Electronic consultations (e-consults) to improve access to specialty care: A systematic review and narrative synthesis

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Electronic consultations (e-consults) to improve access to specialty care: A systematic review and narrative synthesis

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Abstract

Background: We define electronic consultations ("e-consults") as asynchronous, consultative, provider-to-provider communications within a shared electronic health record (EHR) or web-based platform. E-consults are intended to improve access to specialty expertise for patients and providers without the need for a face-to-face visit. Our goal was to systematically review and summarize the literature describing the use and effects of e-consults.

Methods: We searched PubMed, EMBASE, the Cochrane Library, and CINAHL for studies related to e-consults published between 1990 through December 2014. Three reviewers identified empirical studies and system descriptions, including articles on systems that used a shared EHR or web-based platform, connected providers in the same health system, were used for two-way provider communication, and were text-based.

Results: Our final review included 27 articles. Twenty-two were research studies and five were system descriptions. Eighteen originated from one of three sites with well-developed e-consult programs. Most studies reported on workflow impact, timeliness of specialty input, and/or provider perceptions of e-consults. E-consultations are used in a variety of ways within and across medical centers. They provide timely access to specialty care and are well-received by primary care providers.

Discussion: E-consults are feasible in a variety of settings, flexible in their application, and facilitate timely specialty advice. More extensive and rigorous studies are needed to inform the e-consult process and describe its effect on access to specialty visits, cost and clinical outcomes.

Keywords

remote consultation, teleconsulting, telehealth, telemedicine, e-consults

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Background

Electronic consultations (e-consults) are a promising approach to the challenge of improving access to specialty care. E-consults offer a rapid, direct, and documented communication pathway for consultation between primary care and specialist. They may avert the need for a face-to-face visit between specialist and patient. As a result, they have the potential to enable cost-effective and convenient care for patients while improving access to and coordination of specialty care across the system. As such, they may offer an appealing new modality for rational appropriation of health care services.

We define an e-consult as an asynchronous communication between healthcare providers that occurs within a shared electronic health record (EHR) or secure Web-based platform. Referring providers send a consultation request to specialists, who can respond by answering the consult question, requesting more information, and/or scheduling a specialist appointment. The concept of using provider-to-provider communication to precede, enhance, or replace specialty visits is not new.

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"Curbside" consultations are common, and telemedicine modalities such as email and videoconferencing are increasingly used,[1,2] but each has limitations. Curbside consults are informal, undocumented communications which do not imply specialist review of data and require synchronous communication.[3] Email consultations are asynchronous, but are not integrated into the EHR and do not require data review.[4] Videoconferencing between providers requires specialized equipment and synchronous communication. E-consults address many of these limitations; they formalize the consultant role, occur within a secure and dedicated platform, and do not require individuals to be present simultaneously.

E-consults have been adopted at an increasing number of US academic centers, private health care settings, and in the Veterans Affairs health care system, as well as internationally, but research on their use and impact lags behind the enthusiasm for their implementation. Our objective in this systematic review was to answer three key questions:

1. What do we know about how e-consults are being implemented?
2. What benefits do e-consults offer?
3. What gaps are there in existing research?

Methods

We followed the Preferred Reporting Items for Systematic reviews and Meta-Analysis (PRISMA) statement,[5] conducting systematic searches in PubMed, EMBASE, the Cochrane Library, and CINAHL[6] for 1990-December 2014. We used keywords including e-consult*, electronic consult, ediagnos*, remote consult*, and other combinations with MeSH descriptors including Electronic Health Records, Remote Consultation, and Referral and Consultation (Supplementary File). We then searched reference lists of the included articles.

Eligibility criteria

We defined an e-consult as "an asynchronous consultative communication between providers occurring within a shared EHR or secure Web-based platform." This definition excludes "curbside" consultations, other telehealth modalities, and electronic referral. We excluded reports focused on image-based consultations such as those frequently reported for dermatology and ophthalmology. We also excluded articles about e-consultation to connect providers in different health care systems, as our goal was to understand how e-consults function within a system of shared resources. We excluded non-English articles.

Initially we planned to include only peer-reviewed, empirical studies with clearly defined metrics. Because our search process identified relatively few empirical studies, we expanded our systematic review to include peer-reviewed system descriptions, defined as reports on e-consults that detailed information technology platforms, workflow processes and/or and utilization metrics, but provided no quantitative or qualitative analysis of effects.

