Does virtual consultation between primary and specialised care improve healthcare quality? A scoping review of healthcare quality domains assessment

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ABSTRACT

Background Virtual consultation has been proposed as a promising tool to improve the coordination and quality of healthcare between primary and specialised care. However, despite its potential facilitators, the evidence on the usefulness of virtual consultation for improving healthcare quality domains is fragmented and unclear. This scoping review aims to assess the impact of virtual consultation on different healthcare quality domains.

Material and methods We conducted a scoping review with a rigorous search strategy on PubMed, EMBASE and Cochrane Library databases. The inclusion criteria were original articles, reviews, meta-analyses or letters to the editor, published between 1 January 2017 and 24 June 2022, and available in English, Spanish or French. For each of the articles selected, we identified the addressed healthcare quality domains, their facilitators and barriers, areas of improvement and data gaps. We have adhered to Preferred Reporting Items for Systematic Reviews and Meta-Analyses for Scoping Review reporting standards.

Results 1284 manuscripts were retrieved. Finally, 235 papers were included in this review, most of which were original, descriptive studies. The most evaluated quality domain was effectiveness (223 articles). Safety and patient-centred care were the least evaluated. Simultaneous assessment of more than one domain was observed in 117 papers, being effectiveness and timeliness the most frequent combination. Our analysis revealed that virtual consultation is in development and underused. This tool has the potential to improve access to specialised care and enhance coordination between professionals.

Conclusions Virtual consultation has the potential to provide effective, efficient, equitable and timely attention. However, its contribution to safety and patient-centered care needs further evaluation. Our review emphasises the need for more rigorous research and standardised quality assessment criteria to obtain robust evidence on the usefulness of virtual consultation for improving healthcare quality domains.

BACKGROUND

In recent decades, the development of communication technologies has helped the doctor-patient relationship and collaboration between doctors to transcend geographical limits, facilitating the provision of healthcare to dispersed and remote populations. In this sense, virtual consultation has been implemented in various countries to improve coordination between primary and specialised care. This is an asynchronous, bidirectional, online, on-demand communication tool. It is usually based on the issuing of a telematic collaboration request from primary care, which is responded to by specialised care, although other modalities include video-conferences, telephone calls and two-way exchange of information between doctors and pharmacists or dentists.

With any new health technology, it is essential to evaluate its capacity to improve patient care in order to ensure optimal use of the resources invested (in both implementation and operation). To identify strengths and areas to be improved, it is important to
analyse the repercussion of the technology on healthcare quality, that is, the degree to which care services increase the possibility of desired health outcomes for individuals and populations, in accordance with the available evidence. The United States Institute of Medicine has established six domains, or dimensions, of healthcare quality: effectiveness, efficiency, timeliness, equity, safety and patient-centred care.

Effectiveness is to provide healthcare based on the best available scientific evidence, avoiding overuse and underuse of technology and achieving the best health outcomes in patients. An example of effectiveness would be that all patients with diabetes referred to endocrinology had been asked for glycated haemoglobin.

Efficiency is defined as achieving maximum effectiveness at the lowest possible cost. For example, from health system managers’ perspective, to reduce costs of unnecessary face-to-face consultations.

Healthcare is considered timely when it is provided at the right moment, without unnecessary or damaging delays and without geographical, cultural or organisational barriers. By primary care and patients’ perspective, the communication of an allergy brought on by medication to the prescribing doctor to enable its change would be an example of timely attention. This concept is related to two organisational features of the health system that add value: longitudinality, or relationship that is established over time between professionals and patients, and continuity, referring to adequate coordination between care levels and professionals.

Equity is providing the same healthcare and the same attention for similar health problems, without social, economic, geographical, cultural or other distinctions. For example, enabling patients from remote rural areas to access the same resources as in urban areas.

Patient-centred care is to provide personalised care with transparency and respect for dignity, values, beliefs and choice in all matters related to the person and their illness, as well as organise healthcare thinking about patients rather than those who provide it. This involves integrating patients and their families into all aspects of care. Finally, safety refers to the elimination of unnecessary harm or potential harm associated with healthcare, that results from or is associated with the plans or actions of a healthcare professional during the provision of healthcare, and not that which is due to an underlying illness or injury. This is related to correcting diagnostic errors and avoiding unnecessary tests and treatments, among others.

