

The Use of eConsults for Specialty Referrals:

A Policy Report for the
University of Connecticut-Medicaid Partnership



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UConn
HEALTH

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The Center for Public Health and Health Policy, a research and programmatic center founded in 2004, integrates public health knowledge across the University of Connecticut campuses and leads initiatives in public health research, health policy research, health data analysis, health information technology, community engagement, and service learning programs.

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EXECUTIVE SUMMARY

Access to outpatient specialist medical care has long been a concern for the Connecticut Medicaid program. The limited number of specialty practitioners accepting new patients with Medicaid coverage and the long wait times when appointments are scheduled continue to be described in legislative reports, by health professionals, and in mystery shopper surveys. In addition, lack of access to specialty care is viewed by some as a contributing factor to the high use of emergency department care by Medicaid participants. In its 2014 report on emergency department care, the Program Review and Investigation Committee of the Connecticut General Assembly recommended that the General Assembly require the Department of Social Services (DSS) to undertake a demonstration project in telehealth or telemedicine at a federally qualified health center (FQHC). Such a project had been authorized in 2012 by Public Act 12-109, but not implemented.

eConsults is a telehealth system in which primary care providers (PCPs) consult with a specialist reviewer electronically via “eConsults” prior to referring an adult patient to a specialist for non-urgent care. The use of eConsults is intended to improve access to specialist care. In Connecticut, interest in this approach has grown due to the promising results seen in a Community Health Center, Inc. (CHC, Inc.) eConsults pilot program for cardiology referrals by its PCPs. Within the past year, the use of eConsults for specialty referrals, in general, has been proposed as part of health care delivery system reform under the State Innovation Models Initiative of the Centers for Medicare and Medicaid Services. DSS is now considering use of eConsults for PCP-to-specialist referrals within the Medicaid program.

Against this background, DSS entered into the first collaborative project agreement with the University of Connecticut Health Center under the recently established UConn-Medicaid Partnership. This report, done pursuant to this project agreement, presents the results of a study of the potential impact on access to, and cost of, care associated with using eConsults in five specialty areas: dermatology, neurology, urology, gastroenterology, and orthopedics. The UConn Center for Public Health and Health Policy developed the Specialty Referral eConsults Simulation Model (SReSM), which is designed to predict the impact on cost of a telehealth system in which PCPs use eConsults prior to referring adult patients with Medicaid coverage to a specialist for a face-to-face (F2F) appointment. The SReSM model compares such an approach to the “usual care approach” in which PCPs refer patients to specialists for F2F appointments and assessments without prior consultation. An initial set of assumed values were used to produce the projections that are described in this report. Model inputs (Base Assumptions) were based on data from the recent CHC, Inc.’s cardiology eConsults pilot program, published data from other e-referral programs in the US, and CT Medicaid claims data from 2012-2013. In addition to results presented in this report, SReSM can also be programmed to run different scenarios by selecting different values for the twelve model inputs.

Conclusions

Results from our review of the available literature, our Test Scenarios comparing the cost of, and access to, care for Medicaid patients receiving traditional care versus eConsults for specialty referrals led to the following conclusions:

- ♦ **Results of our projections using the specialty-specific Base Assumptions with the SReSM indicate that, for all five specialties examined, replacing Usual Care (i.e., referrals for F2F appointments) with eConsults for patients without an existing relationship with a specialist will likely increase Medicaid spending for these services.**
 - However, the magnitude of the cost increase is difficult to gauge because altering the Base Assumptions yielded very different budget impact scenarios. Under more favorable cost

assumptions, eConsults would result in a small increase in additional annual Medicaid spending for new patients referred to neurologists, dermatologists, gastroenterologists, orthopedists, and urologists. Under less favorable cost assumptions, eConsults would result in a larger increase in additional annual Medicaid spending for new patients referred for specialty care in these five areas.

- ♦ **Results from our analysis of Medicaid claims data and a review of the literature suggest substantial opportunities for eConsults to improve access to, and the timeliness of, care.**
 - For CT Medicaid patients, the median wait times for F2F office visits with specialists following a PCP visit ranged between 70 and 77 days across the five specialties. Available evidence indicates that eConsults may dramatically reduce wait times for specialty care.
- ♦ **A major limitation of our analysis is the inability to project the potential “downstream” savings from reduced hospitalizations associated with more timely specialty care.**

It is possible that improving access to, and the timeliness of, specialty care could reduce future hospital costs. However, with the data available for this analysis, we had no basis for calculating what, if any, savings might be achieved from reduced hospitalizations.
- ♦ **Finally, available evidence leaves a high level of uncertainty about the actual cost and outcomes if DSS implemented the use of eConsults for specialty referrals.** Projected costs from the SReSM are largely dependent on data derived from a very sparse research literature and limited Medicaid claims data. More data are needed to lend greater confidence to our estimates of the budget impact of eConsults for these five specialties.

Recommendations

We recommend that DSS explore additional scenarios using the SReSM to see how changes in assumptions related to use of eConsults result in different projected outcomes. In addition, DSS should pursue further research to assess the potential for eConsults to improve care and reduce hospital costs among Connecticut Medicaid patients. Research efforts could capitalize on the New England eConsults Network Project, which entails a larger pilot of eConsults among four specialties over the next two years under a grant from the Jesse B. Cox Charitable Trust Fund to CHC, Inc.

This report was prepared by the Center for Public Health and Health Policy, UConn Health

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INTRODUCTION

Overview of the University of Connecticut-Medicaid Partnership

The UConn-Medicaid Partnership seeks to conduct research related to the Medicaid program that maximizes well-being, health care quality and value for Connecticut residents served by Connecticut's Department of Social Services (DSS) in a manner that optimizes public resources and supports community development and economic prosperity. DSS, which houses Connecticut's Medicaid program, the University of Connecticut (UConn), and the University of Connecticut Health Center (UConn Health) entered into a global inter-agency memorandum of understanding establishing the UConn-Medicaid Partnership in 2013. The Partnership allows individual projects to be executed by DSS and the University as needed using collaborative project agreements. This report, prepared by UConn Health's Center for Public Health and Health Policy, is pursuant to the first collaborative project agreement under the UConn-Medicaid Partnership.

Scope of Policy Report

This policy report examines the potential impact on utilization and costs of a telehealth system in which primary care providers (PCPs) use electronic consultation, "eConsults," when referring adult patients with Medicaid coverage to specialists for non-urgent care. The specialties examined in this report include dermatology, gastroenterology, neurology, orthopedic surgery, and urology. The use of eConsults, in general, is intended to improve access to specialists, and to improve the quality of care coordination between PCPs and specialists. In Connecticut, the use of eConsults for specialty referrals is being considered by DSS and has been proposed as part of multi-payer payment and health care delivery system reform for the Centers for Medicare and Medicaid Services' State Innovation Models Initiative. Interest in the eConsults approach stems from promising results shown for a cardiology eConsults pilot project¹ at Connecticut's largest multi-site federally qualified health center (FQHC), Community Health Center, Inc.² One of the recommendations of a 2014 report by the Legislative Program Review and Investigations Committee of the Connecticut General Assembly was for the Legislature to mandate that DSS undertake a demonstration project in telehealth or telemedicine at federally qualified health centers (FQHCs) in Connecticut.³

Components of the Policy Report

This report consists of six sections: Background, Policy Context, Clinical Guidelines and Evidence Review, Methods, Findings, and Conclusions and Recommendations. The first three sections set a backdrop for understanding the use of eConsults and similar interventions, whereas the remaining sections focus on evaluating the potential impact of adopting eConsults for specialty referrals.

¹ Anderson, D.R., Olayiwola, J.N., Aseltine, R., Zlateva, I., Jepeal, N. (2014, June). Implementation of an Electronic Consult Platform to Increase Specialty Care Access. Paper presented at the Academy Health Annual Research Meeting, Weitzman Institute, Middletown, Connecticut, USA.

² According to the Bureau of Primary Care, HRSA, CHC, Inc., had 80,120 patients in 2012, more than any other FQHC in Connecticut, available at: <http://bphc.hrsa.gov/uds/datacenter.aspx?q=d&state=CT#glist> (accessed August 13, 2014).

³ Office of Program Review and Investigations (2014). Hospital Emergency Department Use and Its Impact on the State Medicaid Budget. (Prepared for the Legislative Program Review and investigations Committee, Connecticut General Assembly): Hartford, CT.

BACKGROUND

Telehealth and Telemedicine

Telehealth is the application of telecommunication technologies and electronic information to support long-distance clinical health care and other health care-related services such as education or training for patients and professionals.⁴ Telemedicine refers to a subset of telehealth applications and is limited to the provision of clinical care. Telehealth and telemedicine involve the same underlying technologies, and the terms are sometimes used interchangeably.⁵ The primary technologies used for telehealth include the Internet, land and wireless communication, store-and-forward imaging, streaming media, and live video conferencing. The technologies used may be set up to allow “synchronous” two-way discussion in real time or “asynchronous” communication where information is sent and replies may be returned at a later time. This synchronous and asynchronous communication can occur between providers, providers and patients, or both.

Technologies used for telehealth facilitate delivery of health care even when distance separates health professionals from each other or their patients. This makes telehealth a highly discussed topic when considering strategies for improving health care system capacity and access to care, especially for at-risk populations and populations living in areas with a shortage of health professionals. In 2012, it was suggested that the decreasing cost of telecommunication technologies coupled with the increased ease of use make these technologies even more viable than they were five or ten years ago.⁶

Rationale for Electronic Referral and Consultation Systems

Telehealth strategies, including electronic referral and consultation systems (“eConsults”), have been developed in an attempt to resolve perceived shortcomings in the PCP-specialist referral process and to address specialist shortages, primarily for the Medicaid population. In the traditional model of care, PCP-specialist referrals are usually sent from the PCP office to the specialist’s office, often as a handwritten note sent by fax. If successfully received and the specialist accepts a patient’s payment method, the specialist’s office then schedules an in-office appointment.

PCP-specialist referral process. A recent literature review identified several inadequacies in the current specialty care referral process, including PCPs not knowing when to refer for specialty care and gaps in communication between the referring PCP and specialist.⁷ Figure 1 illustrates transfer of knowledge or communication gaps and care coordination opportunities within the PCP-specialist referral process.⁸ As shown in Figure 1, specialists report that the reason for the referral and other clinical question(s) are often lacking or unclear and that documentation on referred patients is insufficient for medical decision-making.⁹ This marks a lack of communication from PCP to specialist which can lead to inefficient visits and duplication of diagnostic testing. PCPs, on the other hand, indicate that consulting specialists often do

⁴ “Telehealth.” Health Research and Services Administration (HSRA), Rural Health (no date), available at: <http://www.hrsa.gov/ruralhealth/about/telehealth/> (accessed August 13, 2014).

⁵ “What is telehealth? How is telehealth different from telemedicine?” available at: <http://www.healthit.gov/providers-professionals/faqs/what-telehealth-how-telehealth-different-telemedicine> (accessed April 1, 2014).

⁶ The Institute of Medicine. 2012. “The Role of Telehealth in an Evolving Health Care Environment: Workshop Summary.” Washington DC: The National Academies Press, p. 7.

⁷ Mehrota A, Forrest C, Lin C. Dropping the baton: specialty referrals in the United States. *The Milbank Quarterly*, 2011;89(1): 39-68.

⁸ O’Malley A, Reschovsky J. Referral and consultation communication between primary care and specialist physicians. *Archives of Internal Medicine*, 2011;171(1): 56-65.

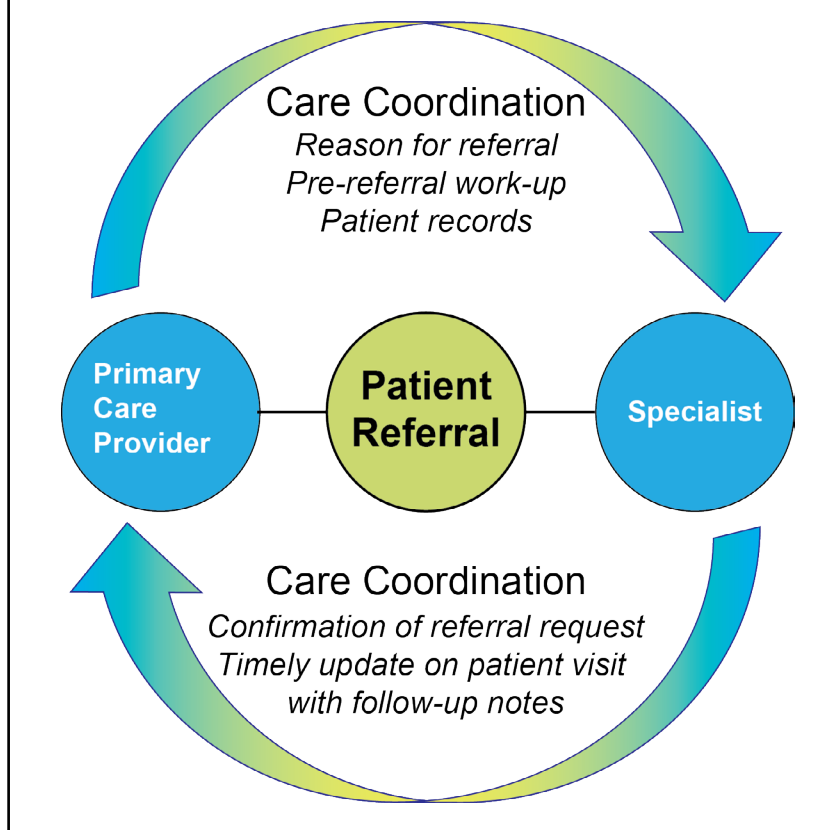
⁹ Ibid.

not report back or do so inadequately. PCPs report they often do not know if the referred patient went to the specialist or what the specialist recommended for care.¹⁰ When PCPs do hear back from a specialist, timely reports within 30 days occur in only one-third of cases.¹¹

Access to specialty care. Improving access to specialty care for Medicaid and other health care safety net populations is another rationale for eConsults. Commonly raised concerns include the difficulty of securing timely specialty care appointments for patients with Medicaid coverage, and patients not showing up for appointments when scheduled. A limited body of research supports the commonly-raised belief that many specialty practices do not accept new patients with Medicaid coverage, and that specialty practices that do accept patients with Medicaid coverage often have lengthy wait times for appointments. Secret shopper surveys

conducted throughout the country routinely find poorer odds of scheduling an appointment and greater wait times for scheduled Medicaid patients. Published survey results exist for orthopedic care of adults^{12,13} and

Figure 1. Transfer of Knowledge in the PCP-Specialist Referral Process: Opportunities for Care Coordination.



¹⁰ O'Malley A, Reschovsky J. Referral and consultation communication between primary care and specialist physicians. *Archives of Internal Medicine*, 2011;171(1):56-65.

¹¹ The Commonwealth Fund. Enhancing the capacity of community health centers to achieve high performance: Findings from the 2009 Commonwealth Fund national survey of federally qualified health centers, (May 2010) available at: http://www.commonwealthfund.org/~media/files/publications/fund-report/2010/may/1392_doty_enhancing_capacity_community_hlt_ctr_2009_fqhc_survey_v5.pdf (accessed August 27, 2014)

¹² Draeger RW, Patterson BM, Olsson EC, Schaffer A, Patterson JM. The influence of patient insurance status on access to outpatient orthopedic care for flexor tendon lacerations. *J Hand Surg Am*. 2014;39(3):527-33.

¹³ Patterson BM, Spang JT, Draeger RW, Olsson EC, Creighton RA, Kamath GV. Access to outpatient care for adult rotator cuff patients with private insurance versus Medicaid in North Carolina. *J Shoulder Elbow Surg*. 2013;22(12):1623-7.

children,¹⁴ post emergency department ambulatory care follow-up visits,^{15, 16, 17} dermatology for adults^{18, 19} and children,²⁰ urological care for children with cryptorchidism,²¹ and specialty care for children.²² Other published research findings based on provider and patient surveys also suggest a problem with access to specialty care for patients with Medicaid coverage.^{23,24, 25}

In Connecticut, these issues have been described in legislative reports, by health professionals, and previous mystery shopper surveys. According to a report issued by the Legislative Program Review and Investigations Committee of the Connecticut General Assembly in 2014, lack of access to specialists is considered one of the ongoing problems in Medicaid and there are questions about the capacity to provide Medicaid participants specialty health care in community settings.²⁶ Related public hearing testimony from the Connecticut College of Emergency Physicians indicated that few options exist for outpatient specialty care for Medicaid patients, and that, often, the only possibility of care in the state is one of two medical school affiliated clinics, with “months-long wait times for appointments.”²⁷

The literature review conducted for this report identified few examples that quantify specialty care access for Medicaid patients in Connecticut: a physician survey and secret shopper surveys. The physician survey, conducted in 2011, found that 36 percent of attending physicians at seventeen teaching clinics in Connecticut

- ¹⁴ Pierce TR., Mehlman CT., Talmai J., Skaggs D. Access to care for the adolescent anterior cruciate ligament with Medicaid versus private insurance. *J Pediatr Orthop.* 2012 Apr-May; 32(3): 245-8. <http://pt.wkhealth.com/pt/re/llwwgateway/landingpage.htm?jsessionid=TmHY01WTyQCyzZ6TnJNjY71hWMZjWnGBpSwQYj0FI53W3DLtB2p!1026220615!181195628!8091!-1?issn=0271-6798&volume=32&issue=3&page=245> (accessed September 30, 2014).
- ¹⁵ Asplin BR, Rhodes KV, Levy H, Lurie N, Crain AL, Carlin BP, Kellermann AL. Insurance status and access to urgent ambulatory care follow-up appointments. *JAMA* 2005;Sep 14;294(1):1248-54.
- ¹⁶ Blanchard J, Ogle K, Thomas O, Lung D, Asplin B, Lurie N. Access to appointments based on insurance status in Washington D.C. *J Health Care Poor Underserved.* 2008 Aug; 19(3): 687-96. http://muse.jhu.edu/journals/journal_of_health_care_for_the_poor_and_underserved/v019/19.3.blanchard.html (accessed September 30, 2014).
- ¹⁷ Rhodes KV, Vieth TL, Kushner H, Levy H, Asplin BR. Referral without access: for psychiatric services, wait for the beep. *Annals of Emergency Medicine.* August 2009;54(2):272-278.
- ¹⁸ Alghothani L, Jacks SK, Vander Horst A, Zirwas MJ. Disparities in Access to Dermatologic Care According to Insurance Type, *Arch Dermatol* 2012;148(8):956-957.
- ¹⁹ Resneck J Jr, Pletcher MJ, Lozano N. Medicare, Medicaid, and access to dermatologists: the effect of patient insurance on appointment and wait times. *J Am Acad Dermatol.* 2004;Jan;50(1): 85-92.
- ²⁰ Chaudhry SB, Armbrrecht ES, Shin Y, Matula S, Caffrey C, Varade R, Jones L, Siegfried E. Pediatric access to dermatologists: Medicaid versus private insurance. *J Am Acad Dermatol.* 2013;68(5):738-748. http://ac.els-cdn.com/S0190962212011693/1-s2.0-S0190962212011693-main.pdf?_tid=67d06dae-11c3-11e4-be94-00000aacb360&acdnat=1406049348_06b887e29803342bc323b4283642855e (accessed September 30, 2014).
- ²¹ Hwang AH, Hwang MM, Xie HW, Hardy B, Skaggs DL. Access to urologic care for children in California: Medicaid versus private insurance. *Urology* 2005; Jul;66(1):170-3.
- ²² Bisgaier J, Rhodes KV. Auditing access to specialty care for children with public insurance. *N Engl J Med.* 2011;Jun 16; 364(24):2324-33.
- ²³ Commonwealth Fund National Survey of Federally Qualified Health Centers, 2009. http://www.commonwealthfund.org/-/media/files/publications/fund-report/2010/may/1392_doty_enhancing_capacity_community_hlt_ctr_2009_fqhc_survey_v5.pdf (accessed September 30, 2014).
- ²⁴ Cook NL, Hicks LS, O'Malley AJ, Keegan T, Guadagnoli E, Landon BE. Access to specialty care and medical services in community health centers. *Health Affairs*, 2007; 26(5):1459-1468.
- ²⁵ Mortensen K. Access to primary and specialty care and emergency department utilization of Medicaid enrollees needing specialty care. *Journal of Health Care for the Poor and Underserved.* May 2014;25(2):801-813.
- ²⁶ <http://www.cga.ct.gov/pri/docs/2013/HEDU%20FINAL%20PRI%20HOSP%20ED%20USE%20REPORT%20FOR%20PRINTING.pdf> (accessed September 30, 2014).
- ²⁷ Testimony for the Program Review & Investigations Committee. Dr. Karen Jubanyik, President, Connecticut College of Emergency Physicians. <http://www.cga.ct.gov/2013/PRIdocs/2013ZZ-00000-R000926-Karen%20Jubanyik,%20M.D.%20President%20CT%20College%20of%20Emergency%20Physicians-TMY.PDF> (accessed September 30, 2014).

reported specialty care for Medicaid patients as “never, rarely, or sometimes” obtained.^{28, 29} The three types of specialty care most frequently reported as difficult to obtain included neurosurgery, orthopedics, and dermatology. A secret shopper survey of Connecticut gastroenterologists reported that only 46 percent of 93 gastroenterology practices reported Medicaid participation for colorectal screening.³⁰ Older secret shopper studies on specialty care³¹ and behavioral health services³² for children in Connecticut also found access and service delivery deficiencies.