Article selection and data abstraction

Two of three investigators (VV, GG, SM) reviewed the title and abstract of each article to identify those meeting eligibility criteria, reviewing the full text as needed. We identified other terms used to describe mechanisms that met our e-consult definition, including "eReferral"[7] and "virtual consult".[8,9] Some articles used the term "e-consultation" to describe patient-provider communication, provider education by electronic means, and electronic methods of sending referrals for face-to-face consults; these articles were excluded as they did not meet our e-consult definition.

For each article selected for inclusion, we extracted data on study design and methods (if applicable), population, setting, e-consult platform and logistics, and any reported outcomes. Data fields were identified by one investigator and confirmed by a second investigator. We held discussions between all 3 investigators to reach consensus for articles where there was lack of agreement.

Data synthesis

We integrated our findings by narrative synthesis through group review. We did not aim to summarize any outcome measures; therefore we did not conduct formal assessments of bias within or across studies.

Results

The database search yielded 541 publications. A description of the study selection process is illustrated in the flow diagram (Figure 1). Details of the 27 articles included in the final review are presented in the Table (available as Online Appendix).

Study characteristics

Of the 27 peer-reviewed articles included in the final review, 22 were research studies and 5 were system descriptions. Three integrated health care systems in the United States accounted for the bulk of the literature. These systems are San Francisco General Hospital (SFGH) (n = 7),[7,10–15] the Mayo Clinic (n = 5),[9,16–19] and the Department of Veterans Affairs (n = 6)[20-25]. At each of these three sites, e-consults provided access to multiple specialty services. The remaining 9 articles represented examples of e-consult programs in other organizational settings and internationally. Four of the 9 described e-consults for multiple specialties at Kaiser Permanente Colorado (a large group model integrated health system),[8] from a regional network in Canada,[26,27] and from a region of Finland.[28] The other five of 9 described e-consult use for a single specialty in regional networks in north England,[29] Ireland,[30] and the Netherlands,[31] and