Virtual consultation has been reported to improve effectiveness, increasing the level of control and monitoring of patients and their access to available resources, both qualified humans and physical resources, such that they feel well informed and cared for without the need for additional face-to-face visits. It has also been suggested that virtual consultation improves efficiency, avoiding costs associated with unnecessary trips and complementary tests; equity, ensuring that patients with similar health problems receive comparable attention and care, with no social, economic, geographical, cultural or other types of distinction; and timeliness, favouring accessibility to specialists when necessary.

However, there seems to be little consensus regarding the implications for patient safety and patient-centred care. In terms of patient safety, virtual consultation can prevent contagion in pandemic situations, allow the correction of erroneous initial diagnoses and the ordering of studies and treatments, although joint deliberation is difficult in complex cases that require rapid decision-making. Its use also raises questions about threats to the confidentiality of clinical information, administrative errors and respect for patient preferences and autonomy.

Determining whether virtual consultation improves the quality of care in all domains is key to evaluating this tool and, ultimately, improving patient care. The objective of this scoping review was to analyse the existing evidence on virtual consultation between primary care and specialised care in order to determine its impact on the different domains of healthcare quality, identify facilitators and barriers, and evaluate the opinion of patients and professionals regarding this communication tool.

MATERIAL AND METHODS
Search strategy
To prepare this scoping review, we conducted a search for scientific articles published in the three main databases used in Health Sciences: PubMed, EMBASE and Cochrane Library. A search strategy was developed using four keywords (telemedicine, consultations, primary care and specialised care) combined with one other using the Boolean AND operator and using OR with related terms, both MESH and free, as described in online supplemental table 1. We also perform a backwards citation search.

Inclusion and exclusion criteria
The search was narrowed by applying the following inclusion criteria: articles published between 1 January 2017 and 24 June 2022; available in full-text versions in English, Spanish or French; and classified as an original article, review, systematic review, meta-analysis or letter to the editor. Due to technological advances in telemedicine in the last years, we decided to limit the search strategy to 5 years. In previous non-exhaustive reviews of references available, the number of items was much lower. Additionally, we consider that the last 2 years of the pandemic, with a large number of articles, had to be put in comparison with a similar technological and duration development period.

Articles that did not meet any of the inclusion criteria, duplicate articles and articles unrelated to the subject of the study were excluded.

Article selection and data extraction
Before the selection process, a concordance study was conducted to evaluate the authors’ content classification. Subsequently, the articles underwent peer review,
initially for the title and abstract, and then for the entire text, to determine if they pertained to virtual consultations between primary care physicians and specialised care professionals. In case of disagreement, the third author made the final decision. Detailed information of the selected articles can be found in online supplemental table 2.

The following parameters were considered for each publication selected: first author, title, publication type and study design (original (descriptive or analytical), review (narrative, systematic or scoping review) and letters to the editor), publication year (2017–2022), country, health quality domains analysed and perspective of analysis (primary care, specialist care, patients or health system managers).

**Information analysis and synthesis**

For each of the articles selected in this review, we identified the reported healthcare quality domains, the facilitators and barriers of the use of virtual consultation for each of the six domains, as well as possible areas of improvement, data gaps and potential directions for future studies. The analysis of facilitators and barriers was a descriptive analysis because the reviewed articles did not use a common facilitators and barriers terminology. So, this analysis was a peer review consensus of the authors, to achieve agreement of criteria and judgments of evaluation. In case of disagreement, a third author decided.

**Ethical aspects**

This study did not require approval by the ethics committee, as it did not include any patients and was limited to the analysis of freely accessible published articles. No protocol for this scoping review was previously published.

**RESULTS**

The total number of articles retrieved was 1259, 1098 without duplicates, to which 25 articles identified by backwards citation search were added. Next, the 1123 articles were subjected to peer review. Following this approach, 235 articles were included (figure 1).

Most were original (201, 85.5%), with a descriptive design (75.7%) and conducted in North America (65.6%), 34.9% were published between January 2021 and 24 June 2022 and 6.8% were multicentre studies. Analysis of the number of virtual consultations, professionals or patients involved in the different studies analysed revealed that most of them were local studies with small samples.

Table 1 outlines the classification, based on design and country of origin, of the set of selected articles.

In terms of content, 81 of the 235 articles discussed the characteristics of virtual consultation as a communication tool, its facilitators, possible areas of improvement and/or implementation in different specialties, while 154 articles focused on its use in a single specialty, the most frequent of which were dermatology (48) and psychiatry (23). The COVID-19 pandemic was cited as a reason for virtual consultation in 6.8% of articles.