Design of Electronic Consultation and Referral Systems

During the course of the literature review, CPHHP identified seven U.S.-based electronic consultation and referral systems currently in operation. Because of the rapid change in this area of physician communication (the oldest system, at SFGH, began as recently as 2005)³³ this list is almost certainly not exhaustive. In these systems, referral requests are sent by PCPs via an electronic mode of communication that is connected to the patient’s electronic health record. The requests are sent to a physician specialist, who may be the intended examining physician, or a designated specialist reviewer. Use of the eConsult system to request referrals may be a mandatory or voluntary part of the referral process.

Table 1 lists the number of eConsult elements incorporated into each system we encountered, as reported by published studies and other on-line descriptions.

Table 1. A few U.S.-based examples of electronic consultation and referral systems				
Location	Electronic communication	Connected with EHR	Designated specialist reviewer	Mandatory use by PCPs
SFGH	Y	Y	Y	Y
Los Angeles DHS	Y	Y	Y	Unclear
Veterans Health Administration	Y	Y	Unclear	N
Mayo Clinic	Y	Y	N	Unclear
Doc2Doc (Tulsa, OK)	Y	Y	N	Unclear
Kaiser Permanente Colorado (Denver-Boulder, CO)	Y	Y	N	N
Partners HealthCare (Boston, MA)	Y	Y	N	N

Health care systems experimented with email-based physician communication prior to 2005. Hilty *et*

²⁸ Grewal, YA. *et al.* Medicaid patients’ access to sub-specialty care in Connecticut: teaching clinics questionnaire. *Conn. Med.* 2011;Sep:75(8):489-493.

²⁹ Specialty care includes: obstetrics-gynecology, psychiatry, general surgery, orthopedics, otolaryngology, cardiothoracic surgery, vascular surgery, urology, neurosurgery, ophthalmology, cardiology, gastroenterology, pulmonary, rheumatology, nephrology, geriatrics, infectious disease, endocrinology, dermatology, and hematology-oncology.

³⁰ Patel, VB. *et al.* Exploring implications of Medicaid participation and wait times for colorectal screening on early detection efforts in Connecticut – a secret-shopper survey. *Conn. Med.* 2013;Apr:77(4): 197-203.

³¹ CT Department of Social Services. Mystery Shopper Project. Hartford, CT: DSS, November 2006. http://www.cga.ct.gov/med/council/2006/1117/20061117MINUTES_Council%20Meeting.htm (accessed September 30, 2014).

³² ValueOptions 2010 survey as described in the PRI report.

³³ Bell D, Straus S, Wu S, Chen A, Kushel M. Use of an electronic referral system to improve the outpatient primary care – specialty care interface: Final Report. (Prepared by RAND Corporation). *AHRQ* 2012;Publication no. 11(12)-0096-EF. Rockville, MD: Agency for Healthcare Research and Quality.

al. (2004) examined a consultation system at UC Davis that employed telephone and email.³⁴ Northern Ireland, described elsewhere in this report, reviewed an electronic communication system that operated independently of any electronic health record.³⁵

There is more variation among the different systems regarding the person receiving the referral request. In both San Francisco³⁶ and Los Angeles,³⁷ PCPs send the referral request to a designated specialist reviewer who screens it for completeness and appropriateness. In these systems, if the specialist reviewer believes the referral request inappropriate, the specialist reviewer may send the PCP advice on managing the patient's condition. If the specialist reviewer deems the referral request premature, instructions for further preparation may be sent. If the specialist reviewer agrees that a referral is appropriate, then the patient is recommended for a face-to-face appointment with a specialist. In the case of SFGH, the patient is scheduled for an appointment with a specialist connected with SFGH. In Los Angeles (L.A.), several hospitals and other facilities are associated with the L.A. Department of Healthcare Services eConsults system and, while each hospital may have its own specialist reviewer,³⁸ it appears that a patient may be scheduled to see a specialist associated with any of the participating facilities.

In the other systems, there is no designated specialist reviewer who performs a screening function. Instead, the PCP sends the referral request to staff at the hospital or other facility and the staff forward the request to an appropriate specialist physician who may ultimately examine the patient. This appears to be the case in Doc2Doc,^{39,40} the Mayo Clinic,⁴¹ Kaiser Permanente of Colorado,⁴² and Partners Health Care of Boston, MA.⁴³ The Partners system, for example, uses software that partially automates the process to identify an available and appropriate physician. In the Veterans Health Administration, there appears to be variation by region, and even by specialty within region, regarding how a referral request ultimately reaches an appropriate specialist.^{44,45}

Finally, some health care systems require PCPs to use eConsults to refer their patients to a specialist

³⁴ Hilty D, Ingraham R, Yang S, Anders T. Multispecialty telephone and e-mail consultation for patients with developmental disabilities in rural California. *Telemedicine Journal and e-Health*, 2004;10(4):413-421.

³⁵ Patterson V, Humphreys J, Chua R (2004). Email triage of new neurological outpatient referrals from general practice. *Journal of Neurology, Neurosurgery, and Psychiatry*, 2004;75:617-620.

³⁶ Bell D, Straus S, Wu S, Chen A, Kushel M. Use of an electronic referral system to improve the outpatient primary care – specialty care interface: Final Report. (Prepared by RAND Corporation). *AHRQ* 2012;Publication no. 11(12)-0096-EF. Rockville, MD: Agency for Healthcare Research and Quality.

³⁷ Bergman J, Neuhausen K, Chamie K, Scales C, Carter S, Kwan L, Leman S, Aronson W, Litwin M. Building a medical neighborhood in the safety net: An innovative technology improves hematuria workups. *Urology*, 2013;82:1277-1282

³⁸ Ibid.

³⁹ The DoctoDoc study at Oklahoma University (n.d.), available at: https://www.ou.edu/content/tulsa/community_medicine/doc2doc.html (accessed September 10, 2014).

⁴⁰ Care coordination through referral and consult tool: the Doc2Doc system. Presentation at the 2012 Provider Summit, Tulsa, OK. Prepared by MyHealth Access Network, Tulsa, OK.

⁴¹ Angstman K, Rohrer J, Adamson S, Chaudhry R. Impact of e-consults on return visits of primary care patients. *The Health Care Manager*, 2009;28(3):253-257.

⁴² Palen T, Price D, Shetterly S, Wallace K. Comparing virtual consults to traditional consults using an electronic health record: an observational case-control study. *BMC Medicaid Informatics and Decision Making*, 2012;12(65). DOI 10.1186/1472-6947-12-65.

⁴³ Gandhi T, Keating N, Ditmore M, Kiernan D, Johnson R, Burdick E, Hamann C. "Improving referral communication using a referral tool within an electronic medical record" in *Advances in Patient Safety: New Directions and Alternatives*, vol. 3 (performance and tools) (Henriksen K, Battles J, Keyes M, et al., eds.). Agency for Healthcare Research and Quality. Rockville MD: 2008.

⁴⁴ McAdams M, Cannavo L, Orlander J. A medical specialty e-consult program in a VA health care system. *Federal Practitioner*, 2014;31(5):26-31.

⁴⁵ Singh H, Esquivel A, Sittig D, Murphy D, Kadiyala H, Schiesser R, Espadas D, Petersen L. Follow-up actions on electronic referral communication in a multispecialty outpatient setting. *Journal of General Internal Medicine*, 2010; 26(10):64-69.

associated with that system, while others provide it as an alternative to traditional referral systems, to be used at the discretion of the physicians. SFGH mandates that all referral requests for specialists at SFGH be sent through eReferral.⁴⁶ In the systems in place in Colorado⁴⁷ and Boston,⁴⁸ the PCPs appear to be able to decide whether they will initiate referrals through eConsults. In Los Angeles, the system appears to be voluntary, at least during a pilot phase conducted by LA Care from 2009 -2011,⁴⁹ though use of eConsults may be required to refer patients at certain hospitals in the system.⁵⁰ For many of the systems, it is unclear from the literature whether the PCP must use eConsult as a necessary step for referring a patient to a specialist. While published articles do examine physician satisfaction with the eConsult-like systems,^{51,52} we did not identify any that directly considered this potentially important variable.

⁴⁶ Kim-Hwang J, Chen A, Bell D, Guzman D, Yee H, Kushel M (2010). Evaluating electronic referrals for specialty care at a public hospital. *Journal of General Internal Medicine*, 2010;25(10):1123-1128.

⁴⁷ Palen T, Price D, Shetterly S, Wallace K (2012). Comparing virtual consults to traditional consults using an electronic health record: an observational case-control study. *BMC Medicaid informatics and Decision Making*, 2012; 2(65).DOI 10.1186/1472-6947-12-65.

⁴⁸ Gandhi T, Keating N, Ditmore M, Kiernan D, Johnson R, Burdick E, Hamann C. "Improving referral communication using a referral tool within an electronic medical record" in Advances in Patient Safety: New Directions and Alternatives, vol. 3 (performance and tools) (Henriksen K, Battles J, Keyes M, *et al.*, eds.). Agency for Healthcare Research and Quality. Rockville MD: 2008.

⁴⁹ Ahmed S. LA Care eConsult Pilot Project: Preliminary Findings, prepared for L.A. Care Health Plan: March 16, 2011.

⁵⁰ Bergman J, Neuhausen K, Chamie K, Scales C, Carter S, Kwan L, Lerman S, Aronson W, Letwin M. Building a medical neighborhood in the safety net: An innovative technology improves hematuria workups. *Urology*, 2013;82: 1277-1282.

⁵¹ Angstman K, Adamson S, Furs J, Houston M, Rohrer J. Provider satisfaction with virtual specialist consultations in a family medicine department. *The Healthcare Manager*, 2009;28(1): 14-18.

⁵² Kim Y, Chen A, Keith E, Yee H, Kushel M. Not perfect, but better: Primary care providers' experiences with electronic referrals in a safety net health system. *Journal of General Internal Medicine*, 2009;24(5):614-619.

POLICY CONTEXT

CPHHP has not identified a Medicaid policy that explicitly reimburses for the services similar to those provided by a specialist reviewer in eConsults. The federal government and various states have, however, begun adopting policies for other types of telehealth applications. The federal Centers for Medicare and Medicaid Services (CMS) has issued some guidance encouraging states to experiment with telehealth applications and has promulgated rules for Medicare coverage. A majority of the states have adopted rules, either through statutes or regulations, governing some telehealth applications. Seven states explicitly reimburse for clinical services delivered through store-and-forward technology. Store-and-forward technology enables asynchronous communication; the message sender and receiver do not have to be communicating at the same time. Store-and-forward technologies allow, among other things, a PCP to send patient information, including written documents as well as audio and visual information, to a specialist electronically; the specialist can retrieve that information when convenient. Store-and-forward technology has been used to conduct virtual examinations; that is, the patient information is sent to a distant specialist and the specialist conducts an examination similar in scope to a traditional in-person examination and makes a diagnosis and other care determinations.

Most of the store-and-forward reimbursement schemes we identified appear to envision virtual examination types of services. Virtual examinations and eConsult reviews are much different in terms of the scope and thoroughness of the specialist assessment, but both rely on similar technologies, and, in some cases, may fit within similar reimbursement schemes. A few of the identified state programs provide reimbursement for physician-to-physician communication. These policies might conceivably cover a specialist reviewer-type service, though we did not locate an example of this. Therefore, the states with store-and-forward coverage policies are examined in some detail.

Federal Medicaid and Medicare Telehealth Policies

The Centers for Medicare and Medicaid Services (CMS) do not currently have a policy requiring or preventing reimbursement through Medicaid for the type of review conducted by the eConsults specialist reviewer or for telehealth applications generally. CMS does explicitly invite state Medicaid programs to experiment with telehealth services.⁵³ When states choose to provide a telehealth service, CMS requires that the relevant health care providers meet usual federal Medicaid standards and that the rate of reimbursement for their services does not exceed the Federal Upper Limits established for in-person delivery of similar services.⁵⁴

CMS has begun promulgating telehealth service delivery and reimbursement rules for Medicare. Medicare's current telehealth policy focuses on communication directly between a provider and a patient, and does not apply to the type of provider-to-provider communication in eConsults. Generally, the patient must be in an authorized location when receiving the service (referred to as an "originating site"), the service must be provided by one of six types of providers (collectively called "distant site practitioners"), the service must be approved by Medicare, and, in most instances, the communication between patient and distant site

⁵³ The different components of CMS are not consistent in their use of the terms "telehealth" and "telemedicine." We use "telehealth" here because it is the more general term, though the guidance that we have identified from CMS appears to envision clinical care only.

⁵⁴ "Telemedicine," Centers for Medicare and Medicaid (no date), available at: <http://www.medicare.gov/Medicaid-CHIP-Program-Information/By-Topics/Delivery-Systems/Telemedicine.html> (accessed April 1, 2014).

practitioner must be synchronous.⁵⁵

Medicaid Telehealth Policies in the States

Some state Medicaid programs have begun experimenting with mechanisms to reimburse for telehealth services. The Center for Telehealth and e-Health Law⁵⁶ conducted what appears to be the first systematic examination of telehealth coverage policies among the various states in 2011.⁵⁷ This report largely consists of copies of relevant statutes, regulations and policy manuals. In 2013, the Center for Connected Health Policy, at the National Telehealth Policy Resource Center, conducted a review of state telehealth reimbursement policies and produced a summary of Medicaid and other coverage in the states.⁵⁸ This more recent study found that:

- ♦ Forty-five states' Medicaid programs reimburse for some form of live video conferencing;
- ♦ Thirteen states' Medicaid programs offer reimbursement for remote patient monitoring;
- ♦ Seven states' Medicaid programs offer some reimbursement for services delivered through store-and-forward technologies;
- ♦ Three states' Medicaid programs reimburse for all three.

The American Telemedicine Association (ATA), a telehealth advocacy group, maintains a website that, among other things, tracks state telehealth policies. In a report released in July 2013, the ATA also stated that seven state Medicaid programs reimbursed for store-and-forward telehealth communication either by statute, regulation, or policy.⁵⁹ The seven states identified were Alaska, Arizona, California, Illinois, Minnesota, Oklahoma, and South Dakota. None of these states' Medicaid programs explicitly reimburse for the type of patient reviews conducted by the Cardiology eConsults specialist reviewer.

Table 2 lists the seven states that cover store-and-forward telehealth applications as of July 2013. Some of the states specifically limit telehealth coverage to specific specialties, while other states specifically exclude certain specialties.

⁵⁵ "Telehealth Services," Rural Health Fact Sheet Series. Centers for Medicare and Medicaid Services (December, 2012), available at: <http://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/downloads/telehealthsrvcfsctsh.pdf> (accessed April 1, 2014); see also "Medicare and Medicaid Programs: Hospital outpatient prospective payment and ambulatory surgical center payment systems and quality reporting programs; hospital value-based purchasing program; organ procurement organizations; quality improvement organizations; electronic health records (EHR) incentive program; provider reimbursement determinations and appeals. 78 *Federal Register* 74826-75200 (accessed December 10, 2013).

⁵⁶ Robert J. Waters Center for Telehealth and e-Health Law, home page: <http://ctel.org/> (accessed April 11, 2014).

⁵⁷ CTel 50 State Medicaid Statute Survey Part I (Alabama to Kansas)(2011): <http://ctel.org/wp-content/uploads/2011/06/CTel-50-State-Medicaid-Statute-Survey-Part-I.pdf>; Part II (Kentucky to North Dakota) <http://ctel.org/wp-content/uploads/2011/06/CTel-50-State-Medicaid-Statute-Survey-Part-II.pdf>; and Part III (Oklahoma to Wyoming): <http://ctel.org/library/research/> (accessed April 11, 2014).

⁵⁸ Center for Connected Health Policy, The National Telehealth Policy Resource Center, "State Telehealth Laws and Reimbursement Policies: A comprehensive scan of the 50 states and the District of Columbia" <http://cchpca.org/sites/default/files/50%20State%20Medicaid%20Update%20Nov.%202013%20-%20Rev.%2012-20.pdf> (accessed April 11, 2014).

⁵⁹ American Telemedicine Association, "Store-and-forward Telemedicine" (July 2013), available at: <http://www.americantelemed.org/docs/default-source/policy/state-medicare-best-practice---store-and-forward-telemedicine.pdf?sfvrsn=6> (accessed April 11, 2014).

Table 2. Specialty coverage by selected states		
State	Explicitly included specialties	Explicitly excluded specialties
Alaska	none	Home and community-based waiver services Pharmacy services End-stage renal disease services Direct-entry midwife services Private-duty nursing services Personal care assistant services Visual care, dispensing, or optician services
Arizona	Cardiology Dermatology Endocrinology Hematology / oncology Home Health Infectious Diseases Neurology Obstetrics / gynecology Oncology / radiation Ophthalmology Orthopedics Pain clinic Pathology and Radiology Pediatrics and pediatric subspecialties Rheumatology Surgery follow-up and consultations Behavioral health services	None
California	Teleophthalmology Teledermatology	None
Illinois	None	None
Minnesota	Specialty physician Oral surgeon	None
Oklahoma	None*	Outpatient surgical services Home health services Well child checkups, and preventive visits Laboratory services Audiologist services Care coordination services Physical, speech, or occupational therapy services
South Dakota	None	None
*SoonerCare lists that it will cover store-and-forward technology services such as teleradiology, telepathology, fetal monitor strips and physician interpretation of electrocardiogram and electroencephalogram readings, but notes that it does not consider these services to constitute telemedicine.		

Further detail for Medicaid policies for store-and-forward applications in the seven states is provided below.