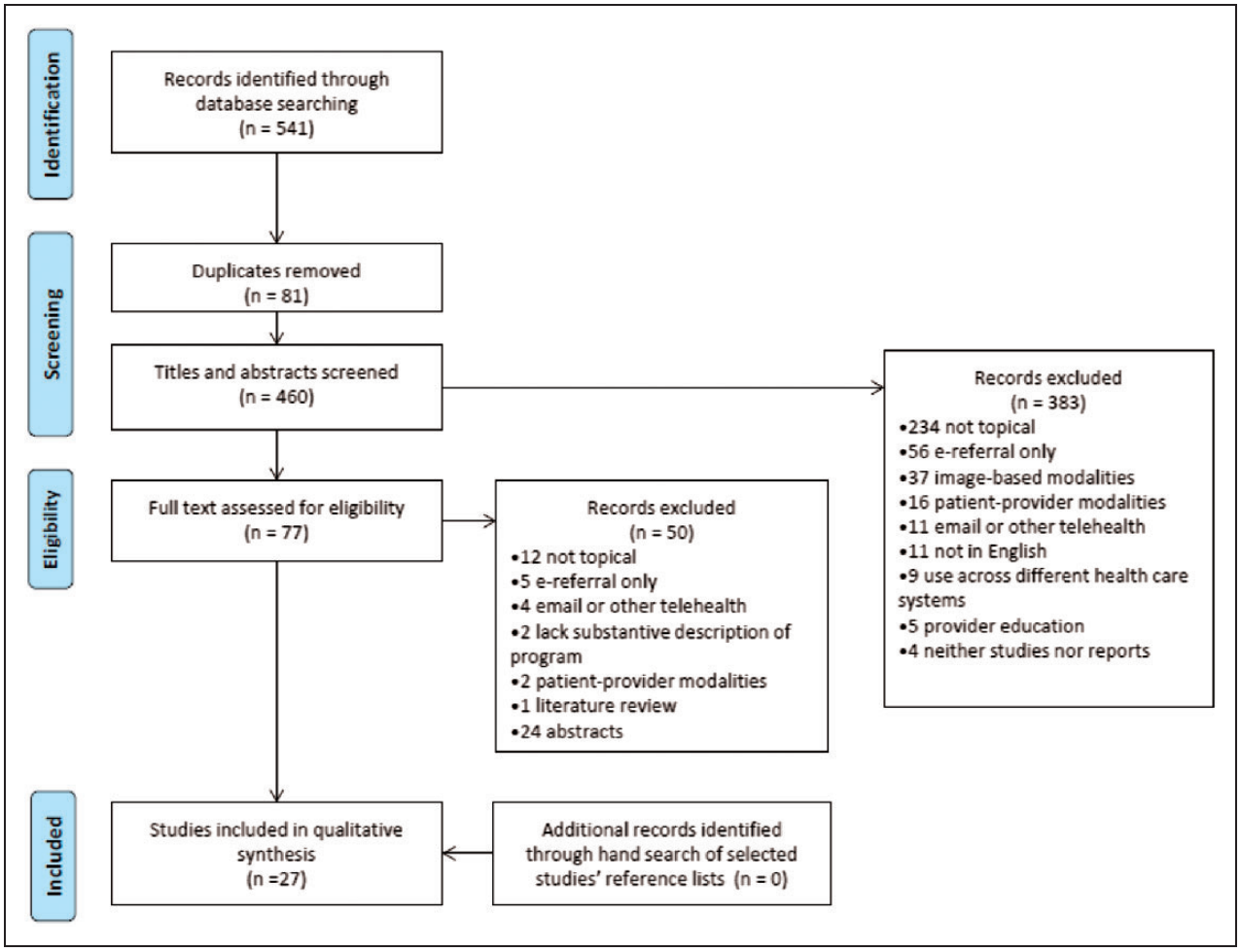

Figure 1. PRISMA flow diagram for literature on e-consults.

from single clinical departments within Olive View-UCLA Medical Center[32] and Massachusetts General Hospital (MGH).[33] Of the 22 research studies, study designs were retrospective (8), cross-sectional (4), pre-post (4), prospective (2), case-control (2), qualitative (1), and simulation (1). Data sources were most commonly chart review and survey, and the commonest outcomes reported were provider perceptions and timeliness of specialty input.

Variations in approach to e-consult systems

The basic steps to an e-consult are illustrated in Figure 2, but e-consult implementation and management across systems vary widely as they are shaped by both the existing information technology (IT) infrastructure and workflow processes as defined within each institution or clinical department. To illustrate the range of possibilities, we describe the e-consult program at the three exemplar sites contributing most to the literature.

SFGH is a large safety-net hospital staffed by physicians affiliated with University of California, San Francisco (UCSF). Primary care providers (PCP) are located in hospital-based, community-based, and independent nonprofit clinics. All consultations are funneled through a single process. Referring providers log into a Web-based portal that is integrated into the hospital's EHR. They enter the e-consult question and supporting information to initiate a process of back-and-forth communication. Each specialty has a designated reviewer who may provide guidance for management by the PCP without a clinic visit, request additional workup prior to scheduling a specialty clinic visit, request clarifying information, or schedule a speciality clinic visit. Reviewers are provided salary support for their role in e-consults.[10]

The VA cares for over 9 million patients. There are 152 VA medical centers (VAMCs), where most specialists are based. Most VAMCs are affiliated with one or more Community-Based Outpatient Clinics (CBOCs) that are often located at a distance from the parent VAMC. Referring providers request an e-consult in the same manner as a face-to-face consult, namely an order is placed in the shared EHR, with free text used to describe the consult question and to highlight any relevant information. Templates can be created at each VAMC by specialty services or by interdisciplinary teams to guide consult requests or responses. Individual specialties develop their own approaches to determining workflow for triage and response. Specialists have the authority

