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Evaluating e-consultation implementations based on use and time-line across various specialties

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ABSTRACT

Background: Electronic Consultation (e-consults) can provide improved access, enhance patient and provider satisfaction, and reduce beneficiary travel expenses. We explored how e-consults were implemented across three specialty areas, diabetes (Diab), gastroenterology (GI), and neurosurgery (Neuro), at two Veterans Affairs hospitals in terms of strategies for use and time-lines.

Methods: We conducted observations and electronically shadowed patient e-consultations submitted to a specialty care service by primary care provider(s) at the two sites during a thirteen-month period. We divided the e-consult process in each specialty into three broad milestones; Request (from primary to specialty), Response (from specialty back to primary), and Follow up (from primary to patient), and recorded the flow and time in each category. An overall hierarchy of e-consults was developed to illustrate the many ways an e-consult was used. The Kolmogorov-Smirnov test was used to compare the distribution of time across specialties.

Results: A total of 394 consults submitted between April 14, 2012 and May 2, 2013 were reviewed (Diab = 152, GI = 169, Neuro = 73). Of the 152 diabetes specialty clinic e-consults, 35% required some sort of direct contact with the patient by the specialty clinic before a recommendation was provided. Overall, 58% of the e-consults were completed within 20 days, while 68% were completed within 30 days. The Response times between Diab and GI were significantly different (median = 0 vs. 3 days; p < 0.0001) and so were Follow up times (median = 0 vs. 4 days; p < 0.0001). All three stages were statistically different between Diab and Neuro; however, there was not enough evidence to suggest any differences between GI and Neuro.

Conclusions: The use of an e-consult is likely to vary based on the specialty, but the often significant variations in time may continue to hinder prompt access to care. E-consult design, implementation, documentation, training, self-learning, and monitoring should be tailored to get the most benefit out of this system.

1. Background

Electronic consultation (e-consult) is a text-based, asynchronous, approach to telehealth where a primary care physician (PCP) can request a specialist to review and offer a recommendation to a clinical inquiry. The primary goals of an e-consult system are to (i) provide short term diagnostic and therapeutic advice to PCPs and patients when circumstances do not require a face-to-face (F2F) consultation with the specialist, (ii) better prepare patients for F2F visits by arranging for completion of tests in advance, and (iii) provide PCPs and specialists interaction to support chronic disease management. This can increase access to specialty clinics and reduce turnaround time for a consult

[1,2], result in increased patient and provider satisfaction [3], reduce patient travel costs and improve provider productivity [4], provide educational value to the primary care providers [5], and enhance overall quality of care [6].

E-consults have gained increasing adoption in the last decade across the US, Canada, and Europe. They have also been discussed as a way to achieve integrated care in the context of the Accountable Care Organization model in the US [7]. A general model for the e-consult system has yet to be presented, though many hospital systems have reported successful implementation of their own version of e-consult for specific specialties; e.g., cardiology [8], nephrology [9], and vascular [10]. A general model for successful implementation of an e-consult

system across a wide range of hospital systems must consider systems-level understanding of the initialization of an e-consult, the structure of the information flow between the PCP and specialist, and therapeutic implementation of the specialist recommendations [3,7]; therefore, continued investigation of e-consults is warranted.

The US Department of Veterans Affairs (VA) initiated their e-consult program in 2011. Since then, several studies have reported findings from initial implementations at VA hospitals [3,11]. The objective of this exploratory study was to evaluate VA strategies for using an e-consult, identify the e-consult time-line (from the initiation of a consult by the PCP to the therapeutic implementation), and investigate possible uses beyond original intent and potential issues across 3 specialties; Diabetes and Gastroenterology from the Dayton Veterans Affairs Medical Centers (VAMC), and Neurosurgery from the Cincinnati VAMC in the Midwest US.

2. Methods

2.1. Setting and data collection

The VA's e-consult program is housed in its electronic health record system, the Veterans Health Information Systems and Technology Architecture (VistA) with CPRS (Computerized Patient Record System) serving as its front end. It relies on the electronic notification system for information sharing. We reviewed patient charts electronically via EHR that were submitted April 14, 2012 to May 2, 2013 to Diabetes (Diab), Gastroenterology (GI), and Neurosurgery (Neuro) specialty care providers at the Dayton and Cincinnati VAMCs by PCPs at various clinics in VISN 10 (Veterans Integrated Service Network). Since the project was initiated by our clinical collaborator (BB) supporting Diabetes e-consults at the Dayton VAMC, that specialty at Dayton was a natural choice. We then reached out to several specialties and found interest from GI at Dayton and Neurosurgery at Cincinnati. We selected these 3 specialties because they were reasonably mature in their implementation of e-consults, and also displayed a willingness to participate in this research and allow data collection (e.g., process mapping, reviewing charts). These three specialties were deemed to be representative specialties in the 3 main categories; i.e., Diabetes is largely a *verbal-interaction (no procedure)* medical specialty and lends itself easily to e-consults; GI is a *procedure-heavy* medical specialty and recommendations are often based on results of procedures and follow up; and Neurosurgery is a *very heavy surgical consultative service* that frequently requires an initial assessment, a procedure, and one follow up.