Alaska Alaska's Medicaid program is part of its Medical Assistance Program, housed within its Department of Health and Social Services.⁶⁰ The rules governing telehealth services covered by the program are found primarily in Alaska Administrative Code (AAC)

⁶⁰ Medicaid, Division of Public Assistance, Alaska Department of Health and Social Services: <http://dhss.alaska.gov/dpa/pages/medicaid/default.aspx> (accessed April 11, 2014).

Title 7.⁶¹ Alaska Medicaid covers telemedicine services provided through store-and-forward systems when the service allows “a consulting provider to obtain information, analyze it, and report back to the referring provider.” Among other services, Medicaid will reimburse for initial visits, follow-up visits, consultations made to confirm a diagnosis, and diagnostic, therapeutic, or interpretive services. The program only reimburses for the professional services rendered through telemedicine, and will not reimburse for the expenses arising from operating the communication system itself.⁶² The regulations do not specify the types of specialties that are appropriate for telemedicine consultations, but they explicitly exclude services related to nine enumerated service types, such as vision care, personal care, and end stage renal disease care.⁶³ Alaska’s scheme conceivably might cover specialist review-type services. Communication with personnel from Alaska’s Department of Health and Social Services confirmed, however, that no such system currently operates in Alaska.⁶⁴

Arizona

Arizona’s Medicaid program is a part of the Arizona Health Care Cost Containment System (AHCCCS), which is operated by the AHCCCS Administration.⁶⁵ AHCCCS has a fee-for-service program and a managed care program.⁶⁶ According to the fee-for-service provider manual, which was updated in April, 2014, the fee-for-service program covers store-and-forward services for seventeen enumerated specialties, including cardiology.⁶⁷ AHCCCS’s Medical Policy for AHCCCS Covered Services, which indicates that it applies to both fee-for-services and managed care programs, limits coverage of most telehealth services to real time communication.⁶⁸ This manual, however, was updated most recently in April, 2012, and its provisions, at least for fee-for-service, may be superseded by the more recent fee-for-service manual.⁶⁹ Communication with personnel at AHCCCS confirmed that there currently are no referral systems like Cardiology eConsults that are reimbursed by the Arizona’s Medicaid program.⁷⁰

California

California’s Medicaid program is referred to as Medi-Cal, which is housed in the California Department of Health Care Services.⁷¹ Medi-Cal reimburses for some telehealth services and has dedicated a section of its provider’s manual to the topic.⁷²

⁶¹ Telehealth Statutes, Regulations, and Policy: <http://dhss.alaska.gov/dph/HealthPlanning/Pages/telehealth/regsandstatutes.aspx> (accessed April 11, 2014).

⁶² Alaskan Administrative Code, vol. 7 section 110.635 (b).

⁶³ Alaskan Administrative Code, vol. 7 section 110.635. (a).

⁶⁴ Alaska Department of Human and Social Services (personal communication, April 14, 2014).

⁶⁵ AHCCCS, home page, available at: <http://www.azahcccs.gov/> (accessed April 4, 2014).

⁶⁶ “Arizona” in Center for Connected Health Policy, The National Telehealth Policy Resource Center, “State Telehealth Laws and Reimbursement Policies: A comprehensive scan of the 50 states and the District of Columbia” <http://cchpca.org/sites/default/files/50%20State%20Medicaid%20Update%20Nov.%202013%20-%20Rev.%2012-20.pdf> (accessed April 11, 2014).

⁶⁷ AHCCS, Fee-for-Service Provider Manual, Chapter 10; Professional and Technical Services, p. 41-42 (updated April 7, 2014) http://www.azahcccs.gov/commercial/Downloads/FFSProviderManual/FFS_Chap10.pdf (accessed April 11, 2014).

⁶⁸ Medical Policy for AHCCCS covered Services, Chapter 300 (updated April 1, 2012): <http://www.azahcccs.gov/shared/Downloads/MedicalPolicyManual/Chap300.pdf> (accessed April 11, 2014).

⁶⁹ The Center for Connected Health Policy appears to make this assumption.

⁷⁰ AHCCCS (personal communication, 4/29/2014).

⁷¹ Medi-Cal, Department of Health Care Services, <http://www.medi-cal.ca.gov/> (accessed April 11, 2014).

⁷² The Medi-Cal provider’s manual is available in a word document through the Medi-Cal telehealth information page: <http://www.dhcs.ca.gov/provgovpart/Pages/Telehealth.aspx> (accessed April 11, 2014).

Medi-Cal explicitly provides reimbursement for direct, synchronous, specialist-to-patient telemedicine examinations for many types of services. It also reimburses for asynchronous patient and specialist communication for dermatology and ophthalmology services.

Illinois

The Medicaid program in Illinois is part of that state's Medical Assistance Program, which is operated by the Division of Medical Programs, Department of Healthcare and Family Services.⁷³

The Illinois practitioner's handbook states that the Medical Assistance Program covers store-and-forward telehealth services.⁷⁴ The handbook divides telehealth into telemedicine and telepsychiatry. The Upper Midwest Telehealth Resource Center produced a summary of Illinois Medicaid telehealth reimbursement policies in 2013. This summary lists a number of specific CPT codes that may be modified for the provision of telehealth services, including consultation codes 99241 through 99255.⁷⁵

Minnesota

Minnesota's Medicaid program is called Medical Assistance, and is part of a larger collection of health-related public-funded programs collectively referred to as Minnesota Health Care Programs (MHCP).⁷⁶ The Minnesota Medical Assistance program is authorized to cover some telehealth services by statute. Minnesota statutes section 256B.0625, subdivision 3b, provides, in relevant part:

“Medical assistance covers telemedicine consultations. Telemedicine consultations must be made via two-way, interactive video or store-and-forward technology. Store-and-forward technology includes telemedicine consultations that do not occur in real time via synchronous transmissions, and that do not require a face-to-face encounter with the patient for all or any part of any such telemedicine consultation... Telemedicine consultations shall be paid at the full allowable rate.”⁷⁷

The MHCP Provider's manual further defines “consultation” as: “A type of service provided by a physician whose opinion or advice is requested by another provider.”⁷⁸ Providers may bill for this service by using the relevant CPT code and adding the modifier GQ.⁷⁹

Oklahoma

Oklahoma's Medicaid services are provided through its SoonerCare program, administered by the Oklahoma Health Care Authority (OHCA). According to the OHCA's Medical Providers fee for service handbook, “SoonerCare views telemedicine

⁷³ HFS Medical Programs, Illinois Department of Healthcare and Family Services, <http://www2.illinois.gov/hfs/MedicalPrograms/Pages/default.aspx> (accessed April 11, 2014).

⁷⁴ Handbook for Practitioners Rendering Medical Services (2010), Chapter A-200: Policy and Procedures for Medical services, Section A-220.67, available at: <http://www2.illinois.gov/hfs/sitecollectiondocuments/a200.pdf> (accessed April 11, 2014).

⁷⁵ Upper Midwest Telehealth Resources Center, 2013 Illinois Telemedicine Reimbursement Summary, <http://www.umtrc.org/resources/payers-reimbursement/2013-illinois-telemedicine-reimbursement-summary/?back=Resources> (accessed April 11, 2014).

⁷⁶ MHCP Home page: http://www.dhs.state.mn.us/main/idcplg?IdcService=GET_DYNAMIC_CONVERSION&RevisionSelectionMethod=LatestReleased&dDocName=dhs16_136855# (accessed April 11, 2014).

⁷⁷ “Covered Services” Minnesota Statutes section 256B.0625, available at: <https://www.revisor.mn.gov/statutes/?id=256B.0625> (accessed April 4, 2014).

⁷⁸ Coverage of PCP to specialist consultation confirmed by e-mail from MCHP Provider Services, received April 11, 2014.

⁷⁹ Minnesota Health Care Programs (personal communication, 4/11/14).

no differently than an office visit or outpatient consultation.”⁸⁰ Telemedicine services are only covered when the originating site is located in a designated rural area or geographic areas where there are too few providers of the relevant medical specialty.⁸¹ SoonerCare does not enumerate a comprehensive list of reimbursable services for which store-and-forward technology may be used, but lists as examples teleradiology, telepathology, fetal monitor strips and physician interpretation of electrocardiograms and electroencephalogram readings.⁸²

South Dakota South Dakota’s Medicaid program is operated by its Division of Medical Services.⁸³ South Dakota’s Policy for Telemedicine Services states that coverage “of telemedicine physician consultations is treated like all other consultation services as defined in the Physician’s Current Procedural Terminology (CPT).” It also specifies that CPT codes appropriate for reimbursement include 99241 through 99275.^{84,85}

Connecticut Telehealth Policies

The Connecticut Medicaid program does not reimburse for any telehealth service, including specialist reviews conducted through an electronic consultation and referral system. The term “telehealth” is not defined by Connecticut statute. A statutory definition for the term “telemedicine” appears in §17b-245c of the Connecticut General Statutes, which authorizes the Department of Social Services (DSS) to implement a telemedicine pilot project. The provision states that telemedicine is “the use of interactive audio, interactive video or interactive data communication in the delivery of medical advice, diagnosis, care or treatment” for included services. It explicitly excludes services that use only facsimile machines or audio-only telephones.

The Connecticut General Assembly considered three telehealth-related bills in its 2014 session. One bill would have required private insurance companies to reimburse the provision of certain telehealth services.⁸⁶ Another would have required Medicaid coverage for home telemonitoring services.⁸⁷ The third bill, when first introduced, would have required DSS to conduct the pilot project that it is authorized to conduct pursuant to §17b-245c, by January 11, 2015.⁸⁸ This bill also included a definition of “telehealth” to mean “the use of telecommunications and information technology to provide access to health assessment, diagnosis, intervention, consultation, supervision and information across distance. Telehealth or telemonitoring includes technologies such as (A) telephones, (B) facsimile machines, (C) electronic mail systems, and (D) remote patient monitoring devices used to collect and transmit patient data for monitoring

⁸⁰ Oklahoma Administrative Code section 317:30-3-27 “Telemedicine” (revised July 1, 2013) available at: <http://www.okhca.org/xPolicySection.aspx?id=7061&number=317:30-3-27.&title=Telemedicine> (unofficial) (accessed April 11, 2014).

⁸¹ Ibid., 317:30-3-27 (c) (2).

⁸² Ibid., 317:30-3-27 (e).

⁸³ Division of Medical Services, South Dakota Department of Social Services, <https://dss.sd.gov/medicalservices/> (accessed April 11, 2014).

⁸⁴ Provider Information: Policy for Telemedicine Services, South Dakota Department of Social Services, available at: <http://dss.sd.gov/medicalservices/providerinfo/programs/telemedicine.asp> (accessed April 11, 2014).

⁸⁵ South Dakota Medicaid Professional Services Billing Manual “Telemedicine Consultation Services,” p 25 (revised February 2014): <http://dss.sd.gov/sdmedx/includes/providers/billingmanuals/docs/Professional2.6.14.pdf> (accessed April 11, 2014).

⁸⁶ Connecticut General Assembly, An Act Concerning Health Insurance Coverage for Telemedicine Services, raised Senate Bill 202, Session Year 2014.

⁸⁷ Connecticut General Assembly, An Act Concerning Medicaid coverage of Telemonitoring Services, raised bill no. 5445, Session Year 2014.

⁸⁸ Connecticut General Assembly, An Act implementing the recommendations of the legislative program review and investigations committee Medicaid-funded emergency department visits. Raised House Bill 5378, Session Year 2014, § 6.

and interpretation.”⁸⁹ While the bill was ultimately enacted into law as PA 14-62, the provisions related to telehealth were not included in the final version.

CLINICAL GUIDELINES

The search for relevant clinical guidelines included queries of the National Guidelines Clearinghouse, the Internet websites for the American Medical Association (AMA) and the American Telemedicine Association, and review of individual websites of other relevant national professional societies. Follow-up searches were also conducted using the Google search engine. The results described here include only guidelines promulgated in the United States.

Based on this search, there do not appear to be any national guidelines or broad-based guidance on when a PCP should refer a patient to a specialist in dermatology, gastroenterology, neurology, orthopedic surgery or urology, either using an electronic or traditional referral system. Clinical guidelines for specific conditions that fall within the ambit of these specialties sometimes include advice for referring. This advice may be quite brief. For example, the Institute for Clinical Systems Improvements, as part of its guidelines for treating headaches, suggests that if “the patient has [an] intractable headache or is unresponsive to prophylactic treatment, consider referral to a headache specialist.”⁹⁰

Some guidelines provide more detailed advice. The U.S. Department of Veterans Affairs, for example, has issued a limited number of clinical guidelines for chronic disease in primary care.⁹¹ These guidelines are written for PCPs and generally include a detailed list of recommendations for when referral to specialty care might be appropriate for the particular condition covered by the guideline. One of the guidelines, “Management of Chronic Kidney Disease” (2008), addresses a urological condition.

Other relevant guidance has been issued by the AMA, as part of its Code of Medical Ethics. This includes very general guidance on when a physician might refer a patient to another physician, select conditions that should be satisfied when referrals are made, and ethical obligations surrounding the referral process.^{92, 93, 94, 95} The AMA has also issued Opinion 5.025, regarding physician-patient online communication. Some of the communication privacy and security concerns raised may be relevant to referral-related electronic communication between physicians.

Guides that have been issued about electronic communication focus on physician–patient communication,

⁸⁹ Ibid., § 6 (2).

⁹⁰ Beithon J, Gallenberg M, Johnson K, Kildahl P, Krenik J, Liebow M, Linbo L, Myers C, Peterson S, Schmidt J, Swanson J. Diagnosis and treatment of headache. Bloomington (MN): Institute for Clinical Systems Improvement (ICSI); 2013 Jan. 90 p., available on the National Guideline Clearinghouse’s website, at: <http://www.guideline.gov/index.aspx> (accessed August 27, 2014).

⁹¹ VA/DoD Clinical Practice Guidelines (updated May 8, 2014), available at: <http://www.healthquality.va.gov/> (accessed August 27, 2014).

⁹² American Medical Associations Code of Medical Ethics, available at: <http://www.ama-assn.org/ama/pub/physician-resources/medical-ethics/code-medical-ethics.page> (accessed August 27, 2014).

⁹³ AMA Opinion 3.04 provides, in relevant part, that a “physician may refer a patient for diagnostic or therapeutic services to another physician, limited practitioner, or any other provider of health care services permitted by law to furnish such services, whenever he or she believes that this may benefit the patient.”

⁹⁴ AMA Opinion 8.132 further states that physicians “should always make referral decisions based on the best interests of their patients, regardless of the financing and delivery mechanisms or contractual agreement between patients, health care practitioners, and institutions, and third party payers.”

⁹⁵ Opinion 7.025, which addresses patient privacy and informal consultation, may have some relevance to electronic referrals. It provides, in relevant part, that “[i]nformal case consultations that involve the disclosure of detailed medical information are appropriate in the absence of [patient] consent only if the patient cannot be identified from the information.”

or the technical details of conducting such communication, rather than the question of when to initiate it. Such projects include the guide for online communication issued by the national eRisk Working Group for Healthcare,^{96,97} and a guide for store-and-forward teledermatology-related communication produced by the American Telemedicine Association in 2012.⁹⁸

EFFECTIVENESS LITERATURE REVIEW

As part of the requirements of the UConn—Medicaid Partnership, first Collaborative Project Agreement – One, CPHHP searched the peer reviewed and non-peer reviewed literature examining the experience that health care systems have had with implementing electronic consultation and referral systems.

The findings from this search, summarized in Table 3, are reported in “The Use of eConsults for Cardiology Referrals.”⁹⁹ The remainder of this section focuses on reviewing reported outcomes related to the five specialties that are the focus of this report: dermatology, gastroenterology, neurology, orthopedic surgery, and urology. The available evidence suggests that eConsults may decrease the number of patients who are scheduled to receive an in-person appointment with a specialist and reduce wait times for those patients who are referred to see a specialist.

Summary of General Findings for Electronic Referral and Consultation Systems

A summary of the findings of the literature review conducted for “The Use of eConsults for Cardiology Referrals” is presented in Table 3.

⁹⁶ Carrns A. Doctors Advised on E-Mail ‘visits.’ *The Wall Street Journal*, Eastern edition, December 4, 2002, D3.

⁹⁷ The Ophthalmic Mutual Insurance Company maintains a 2010 version of the eRisk Health Group’s guidelines on its website, www.omic.com. This document is entitled “Medical eRisk Considerations for Online Communication 2010 Update,” available at: <http://www.omic.com/wp-content/uploads/2012/12/Medical-eRisk-Considerations-for-Online-Communication-2010.docx> (accessed August 27, 2014).

⁹⁸ McKoy K, Norton S, Lappan C, (April 2012). Quick Guides for Store-Forward Teledermatology and Live-Interactive Teledermatology for Referring Providers. American Telemedicine Association.

⁹⁹ UConn Health, Center for Public Health and Health Policy; 2014. The Use of eConsults for Cardiology Referrals: A Policy Report for the University of Connecticut-Medicaid Partnership. Farmington, CT.

Table 3. “The Use of eConsults for Cardiology Referrals.” Summary Findings from the Effectiveness Literature Review.

Potential Benefits	Unintended Negative Outcomes and Unresolved Issues
<ul style="list-style-type: none"> ♦ Use of a specialist reviewer increases the capacity for PCPs to treat patients, increases efficiency of specialist visits when they do occur, and reduces the number of specialist visits. ♦ Electronic referral, electronic consultation and other store-and-forward systems, in most cases, led to decreases in the length of time a patient waited between initiation of referral request and a patient visit with a specialist. ♦ Electronic referral systems can improve communication between PCPs and specialists. <ul style="list-style-type: none"> – Specialists are more likely to receive a clear consultation question/reason for referral. – Specialists receive more complete patient history and fuller workup prior to patient visit, thereby reducing specialty visit follow-up requests. – Specialist are more likely to receive a complete consult request through an electronic system, compared to paper-based system. – Specialist are more likely to send information back to PCP following an examination in the electronic system. 	<ul style="list-style-type: none"> ♦ Long-term effects on patient health are unknown, though there is some evidence to suggest that some health issues go unnoticed when using a specialist reviewer rather than a full F2F or virtual examination. ♦ PCPs report an increased work burden from making an electronic referral. ♦ Systems have faced resistance to adoption when expanding from pilot phases to wider implementation. ♦ The extent to which the specialist reviewer is responsible for the health of the patient or liable for inappropriate recommendations is unclear. ♦ Electronic communication raises issues of patient privacy because medical information must be sent to a physician with whom the patient may not establish a usual doctor-patient relationship.

Reported Outcomes for the Five Specialties

We discovered five relevant articles that reported outcome data specific to at least one of the five focus specialties. These articles examined three distinct eConsult systems. We discovered no articles that estimated the costs of implementing eConsults for any specific specialty. The results of a sixth article, Warshaw *et al.* (2011), which reviewed several studies of teler dermatology, is also included. Unlike eConsults, teler dermatology involves a distant specialist conducting a full examination of the patient, though the exam is conducted virtually rather than in-person.