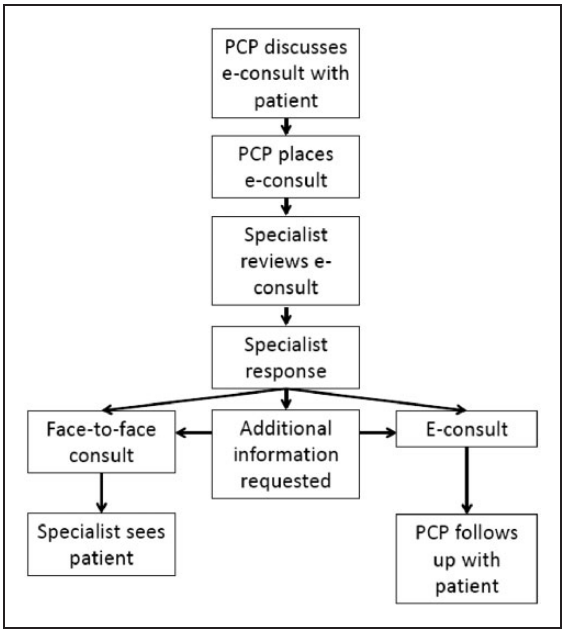

Figure 2. Basic steps of an e-consultation (e-consult).
The flow diagram indicates the steps involved in a typical e-consult, though not all the steps occur for every e-consult in every system. PCPs and other types of requesting providers may judge it necessary to discuss the decision to place an e-consult with the patient. They request the e-consult within the EHR or secure Web-based portal. The request may be templated, rely on free text entry of relevant data, or both. The specialist receives and reviews the e-consult, referring if appropriate and feasible to the EHR for supporting information. The specialist has the option to arrange for or suggest a face-to-face specialty clinic visit, complete and deliver the e-consult electronically, or request additional information which would inform either decision. Additional information may include details of the history, exam, or test results, but may also include recommendations for work-up and testing that can be completed prior to a face-to-face consultative visit.

and capability to convert an e-consult to a face-to-face consult, and vice versa. The e-consult process allows iterative communication using a comment function in the existing EHR that is shared with clerical staff for scheduling questions and communication.[23] VA providers are generally salaried, and specialists receive 1 of 3 levels of workload credit based on the time spent to complete an e-consult.

The Mayo Clinic is a large integrated and academically oriented tertiary-care center in Rochester, Minnesota. In 2012, 370,000 patients made 1.55 million outpatient visits to the center.[19] Mayo providers within the Rochester practice share a single EHR. Initially, e-consults could be requested only for a number of specialty-prespecified conditions, using templates in the shared EHR which required the requesting clinician to input results of relevant test and procedures.[18] As experience with e-consults evolved over time, specialties added additional conditions for which e-consults can be requested. Iterative communication is neither encouraged nor prohibited, though is more likely to happen by phone or page (L. Uthke, personal communication, January 13, 2015). Administrative staff members schedule e-consults for completion as 15-minute appointments in the specialist's clinic calendar. Mayo physicians are salaried and receive visit credit for responding to e-consults.

Uses for e-consults

E-consults are used for a variety of purposes, both within and across medical centers. The most commonly described use of e-consults is by PCPs to request clinical input from specialists on outpatient issues. Hematology and endocrinology are consistently among the top five specialties receiving these e-consults across systems.[8,18,19,21,23,26,27] There are multiple examples of e-consults being adapted for other tasks. North et al. identified 7 alternative types of e-consults at the Mayo Clinic.[19] After primary care-to-specialty e-consults (44%), inter-specialty (30%) surgical (8.7%), and intra-specialty (7.5%) e-consults were most common. One of the less common types was the required e-consult for certain clinical situations (2.7%). For example, the transplant service at Mayo Clinic required a psychiatric review via e-consult of potential transplant patients' self-administrated psychological evaluations.

Specialty services can develop condition-specific e-consult programs. One endocrinology service encourages providers at their VAMC and affiliated clinics to refer all patients with a hemoglobin A1C > 9% or evidence of hypoglycemia for a team-based diabetes e-consult.[22] At Mayo, an elevated ambulatory blood pressure monitor reading can trigger a hypertension e-consult to nephrology.[19] Specialty services may also unilaterally initiate e-consults without a PCP request. For example, a group of 3 VAMCs in North Carolina used regional clinical data to identify patients with an osteoporotic fracture for automatic e-consults to a bone specialist for secondary prevention.[20]

E-consults' effect on workflow

For the PCP, placing an e-consult is generally easy and convenient.[27,29] Receiving the specialist's response, however, generates additional work that may have fallen to the specialist in the case of a face-to-face visit.[17,23] In a simulation model, the PCP's ability to follow up on e-consult recommendations in a timely manner was influenced by covering for another PCP, the number of walk-in patients daily, the number of other electronic notifications received daily, and number of e-consults completed by specialists.[25] Specialists may also experience increased work. In a VA report, specialists estimated that 27% of e-consults represented new work, i.e., consultations that would not have occurred formally or informally in the absence of e-consults.[23] The time to complete an e-consult is usually less than 15 minutes, but could be much longer.[20,23,26,29]