The origin of the research was primarily and secondary care professionals, but the perspective of analysis of the articles could be primary care, specialised care, the patients or health system managers. Regarding the articles selected in this review, the most addressed perspective of analysis was primary care, but the evaluation of virtual consultation often involves intertwined perspectives, and the most frequent combination was primary care and specialised care. The least addressed analysis perspective was the patients.

Of the health quality domains evaluated, the most frequent was effectiveness (223, 94.9%; in 99 articles effectiveness was the only domain evaluated), followed by timeliness (77, 32.8%) and efficiency (39, 16.6%).

![Figure 1](http://example.com/f1.png)  
**Figure 1** Stages of the review, formulated based on ‘The PRISMA 2020 statement: an updated guideline for reporting systematic reviews’.
as indicated in online supplemental table 2, which also shows that 128 articles (54.5%) assessed the impact of virtual consultation in more than one domain. Of these, 99 articles assessed two domains, the most frequent combinations being effectiveness+timeliness (50), effectiveness+efficiency (24) and effectiveness+equity (11); 26 articles evaluated three domains and only 3 studied four domains.

Effectiveness was the most evaluated quality domain, present in 94.9% of the articles included. Facilitators of virtual consultation highlighted in the selected articles include improving coordination between levels of care, access to specialised care and satisfaction of professionals and patients. Another noteworthy benefit was a reduction in waiting times and diagnostic delays, prioritisation of treatments, and avoidance of unnecessary face-to-face consultations, as well as increased confidence in both the health system and primary care professionals.

Other aspects highlighted among the included articles were the need for specific training and information on the necessary data, available specialties and standards and protocols that should be used to avoid failures and errors.

In terms of efficiency, which was evaluated in 16.6% of articles, virtual consultation allows for reduced costs, avoiding face-to-face consultations and unnecessary trips by patients, complementary studies that are not indicated or devoid of value, and improved use of specialised resources, reducing referrals to emergency services. However, available evidence on health outcomes and quality of life, and on the cost of implementing this health technology, remains scarce.

Of the articles included in our analysis, 32.8% reported improvements in timeliness, enabling faster access to specialised assistance through on-demand consultations. However, persisting barriers identified included a lack of specialised human and material healthcare resources, their centralisation in more populated areas, and a lack of virtual access to available resources due to poor internet connectivity in dispersed and remote populations.

Regarding healthcare equity, 13.6% of articles reported a positive influence of virtual consultation on reducing geographical, economical and functional barriers (bedridden patients or those with limited movement), particularly favouring accessibility to specialised care in rural and remote areas. Improving the telematic communication infrastructure and homogenising the distribution of resources remains an unresolved challenge, complicating emergency assistance in remote populations. Moreover, it is necessary to avoid the existence of multiple management styles and delays in face-to-face consultations after their electronic acceptance.

An improvement in patient safety was reported in 7.2% of articles, which note a reduction in unnecessary harm related to healthcare, such as infections due to avoidable face-to-face visits in the context of the COVID-19 pandemic, correction of erroneous diagnoses, avoidance of unnecessary tests and unindicated treatments, and prioritisation of treatment initiation, with consequent improvement in quality of life and life expectancy. Conversely, insufficient or doubtful data, having little time for patient assessment during virtual consultations, and the possibility of making decisions based on diagnostic errors, were identified as threats to safety.

Patient-centred care was the least valued healthcare quality domain, featuring in only 3% of the 235 articles included. Respect for the patient’s autonomy, dignity, values and preferences, improving the transparency of communication and safeguarding confidentiality were all identified as challenges to achieving healthcare focused more on the patient than on the health system itself.

Online supplemental figure 1 shows the density of papers selected by quality domains, it allows to identify the lack of manuscripts on the assessment of patients’ experiences and safety issues.

Table 2 shows the number of articles, out of the 235 selected, that analysed each healthcare quality domain, and summarises the facilitators and barriers identified, citing the number of articles that include each of them.

Regarding the opinion of patients, concerns regarding the use of virtual consultation (confidentiality, loss of direct contact with the specialist) were assessed in only 1 article, respect of their preferences in 3 articles and their satisfaction with this tool in 15 articles. Regarding healthcare professionals, their preferences were considered in 2 articles, their concerns in 6 and their satisfaction (trust and mutual knowledge between primary and specialised
This scoping review on the quality of virtual consultation assessed each of the domains of healthcare quality, and included 235 articles on virtual consultation between primary and specialised care physicians, most of which were original descriptive studies. Effectiveness was the most commonly evaluated domain (94.9% of articles), followed by timeliness and efficiency. Only 42% of the studies evaluated more than one healthcare quality domain simultaneously. The most frequent combination was effectiveness and timeliness.

