



Original Research

Adoption and impact of an eConsult system in a fee-for-service setting



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1. Introduction

Referrals from primary care providers (PCPs) to specialists in the US nearly doubled from 1999 to 2009, with 1/3 of non-elderly patients and 1/2 of elderly patients referred to a specialist each year.^{1–3} Ambulatory specialty care represents a significant cost to the US health care system^{4,5} and demand for specialty services surpasses supply in many referral centers, often resulting in long wait times.

Integrated health systems with aligned financial incentives and defined populations have developed models for electronic consultation of specialists (eConsult) to manage problems of lower clinical complexity and for those questions that do not require in-person evaluation. It has been demonstrated that an electronic referral process can improve access to care, clarity of the consult question, and improve PCP satisfaction with the referral system.^{6,7–10} We define *e-Consult* as an *a*-synchronous exchange between PCP and specialist designed for use in place of a referral for an in-person evaluation by the specialist.

Fee-for-service organizations have not tended to adopt these models due, in part, to payment incentives that reward in-person care.¹¹ With proliferation of value-based reimbursement programs, there is interest in new models of care that offer timely, efficient, electronic access to high-quality specialty care. We developed an eConsult system that integrates with current care-delivery practices at an Academic Medical Center and supports the work of both the PCP and specialist.

We hypothesized that an eConsult program, with reimbursement for individual exchanges, over the course of the 8 month study period would improve access to specialty care while decreasing the median wait time for input from the specialist, and that this would lead to a decrease in health care utilization and costs.

To prepare a foundation for implementation of the eConsult program, in April 2012 we introduced an Enhanced-Referral platform designed to improve the clarity, consistency, and content of all primary care referrals to medicine subspecialties. While there is consensus among PCPs and specialists regarding the essential elements of a referral,^{12,13} in practice, referrals often lack a consultative question^{7,14} and relevant clinical data.^{15–18} Specialists report receiving no information from the referring PCP prior to a consultation visit in up to 68% of cases,^{12,15,19} and rate the quality of the information they receive as poor or fair in 70% of referrals.²⁰

Each participating specialty developed problem-specific templates integrated into the referral order interface to provide the referring PCP with decision support. We identified the most frequent clinical problems referred to each specialty practice using administrative data and developed templates for each. An “un-specified” referral problem was also included. The major domains of these templates were guided by the American College of Physicians’ Council of Subspecialty Societies principles of the Patient Centered Medical Home – Neighborhood²¹ and include appropriateness; recommended diagnostic testing; relevant data; referral question; and expectations regarding co-management. The proportion of referrals that included a consultative question increased from 45% to 97% following implementation of the Enhanced-Referral platform.²²

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2. Methods

The location is a multi-site Academic Medical Center (AMC) with a shared electronic health record (EHR) system (Epic Systems, Madison, WI). In September 2012, an eConsult option was introduced into the EHR referral platform. PCPs were encouraged to submit any clinical question provided that, A) a specialist could address the question based upon the available data and without an in-person evaluation, B) an eConsult response would meet the patient's needs, and C) the question would warrant an office-based referral in the absence of the eConsult program. The expected response time is 3 business days. For questions that are too complex or otherwise inappropriate for eConsult, the specialist may convert the eConsult to a standard new-patient visit. The PCP receives the eConsult response as an EHR in-basket message and may ask follow-up questions, if needed. The number of follow-up questions is not limited, but the program is designed for answering discrete questions and not for ongoing co-management.

Specialists received a payment corresponding to 0.5 wRVU per completed eConsult. PCPs also receive 0.5 RVU credit per eConsult toward annual productivity targets. The PCP credit recognizes that the PCP maintains management responsibility for the referral problem. The program was supported by the Medicaid Delivery System Reform Incentive Payments (DSRIP) program for the first 3 years.

2.1. Population and study period

The following medicine subspecialties participated in the Enhanced Referral and eConsult programs during the study period: Allergy, Cardiology, Endocrinology, Gastroenterology, Hematology, Hepatology, Infectious Diseases, Pulmonary Medicine, Sleep Medicine, Rheumatology, and Nephrology. All 178 PCPs across the AMC who care for adults were included in the program and analysis. PCP academic rank (as a proxy for practice experience), clinical activity, specialty, and practice site were obtained from institutional databases and schedules. To account for changes in the primary care population size over time, 5 interval population reports (informed by PCP assignment within the EHR and attribution by payers) were used and the difference between each point was distributed across the months between each point. Age, sex, race, and insurance type of patients were determined using EHR demographics. The *baseline period* was 9/1/11–8/31/12 unless otherwise specified, and the *intervention period* was 9/1/12–4/30/13. The start date of the intervention was delayed in three specialties (Allergy, Hematology, and ID), which launched the Enhanced-Referral and eConsult programs on 2/1/13.