The e-consult platform impacts usability. In settings where providers do not share an EHR, logging on to a separate system may be slowed by insufficient equipment availability, spotty internet connections, or the need for

multiple log-ins.[7] With a shared EHR, although more patient data is readily available for the responding provider, pinpointing the relevant information from years of accumulated notes and test results can be challenging.[17] The e-consult request may be templated to help support the consult question, but templates may be inadequately completed or not meet the needs of the requesting provider.[18]

OUTCOMES

Provider perceptions

PCP satisfaction was generally good across systems, with 70-95% of providers reporting high satisfaction with e-consults.[7,9,18,23,26,27,29,33,34] Common reasons for PCP satisfaction included convenience, educational value, rapid turnaround, improved access to specialty input, better provider-provider communication, avoidance of unnecessary patient travel, and the perception of shorter waiting times for patients ultimately referred to face-to-face visits.[7,17,23,27,29,33,34] PCP concerns included increased workload, being unable to select the specific consultant, and dissatisfaction with the technology.[12,26]

Specialist satisfaction with e-consults was less uniformly high. In a VA study in which 93% of PCPs were satisfied, just 53% of specialists were satisfied and 26% were dissatisfied.[23] Dissatisfied specialists were less likely to complete their responses in less than 15 minutes, and were more likely to convert e-consults to face-to-face consults than were satisfied providers. In various studies, specialists reported improved clarity of clinical questions, fewer inappropriate clinic visits, increased efficiency when initial diagnostic testing or treatment had been completed prior to a clinic visit, perceived shorter wait times for face-to-face patients, improved provider-provider communication, and reduced disruption compared to phone or page.[9,11,27] Concerns included persistence of unclear clinical questions, medicolegal liability due to the risks of providing advice on a patient who was never evaluated in person, and the need for adequate protected time and credit.[9,11,17]

Patient perceptions

In surveys, high levels of patient satisfaction have been reported, both overall[8] and with the convenience of e-consults.[33] We did not identify studies on patient preferences for e-consultation versus other modalities.

Timeliness of specialist input

Across systems, the time between placing a referral and receipt of specialist input was shorter with e-consults than with traditional referrals. Expected time to completion of an e-consult was usually specified by the organization, but was most commonly reported as less than 3 days.[18,26,31] In a VA report, e-consults reduced consultation response time by 92–95% in 3 of 5 specialties.[21]

Health care utilization

PCPs affirmed that e-consults often allowed management of patients in primary care who would otherwise have been referred to specialists.[26,31] Specialists reported fewer inappropriate clinic visits, fewer avoidable follow-up visits, and an increase in necessary follow-up visits with e-consult-based versus paper-based referrals.[11] These effects may vary by specialty; Keely et al. found the greatest impact for hematology, endocrinology, and dermatology, in which over 50% of face-to-face visits were avoided through e-consult use.[26] At Massachusetts General Hospital, introduction of cardiology e-consults was not associated with increased overall referrals.[33] While e-consults may reduce specialty visits, overall healthcare visits may not decrease. In one study, the odds of a return visit to primary care for any reason within 2 weeks was 1.88 for e-consult vs. a face-to-face visit.[16] The authors suggest this finding may have been due to PCPs needing to follow up in person on the e-consult recommendations, but the issue was not investigated within the study.

Clinical outcomes

Two studies examined objective measures of clinical care. E-consults reduced the days to completion of a hematuria workup by over 50% compared to paper-based referrals in a UCLA-Olive View study.[32] A specialist-initiated e-consult led to increased rates of bisphosphonate treatment and calcium/vitamin D supplementation in a VA study.[24] The perception of improved quality of care may not be uniform across systems or respondent types. At SFGH, more residents (87%) than attending physicians (68%) and midlevel practitioners (65%) felt that care improved; 21% of respondents overall felt that care had not changed.[7] In one Mayo study, 43% of PCPs reported e-consults had no effect on quality of care and a similar percent of specialists reported e-consults actually decreased the quality of care.[17]

Access to specialty visits

Though improvements in clinic wait times have been described, these data are limited to reports[10,13] or describe provider perceptions of wait times.[7,27,34] Rigorous approaches to evaluating the impact of e-consults on wait times for specialty appointments have not yet been reported.