The system that most closely resembles the proposed eConsult system in Connecticut is that operated by San Francisco General Hospital (SFGH), and is named eReferral. eReferral was also the basis of the most comprehensive eConsults study we discovered, an evaluation conducted by the RAND Corporation for the

Agency for Healthcare Research and Quality.¹⁰⁰ Other results were available from Los Angeles County's public health care system and from Erne Hospital in Northern Ireland. San Francisco General Hospital has approximately 500,000 outpatient visits per year, the majority of which are publicly insured or uninsured.¹⁰¹ Los Angeles County's public health care system serves more 800,000 individuals.¹⁰² The authors of the study at Erne Hospital did not provide the number of outpatient visits or the population of its service area, but, presumably, it is much smaller than the subjects of the U.S.-based studies.¹⁰³

Avoided specialist visits

Bell *et al.* (2012) reported the number of referral requests and the percentage of those requests that resulted in a visit to the intended specialist in gastroenterology, neurology, orthopedic surgery and urology. In this study, a small number of patients ultimately saw a different type of specialist than that identified in the original request, but these are treated separately. It labels all referral requests that did not initially receive a recommendation from the specialist reviewer for a referral as "Not Initially Scheduled." Some of these patients ultimately did see a specialist, but only after the PCP conducted tests or provided other care recommended by the specialist reviewer. The subset of referrals that did not result in a specialist visit within 180 days after the referral request was termed "Never Scheduled." Many of the "Not Initially Scheduled" referrals may represent avoided initial visits with a specialist that would have been inconclusive due to inadequate preparation. The "Never Scheduleds" may represent the proportion of patients whose cases were adequately managed by their physicians with the advice of the specialist alone, and therefore avoided visits to a specialist that would occur under a traditional referral system. The range of "Never Scheduled" among the focus specialties extended from 4.4 percent of referral requests in neurology to 25.3 percent for gastroenterology.¹⁰⁴

Inform Change, a private consulting firm based in Berkley, California, reviewed Los Angeles County's eConsult system for the Blue Shield of California Foundation. The study provides the number of electronic referrals from the program's initiation in August, 2012 until September 2013. They also provide a proportion of referral requests that they label "% reduction of in-person visits." It is unclear what this percentage represents, but it may be similar in concept to SFGH's "Not Initially Scheduled" group. Data are available for dermatology, neurology (adults), gastroenterology and urology. The percent of not scheduled ranged from 31% for gastroenterology to 59% for neurology.¹⁰⁵

Patterson *et al.* (2004) examined an older system in Northern Ireland that used email to make referrals, but did not employ a specialist reviewer to screen referral requests and determine their appropriateness. Instead, the PCP (called a GP in Northern Ireland) emailed a neurologist directly with the clinical question. The researchers found that the email system resulted in PCPs handling 45% of the issues raised in the emails

¹⁰⁰ Bell D, Straus S, Wu S, Chen A, Kushel M. Use of an electronic referral system to improve the outpatient primary care – specialty care interface: Final Report. (Prepared by RAND Corporation). *AHRQ*, 2012;Publication no. 11(12)-0096-EF. Rockville, MD: Agency for Healthcare Research and Quality.

¹⁰¹ Chen A, Kushel M, Gumbach, Yee H. A safety-net system gains efficiencies through 'eReferrals' to specialists. *Health Affairs*, 2010;29(5):969-971.

¹⁰² Bergman J, Neuhausen K, Chamie K, Scales C, Carter S, Kwan L, Kerman S, Aronson W, Litwin M. Building a medical neighborhood in the safety net: An innovative technology improves hematuria workups. *Urology*, 2013;82: 1277-1282.

¹⁰³ Patterson V, Humphreys J, Chua R. Email triage of new neurological outpatient referrals from general practice. *Journal of Neurology, Neurosurgery, and Psychiatry*, 2004;75:617-620.

¹⁰⁴ Bell D, Straus S, Wu S, Chen A, Kushel M. Use of an electronic referral system to improve the outpatient primary care – specialty care interface: Final Report. (Prepared by RAND Corporation). *AHRQ*, 2012;Publication no. 11(12)-0096-EF. Rockville, MD: Agency for Healthcare Research and Quality.

¹⁰⁵ Sheridan R and Howard K. Mission Possible: Healthcare Safety Net Integration (Prepared by Informing Change for Blue Shield of California Foundation (September 2013), available online at: <http://informingchange.com/cat-publications/mision-possible-healthcare-safety-net-integration> (accessed August 29, 2014).

with advice from the specialist alone, without the patient making an appointment to see the specialist.¹⁰⁶

Table 4 displays specialty-specific results from the eReferral program, eConsult program, and email referral system. Three specialties, gastroenterology, neurology, and urology had results from more than one program. Though each study shows that an in-person specialist visit is not always scheduled following the referral, the proportions of avoided visits vary substantially by study. These diverse outcomes may be due to differences in program design, intervention population, or measurement.

Table 4. Examples of specialty-specific referral systems				
	eReferral program, San Francisco General Hospital	eConsult program, Los Angeles County	Email referral system, Northern Ireland	
	Never scheduled*	Not initially scheduled	Not scheduled**	Resolved with advice alone
Dermatology	n/a	n/a	40%	n/a
Gastroenterology	25%	35%	31%	n/a
Neurology	4%	9%	59%	45%
Orthopedic Surgery	19%	33%	n/a	n/a
Urology	19%	32%	37%	n/a

* “never scheduled” is a subset of “not initially scheduled”
 **labeled “% Reduction of In-Person Visits” in original.

While these systems have all reported that a substantial proportion of referral requests were resolved without sending the patient to the specialist, it is not clear whether these actually constitute avoided visits to a specialist when compared to traditional referral systems. The eConsults system may encourage PCPs to ask more questions of specialists than they otherwise might, and these additional questions might account for some of the “Never Scheduled” group. Patterson *et al.* (2004) suggested this possibility in their study.¹⁰⁷ Palen *et al.* (2012) estimated that one half of questions PCPs would like to send to specialists remain unasked in a traditional referral system.¹⁰⁸ There is some evidence from New Zealand that total referral requests did, indeed, increase noticeably in the year following the implementation of an eConsult system.¹⁰⁹

Wait Times

The literature also suggests that wait times have decreased after the implementation of eConsults in the focus specialties. Bell *et al.* (2012) found that median wait times to see a specialist declined in the first six months after implementation of eReferral for the four focus specialties included in that study. The report provides a graph visually depicting the differences in wait times, though it does not provide the actual times for the focus specialties.¹¹⁰

In a separate study, researchers connected with SFGH reported that the average wait time to see a

¹⁰⁶ Patterson V, Humphreys J, Chua R. Email triage of new neurological outpatient referrals from general practice. *Journal of Neurology, Neurosurgery, and Psychiatry*, 2004;75:617-620.

¹⁰⁷ Ibid.

¹⁰⁸ Palen T, Price D, Shetterly S, Wallace K. Comparing virtual consults to traditional consults using an electronic health record: An observational case-control study. *BMC Medicaid Informatics and Decision Making*, 2012;12:65.

¹⁰⁹ Warren J, White S, Day K, Gu Y, Pollock M. Introduction of electronic referral from community associated with more timely review by secondary services. *Applied Clinical Informatics*, 2011;2:546-564.

¹¹⁰ Bell D, Straus S, Wu S, Chen A, Kushel M. Use of an electronic referral system to improve the outpatient primary care – specialty care interface: Final Report. (Prepared by RAND Corporation). *AHRQ*, 2012, Publication no. 11(12)-0096-EF. Rockville, MD: Agency for Healthcare Research and Quality.

gastroenterologist decreased from eleven months to four months after the adoption of eReferrals.¹¹¹ Bergman *et al.* (2013) found that wait times between an initial urinalysis documenting hematuria to a completed hematuria workup decreased from an average of 404 days before eReferral to 192 after.¹¹²

In a review of studies examining teledermatology, Warshaw *et al.* (2011) found that the studies reported at least some reduction in wait times after the implementation of the virtual patient examinations characteristic of that telehealth application.

Table 5. Wait times			
Specialty / location / source	Paper System	Electronic System	Change in Wait times
Urology (Los Angeles County) ¹¹³	404 days	192 days	212 day reduction
Gastroenterology (San Francisco General Hospital) ¹¹⁴	11 months	4 months	7 month reduction (approximately 210 days)
Dermatologists ^{115*} (multiple locations)	48 to 88.6 days	4 to 13 days	44 to 76.3 day reduction

*The dermatology articles reviewed by Warshaw *et al.* (2011) examine store-and-forward virtual examinations. The difference in wait times compared in these articles, then, is the difference between receiving a virtual examination and an in-person examination, rather than the difference between using a paper-based system and an electronic system to make a specialist referral.

While there is a paucity of studies measuring the outcomes associated with adoption of eConsults, the extant evidence does suggest that adoption of an eConsults system might lead to a reduction in the proportion of patients who are sent to see a specialist, and a reduction in wait times to see the specialist for those patients for whom the specialist reviewer deems a specialist visit appropriate.

METHODS

This report explores the potential impact of the Connecticut Medicaid Program adopting an eConsults approach for dermatology, gastroenterology, neurology, orthopedic surgery, and urology referrals made by PCPs for their adult patients. To estimate the potential impact of eConsults on the cost of care received, we developed a Specialty Referral eConsults Simulation Model (SReSM) and analyzed Connecticut Medicaid claims data. The SReSM was informed by our review of relevant literature.

Specialty referral eConsults simulation model. The Specialty Referral eConsults Simulation Model (SReSM) was designed to project the potential impact of eConsults on health care utilization and costs despite the limited evidence base for such estimates. The SReSM is intended for the user to run simulations to see how a range of values, when used for given utilization and cost criteria, influence the projected outcome.

SReSM structure. The basic structure of SReSM is informed by a RAND Corporation report on the eReferral program. The eReferral program, developed by University of California San Francisco and San

¹¹¹ Chen A, Murphy E, Yee H. eReferral – a new model for integrated care. *New England Journal of Medicine*, 2013;368(26):2450-2453.

¹¹² Bergman J, Neuhausen K, Chamie K, Scales C, Carter S, Kwan L, Kerman S, Aronson W, Litwin M. Building a medical neighborhood in the safety net: An innovative technology improves hematuria workups. *Urology*, 2013;82: 1277-1282.

¹¹³ Ibid.

¹¹⁴ Chen A, Murphy E, Yee H. eReferral – a new model for integrated care. *New England Journal of Medicine*, 2013;368(26):2450-2453.

¹¹⁵ Warshaw E, Hillman Y, Greer N, Hagel E, MacDonald R, Tutks I, Wilt T. *Journal of the American Academy of Dermatology*, 2011;64: 759-772.

San Francisco General Hospital for use with area PCPs, is a web-based referral and consultation program used for San Francisco's safety net system. It has been evaluated for use in nine medical specialties, including gastroenterology and neurology, and six surgical specialties, including orthopedic surgery and urology. Using the same approach as the eReferral program, the SReSM categorizes referrals into three groups: unnecessary to see a specialist, premature to see a specialist, or appropriate to see a specialist.

Categorization differs based on whether or not a patient is recommended to see a specialist when first reviewed by the specialist reviewer or at a subsequent date.

- ◆ Patients are considered “unnecessary to see a specialist” if the patient is not recommended for an appointment at the initial or any follow-up review within six months. For these patients, the specialist reviewer may request additional information or procedures to be provided by the PCP, but none of this follow-up leads to a specialist appointment recommendation. In some cases, the specialist reviewer may recommend care management be delivered by the PCP, which, in turn, requires PCP office visits.
- ◆ Patients are considered “premature referrals” if the patient is not recommended at the initial appointment but is recommended during any follow-up review within six months. These are patients for whom the specialist reviewer determined the initial information provided by the PCP as incomplete or had additional procedures rendered at the PCP level. Once the PCP work up was complete, the specialist appointment was then considered necessary.
- ◆ Patients are considered “appropriate referrals” if the patient is recommended at the initial specialist review without needing additional information from the PCP. The eReferral program allowed patients with more severe symptoms to be scheduled sooner, using an “overbook” function.

Note that whether a PCP or specialist delivers care to these patients following an eReferral review differs by category. Within this system, those recommended for a F2F appointment with a specialist included appropriate referrals and premature referrals. Patients with PCP follow-up as a result of the eReferral included those for whom it was unnecessary to see a specialist and where the referral was premature.

Parameters and simulations. The SReSM, built in Microsoft Excel, includes a total of 12 model parameters to estimate how patient referrals flow through the PCP-specialty referral process and the associated costs of those referrals. The user can vary each of these values through the SReSM User Interface (Figure 2). There are seven patient flow parameters: two address the number of specialty referrals, one is for the proportion of patients seen by a specialist under the traditional approach to referrals, and the remaining four address patient flow for the eConsults approach. These allow the user to model the outcome of the specialist review, the extent to which patients are seen by a specialist at a F2F appointment, and whether PCP follow-up is recommended and received as a result of the specialist review. The remaining five parameters are for the cost of care. They include a per patient referral incentive for the PCP, a per patient review payment rate for the specialist reviewer, average cost of a PCP visit, average cost of the specialist visit, and average cost of transportation for patients seen at an office visit.

Figure 2. Specialty Referral eConsults Simulation Model (SReSM)—User Interface

Patient Flow and Cost Criteria	Model Input Value	Input Value Options	Recommended Range
Referral Volume		≥1	≥1 to 4,600
Percent of referrals for which an eConsult is completed		0-100%	90-100%
Usual Care Approach—specialty care utilization			
Percent of referrals seen at office visit		0-100%	60-95%
eConsult Approach—specialty care utilization			
Outcome of eConsult review			
“Unnecessary Referral” — Percent not recommended for F2F within six months of eConsult review		0-100%	4-75%
Percent of F2F recommended who were premature referral		0-100%	4-18%
Percent of recommended patients seen F2F by specialist		0-100%	60-90%
eConsult Approach—PCP utilization			
Percent of premature and unnecessary referral w/ PCP follow-up		0-100%	0-75%
COST PARAMETERS			
Transportation, (cost per participant seen at office visit)		\$0 to \$4.00	\$1.75 to \$4.00
eConsult rate: PCP Incentive		\$0 to \$50	\$0 to \$15
eConsult rate: Specialist reviewer		\$0 to \$50	\$25 to \$36
Specialist care, average cost		\$50 to \$300	\$95 to \$158
PCP visit code only, average cost		\$55 to \$60	\$55 to \$60

The values entered by the user for all of these parameters are then incorporated in formulas embedded within the SReSM to generate estimates. The SReSM projections output shows how patients would flow through the referral process under the Usual Care approach of referral-to-appointment and the eConsults approach of referral-to-specialist reviewer. The number of patients who see a specialist at an office visit is estimated for both approaches. Under the eConsults approach, patients are categorized based on the eConsult specialist reviewer’s determination of 1) unnecessary to see a specialist (not recommended for a F2F specialist visit) or 2) specialist visit recommended. Patients with a F2F specialist visit recommended are then categorized as appropriate referrals or premature referrals. The number of patients receiving PCP follow-up is also estimated. In addition, the estimated cost of care provided by the specialist, the PCP, and overall is shown for both approaches. The difference in total cost between these approaches is the projected budget impact for DSS under the assumptions entered in the SReSM. Due to the limited evidence base, changes in quality of care are not estimated through the SReSM.

The objective of the SReSM is for the user to run budget impact simulations and see how a range of values, when used for patient flow and cost criteria, influence the projected outcome. Three simulations, labeled A, B, and C are included in the SReSM. These simulations use a range of values for four of the criteria considered to have the greatest potential for impact patient flow and cost projections. These include:

- ◆ Proportion of patients seen by a specialist under Usual Care

- ♦ Proportion of patients not recommended for a specialist appointment under eConsults
- ♦ Proportion of patients seeing a PCP for follow-up care following the specialist reviewer under eConsults
- ♦ The average cost paid for PCP-referred specialist visit(s)

Table 6 shows how these patient flow and cost criteria are varied for the budget impact simulations.

Table 6. Patient flow and cost criteria for the budget impact simulations					
Simulation		Patient Flow and Cost Criteria			
Name	Output	Usual Care	eConsult		Specialist visit cost
	(# of tables)	Percent of patient referrals seen by specialist	Percent not recommended for a specialist visit	Percent with PCP follow-up	
A	1	Varies from 60 to 80%	Varies from 4 to 75%	User Interface value	User Interface value
B	8	Same as above	Same as above	Varying at 10% increments from 0 to 70%	User Interface value
C	16	Same as above	Same as above	User Interface value	Varying in \$10 increments from \$55 to \$205

Because of both the limited data available in the literature and the limited information in the Medicaid claims data, the accuracy of the specific cost values generated by the SReSM is unknown. Specifically, data obtained from descriptions and evaluations of other electronic consultation programs are of unknown generalizability to eConsults. Many factors influence the generalizability of data from the literature including 1) the similarity of the identified eConsults programs to what Connecticut Medicaid may adopt, and 2) the similarity of participating patients in terms of age, race, socioeconomic status, and/or diagnosis to those in the CT Medicaid population who would participate in eConsults. In addition, the Medicaid claims data were used to determine average paid costs for specialist visits and procedures used in the SReSM. However, average costs may not accurately reflect true costs because the health care costs of patients who need F2F visits with specialists may differ greatly from those of patients who can be managed with eConsult directed care. In addition, potential procedural improvements resulting from eConsult directed care might eliminate inefficiencies in the Usual Care system, such as duplicate tests. Any such cost savings due to increased efficiencies would not be captured in SReSM cost projections.

Because of these limitations, the greatest value of the SReSM cost projections in evaluating the potential impact of the eConsults patient care model is in the illustration of the relative impacts of the various components of the budget impact simulations described above, and their implications for future research. For example, in the Findings section, the SReSM demonstrates how increases in the proportion of patients seeing a PCP for follow-up care following the specialist reviewer increases the short-term cost of the eConsults patient care model. Or, as another example, higher average costs paid for PCP-referred specialist visits result in greater cost savings from the eConsults relative to Usual Care. Thus, when considering the import of the SReSM results presented in this report, it is important to remember that the SReSM is most useful in exploring relative costs and highlighting opportunities for further investigation.

Medicaid Data Analysis

Connecticut Medicaid data was used to identify medical utilization and the reimbursed medical costs for Medicaid recipients who were potential candidates for a specialty care eConsult in one of five specialties. A patient considered eligible for eConsults was aged 18 to 65 and had a paid medical claim for a non-urgent outpatient visit to a dermatology, gastroenterology, neurology, orthopedic surgery, or urology specialist within six months following a visit to a PCP (termed “PCP referral”). Patients with Charter Oak coverage were excluded. We examined the frequency of a first specialist visit and follow-up visits with the specialist within the six weeks following the initial specialist visit, the wait time between the PCP visit and first specialist visit, the costs of the PCP and the specialist visits, the costs of procedures that occurred at the first specialist visit and those that occurred at a follow-up specialist visit within six weeks of the first visit.

Analyses were limited to new specialist visits after a “PCP referral.” Specialist visits were categorized as new if the provider specialist was one of the 5 listed above and the CPT procedure code for the visit was in the following ranges: 99201-99205, or 99241-99245. We examined claims between 3/1/2012 and 2/28/2013. For specialist visits occurring in March 2012, this allowed 2 months (January and February 2012) prior to the analysis period to determine if a PCP visit had occurred prior to the specialist visit.

PCP visits were defined as a visit with a Medicaid-designated PCP or any provider with the same billing number as a PCP who was not a provider in the specialty of interest for the analysis. Using claim data, there is no way to confirm that these PCP visits resulted in referrals to the specialist. For the purposes of the analyses, we assumed that any new specialist visit within six months of a PCP visit was the result of a referral. Thus, our estimates of PCP referral rates for the 5 specialties could be higher than actual referral rates. Our estimates may also be higher because we did not account for other incidents, such as ED or hospital visits, that occurred between the PCP and specialist visits and may have resulted in specialty care.