Almost all articles included in this review highlighted the effectiveness of virtual consultation as a tool for communication and for reducing waiting times and improving coordination between professionals and access to specialised care. However, in many primary care centres virtual consultation is not available in all specialties, and continuous updating of knowledge is necessary to improve its usefulness and ensure positive attitudes towards its adoption.

Of the articles included, 32.8% analysed the impact of virtual consultation on improving patient access to specialised care when needed most, although not all centres have the necessary technological infrastructures or human resources.

The efficiency of virtual consultation was noted in 16.6% of articles, which reported savings in travel costs and unnecessary tests and treatments, although these articles did not quantify the budget necessary for the development and operation of this tool, or analyse its impact on the use of resources or on patient morbidity.

A positive influence on equity was described in 13.6% of articles, which noted a reduction in barriers that limit timeliness of access to specialised care, especially for patients living in areas with significant geographic dispersion or poor communication, or who have deteriorated functional health. However, the distribution of resources is not homogeneous, different management styles complicate comparison and technological challenges, such as a single shared electronic medical record, persist.

The scarcity of studies assessing the key domains of safety (7.2%) and patient-centred care (3%) is noteworthy, although reported facilitators include correcting erroneous diagnoses and associated patient management, which may facilitate a shift towards care that is more oriented towards patient preferences and values. Potential negative aspects include possible threats to the confidentiality of clinical information and the risk of

**DISCUSSION**

<table>
<thead>
<tr>
<th>Healthcare quality domain</th>
<th>Facilitators</th>
<th>Barriers</th>
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<tbody>
<tr>
<td><strong>Effectiveness</strong> (223, 94.9%)</td>
<td>Improves PC-SC coordination (82) Improves SC access (126) Increases patient and/or professional satisfaction (48) Reduces waiting times (54) Avoids face-to-face consultations (50)</td>
<td>Noncollaborative attitudes (14) Exclusion of relevant information (10) Necessary training (29) Complex VC (emergencies, shared deliberation) (14)</td>
</tr>
<tr>
<td><strong>Efficiency</strong> (39, 16.6%)</td>
<td>Reduces travel costs (8) Reduces costs of face-to-face consultations (15) Reduces costs due to better management and fewer emergency room visits (16)</td>
<td>Analysis of the impact on the care process is required (15) Analysis of the cost of the technology is required (1)</td>
</tr>
<tr>
<td><strong>Timeliness</strong> (77, 32.8%)</td>
<td>Facilitates on-demand consultations for: ► Clinical reasons (67) ► Bureaucratic reasons (visas, reports) (0)</td>
<td>Lack of SC resources (6) Lack of SC access (9)</td>
</tr>
<tr>
<td><strong>Equity</strong> (32, 13.6%)</td>
<td>Barrier-free SC access: ► Geographic and/or economic barriers (24) ► Functional barriers (3)</td>
<td>Technological challenges (4) Non-homogeneous distribution of resources (14) Different management styles (4) Delayed in-person consultation after online assessment (2)</td>
</tr>
<tr>
<td><strong>Safety</strong> (17, 7.2%)</td>
<td>Correction of diagnostic errors (8) Avoidance of infections (2) Avoids unnecessary treatments and tests and/or allows treatment initiation (8)</td>
<td>Insufficient time to assess VC (2) Insufficient or questionable data (2) Misdiagnoses and decisions based on misdiagnoses (3)</td>
</tr>
<tr>
<td><strong>Patient-centred care</strong> (7, 3%)</td>
<td>Patient preferences can be expressed and considered (4) VC with trusted PCD (2) Improved transparency of communication to the patient (5)</td>
<td>Not involving or informing the patient (3) Legal responsibility (confidentiality) (4)</td>
</tr>
</tbody>
</table>

PC, primary care; PCD, primary care doctor; SC, specialised care; VC, virtual consultation.
making decisions without direct patient contact, sometimes based on insufficient information. Collecting patients-reported experiences (PREMs) and patients-reported outcomes (PROMs) in medical health records, as internationally recognised instruments to measure the quality of health services from the patient’s perspective, is a very relevant information for the evaluation of virtual consultation. Unfortunately, they have not adequately addressed in the reviewed literature. Collecting PREMs and PROMs, and the development of a checklist to avoid forgetting relevant information, would be useful tools to improve virtual consultation safety. We did not identify any studies that comprehensively assessed quality, taking into account all components or domains.