2.2. Analyses

To describe the impact of the eConsult program from a *provider perspective*, we conducted surveys to assess PCP and specialist acceptability of the eConsult system. To examine the impact of the eConsult program from the *patient and the delivery system perspective*, we measured PCP referral rates, specialty clinic new-patient visit rates, the time to access specialty care, emergency department (ED) visits, hospitalizations, and pro-fee-associated costs.

1. Measures of physician acceptability: At the beginning of the eConsult program, Email surveys were sent to the PCP and specialist following each eConsult exchange with a target of 100 responses. PCP surveys assessed the clarity and utility of the eConsult response, the plans for acting upon the eConsult recommendations, and how the plan would be communicated to the patient. Specialist surveys assessed the clarity and

appropriateness of the question, and the self-reported time spent per eConsult. Results are presented as proportions with 95% confidence intervals.

- 2. Measures of eConsult adoption and impact on referral rate:** Based on total referrals placed by AMC PCPs to participating specialties during the baseline and intervention periods, we calculated the total specialty contact rate (referrals+eConsults) per 100 primary care visits per month and the proportion of these sent as eConsults. To compare the total referral rates during the baseline and intervention periods, the unit of analysis is the referral, while the unit of observation or inquiry is the PCP. Some patients have more than one observation in the dataset. We used standard programs in SAS 9.0 (Cary, NC) to conduct mixed linear models with a first level autocorrelation covariation structure, including the patient and provider as random effects. As a control for referral behavior, we compared referrals to non-participating specialty practices (e.g., general surgery, urology, dermatology; n=83 control practices). Taking the perspective of the specialty clinic, and to triangulate the referral data, we used schedule data to describe the rate of new-patient visits to participating specialty practices per 1000 patients in the primary care population, per month.
- 3. Impact on specialty care access:** We calculated the proportion of AMC primary care patients who received specialty care input (either an office visit or completed eConsult) within 14 business days.
- 4. Impact on ED visits, hospitalization, and health care costs.** We defined a period of 120 days following a specialty contact (referral or eConsult) by the PCP as our observation period for analysis of utilization and cost of care. We obtained utilization and pro-fee billing data for ambulatory visits, ED use, and hospitalization at the AMC from the University Health System Consortium (UHC) Faculty Practice Solutions Center (FPSC). We used baseline and intervention periods of October 2011–April 2012 vs. October 2012–April 2013 to account for seasonal effects on ED visits and hospitalizations. For eConsults, \$60 was added to account for the 0.5 RVU credit to the specialist and PCP. Since the specialty referral is the unit of analysis, the data include patients who did not schedule an appointment or show for their visit as well as patients with multiple referrals.

The AMC Committee on Human Research found the study to be exempt from institutional review.

3. Results

3.1. eConsult adoption and impact on referral rate

The mean referral rate decreased from 12.19 per 100 primary care visits (SD 0.88) during the baseline period to 10.68 (SD 0.81) total specialty contacts (referrals+eConsults) in the study period, a decrease of 12.4%. Of the specialty contacts in the study period, 9.85 per 100 visits were sent as referrals and 0.83 (8.0%) were sent as eConsults. Referrals for office visits, i.e., excluding eConsults during the study period, decreased 19% ($p=0.0001$). (Fig. 1) Referrals to nonparticipating specialties increased by 3.5% over the same period. Of the 178 PCPs, 136 (76%) placed at least one eConsult during the study period. Of 517 eConsults sent during the study period, specialists converted 125 (24%) to an in-office visit and 392 were completed. The median response time was 2.0 days (IQR=2.0). Conversion of eConsults to in-office visits by specialists varied across the specialties. Of the 125 total eConsults converted by the specialist to in-office visits, 110 patients were scheduled (87%) for a new patient visit, and 92 completed the visit (84%).