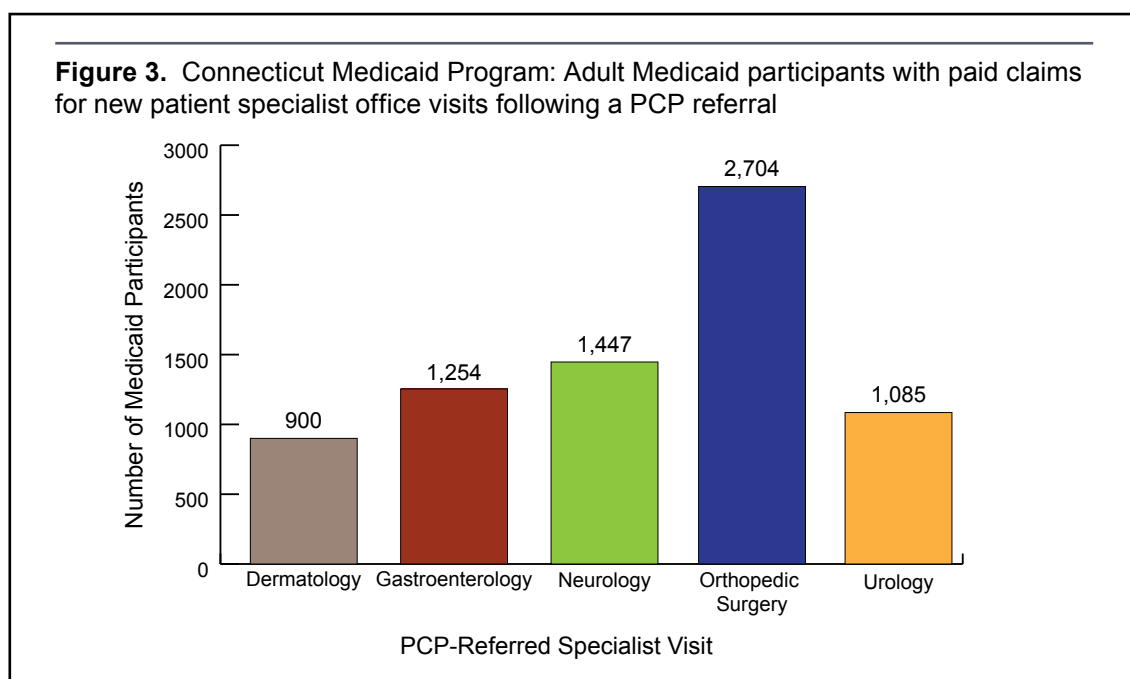
The time between the PCP visit and the specialist visit was considered as the wait time for a specialist appointment. Patients’ wait times were limited to six months due to the constraint of the 6 month look-back period between the PCP and specialist visit. Additionally, the estimates of the wait times may be higher or lower than the actual wait times depending upon which of the visits were the result of actual referrals.

FINDINGS

This section has been divided into three parts for ease of understanding. Part One compares the expenses and average paid costs across the five specialties of interest: dermatology, gastroenterology, neurology, orthopedic surgery, and urology. The comparisons include the number of PCP-referred specialty visits, total and average paid costs, and wait times (days between the PCP visit and specialist visit). Part Two examines each individual specialty and includes more details on costs, wait times by county, and procedures performed within six weeks of the first specialist visit after the PCP visit. All costs, number of specialty and PCP visits, wait times, and procedure frequencies are derived from paid Medicaid claims data. Finally, budget impact projections using the Specialty Referral eConsults Simulation Model (SReSM) are presented for each specialty in Part Three.

Part One: Comparison of patients, expenses and average paid costs by specialty

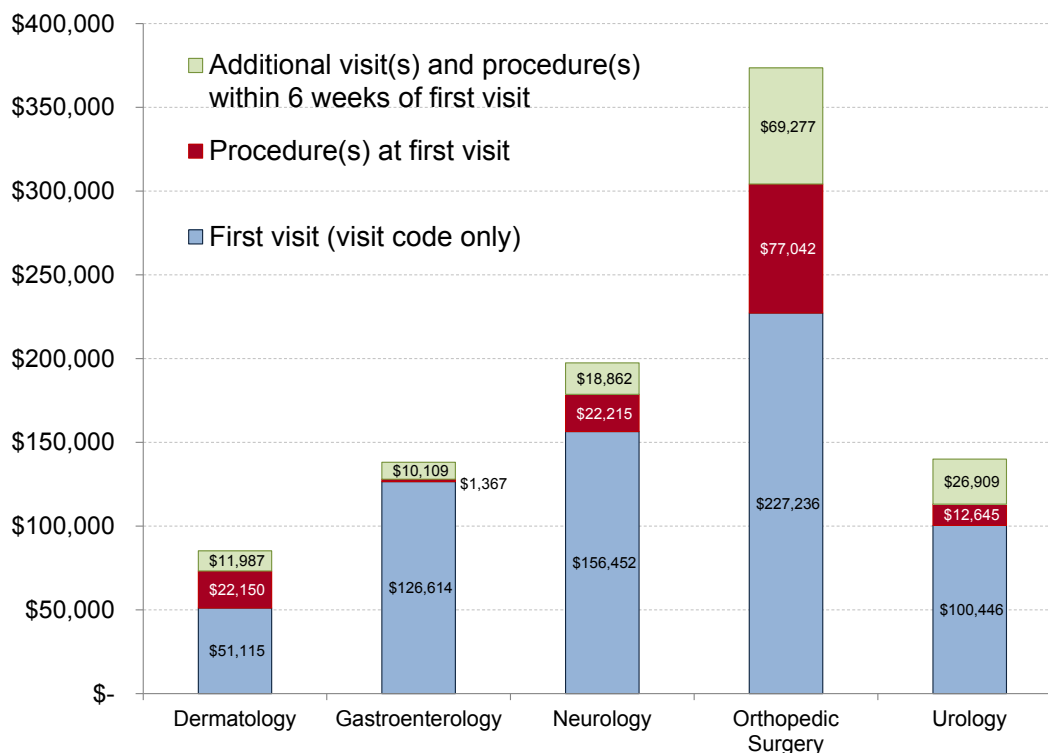
Specialist visits following a PCP referral. Figure 3 shows the number of PCP-referred patients for each of the five specialties. Orthopedic surgery had approximately 2 to 3 times as many patients as the other four specialties. Dermatology had the fewest PCP-referred patients, possibly because PCPs treat many dermatological problems or many referrals made by PCPs do not result in patients being seen.



Total paid costs. For each specialty, Figure 4 shows the total paid costs of each new patient office visit. Costs are divided into three parts: costs of first visit (visit code only), procedure costs at first visit, and follow-up costs at specialist visits during the subsequent six weeks. Total spending largely reflects of the number of patients seen—orthopedic surgery had the highest total spending (\$373,555), neurology was second at almost \$200,000, and dermatology was lowest at \$85,253.

Across all specialties, the largest paid cost is the initial visit code or consultation code used for the appointment. This accounts for a low of sixty percent of total paid costs at the first visit and subsequent visits within six weeks for dermatology and orthopedic surgery, to a high of 92 percent for gastroenterology. Paid claims for procedures at the first visit contributed far less to overall cost, varying from 1 percent for gastroenterology to 26 percent for dermatology.

Figure 4. CT Medicaid Program: Total Paid Costs for Adult New Patient Specialist Office Visits following PCP Referral, 3/1/2012-2/28/2013

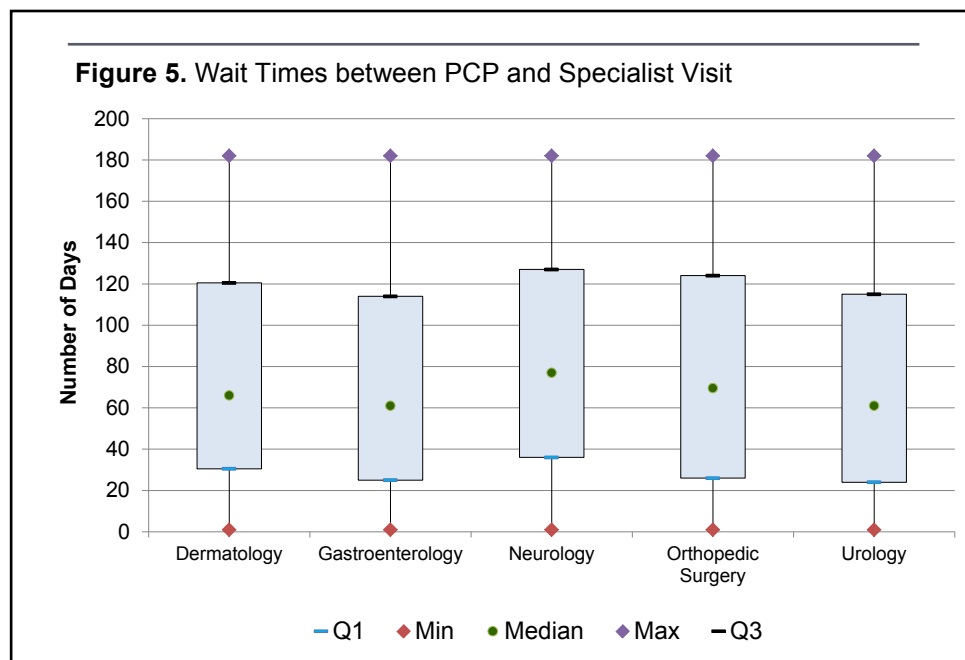


Average Paid Costs. The average paid costs for the first specialist visit and follow-up specialist visits within six weeks varied from \$95 to \$138 (Table 7). A more conservative estimate of average paid cost includes only costs from the first visit cost. These costs varied from \$81 to \$123. Orthopedic surgery and neurology had the highest 6-week total costs at \$138 and \$137, respectively. In contrast, using only the costs at the first visit, neurology had a higher average cost than orthopedic surgery (\$123 versus \$113). Cost for the preceding PCP visit (visit code only) varied slightly from \$57 to \$60.

Table 7. Average Paid Costs for Adult New Patient Specialist Office Visits following PCP Referral, 3/1/2012 – 2/28/2013

	Dermatology	Gastroenterology	Neurology	Orthopedic Surgery	Urology
First specialist visit <u>and</u> any follow-up specialist visit(s) within six weeks	\$94.73	\$110.12	\$136.51	\$138.15	\$129.03
First specialist visit	\$81.41	\$102.06	\$123.47	\$112.53	\$104.23
Visit code only	\$56.79	\$100.97	\$108.12	\$84.04	\$92.58
PCP-visit	\$56.77	\$59.86	\$59.11	\$58.04	\$58.93

Wait Times. The wait times - number of days between the PCP visit and the specialist visit – for each specialty are shown in Figure 5. Patients waited the longest for appointments with neurologists and orthopedic surgeons. The median wait time for these specialties was 77 and 70 days. Wait times for appointments with urologists and gastroenterologists were two weeks shorter.



Part Two: Specialty-specific findings for utilization and cost

Dermatology

In the research conducted for this report, no data source was identified for the number of PCP referrals made to dermatologists for new adult patients in Connecticut. Results from the analysis of Medicaid data from March 1, 2012 through February 28, 2013 suggest 900 Medicaid participants were seen by a dermatologist for a new patient visit within six months following a PCP visit. The PCP may or may not have referred the 900 patients seen by a dermatologist. Further, the actual number of PCP-referred patients may be significantly greater than those actually seen.

The Connecticut Medicaid Program paid \$85,253, or an average of \$94.73, per new patient for the first dermatology visit and any follow-up dermatology visits occurring within six weeks of the first visit (Table 8). Sixty percent of this amount was billed for the new patient evaluation or consultation CPT code at the first dermatology visit; 25.9 percent of spending (\$22,151) was for procedures at the first visit, and just 14.1 percent (\$11,987) was for additional visits and procedures within six weeks of the first visit.

Table 8. Total Costs for Dermatology Visits following PCP Referral (n=900 unique recipients), March 1, 2012-February 28, 2013

Type of Care	Total Paid Cost	Average Paid Cost
First visit	\$73,266 (85.9%)	\$81.41
First visit, visit code only	\$51,115 (60.0%)	\$56.80
Procedure(s) at first visit	\$22,151 (25.9%)	\$24.61
Additional visit(s) and procedure(s) within six weeks of first visit	\$11,987 (14.1%)	\$13.32
First specialist visit <u>and</u> any follow-up specialist visit(s) w/in six weeks	\$85,253 (100%)	\$94.73

Table 9 shows the mean and median wait times – number of days between the PCP visit and the first dermatology visit. Overall, the median wait time was 66 days, meaning that half of the patients waited more than 66 days for their specialist visit. In contrast, the mean wait time, at 77 days, indicates that wait times were skewed and some patients waited much longer. Patients who lived in New Haven and Litchfield counties had the longest wait times with median waits of 76 and 80 days, respectively. Tolland and Middlesex counties had the shortest wait times, 34 and 48 days respectively. However, very few sampled patients lived in these latter counties and the numbers should be verified with a larger sample. Among the counties with more than 50 sampled patients, Hartford County had the lowest median wait time—55 days. All other counties had similar wait times of between 63 and 70 days.

Table 9. Wait times for Dermatology visit by county, 3/1/2012 – 2/28/2013			
County	Number of recipients	Mean days	Median days
Fairfield	251	77	66
Hartford	159	72	55
Litchfield	103	82	80
Middlesex	15	57	48
New Haven	213	83	76
New London	80	71	70
Tolland	6	37	34
Windham	72	78	63
Missing	1	6	6
Overall	900	77	66

It may be reasonable to assume that patients who undergo procedures or attend more than one appointment may be recommended for additional PCP follow-up or a F2F dermatology appointment under eConsults. On the other hand, it is also possible that the first visit with a specialist may be inefficient due to incomplete medical history, not having a translator available or other factors. In turn, this could lead to a less productive first visit and a delay of any procedures taking place.

Table 10 shows the proportion of new dermatology patients who had procedures at the first visit or a follow-up visit. A total of 263 patients (29 percent) with a dermatology visit had paid claims for one or more procedures. The vast majority of these patients, 243, had their first procedure at the first dermatology visit. Only 20 of the 263 patients with procedures had their first procedure at a follow-up visit. Given that only 20 (2.2 percent) of patients had their first procedure at a follow-up visit, it does not appear that there is an issue with inefficient first visits delaying the delivery of procedures. Very few patients, 23, had procedures at both the first visit and a follow-up visit.

Table 10. Number of New Dermatology Patients with Procedures, 3/1/2012 – 2/28/2013			
	One or more	No procedures	Total
Patients with procedures at first or follow-up visit			
Procedures at first or follow up	263	637	900
First procedure(s) at first visit	243	657	900
First procedure(s) at follow-up visit	20	637	657
Patients who had a procedure at both visits			
Procedure(s) at first visit and follow-up visit(s)	23	220	243

Table 11 shows the CPT codes of the five procedures that occurred most often at a dermatology visit. Biopsies of skin, subcutaneous tissue and/or mucous membrane (11100 and 11101) and pathology examination of tissue using a microscope (88305) accounted for sixty percent of dermatological procedures. Wart removal (17110) and injection of triamcinolone acetonide (J3301) were also in the top five.

Table 11. Five Most Frequent Dermatology Procedures at First Visit, 3/1/2012 – 2/28/2013

CPT Procedure Code	Frequency	Percent
11100	129	31.4
88305	90	21.9
17110	51	12.4
11101	30	7.3
J3301	25	6.1

Figure 6. Number of dermatology office visits within six weeks of first visit (including the first visit); Number of patients: n=900

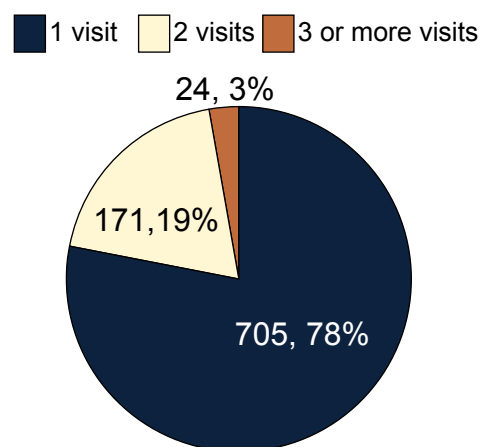


Figure 6 shows the distribution of new patients with one or more dermatology office visits within six weeks of their first visit. Nearly four out of five new patients (78 percent) had only the first office visit. Only 195 new patients (22 percent) had more than one office visit soon after the first, of which just 24 patients had three or more visits.

Gastroenterology

In the research conducted for this report, no data source was identified for the number of PCP referrals made to gastroenterologists for new adult patients in Connecticut. Results from the analysis of Medicaid data from March 1, 2012 through February 28, 2013 suggest 1,254 Medicaid participants were seen by a gastroenterologist for a new patient visit within six months following a PCP visit. The PCP may or may not have referred the 1,254 patients seen by a gastroenterologist. Further, the actual number of PCP-referred patients may be significantly greater than those actually seen.

The Connecticut Medicaid Program paid \$138,090, or an average of \$110.12, per new patient for the first gastroenterology visit and any follow-up gastroenterology visits occurring within six weeks of the first visit (Table 12). Virtually all of this amount (92.7 percent) was billed for the new patient evaluation or consultation CPT code at the first gastroenterology visit. Only 1 percent of spending (\$1,367) was for procedures at the first visit, and just 7.3 percent (\$10,109) was for additional visits and procedures within six weeks of the first visit.

Table 12. Total Costs for Gastroenterology Visits following PCP Referral (n=1,254 unique recipients), March 1, 2012-February 28, 2013

Type of Care	Total Paid Cost	Average Paid Cost
First visit	\$127,981 (92.7%)	\$102.06
First visit, visit code only	\$126,614 (91.7%)	\$100.97
Procedure(s) at first visit	\$1,367 (1.0%)	\$1.09
Additional visit(s) and procedure(s) within six weeks of first visit	\$10,109 (7.3%)	\$8.06
First specialist visit <u>and</u> any follow-up specialist visit(s) within six weeks	\$138,090 (100%)	\$110.12

Table 13 shows the mean and median wait times – number of days between the PCP visit and the first gastroenterology visit. Overall, the median wait time was 61 days, meaning that half of the patients waited more than 61 days for their specialist visit. In contrast, the mean wait time, at 76 days, indicates that wait times were very skewed and some patients waited much longer. Patients who lived in Windham, Litchfield and Tolland counties had the longest wait times with median waits of 79, 78 and 74 days, respectively. Fairfield and New London counties had the shortest wait times, 45 and 49 days respectively. All other counties had similar wait times of between 59 and 64 days.

Table 13. Wait times for Gastroenterology visit by county, 3/1/2012 – 2/28/2013			
County	Number of recipients	Mean days	Median days
Fairfield	41	76	45
Hartford	345	80	64
Litchfield	43	75	78
Middlesex	166	71	61
New Haven	528	59	59
New London	41	75	49
Tolland	47	87	74
Windham	43	73	79
Overall	1,254	76	61

It may be reasonable to assume that patients who undergo procedures or attend more than one appointment may be recommended for additional PCP follow-up or a F2F gastroenterology appointment under eConsults. On the other hand, it is also possible that the first visit with a gastroenterologist may be inefficient due to incomplete medical history, not having a translator available or other factors. In turn, this could lead to a less productive first visit and a delay of any procedures taking place.