Discussion

Summary of findings

We conducted this systematic review to understand the state of the e-consult research and summarize lessons learned from early adopters of e-consults. We found that three major integrated U.S. health care systems

with different organizational and financial structures have published frequently, with reports demonstrating strong commitments to an e-consult program. E-consult use is robust and growing in these systems, each of which has implemented a unique workflow. Simultaneously, e-consults are being adapted by users to meet a diversity of pre-existing institutional needs. Smaller care networks are developing e-consult programs both in the U.S. and internationally. Across systems, e-consults are well received by primary care providers and offer rapid access to specialist input. These findings indicate that e-consults are feasible in a variety of settings, flexible in their application, highly useful to providers, and improve timeliness of specialty advice. Whether these promising findings are generalizable to non-integrated health care systems, and will translate to improvements in the experience of care, population health, and costs, is not yet clear.

The research on e-consults is in an early stage. There is little consensus on terminology, although most publications use variations on the term ''e-consult''. We found only 22 empirical research studies; these reports most often assessed process measures using chart review or surveys. In many important domains we identified few or no studies. There were no studies of cost or safety, for example. E-consults may be implemented with relatively little in the way of new infrastructure, but as e-consult programs spread, additional studies are needed to guide implementation and expectations.

Future research directions

Based on the state of the e-consult literature, we recommend five major directions for future research; studies of: 1) implementation; 2) appropriate use; 3) communication; 4) effectiveness; and 5) unanticipated consequences.

Implementation studies. Evaluative research on both new and more mature e-consult programs should explore facilitators and barriers to use of e-consults, including training and support requirements, usability, impact on workflow, and effect on provider communication. These factors are not well-described in the literature but are highly likely to impact provider efficiency and adoption.[35,36]

Appropriate use. Achieving coordinated, high-quality and efficient care depends in part on providing the level of specialty input that matches needs of the patient and PCP.[37] E-consults are but one modality for delivery of specialty care. As such, they may be more or less appropriate for certain specialties, clinical conditions, or patient types. A better understanding of patient complexity and preferences, and PCP, specialist and system factors in relation to e-consultation is needed.

Communication. Effective provider-provider communication is at the heart of e-consultation and strategies are needed to optimize it. For example, specialists can best respond to an e-consult when the provided data is sufficient, accurate, and usable.[15] Further explorations of the use of templates or service agreements that specify details of bidirectional information exchange are needed.

Effectiveness. For policymakers and organizational leaders, the most pressing questions are about whether the reduced burden to patients and faster access to specialists translate to better outcomes. There are opportunities to rigorously evaluate the effect of e-consults on health care utilization, clinical endpoints, waiting times for specialty clinic appointments, and cost. Better metrics are needed for clinical outcomes and access, which have thus far been measured by primarily by provider perceptions rather than objective criteria.

Unanticipated consequences. Every change in health care delivery carries the likelihood of both positive and negative unintended consequences. For example, e-consults may increase PCP knowledge and skills;[37] a positive impact. On the other hand, e-consults are used to solicit specialty advice for patients who may never be seen by the specialist, perhaps raising safety or satisfaction concerns; a negative impact. This issue has not been addressed in studies to date, but researchers should be open to recognizing such effects as e-consults evolve and their use expands.

Limitations

Most published studies originate from one of three integrated health care systems, so the generalizability of their findings is limited. By restricting our systematic evaluation to peer-reviewed literature we may have inadvertently overlooked additional publications of interest. We may have excluded relevant manuscripts in languages other than English. Nonetheless, to our knowledge the only review of e-consults was published in 2011,[38] and that was not a systematic review. Considerable growth of e-consults has occurred since that time, necessitating our systematic review.

Conclusion

An e-consult program could alleviate pressure on limited health system resources by improving access to specialty care at relatively low cost. There are multiple opportunities to investigate the benefits and costs of different e-consult models, which may encourage adaptation of payment strategies to cover e-consults in fee-for-service or accountable care organizations.

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Contribution statement

All authors made substantial contributions to one or more of the following: the study conception and design; acquisition of data; and analysis and interpretation of the data. All authors

contributed to drafting and/or revising the article critically for important intellectual content and all authors provided their final approval of the version to be published. VGV is the guarantor of this work.

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