This study was initiated at the beginning of 2014. At that time, we were allowed to access from the CPRS system all e-consult records from April 14, 2012 to May 2, 2013 across all three specialties. We used 2014-15 duration to collect the required data elements; this involved many hours of manual access and review of patient charts in the EHR at the two sites, and summarizing it in a format appropriate for statistical analysis. The data elements collected are shown in Table 1.

The source of our funding, as well as approved and authorized

Table 1
Data collected for each e-consult (PACT = Patient Aligned Care Team).

Date of initial encounter between patient and PCP	Location of PACT
Date of e-consult submission	PCP who submitted the recommendation
Date of released consult recommendation	Reason for submission of the e-consult
Comments between the PCP and the Specialist	Specialist's recommendation
Date of contact between PACT member and patient discussing results of consult (follow up)	Evidence that the PCP/PACT contacted the patient for follow up

access to medical records, limited us to VA hospitals in VISN 10 (which includes MI, IN, and OH). Considering that we had to physically visit sites to collect data, especially as we were required by VA regulations and IRB to review patient charts on VA computers at those sites, the Southwest Ohio region was the most reasonable choice. The two sites co-located in VISN 10, Dayton and Cincinnati (Southwest Ohio) were chosen due to the willingness of specialties at these sites to collaborate on this study and travel considerations. Further, Neurosurgery is only available in Cincinnati and, therefore, Dayton is a remote site for Cincinnati. The approval of this study was obtained from Wright State University and Dayton VAMC's Institutional Review Boards.

2.2. Data analysis

Data were analyzed to (i) develop a process map of e-consult use and deduce the types of e-consults within a specialty, and (ii) estimate the time-line of the e-consult (from the initial encounter between the PCP and the patient to the PCP's contact with the patient to discuss the specialist's response) and conduct statistical comparisons.

2.3. Process map and use of e-consults

Procedures play a different role in various specialties, affecting the use of e-consults. We chose three specialties that represent the full range: Diabetes (no procedures), GI (some procedures) and Neurosurgery (predominantly procedural). We, therefore, divided e-consults in each specialty into 3 key stages: *Request* (from primary to specialty), *Response* (from specialty back to primary), and *Follow up* (from primary to patient). The *Request* stage included activities associated with patient assessment, decision for e-consult, and electronically entering an e-consult in the system. The *Response* stage included activities at the specialty care; e.g., review, evaluate, and provide a recommendation electronically back to the PCP. The *Follow up* stage included activities of the PACT, which comprised the PCP reviewing the specialist recommendation and one of the PACT members making an initial contact with the patient. In some cases, the specialist made direct contact with the patient, with no follow up required by the PACT.

Fig. 1 shows the chronology of the events across the three stages of a typical e-consult. In the Request stage, the e-consult could be submitted by the PCP when the patient is in the room or after the PCP has received results from specific tests. In the Response state, either the specialist provided a recommendation or a Nurse Practitioner (NP) provided a recommendation followed by the specialist reviewing it before signing off.

2.4. Time-line for a specialty

We identified the start and end times of each of the three stages of an e-consult for each specialty. Request time, in most cases, began during the initial encounter with the patient; in some cases, it began after the PCP received test results or received a recommendation from one specialist to consult another. It ended the moment the PCP digitally signed the consult request. Response time was estimated as the time from the end of the Request time until the specialist digitally signed the e-consult recommendation. In many Diabetes cases, the recommendation was written by an NP who required a co-signature by the specialist to complete the consult. In these cases, the Response time did not end until the specialist reviewed and signed the recommendation and officially completed the e-consult. Follow up time was estimated from the end of the Response time until the first attempt to contact the patient was made by the PACT to inform them of, or discuss, the specialist's recommendation. If no record of contact existed, evidence that the recommendation was implemented was used as the end time. Occasionally, no record of contact or implementation existed. In these instances, Follow up time was listed as incomplete.

We calculated descriptive statistics for the time it took to