted by phone, and an initial Asthma Control Score (ACS) was assessed. Patients with an ACS <20 (uncontrolled asthma) had their medication adjusted and a new AAP implemented by phone. Uncontrolled patients were reassessed by phone monthly and management was adjusted until control was achieved.	Telemedicine appointments – triaged by Asthma Control Score - with uncontrolled patients getting monthly assessments	Improved asthma control (Asthma Control Score)	1, targeted telephone care management programs can be successful in reducing medical costs and hospitalizations 2. constrained by the proportion of patients who are difficult to reach by telephone because they lack functioning message systems and/or seldom answer their phone when care providers try to call them. 3. From a practical standpoint, physicians would likely not have the time to call patients for the initial assessment (someone else to do the initial triage)	Clinical Effectiveness	A3. Provision of/agreement on specific clinical action plans and/or rescue medication A1. Information about conditions and / or its management A5. Monitoring of condition with feedback

No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness/ or Acceptability?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;	Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)			
			Resource	Reaction/Response			
14	Van Gaalen, J. L., S. Hashimoto and J. K. Sont (2012). "Tele management in asthma: an innovative and effective approach." Current Opinion in Allergy & Clinical Immunology 12(3): 235-240.	People with asthma	Regular routine asthma review is conducted via telemedicine (telephone/video consultation)	Patient feels empowered and has the tools to be able to manage their condition	Use of telemedicine provides patients with the tools to self-manage and gain control over their condition (due to provision of; self-monitoring (A5), patient is able to detect and respond to symptom worsening (A1) and can easily contact a professional (A8).	Clinical Effectiveness	A1. Information about condition and/ or its management A5. Monitoring of condition with feedback A8. Provision of easy access to advice or support when needed
		People with asthma	Regular routine asthma review is conducted via telemedicine (telephone/video consultation) and provision/discussions take place about individualised asthma action plan	Patient has an individualised action plan and understands their condition and what to do if symptoms worsen or change	Use of telemedicine enables proactive individual patient care through the provision of a personalised asthma action plan.	Clinical Effectiveness	A3. Provision of/ agreement on specific clinical action plans and/or rescue medication

No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness/ or Acceptability?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;	Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)			
			Resource	Reaction/Response			
15	Vitacca, M., L. Comini and S. Scalvini (2010). "Is teleassistance for respiratory care valuable? Considering the case for a 'virtual hospital'." Expert Review of Respiratory Medicine 4(6): 695-697.	Patients with asthma	Providing the patient with a routine review using telemedicine (telephone or video consultation)	Patients are supported to manage their asthma more effectively	Results in quick transmission of information and clinical data in real-time, thus leading to greater continuity of care. Can provide active education and support.	Clinical Effectiveness	A1. Information about and/ or its management A4. Regular clinical review
		Patients with asthma	Providing the patient with a routine review using telemedicine (telephone or video consultation) and use of telemonitoring of respiratory measures (e.g., peak expiratory flow)	Patient is able to adjust their medication and detect if symptoms may be worsening	Use of monitoring via telemedicine can result in earlier detections of symptoms exacerbations. As these measures may be missed by a patient who would not visit a practice for a face-to-face review.	Clinical Effectiveness	A4. Regular Clinical Review A5. Monitoring of condition with feedback A6. Practical support with adherence (medication or behavioural) A11. Training/ rehearsal for everyday activities

No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness/ or Acceptability?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;	Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)			
			Resource	Reaction/Response			
16	(Added by External Reference Group) Hamour, O., Smyth, E., & Pinnock, H. (2020). Completing asthma action plans by screen-sharing in video-consultations: practical insights from a feasibility assessment. NPJ primary care respiratory medicine, 30(1), 1-5.	Patients with asthma, scheduled for a routine review	Review conducted via video-consultation and health professional uses the 'edit document' and screen sharing features during the video consultation to review asthma action plan	Improved understanding and relationship between patient and professional	Patients felt editing the document with the clinician collaboratively improved communication and avoided misunderstandings. It also enhanced shared decision making between individual and professional.	Clinical Effectiveness/ Acceptability/ Safety	A3. Provision of/ agreement on specific clinical action plans and/ or rescue medication A9. Training/ rehearsal to communicate with healthcare professionals
		Patients with asthma, scheduled for a routine review	Review conducted via video consultation. Consultation is recorded via videoconferencing software	Patients appreciated being able to review their consultation and what had been discussed	Patients can revisit their review and help consolidate the information delivered during to better understand their asthma and how to manage their condition.	Clinical Effectiveness/ Acceptability	A1. Information about condition and/or its management A9. Training/ rehearsal to communicate with healthcare professionals
		Patients with asthma, scheduled for a routine review,=	Review conducted via video consultation and asthma action plan discussed via screen sharing	Patients found the approach to be comparable to live situations	Online screen-sharing is a practical approach to joint completion of asthma action plans.	Clinical Effectiveness/ Acceptability	A3. Provision of/ agreement on specific clinical action plans and/ or rescue medication

No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness/ or Acceptability?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;	Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)			
			Resource	Reaction/Response			
17	(Added by External Reference Group) Pare, G., K. Moqadem, G. Pineau and C. St-Hilaire (2010). Clinical effects of home telemonitoring in the context of diabetes, asthma, heart failure and hypertension: A systematic review. [References], Journal of Medical Internet Research. Vol.12(2), 2010, pp. p190-p204.	Patients with asthma, provided with the equipment and instruction to monitor their condition via telemonitoring	Offered a remote consultation to review condition	Feelings of empowerment & improved feelings of security	Patients are able to actively participate in their own care.	Clinical effectiveness / Acceptability	A5. Monitoring of condition with feedback
		Patients with asthma, provided with the equipment and instruction to monitor their condition via telemonitoring	Used an interactive tool via remote consultation to monitor condition and gain feedback from a healthcare professional	Empowerment	Fewer asthma related symptoms, and patient’s asthma was better controlled.	Clinical Effectiveness	A5.Monitoring of condition with feedback A9. Training/ Rehearsal to communicate with healthcare professionals

No.	Reference	Context – Mechanism - Outcomes Configurations			Safety/ Clinical Effectiveness/ or Acceptability?	PRISMS Taxonomy Component?	
		Background information e.g., setting and demographics to outline possible Contextual factors;	Key workings that contributed to the design and functioning of a pathway to identify Mechanisms and resources;				Information and evidence suggestive of the successes or failures of different aspects of an intervention (Outcomes)
			Resource	Reaction/Response			
18	(Added by External Reference Group) Thiyagarajan, A., C. Grant, F. Griffiths and H. Atherton (2020). "Exploring patients' and clinicians' experiences of video consultations in primary care: a systematic scoping review." BJGP open 4(1).	Patients with asthma, (most specifically for older patients)	Routine consultation conducted via video consultation	Patient benefits: increased patient convenience, reduced travel costs	Improved access to support.	Acceptability	A8. Provision of easy access to advice or support when needed