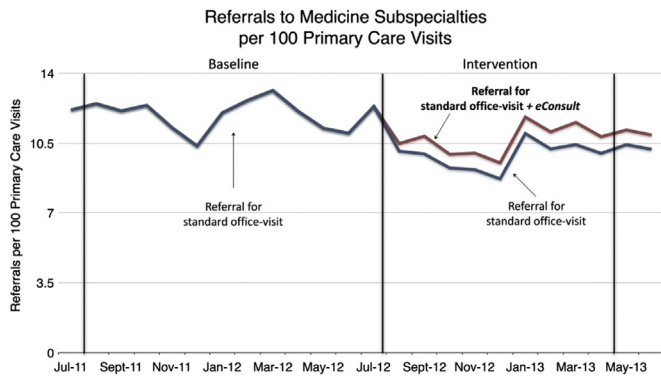


Fig. 1. Referrals from primary care to medicine subspecialties before and during eConsult intervention.

3.2. Patient characteristics

When comparing patients referred for standard office visits with patients who had a completed eConsult, there was no difference in sex, race, or ethnicity ($p=0.065$, 0.701 , and 0.163 respectively). Patients with an eConsult were older, with a median age of 60.5 versus 58.5, ($p=0.003$) and more likely to have Medicare than commercial insurance ($p=0.002$). (Table 1).

Table 1
Patient and provider characteristics during eConsult intervention.

	Referrals	eConsults	P value
Sample size during study period (n)	6566	392	
Patient characteristics			
Age (median)	58.5	60.5	0.003
Sex (% female)	58%	62%	0.065
Race			0.701
White or Caucasian	48%	51%	
Asian	21%	21%	
Other	14%	13%	
Black or African American	11%	11%	
Unknown/Declined	4%	3%	
Native Hawaiian or other Pacific Islander	2%	1%	
American Indian or Alaska Native	0%	0%	
Background			0.163
Not Hispanic or Latino	86%	89%	
Hispanic or Latino	8%	6%	
Unknown/Declined	6%	5%	
Insurance Type			0.002
Commercial	53%	46%	
Medicare	36%	45%	
Medi-Cal	10%	8%	
Self Pay/None	1%	1%	
Provider characteristics			
Academic Position			< 0.0001
Resident	17%	25%	
Fellow	4%	5%	
Assistant Professor	25%	16%	
Associate Professor	20%	29%	
Professor	23%	19%	
Nurse Practitioner	10%	6%	
Specialty			0.012
Family and Community Medicine	23%	27%	
Geriatrics	2%	4%	
General Internal Medicine	73%	67%	
Infectious Diseases	3%	2%	
Number of half-day clinic sessions per Week			< 0.0001
Less than 3	35%	41%	
Three or More	65%	59%	

3.3. Provider characteristics

PCPs who placed at least one eConsult were more likely to practice fewer than 3 half-day clinic sessions per week ($p < 0.0001$) and more likely to be Family Medicine physicians than Internists. ($p=0.012$). (Table 1).

3.4. eConsult Acceptability

PCPs and specialists email surveys were administered following the first 158 eConsults. PCPs completed 101 surveys (64% response rate) and specialists completed 121 (77% response rate). Among specialists, 67% “strongly agree” that the eConsult question was clear. With regard to appropriateness, 62% of specialists reported “optimal complexity,” 26% “somewhat complex,” 6% “much too complex,” and 6% “probably too straightforward for eConsult.” Specialists reported spending < 10 min on their response for 55%, 10–20 min for 36%, and > 20 min for 9%. Among PCPs, 91% strongly agreed that the “response was helpful,” and 84% strongly agreed that the “eConsult response influenced my care plan.” “In the absence of an eConsult option,” 47% of PCPs reported that they would have submitted a standard referral, 32% would have contacted the specialist by email, 11% would have sent a message to the specialist via the EHR, 9% would have searched medical reference texts or clinical guidelines, and 1% would have contacted the specialist by phone or pager. When asked, “how did you (or will you) act on information from the eConsult response?” 63% of PCPs relayed the information by phone or message (via a patient Web portal), 40% planned to discuss at the next office visit,” 7% scheduled a visit with the patient at date sooner than previously planned, and 6% planned to ask the specialist a follow-up question. (Fig. 2).

3.5. Specialty care access

The proportion of referrals that resulted in a visit to the specialist within 14 days improved from 29% to 35%, averaged across participating specialties. When including eConsults, the proportion of patients who received specialty care within 14 days improved from 29% to 46%, ($p=0.001$). (Fig. 3).

3.6. Specialty clinic utilization

The mean rate of new-patient visits to participating specialty practices, per 1000 patients in the primary care population, per month, was 8.9 (SD 0.65) in the baseline period versus 7.8 (SD 1.24) in the study period, a 12.1% reduction ($p 0.048$).