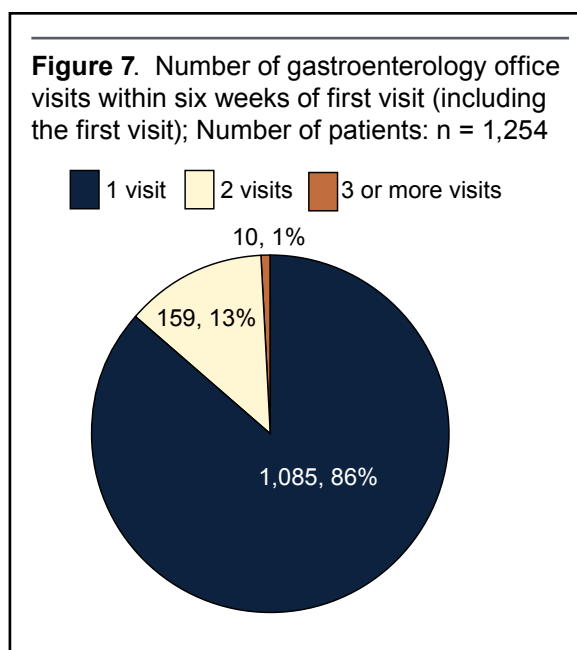
Table 14 shows the proportion of new gastroenterology patients who had procedures at the first visit or a follow-up visit. Only 43 patients (3.4 percent) with a gastroenterology visit had paid claims for one or more procedures, with 37 of them at the first visit. Only 6 of the 43 patients with procedures had their first procedure at a follow-up visit. Given that only six patients had their first procedure at a follow-up visit, it does not appear that there is an issue with inefficient first visits delaying the delivery of procedures. Only one patient had procedures at both the first visit and a follow-up visit.

Table 14. Number of New Gastroenterology Patients with Procedures, 3/1/2012 – 2/28/2013			
	One or more	No procedures	Total
Patients with procedures at first or follow-up visit			
Procedures at first or follow up	43	1,211	1,254
First procedure(s) at first visit	37	1,217	1,254
First procedure(s) at follow-up visit	6	1,211	1,217
Patients who had a procedure at both visits			
Procedure(s) at first visit and follow-up visit(s)	1	36	37

Table 15 shows the CPT codes of the five procedures that occurred most often at a gastroenterology visit. It is notable that so few procedures occurred within six weeks of the first visit. The top five procedures were fecal occult blood test, anoscopy, venipuncture, and esophagogastroduodenoscopy (EGD, both 43239 and 43255).

Table 15. Five Most Frequent Gastroenterology Procedures at First Visit, 3/1/2012 – 2/28/2013		
CPT Procedure Code	Frequency	Percent
82272	17	43.59
46600	8	20.51
36415	7	17.95
43239	3	7.69
43255	1	2.56

Figure 7 shows the distribution of new patients with one or more gastroenterology office visits within six weeks of their first visit. The majority of patients (86.5 percent) had only the first office visit. Of the remaining 13.5 percent, only 159 new patients (12.7 percent) had two office visits and only 10 had more than two visits.



Neurology

In the research conducted for this report, no data source was identified for the number of PCP referrals made to neurologists for new adult patients in Connecticut. Results from the analysis of Medicaid data from March 1, 2012 through February 28, 2013 suggest 1,447 Medicaid participants were seen by a neurologist for a new patient visit within six months following a PCP visit. The PCP may or may not have referred the 1,447 patients seen by a neurologist. Further, the actual number of PCP-referred patients may be significantly greater than those actually seen.

The Connecticut Medicaid Program paid \$197,529, or an average of \$136.51, per new patient referral for the first neurology visit and any follow-up neurology visits occurring within six weeks of the first visit (Table 16). Much of this amount (79.2 percent) was for the new patient evaluation or consultation CPT code at the first neurology visit; only 11.3 percent of spending (\$22,215) was for procedures at the first visit, and just 9.5 percent (\$18,862) was for additional visits and procedures within six weeks of the first visit.

Table 16. Total Costs for Neurology Visits following PCP Referral
(n=1,447 unique recipients), March 1, 2012-February 28, 2013

Type of Care	Total Paid Cost	Average Paid Cost
First visit	\$178,667 (90.5%)	\$123.47
First visit, visit code only	\$156,452 (79.2%)	\$108.12
Procedure(s) at first visit	\$22,215 (11.3%)	\$15.35
Additional visit(s) and procedure(s) within six weeks of first visit	\$18,862 (9.5%)	\$13.04
First specialist visit <u>and</u> any follow-up specialist visit(s) within six weeks	\$197,529 (100%)	\$136.51

Table 17 shows the mean and median wait times – number of days between the PCP visit and the first neurology visit. Overall, the median wait time was 77 days, meaning that half of the patients waited more than 77 days for their neurology visit. In contrast, the mean wait time, at 84 days, indicates that wait times were skewed and some patients waited much longer. Patients who lived in Litchfield and Tolland counties had the median wait times of 3 months. Fairfield and New London counties had the shortest wait times, 70 and 71 days respectively. All other counties had wait times between 77 and 85 days.

Table 17. Wait times for Neurology visit by county, 3/1/2012 – 2/28/2013			
County	Number of recipients	Mean days	Median days
Fairfield	131	80	70
Hartford	467	82	77
Litchfield	70	94	93
Middlesex	97	88	82
New Haven	323	84	77
New London	245	82	71
Tolland	69	90	91
Windham	43	87	85
Missing	2	149	149
Overall	1,447	84	77

It may be reasonable to assume that patients who undergo procedures or attend more than one appointment may be recommended for additional PCP follow-up or a F2F neurology appointment under eConsults. On the other hand, it is also possible that the first visit with a neurologist may be inefficient due to incomplete medical history, not having a translator available or other factors. In turn, this could lead to a less productive first visit and a delay of any procedures taking place.

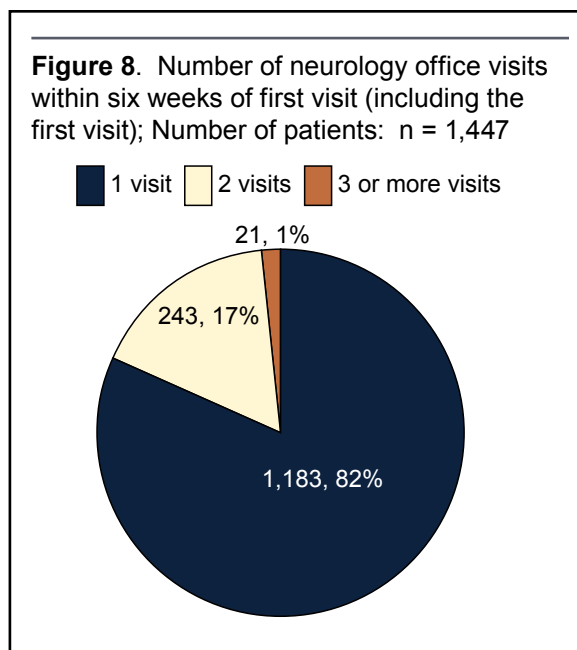
Table 18 shows the proportion of new neurology patients who had procedures at the first visit or a follow-up visit. Only 112 patients (7.7 percent) with a neurology visit had paid claims for one or more procedures, with 98 of them at the first visit. Only 14 of the 112 patients with procedures had their first procedure at a follow-up visit. Given that only fourteen patients had their first procedure at a follow-up visit, it does not appear that there is an issue with inefficient first visits delaying the delivery of procedures. Only six patients had procedures at both the first visit and a follow-up visit.

Table 18. Number of New Neurology Patients with Procedures, 3/1/2012 – 2/28/2013			
	One or more	No procedures	Total
Patients with procedures at first or follow-up visit			
Procedures at first or follow up	112	1,335	1,447
First procedure(s) at first visit	98	1,349	1,447
First procedure(s) at follow-up visit	14	1,335	1,349
Patients who had a procedure at both visits			
Procedure(s) at first visit and follow-up visit(s)	6	92	98

Table 19 shows the CPT codes of the five procedures that occurred most often at a neurology visit. Nerve conduction studies (95903, 95904, 95886) accounted for half of all procedures within six weeks of the first visit. Optical imaging (92083 and 92133) made up 16 percent of procedures.

Table 19. Five Most Frequent Neurology Procedures at First Visit, 3/1/2012 – 2/28/2013		
CPT Procedure Code	Frequency	Percent
95904	44	21.3
95903	35	16.9
95886	26	12.6
92083	18	8.7
92133	16	7.7

Figure 8 shows the distribution of new patients with one or more neurology office visits within six weeks of their first visit. The majority of patients (81.8 percent) had only the first office visit. Of the remaining 18.2 percent, only 243 new patients (16.8 percent) had two office visits and 21 patients had more than two visits within the six weeks.



Orthopedic Surgery

In the research conducted for this report, no data source was identified for the number of PCP referrals made to orthopedic surgeons for new adult patients in Connecticut. Results from the analysis of Medicaid data from March 1, 2012 through February 28, 2013 suggest 2,704 Medicaid participants were seen by a orthopedic surgeon for a new patient visit within six months following a PCP visit. The PCP may or may not have referred the 2,704 patients seen by an orthopedic surgeon. Further, the actual number of PCP-referred patients may be significantly greater than those actually seen.

The Connecticut Medicaid Program paid \$373,555, or an average of \$138.15, per new patient referral for the first visit and any follow-up visits occurring within six weeks of the first visit (Table 20). More than half of this amount (60.8 percent) was for the new patient evaluation or consultation CPT code at the first orthopedic surgery visit; 20.7 percent of spending (\$77,042) was for procedures at the first visit, and a similar amount, 18.5 percent (\$69,277) was for additional visits and procedures within six weeks of the first visit.

Table 20. Total Costs for Orthopedic Surgery Visits following PCP Referral (n=2,704 unique recipients), March 1, 2012-February 28, 2013		
Type of Care	Total Paid Cost	Average Paid Cost
First visit	\$304,278 (81.5%)	\$112.53
First visit, visit code only	\$227,236 (60.8%)	\$84.04
Procedure(s) at first visit	\$77,042 (20.7%)	\$28.49
Additional visit(s) and procedure(s) within six weeks of first visit	\$69,277 (18.5%)	\$25.62
First specialist visit <u>and</u> any follow-up specialist visit(s) within six weeks	\$373,555 (100%)	\$138.15

Table 21 shows the mean and median wait times – number of days between the PCP visit and the first orthopedic surgery visit. Overall, the median wait time was 70 days, meaning that half of the patients waited more than 70 days for their orthopedic surgery visit. In contrast, the mean wait time, at 77 days, indicates that wait times were skewed and some patients waited much longer. Patients who lived in New

London, Litchfield and Windham counties had the longest wait times with median waits of 79, 76, and 75 days, respectively. Middlesex County had the shortest wait times, 56 days. All other counties had wait times of between 65 and 71 days.

Table 21. Wait times for Orthopedic Surgery visit by county, 3/1/2012 – 2/28/2013			
County	Number of recipients	Mean days	Median days
Fairfield	473	75	67
Hartford	788	76	65
Litchfield	113	78	76
Middlesex	178	71	56
New Haven	685	80	71
New London	178	82	79
Tolland	103	74	69
Windham	184	78	75
Missing	2	57	57
Overall	2,704	77	70

It may be reasonable to assume that patients who undergo procedures or attend more than one appointment may be recommended for additional PCP follow-up or a F2F orthopedic surgeon appointment under eConsults. On the other hand, it is also possible that the first visit with an orthopedist may be inefficient due to incomplete medical history, not having a translator available or other factors. In turn, this could lead to a less productive first visit and a delay of any procedures taking place.

Table 22 shows the proportion of new orthopedic surgery patients who had procedures at the first visit or a follow-up visit. More than half the patients (1,392 out of 2,704) with an orthopedic surgery visit had paid claims for one or more procedures. The vast majority of these patients, 1,286, had their first procedure at the first orthopedic surgery visit. Only 106 of the 1392 patients with procedures had their first procedure at a follow-up visit. Given that only 3.9 percent of patients had their first procedure at a follow-up visit, it does not appear that there is an issue with inefficient first visits delaying the delivery of procedures. Approximately 5 percent of patients, 131, had procedures at both the first visit and a follow-up visit.

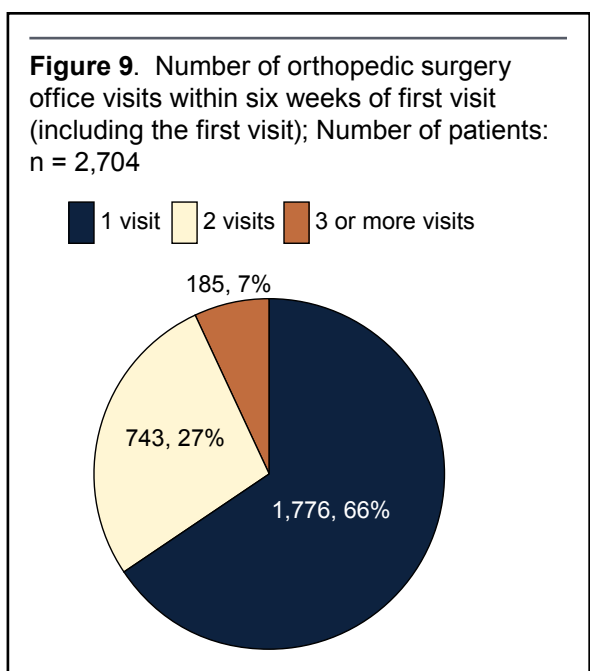
Table 22. Number of New Orthopedic Surgery Patients with Procedures, 3/1/2012 – 2/28/2013			
	One or more	No procedures	Total
Patients with procedures at first or follow-up visit			
Procedures at first or follow up	1,392	1,312	2,704
First procedure(s) at first visit	1,286	1,418	2,704
First procedure(s) at follow-up visit	106	1,312	1,418
Patients who had a procedure at both visits			
Procedure(s) at first visit and follow-up visit(s)	131	1,155	1,286

Table 23 shows the CPT codes of the five procedures that occurred most often at an orthopedic surgery visit. Arthrocentesis, aspiration and/or injection of major joint (20610) was the most common procedure, followed by x-ray of the shoulder (73030) and knees (73562, 73564).

Table 23. Five Most Frequent Orthopedic Surgery Procedures at First Visit, 3/1/2012 – 2/28/2013

CPT Procedure Code	Frequency	Percent
20610	176	7.7
73030	152	6.6
73562	145	6.3
73564	138	6.0
72110	92	4.0

Figure 9 shows the distribution of new patients with one or more orthopedic surgery office visits within six weeks of their first visit. Two-thirds (65.7 percent) of new patients had only the first office visit, and another quarter (27.5 percent) had two visits. Seven percent of the patients had between 3 and 7 visits within six weeks of their first visit.



Urology

In the research conducted for this report, no data source was identified for the number of PCP referrals made to urologists for new adult patients in Connecticut. Results from the analysis of Medicaid data from March 1, 2012 through February 28, 2013 suggest 1085 Medicaid participants were seen by a urologist for a new patient visit within six months following a PCP visit. The PCP may or may not have referred the 1,085 patients seen by an urologist. Further, the actual number of PCP-referred patients may be significantly greater than those actually seen.

The Connecticut Medicaid Program paid \$139,999, or an average of \$129.03, per new patient for the first urology visit and any follow-up urology visits occurring within six weeks of the first visit (Table 24). Almost three-fourths of this amount (71.1 percent) was for the new patient evaluation or consultation CPT code at the first urology visit; 9.1 percent of spending (\$12,645) was for procedures at the first visit, and 19.2 percent (\$26,908) was for additional visits and procedures within six weeks of the first visit.

Table 24. Total Costs for Urology Visits following PCP Referral (n=1,085 unique recipients), March 1, 2012-February 28, 2013

Type of Care	Total Paid Cost	Average Paid Cost
First visit	\$113,091 (80.8%)	\$104.23
First visit, visit code only	\$100,446 (71.7%)	\$92.58
Procedure(s) at first visit	\$12,645 (9.1%)	\$11.65
Additional visit(s) and procedure(s) within six weeks of first visit	\$26,908 (19.2%)	\$24.80
First specialist visit <u>and</u> any follow-up specialist visit(s) within six weeks	\$139,999 (100%)	\$129.03

Table 25 shows the mean and median wait times—number of days between the PCP visit and the first

urology visit. Overall, the median wait time was 61 days, meaning that half of the patients waited more than 2 months for their urology visit. In contrast, the mean wait time, at 73 days, indicates that wait times were very skewed and some patients waited much longer. Patients who lived in Litchfield county had the longest wait times with median waits of 85 days. Middlesex county had the shortest wait times, just 33 days. All other counties had wait times of between 56 and 75 days.

Table 25. Wait times for Urology visit by county, 3/1/2012 – 2/28/2013			
County	Number of recipients	Mean days	Median days
Fairfield	194	73	60
Hartford	316	70	59
Litchfield	28	92	85
Middlesex	64	54	33
New Haven	256	77	63
New London	99	79	72
Tolland	65	68	56
Windham	62	81	75
Missing	1	1	1
Overall	1,085	73	61

It may be reasonable to assume that patients who undergo procedures or attend more than one appointment may be recommended for additional PCP follow-up or a F2F urology appointment under eConsults. On the other hand, it is also possible that the first visit with a urologist may be inefficient due to incomplete medical history, not having a translator available or other factors. In turn, this could lead to a less productive first visit and a delay of any procedures taking place.

Table 26 shows the proportion of new urology patients who had procedures at the first visit or a follow-up visit. A total of 554 patients (51 percent) with a urology visit had paid claims for one or more procedures. The vast majority of these patients, 517, had their first procedure at the first urology visit. Only 37 of the 554 patients with procedures had their first procedure at a follow-up visit. Given that only 3.4 percent of patients had their first procedure at a urology follow-up visit, it does not appear that there is an issue with inefficient first visits delaying the delivery of procedures. Almost twelve percent of patients, 128, had procedures at both the first visit and a follow-up visit.

Table 26. Number of New Urology Patients with Procedures, 3/1/2012 – 2/28/2013			
	One or more	No procedures	Total
Patients with procedures at first or follow-up visit			
Procedures at first or follow up	554	531	1,085
First procedure(s) at first visit	517	568	1,085
First procedure(s) at follow-up visit	37	531	568
Patients who had a procedure at both visits			
Procedure(s) at first visit and follow-up visit(s)	128	389	517

Table 27 shows the CPT codes of the five procedures that occurred most often at a urology visit. Urinalysis (81000, 81001) accounted for more than half of all procedures. Creatinine, timed urine test (82570), measurement of post voiding residual urine and/or bladder capacity by ultrasound (51798), and cystourethroscopy (52000) rounded out the top five procedures.

Table 27. Five Most Frequent Urology Procedures at First Visit, 3/1/2012 – 2/28/2013

CPT Procedure Code	Frequency	Percent
81000	359	47.4
82570	152	20.1
51798	89	11.7
81001	45	5.9
52000	30	4.0

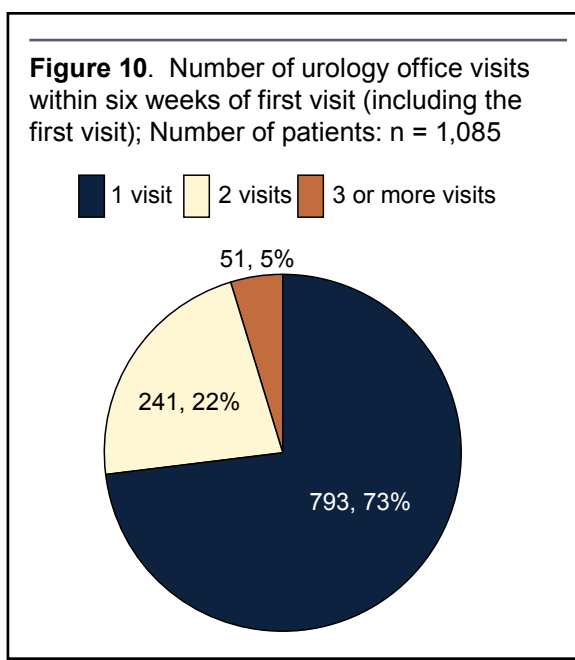


Figure 10 shows the distribution of new patients with one or more urology office visits within six weeks of their first urology visit. Nearly three out of four new patients (73 percent) had only the first office visit. Another 22 percent had two office visits, and 51 patients had 3 to 8 visits.