Assessment of the quality of articles on virtual consultation revealed that only 6% of the 235 included articles corresponded to systematic reviews or scoping reviews, and only one was a meta-analysis. Most of the studies had a descriptive design with a small number of cases, and were limited to one or two health centres. These data highlight the need for further reviews and multicentre analyses to evaluate the impact of the peculiarities of each region, and the unequal distribution of health resources, on the implementation and evolution of virtual consultation.

Feedback and the promotion of positive attitudes were considered by healthcare professionals to be the most appropriate mechanisms to facilitate cooperation between different levels of care, while concern about lack of time and increased workload are two key barriers that were identified. The use of virtual consultation entails adaptation and greater flexibility of medical agendas, improvements in the identification of specialists to whom patients are referred, and greater standardisation of the referral process. These issues have not been quantitatively evaluated in the literature. Furthermore, although many countries initially developed virtual consultation as a teledermatology tool, its implementation in all medical and surgical specialties is warranted to improve the confidence and resolutive capacity of primary care physicians, as well as joint decision-making with other specialists.

An open question, which was not adequately addressed in the articles included in this review, concerns the training required by health professionals in order to effectively use new communication and information technologies. In our opinion, it is essential to acquire knowledge about the functioning of virtual consultations as a computer-based tool. This includes knowledge about the specialties and medical centres that provide this service, the specific information necessary for effective communication (such as problem description, conducted examinations, performed tests and assessments), as well as the establishment of referral protocols to reduce the occurrence of errors.

Also, a notable observation, despite the inclusion of only three articles describing virtual consultation between primary care physicians and pharmacists, is the positive impact of this tool on the management of therapeutic adherence in patients with chronic diseases and of dose adjustment and drug interactions. This is undoubtedly one of the areas in which work should continue in order to improve the safety and effectiveness of therapies.

Our study has certain limitations. The influence of the COVID-19 pandemic during the final phase of the period analysed (2021 and 2022 until June 24) could not be sufficiently analysed. Nonetheless, it is undeniable that the resulting restriction of movement and gathering, as well as the widespread use of telematic resources developed in different healthcare environments (specific software and communications technology aimed at improving the accessibility and communication between professionals) resulted in an increase in the number of papers published on virtual consultation.

Most of the articles included in this review correspond to studies conducted in Canada and the USA, both of which have health systems with organisational structures that differ from European counterparts. The various formats (to refer a complex patient to another specialty, to adjust patient’s medication, to answer a question regarding the patient’s evolution) and applications developed for virtual consultations and differences in insurer participation make comparison difficult. Other potential methodological limitation is the double-counting (overlap) of articles because a primary study could have been selected in our scoping review and also have been included in a systematic review also selected. Finally, because quality of care is a concept that involves multiple intertwined domains, it can sometimes be difficult to assign the theme of an article to a specific domain.

Several strengths of the current review should be noted. To the best of our knowledge, this is the first study to focus on the impact of virtual consultation on the different domains of healthcare quality, both individually and in combination, as opposed to focusing exclusively on organisational or situational aspects of the pandemic. Regarding the methodology used, the scoping review allows for broad exploration of the bibliography and provides a higher level of sensitivity in detecting knowledge gaps and research opportunities, synthesising available evidence to facilitate strategic decision-making. For this reason, although the selection of search filters may have resulted in the omission of some relevant articles, we believe that the methodology and the three databases used allow for a sufficiently exhaustive analysis of the topic. Finally, we sought to offset the risk of selection bias by having two authors review each article, and a third in cases of disagreement.

CONCLUSIONS
The studies included in this review indicate that virtual consultation enables more effective, efficient, equitable and timely healthcare attention than direct face-to-face referral from primary to specialised care. However, there is not enough evidence to adequately evaluate its
contribution to improving patient safety and patient-centred care based on the articles included in our review.

The aims of virtual consultation should be to promote adequate comprehensive care and healthcare continuity and coordination, and to establish primary care as the first point of contact with the health system, from where links to other resources can be formed. The resolutive capacity of this tool should be enhanced, with a view to providing patients with higher quality care.

The characteristics of the studies included in this review highlight the need for the use of common performance indicators and standardised quality assessment criteria, and for analytical, multicentre studies exploring the experience of both patients and professionals. Such studies are essential to obtain sufficient evidence to adequately and precisely evaluate the use of virtual consultation.

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