3.7. Utilization and health care costs following referral or eConsult

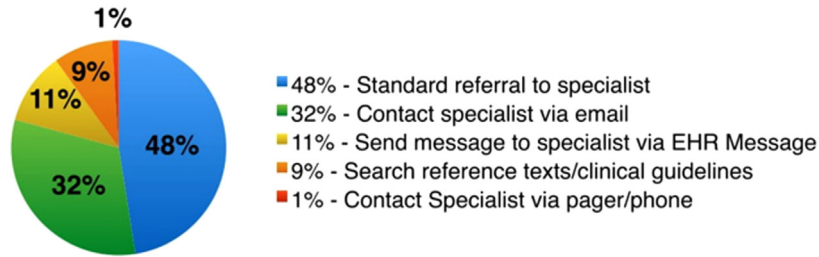
UHC data showed 13,738 referrals representing 11,597 unique patients across the observation period. The mean total pro-fees (including eConsult reimbursement fees) during the 120-day period following specialty contact (referrals or eConsults) to a participating specialty changed from \$557 during the baseline period to \$517 during the intervention period, a decrease of 7.2%. Ambulatory pro-fees, which represented 77% of costs in this analysis, decreased from \$427 to \$411 (3.8%). The proportion with an ED visit within 120 days decreased from 9.8 to 8.6%, with an associated decrease in ED pro-fee costs of 17% ($p=0.016$). Hospital admissions among these patients decreased from 6.6 to 5.9% with a non-significant decrease in pro-fee costs.

4. Discussion

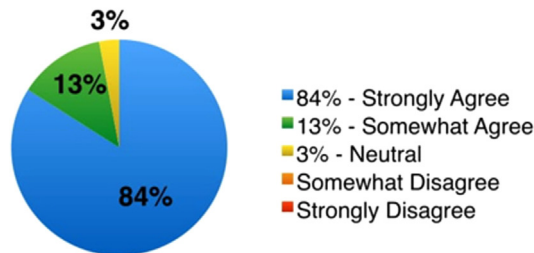
Our findings show robust adoption of the eConsult system by PCPs and, together with the implementation of an Enhanced

PCP Survey Responses (n=101)

In the absence of eConsult, what would have been your first step in addressing this question?

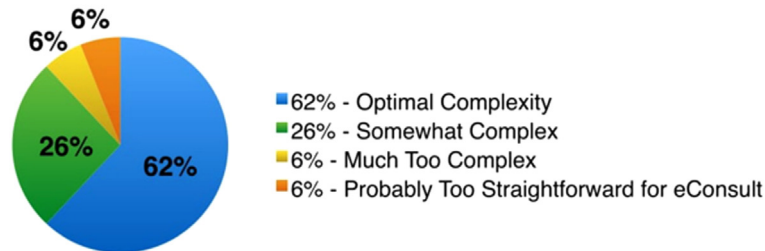


This eConsult response influenced my care plan.



Specialist Responses (n=121)

How appropriate was the question for eConsult?



How much time did you spend on your response?

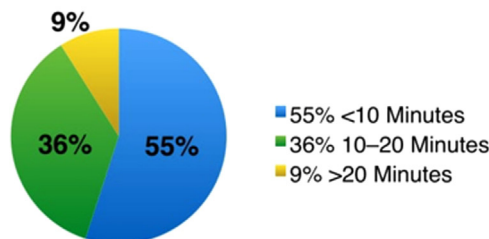


Fig. 2. Primary Care Provider (PCP) and Specialist responses to survey questions measuring eConsult acceptability.

Referral platform, a significant reduction in referral rate, specialty care utilization, specialty care access time, and costs. Over two-thirds of PCPs placed at least one eConsult during the study period, and surveys showed high acceptability among PCPs. We had anticipated that an unintended consequence of an eConsult program could be a net increase in total specialty contacts if PCPs utilized eConsults for cases they would not otherwise have referred to a specialist. No such induced demand was seen and the rate of total specialty contact decreased by 12%. There are several possible explanations for this. The launch of the Enhanced Referral and eConsult programs may have raised awareness about referral behavior, leading to more judicious use of specialty care. The

decision support embedded within the Enhanced Referrals may have prompted PCPs to take additional diagnostic or management steps rather than continue with the referral. With experience, clinicians may recall some of these recommendations and avert referral in some cases. Finally, the Enhanced Referral adds a small amount of time to the referral process, which may influence PCP decision-making.

For total specialty contacts, the time to access specialty care input via office visit or eConsults improved markedly, up 59% from the baseline. Visit slots made available by addressing some PCP questions via eConsult likely contribute to the 24% improvement in access for patients referred for an office visit.