Part Three: Specialty Referral eConsults Simulation Model

The SReSM was used to explore the potential financial impact of replacing Usual Care with eConsults for specialty referrals among patients without an existing relationship with a specialist (i.e., new patients). For each specialty—dermatology, gastroenterology, neurology, orthopedic surgery and urology—costs were projected using specialty-specific data from the Connecticut Medicaid program as well as data from the research literature. Following a general description of the methods used to calculate cost projections, results are presented by specialty.

The per-referral projections calculated with the SReSM are based on a set of eleven model inputs that comprise our per-referral Base Assumptions. Six of these are the same for each of the specialties and five vary by specialty

The five model inputs that vary by specialty are:

- ♦ The percent of specialty referrals that would be considered unnecessary by the specialist reviewer
- ♦ Percentage of patients recommended for a F2F visit who were premature referrals
- ♦ The specialist reviewer rate
- ♦ The average cost of PCP follow-up
- ♦ The average cost of care with the specialist

Specialty-specific values, along with rationales and sources, are presented in the specialty sections below.

The six model inputs that are constant across specialties are presented below. Footnotes describe the

rationale for selecting each input and relevant information sources.

- ◆ The percent of specialty referrals that would result in an office visit with a specialist (60-80%)¹¹⁶
- ◆ The percent of referrals for which a specialty eConsult that was requested would be successfully completed by a specialist reviewer (100%)¹¹⁷
- ◆ The percent of patients recommended to schedule a F2F appointment with a specialist that would be seen by the specialist at an office visit (80%)¹¹⁸
- ◆ The percent of the referrals considered premature or unnecessary that would result in PCP follow-up visit(s) recommended by the specialist reviewer (50%)¹¹⁹
- ◆ The PCP incentive (\$15)¹²⁰
- ◆ The cost of transportation for the participant seen at an office visit with the PCP or specialist (\$2.40)¹²¹

A critical unknown in our model is the percent of referrals resulting in a F2F visit with a specialist under Usual Care. This value likely differs by specialty, but it is assumed that, for the specialties considered in this report, the value would likely fall somewhere between 60 and 80 percent. Thus, initial estimates are calculated at the endpoints of this range. For all other input values, the best estimate of each value was used. To simplify any additional analyses using the SReSM, model input assumptions and their underlying rationales for all specialties are presented in the Appendix.

The initial cost projections represent our best estimates of the costs of implementing eConsults in the five specialties. However, the projected budget impact per referral is sensitive to assumed values for five model inputs for which little data are available: (1) the proportion of referrals considered unnecessary through eConsults, (2) the proportion of patients for whom an eConsult involves the PCP delivering follow-up care, (3) the average cost of the specialist care provided, and the eConsult rate which includes (4) the amount paid per eConsult to the specialist reviewer and (5) the PCP incentive. In order to demonstrate the sensitivity of SReSM results to deviations from the Base Assumptions, these five model input values were varied by ten percent to present higher and lower budget-impact projections for each specialty.

Finally, for each of the specialties, the potential total budget impact to DSS for replacing Usual Care with eConsults was calculated for a range of referral volumes due to the lack of data on the number of actual specialty referrals made by PCPs. At this time, the best available estimate for total cost for all referrals was derived from the Connecticut Medicaid claims data. Initial, lower, and higher budget-impact per-referral costs were used to estimate the budget impact at different referral volumes. The lower amount represents the cost for the lowest plausible number of referrals if 80 percent of referred patients were seen under Usual

¹¹⁶ In the CHC, Inc. cardiology eConsult pilot 81% of new patient referrals were seen by a cardiologist. For patient referrals, including new and established patients, 75% were seen. A value of 60% was used as a lower bound placeholder because limited evidence suggests that patients may be less likely to be seen than those in the cardiology study. Simulation A varies this assumption at 1% increments from 60 to 80%.

¹¹⁷ 100% represents the maximum success rate for PCP adoption and transmission of referrals via eConsults. There is some evidence to suggest eConsults get lost or adoption rates are poor. If this is the case, the average cost per referral would be less than projected. The maximum of 100% was selected because this value better reflects the maximum potential costs of adopting eConsults.

¹¹⁸ This input value was informed by the CHC, Inc. study in which 80% of new patient cardiology referrals were seen by a cardiologist under traditional care and 69% of eConsult patients recommended for F2F follow-up were seen.

¹¹⁹ Findings from the SFGH eReferral program and anecdotal evidence from the CHC, Inc. cardiology pilot suggest that PCP follow-up is common. Simulation B allows the model user to observe the impact of 10% changes in this assumption, ranging from 0% to 70%.

¹²⁰ The value is roughly 58% the amount paid for the CPT code 99201, which is a 15-minute new patient visit.

¹²¹ Connecticut Medicaid data. This rate is not specialty specific.

Care; the higher amount captures the projected increase for the highest plausible number of referrals if sixty percent of referred patients were seen under Usual Care.

Dermatology

Dermatology-specific SReSM input values, along with rationales and sources, are presented in Table 28.

Table 28. Rationale and sources for dermatology-specific SReSM base assumption values		
SReSM Criteria	Model Input	Data source(s)/Explanation of Assumption
eConsults Approach		
Unnecessary Referral (Percentage not recommended for F2F within six months of eConsult review)	40%	Data is from the evaluation of Los Angeles County's eConsult system, conducted by Sheridan and Howard (2013). Simulation A varies this assumption at 1% increments from 4 to 75%.
Percentage of F2F recommended who were premature referral	18%	The value was derived from the SFGH eReferral program evaluation conducted by RAND. Simulation A varies this assumption at 1% increments from 4 to 75%.
Cost Parameters		
eConsult rate: Specialist reviewer	\$26	Connecticut Medicaid data for new referrals. This rate is the average amount paid for the CPT code 99201, which is for a 15-minute visit for new patients.
Specialist care, average cost	\$94.73	Connecticut Medicaid data for new referrals. This value is the average paid cost for the first dermatology visit and any follow-up visits within six weeks. Simulation C allows the user to observe the impact of \$10 changes in this assumption, ranging from \$55 to \$205.
PCP visit code only, average cost	\$56.77	Connecticut Medicaid data for new referrals. This is the average amount paid for the visit code (99201-99205, 99211-99215) portion of the PCP visit occurring prior to the dermatology visit.

SReSM results for dermatology—using as model inputs the Base Assumptions in Table 28 and those that are constant across specialty—are presented in Table 29.¹²² The SReSM projects a budget increase per dermatology referral of \$44.34 if sixty percent of referrals result in a F2F dermatology visit under Usual Care, and a budget increase per dermatology referral of \$24.92 if 80 percent of referrals result in a F2F visit under Usual Care. To demonstrate sensitivity to changes in each of the five key assumptions, the initial values were each increased and decreased by ten percent holding other values at the Base Assumption levels. The initial projected budget impact of between \$24.92 to \$44.34 assumes that forty percent of referrals would result in an “unnecessary F2F” determination by the specialist reviewer. As shown in Table 29, a ten percent change in unnecessary referrals changes the budget impact by about \$5.33 per referral. For example, if 30 percent of referrals were ruled unnecessary, the projected budget impact would be between \$30.25 (\$24.92 + \$5.34) and \$49.68 (\$44.34 + \$5.34) per referral. On the other hand, if the proportion of referrals deemed unnecessary increased to fifty percent, the projected budget impact would be between \$19.58 (\$24.92 - \$5.34) and \$39.00 (\$44.34 - \$5.34) per referral. Similarly, a ten percent change in the fifty percent assumption for PCP follow-up care would change the projected budget impact by \$3, resulting in a range of \$21.92 – \$41.34 in added costs assuming a forty percent rate of PCP follow-up care, and \$27.92 – \$47.34 for a sixty percent rate of PCP follow-up care. Finally, a ten percent change in the Base Assumption for the eConsult rate (\$26 for the specialist reviewer + \$15 PCP incentive) would influence the budget impact of the eConsults program in dermatology by \$4.10 per referral. Decreasing the eConsult rate

¹²² Values in Table 28 and those that are constant across specialty are included in the Appendix to facilitate replication and extension of the SReSM analyses in this report.

from \$41 to \$36.90 would decrease the budget impact per referral to between \$20.82 and \$40.24. If the eConsult rate increased from \$41 to \$45.10, the projected budget impact would increase to between \$29.02 and \$48.44.

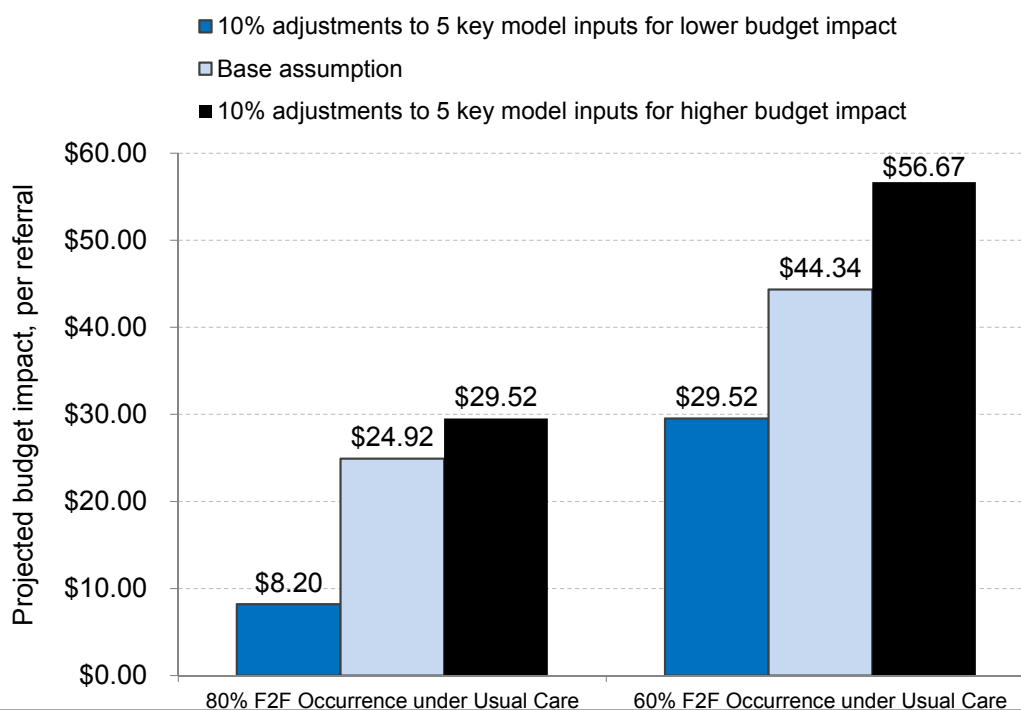
Table 29. SReSM projected initial budget impact per dermatology eConsult for Base Assumptions and effects of ten percent changes in Base Assumptions

eConsult Base Assumptions	Usual Care Base Assumption—Percent of dermatology referrals resulting in a F2F visit with the dermatologist			
	80% (Low Budget Impact) →		60% (High Budget Impact)	
Base Assumptions	\$24.92		\$44.34	
— (50% PCP follow-up)				
— (40% of referrals considered unnecessary)				
— (\$41 eConsult rate)				
— (\$94.73 average cost of specialist care provided)				
Change in Base Assumptions	-10%	+10%	-10%	+10%
— Referrals considered unnecessary	+\$5.33	-\$5.34	+\$5.34	-\$5.34
— PCP follow-up care as a result of specialist review	-\$3.00	+\$3.00	-\$3.00	+\$3.00
— Amount paid per eConsult for specialist review and PCP incentive	-\$4.10	+\$4.10	-\$4.10	+\$4.10
— Average payment for specialist care provided	+\$3.03*	-\$3.04*	+\$1.14*	-\$1.14*
*Changes in cost of specialty care depend upon values of other model inputs; change is greater for larger percent of patients seen F2F by specialist				

The average cost of specialist care is another important consideration for potential budget impact. The value used in our Base Assumptions, \$94.73, is the average cost derived from Medicaid claims data of dermatologic care provided by a specialist at the first specialist visit and any follow-up visits within six weeks. The budget impact from varying this cost is not fixed; it depends on the values of other assumptions. The change is larger when the percent of dermatology referrals that would result in an office visit with the dermatologist under Usual Care is higher (i.e. 80 versus sixty percent). For example, a ten percent change in average cost of specialist care would result in a per referral budget impact of \$1.14 at sixty percent of referrals that result in a F2F visit with a dermatologist and approximately \$3.04 at 80 percent. An additional consideration is that, under eConsults, patients who have a F2F dermatology visit may require more expensive care than those for whom a F2F visit is deemed unnecessary. If this is the case, the cost of dermatology eConsults may be greater than the projections shown.

To further explore the relationships between the key model inputs and overall budget impact, adjustments (in ten percent increments) were made to all five of the key model inputs simultaneously in order to determine the lowest and highest budget impact. The values for unnecessary referrals and cost of specialty care were both increased by ten percent, to fifty percent and \$104.20 respectively, due to their negative relationship with budget impact. Conversely, PCP follow-up care and the eConsults rate paid for the specialist review and PCP incentive were decreased by ten percent, to forty percent and \$36.90 respectively, because of their positive relationship with budget impact. These inputs were then used in the SReSM model to determine the projected budget impact using both 80 and sixty percent F2F under Usual Care. The budget impact from changing these model inputs concurrently differs slightly from the sum of the individual changes shown in Table 29. The resulting budget impacts which range from \$8.20 to \$55.67 are shown in Figure 11 below.

Figure 11. SReSM projected budget impact per dermatology referral for base assumption and ten percent adjustments to five key model inputs



To illustrate the potential total costs of implementing eConsults, the Base Assumptions and adjustments presented above were combined with referral volume estimates to obtain total cost estimates. During the one year period between 3/1/12 and 2/28/13, roughly 900 patients were seen by a dermatologist following a PCP visit. If all of these patient visits identified in the Medicaid claims data were actually the result of a PCP referral and if referral trends remain constant into the future, the estimated number of PCP-dermatologist referrals within CT Medicaid would be 1,125 to 1,500. Specifically, there would be 1,500 referrals if sixty percent of referred patients were seen by a dermatologist and 1,125 referrals if 80 percent of referred patients were seen. Since it is almost certain that the Medicaid claims data captured a significant number of patients not referred by a PCP, Table 30 includes both of these higher values as well as two lower values derived using half of the patients identified in the Medicaid claims [i.e., $563 = (900 \times 0.5) / 0.8$ and $750 = (900 \times 0.5) / 0.6$]. Under these assumptions, the additional cost for implementing eConsults for all dermatology referrals would be within the range of \$4,618 to \$85,009.¹²³ The lower amount represents the cost for 563 referrals if 80 percent of referred patients were seen under Usual Care and the higher amount captures the projected increase for 1,500 referrals if sixty percent of referred patients were seen under Usual Care.

¹²³ This value was calculated using the SReSM. Results from calculations using the average cost per referral and the number of referrals differ slightly, due to rounding.

Table 30. Total Budget Impact for SReSM projections using Base Assumptions and ten percent adjustments to Base Assumptions*

SReSM Simulations	Budget Impact per referral	Number of Referrals				
		563	750	1,125	1,500	
80% F2F occurrence under Usual Care						
10% Adjustment, lower budget impact	\$8.20	\$4,618	\$6,151	\$9,227	n/a	
Base Assumption	\$24.92	\$14,027	\$18,687	\$28,030	n/a	
10% Adjustment, higher budget impact	\$39.14	\$22,037	\$29,356	\$44,034	n/a	
60% F2F occurrence under Usual Care						
10% Adjustment, lower budget impact	\$29.52	n/a	\$22,142	\$33,213	\$44,283	
Base Assumption	\$44.34	n/a	\$33,256	\$49,884	\$66,512	
10% Adjustment, higher budget	\$56.67	n/a	\$42,505	\$63,757	\$85,009	

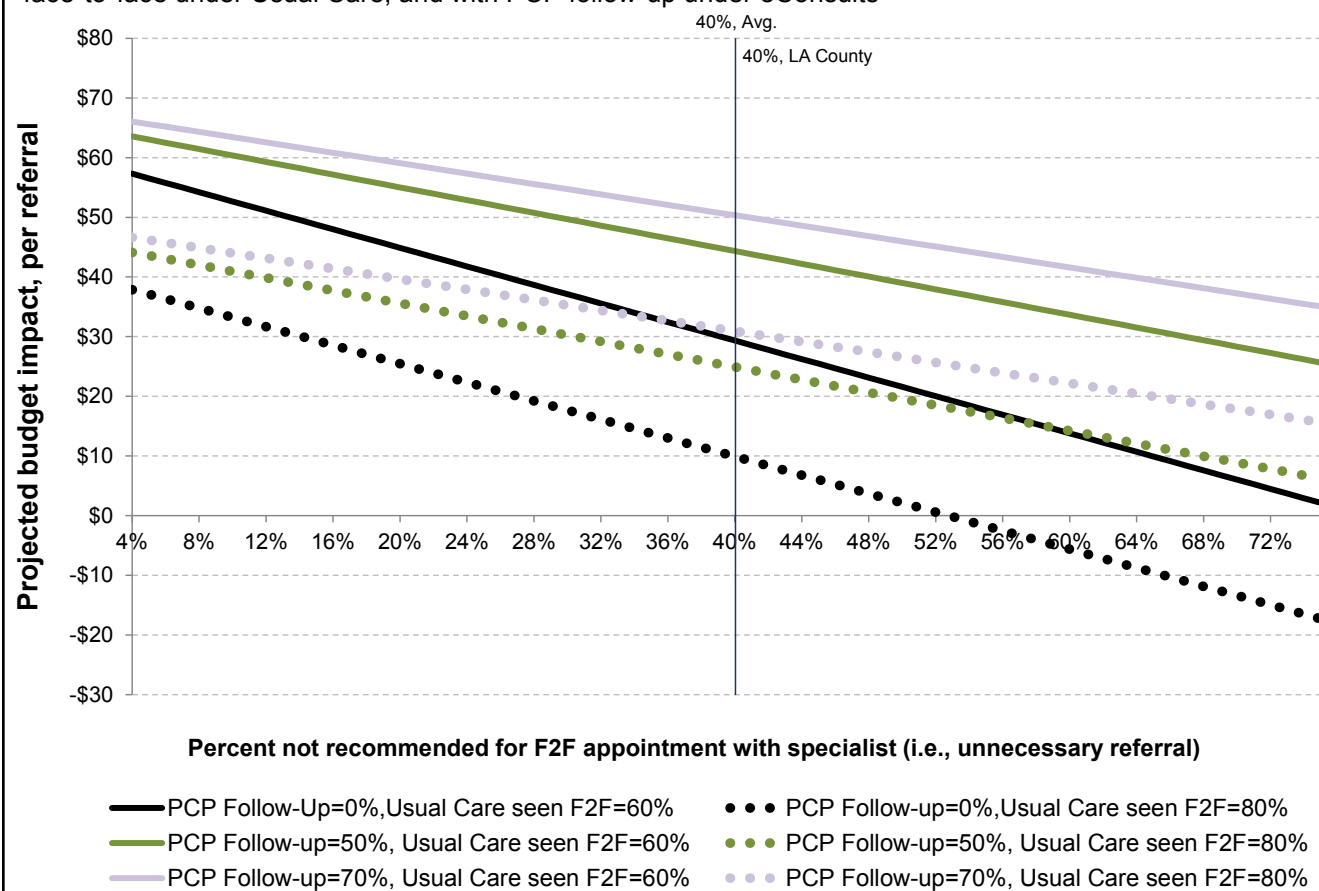
n/a: Number of referrals is considered beyond the range of likely referrals.