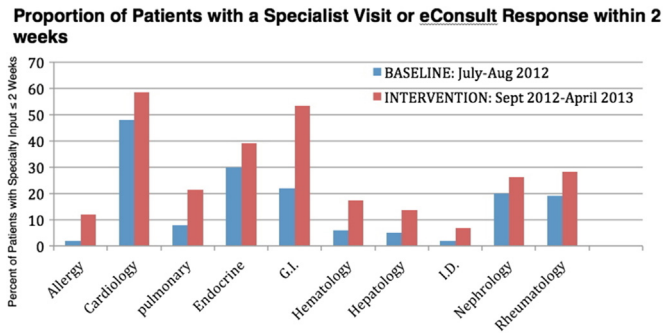


Fig. 3. Proportion of patients who received specialty care within 14 days, before and during eConsult intervention.

Specialty practices saw a 12.1% decrease in new-patient visits from the primary care population. This is a smaller change than the 19% decrease in referrals for primary care patients to those practices, which may be due to accommodating a backlog of referrals. The decrease in visits by patients in the primary care population did not translate to lower total new-patient visit volume in the specialty practices. Because the demand for specialty care from the surrounding region exceeds the capacity, new-patient visit appointment slots remained filled, with a greater proportion of new patients coming from outside the primary care population.

PCP survey data show that informal consultation plays a role in accessing specialty input. In the absence of an eConsult option, 43% would have contacted the specialist by email or EHR message. There are compelling reasons to transition informal care to an eConsult system. Informal exchanges are not preserved in the EHR to guide future care, the work is not compensated, the EHR is not leveraged to bring relevant data into the exchange, and the quality of the care is impossible to assess.

The eConsult model reimagines the concept of “access to specialty care,” as the specialist’s expertise and input are brought to bear without meeting the patient. The 24% rate of conversion of eConsults to office visits by the specialist suggests that most eConsult questions are well suited to non-face-to-face evaluation, though there is room for improvement.

When faced with a gap in clinical knowledge, PCPs have a choice – to refer or not to refer. Each referral has implications on care coordination, patient experience, and cost to the system. eConsult is a third option. The care coordination burden faced by PCPs is formidable. To care for 100 Medicare patients, the average PCP coordinates care with 99 physicians in 53 practices.²³ There is evidence that, where possible, PCPs prefer to maintain management responsibility for a problem, and eConsult facilitates this.²⁴ The wide variability in referral rate among PCPs further suggests the need for options that provide more dynamic specialty input.^{25–28}

Reducing care fragmentation can benefit patients as well, with 23–26% of patients reporting that they received conflicting information from different physicians.^{29,30} Also, eConsults appear to be a reliable path to specialty input. The proportion of referrals that result in a completed office visit ranges from 54 to 83% in prior studies, while 94% of eConsult requests led to an eConsult response or office visit in this study.^{31–33}

4.1. Limitations

Patients often receive care for multiple, unrelated problems within one health care system. We chose a global approach, capturing all pro-fee costs for a fixed time period following each referral or eConsult, to account for this. This has limitations. First, expensive, unrelated care could obscure the impact of the

program. Second, care delivered outside our system is not captured. Finally, the analysis includes only patients who had a referral or eConsult. Specialty contact averted due to the program represents savings not captured by this method. Given the change in referral rate seen in the study, this likely biases the analysis by underrepresenting the reduction in cost.

All measures are pre-post analyses and, as such, cannot account for possible secular trends. There were unrelated interventions at the institution designed to reduce emergency department utilization and hospital readmission during the baseline and study periods (including RN phone calls following hospital discharge). Finally, while the high degree of acceptability among PCPs suggests that an eConsult system can provide safe and effective care, research into disease outcome and patient experience associated with non-face-to-face specialty care is needed.

5. Conclusions

An electronic consultation has several potential advantages over a standard referral for appropriate questions. The patient receives timely access to specialist expertise, avoids the costs associated with an office visit, and maintains relationship continuity with the PCP. The PCP has dynamic access to specialist expertise while maintaining management responsibility. Consultation questions addressed via an eConsult system could reduce waiting times for specialty office visits for other patients. Adoption of an eConsult system represents the rare case in which the value proposition is strong for all stakeholders.

Fee-for-service organizations have not adopted eConsult or similar innovations for delivery of specialty care, and are unlikely to do so without a well-calibrated reimbursement plan. Building a system that supports a fee-per-eConsult payment model allows an organization to develop this flexible care delivery model during the transition to global payment models.

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Conflict of interest disclosure statement

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