*These values were calculated using the SReSM. Total costs from calculations using the average cost per referral and the number of referrals differ slightly, due to rounding.

To provide another illustration of how changes in assumption values relate to changes in budget impact projections, Figure 12 illustrates differing budget impact projections for the use of eConsults instead of Usual Care for dermatology referrals when levels of three key assumptions are varied: the proportion of patients under Usual Care seen at a F2F visit with a dermatologist, the proportion of eConsult patients receiving PCP follow-up care, and the proportion of patients for whom an eConsult specialist review identifies an unnecessary referral. Figure 12 demonstrates that as the assumed percentage of patients with unnecessary referrals identified under eConsults increases, the cost of eConsults decreases. In addition, as the percentage of patients who are seen F2F under Usual Care increases from 60 to 80 percent, the budget impact decreases at all levels of unnecessary referrals. Similarly, as the percentage of patients needing PCP follow-up care (70 versus 50 versus 0 percent) decreases, the budget impact decreases regardless of the proportion of unnecessary referrals. The unnecessary referral value from the published electronic referral and/or consultation study (presented in Table 4) is marked on Figure 12 as a reference line. In this study, the proportion of unnecessary referrals to a dermatologist was reported to be forty percent. With only one published study available as a reference, no information is available as to the possible uncertainty of this estimate.

Replacement of Usual Care with eConsults reaches the break-even point (no additional spending beyond Usual Care, where the line crosses \$0 in Figure 12) when at least 53 percent of dermatology eConsults are considered unnecessary referrals by the specialist reviewer. Breaking even at 53 percent occurs only under assumptions most favorable to the budget impact of adopting eConsults: at least 80 percent of dermatology referrals must be seen F2F by a dermatologist under Usual Care and 0 percent of eConsults patients receive PCP follow-up care. In addition, the SReSM Base Assumption is that forty percent of referrals are unnecessary. At the forty percent unnecessary referral level, even combined with the most favorable levels of the other assumptions, eConsults costs approximately \$10 more per referral than Usual Care.

Figure 12. Projected budget impact for dermatology eConsults at varying assumptions for patients seen face-to-face under Usual Care, and with PCP follow-up under eConsults



Gastroenterology

Gastroenterology-specific SReSM input values, along with rationales and sources, are presented in Table 31.

Table 31. Rationale and sources for gastroenterology-specific SReSM base assumption values		
SReSM Criteria	Model Input	Data source(s)/Explanation of Assumption
eConsults Approach		
Unnecessary Referral (Percentage not recommended for F2F within six months of eConsult review)	28%	This value is the average of findings from Los Angeles County's eConsult system and the SFGH eReferral program. Simulation A varies this assumption at 1% increments from 4 to 75%.
Percentage of F2F recommended who were premature referral	13.6%	This proportion is derived from findings for gastroenterology within the SFGH eReferral program evaluation conducted by RAND.
Cost Parameters		
eConsult rate: Specialist reviewer	\$26	Connecticut Medicaid data for new referrals. This rate is the average amount paid for the CPT code 99201, which is for a 15-minute visit for new patients.
Specialist care, average cost	\$110.12	Connecticut Medicaid data for new referrals. This value is the average paid cost for the first gastroenterology visit and any follow-up visits within six weeks. Simulation C allows the user to observe the impact of \$10 changes in this assumption, ranging from \$55 to \$205.
PCP visit code only, average cost	\$59.86	Connecticut Medicaid data for new referrals. This is the average amount paid for the visit code (99201-99205, 99211-99215) portion of the PCP visit occurring prior to the gastroenterology visit.

SReSM results for gastroenterology using, as model inputs, the Base Assumptions in Table 31 and those that are constant across specialty, are presented in Table 32. The SReSM projects a budget increase per gastroenterology referral of \$50.03 if sixty percent of referrals result in a F2F gastroenterology visit under Usual Care and a budget increase of \$27.53 per referral if 80 percent of referrals result in a F2F under Usual Care. To demonstrate sensitivity to changes in each of the five key assumptions, the initial values were each increased and decreased by ten percent, holding other values at the Base Assumption levels. The initial projected budget impact of between \$27.53 and \$50.03 assumes that 28 percent of referrals would result in an “unnecessary F2F” determination by the specialist reviewer. As shown in Table 32, a ten percent change in unnecessary referrals changes the budget impact by about \$6.31 per referral. For example, if 18 percent of referrals were ruled unnecessary, the projected budget impact would be between \$33.84 (\$27.53 + \$6.31) and \$56.34 (\$50.03 + \$6.31) per referral. On the other hand, if the proportion of referrals deemed unnecessary increased to 38 percent, the projected budget impact would be between \$21.22 (\$27.53 - \$6.31) and \$43.73 (\$50.03 - \$6.30) per referral. Similarly, a ten percent change in the fifty percent assumption for PCP follow-up care would change the projected budget impact by approximately \$2.35, resulting in a range of \$25.18 to \$47.69 in added costs assuming a forty percent rate of PCP follow-up care, and \$29.88 to \$52.38 for a sixty percent rate of PCP follow-up care. Finally, a ten percent change in the Base Assumption for the eConsult rate (\$26 for the specialist reviewer + \$15 PCP incentive) would influence the cost of the eConsults program in gastroenterology by \$4.10 per referral. Decreasing the eConsult rate from \$41 to \$36.90 would decrease the budget impact per referral to between \$23.43 and \$45.93. If the eConsult rate increased from \$41 to \$45.10, the projected budget impact per referral would increase to between \$31.63 and \$54.13.

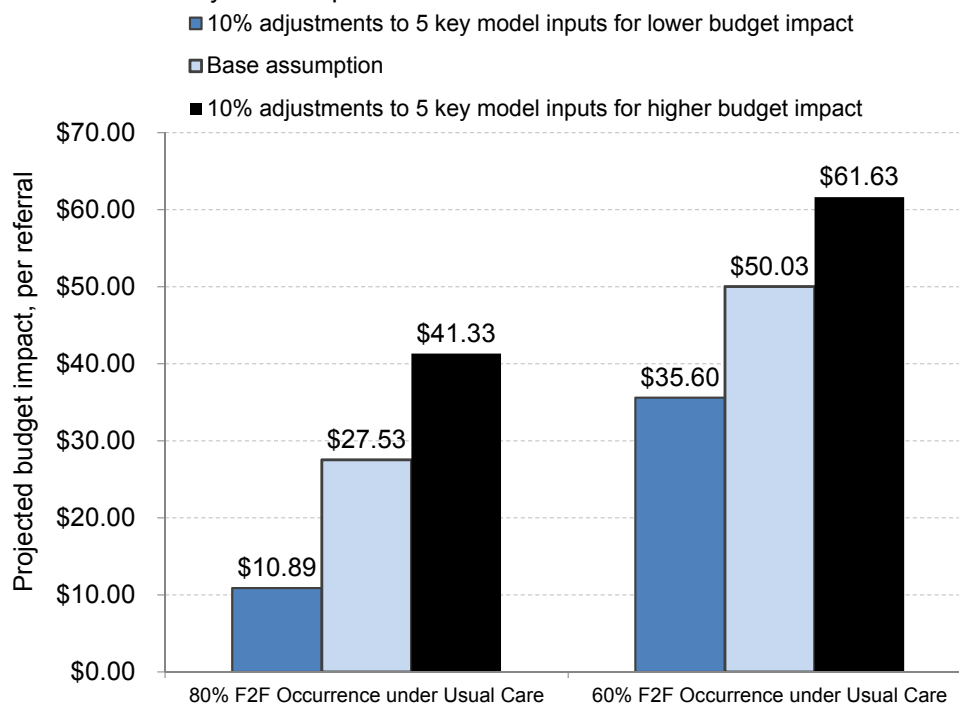
Table 32. SReSM projected initial budget impact per gastroenterology eConsult for Base Assumptions and effects of ten percent changes in Base Assumptions

eConsult Base Assumptions	Usual Care Base Assumption—Percent of gastroenterology referrals resulting in a F2F visit with the gastroenterologist			
	80% (Low Budget Impact) →		60% (High Budget Impact)	
Base Assumptions	\$27.53		\$50.03	
— (50% PCP follow-up)				
— (28% of referrals considered unnecessary)				
— (\$41 eConsult rate)				
— (\$110.12 average cost of specialist care provided)				
Change in Base Assumptions	-10%	+10%	-10%	+10%
— Referrals considered unnecessary	+\$6.31	-\$6.31	+\$6.31	-\$6.30
— PCP follow-up care as a result of specialist review	-\$2.35	+\$2.35	-\$2.34	+\$2.35
— Amount paid per eConsult for specialist review and PCP incentive	-\$4.10	+\$4.10	-\$4.10	+\$4.10
— Average payment for specialist care provided	+2.47*	-\$2.47*	+\$0.26*	-\$0.27*
*Changes in cost of specialty care depend upon values of other model inputs; change is greater for larger percent of patients seen F2F by specialist				

The average cost of specialist care is another important consideration for potential budget impact. The value used in our Base Assumptions, \$110.12, is the average cost derived from Medicaid claims data of care provided by a gastroenterologist at the first specialist visit and any follow-up visits within six weeks. The budget impact from varying this cost is not fixed—it depends on the values of other assumptions. The change is larger when the percent of gastroenterology referrals that would result in an office visit with the gastroenterologist under Usual Care is higher (i.e. eighty versus sixty percent). For example, a ten percent change in average cost of specialist care would result in a per referral budget impact of approximately \$0.26 at sixty percent of referrals that result in a F2F visit with a gastroenterologist and \$2.47 at eighty percent. An additional consideration is that, under eConsults, patients who have a F2F gastroenterology visit may require more expensive care than those for whom a F2F visit is deemed unnecessary. If this is the case, the cost of gastroenterology eConsults may be greater than the projections shown.

To further explore the relationships between the key model inputs and overall budget impact, adjustments (in ten percent increments) were made to all five of the key model inputs simultaneously in order to determine the lowest and highest budget impact. The values for unnecessary referrals and cost of specialty care were both increased by ten percent, to 38 percent and \$121.13 respectively, due to their negative relationship with budget impact. Conversely, PCP follow-up care and the eConsults rate paid for the specialist review and PCP incentive were decreased by ten percent, to forty percent and \$36.90 respectively, because of their positive relationship with budget impact. These inputs were then used in the SReSM model to determine the projected budget impact using both eighty and sixty percent F2F under Usual Care. The budget impact from changing these model inputs concurrently differs slightly from the sum of the individual changes shown in Table 32. The resulting budget impacts, which ranged from a per referral spending increase of \$10.89 to \$61.63, are shown in Figure 13 below.

Figure 13. SReSM projected budget impact per gastroenterology referral for Base Assumptions and ten percent adjustments to five key model inputs



To illustrate the potential total costs of implementing eConsults, the Base Assumptions and adjustments presented above were combined with referral volume estimates to obtain total cost estimates. During the one year period between 3/1/12 and 2/28/13, roughly 1,254 patients were seen by a gastroenterologist following a PCP visit. If all of these patient visits identified from the Medicaid claims data were actually the result of a PCP referral and if referral trends remain constant into the future, the estimated number of PCP-gastroenterologist referrals within CT Medicaid would be 1,568 to 2,090. Specifically, there would be 2,090 referrals if sixty percent of referred patients were seen by a gastroenterologist and 1,568 referrals if eighty percent of referred patients were seen. Since it is almost certain that the Medicaid claims data captured a significant number of patients not referred by a PCP, Table 33 includes both of these higher values as well as two lower values derived using half of the patients identified in the Medicaid claims [i.e., $784 = (1,254 \times 0.5) / 0.8$ and $1,045 = (1,254 \times 0.5) / 0.6$]. Under these assumptions, the additional cost for implementing eConsults for all gastroenterology referrals would be within a range of \$8,537 to \$128,813.¹²⁴ The lower amount represents the cost for 784 referrals if eighty percent of referred patients were seen under Usual Care and the higher amount captures the projected increase for 2,090 referrals if sixty percent of referred patients were seen under Usual Care.

¹²⁴ This value was calculated using the SReSM. Results from calculations using the average cost per referral and the number of referrals differ slightly, due to rounding.

Table 33. Total budget impact for SReSM projections for gastroenterology using Base Assumptions and ten percent adjustments to Base Assumptions*

SReSM Simulations	Budget Impact per referral	Number of Referrals				
		784	1,045	1,568	2,090	
80% F2F occurrence under Usual Care						
10% Adjustment, lower budget impact	\$10.89	\$8,537	\$11,379	\$17,073	n/a	
Base Assumption	\$27.53	\$21,583	\$28,769	\$43,167	n/a	
10% Adjustment, higher budget impact	\$41.33	\$32,404	\$43,191	\$64,807	n/a	
60% F2F occurrence under Usual Care						
10% Adjustment, lower budget impact	\$35.60	n/a	\$37,197	\$55,813	\$74,394	
Base Assumption	\$50.03	n/a	\$52,285	\$78,453	\$104,570	
10% Adjustment, higher budget	\$61.63	n/a	\$64,406	\$96,640	\$128,813	

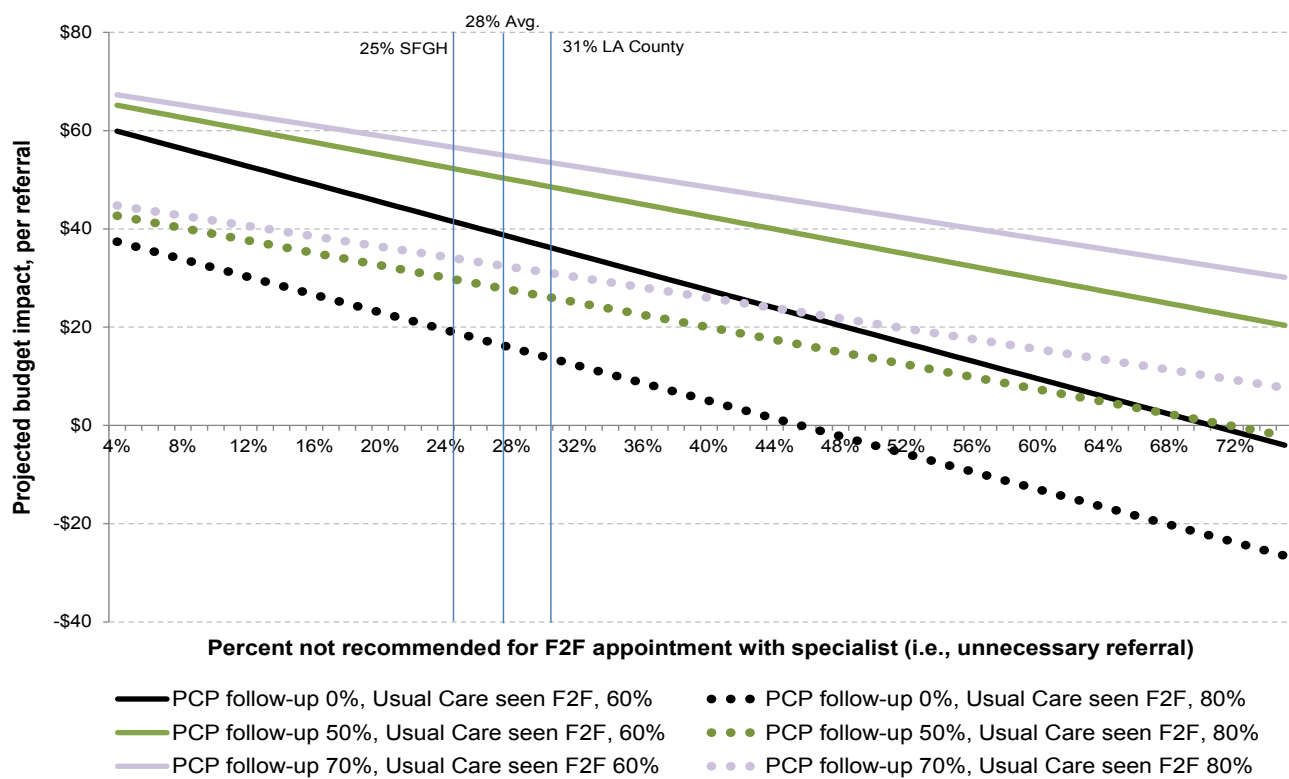
n/a: Number of referrals is considered beyond the range of likely referrals.

*These values were calculated using the SReSM. Total costs from calculations using the average cost per referral and the number of referrals differ slightly, due to rounding.

To provide another illustration of how changes in assumption values relate to changes in budget impact projections, Figure 14 illustrates differing budget impact projections for use of eConsults instead of Usual Care for gastroenterology referrals when varying levels of three key assumptions: the proportion of patients under Usual Care seen at a F2F visit with a gastroenterologist, the proportion of eConsult patients receiving PCP follow-up care, and the proportion of patients for whom an eConsult specialist review identifies an unnecessary referral. Figure 14 demonstrates that as the assumed percentage of patients with unnecessary referrals identified under eConsults increases, the cost of eConsults decreases. In addition, as the percentage of patients who are seen F2F under Usual Care increases from sixty to eighty percent, the budget impact decreases at all levels of unnecessary referrals. Similarly, as the percentage of patients needing PCP follow-up care (70 versus 50 versus 0 percent) decreases, the budget impact decreases regardless of the proportion of unnecessary referrals. Values from the published electronic referral and/or consultation studies (summarized in Table 4), as well as the average of the two studies, are marked on Figure 14 as reference lines. In these studies, the proportions of unnecessary referrals to a gastroenterologist were reported to be 25 and 31 percent, with an average of 28 percent.

Replacement of Usual Care with eConsults reaches the break-even point (no additional spending beyond Usual Care, where the line crosses \$0 in Figure 14), when at least 46 percent of gastroenterology eConsults for new patients are considered unnecessary referrals by the specialist reviewer. This is well above the proportions of unnecessary referrals observed in the two published studies. In addition, breaking even at 46 percent occurs only under assumptions most favorable to the budget impact of adopting eConsults: at least eighty percent of gastroenterology referrals must be seen F2F by a gastroenterologist under Usual Care and 0 percent of eConsults patients receive PCP follow-up care. The projected budget impact varies somewhat at the two levels presented in the literature, but even combined with the most favorable levels of the other assumptions, eConsults costs approximately \$13 to \$18 more per referral than Usual Care.

Figure 14. Projected budget impact for gastroenterology eConsults at varying assumptions for patients seen face-to-face under Usual Care, and with PCP follow-up under eConsults



Neurology

Neurology-specific SReSM input values, along with rationales and sources, are presented in Table 34.

Table 34. Rationale and sources for neurology-specific SReSM base assumption values		
SReSM Criteria	Model Input	Data source(s)/Explanation of Assumption
eConsults Approach		
Unnecessary Referral (Percentage not recommended for F2F within six months of eConsult review)	36%	This value is the average of findings from Los Angeles County's eConsult system, the SFGH eReferral program, and Northern Ireland's email referral system. Simulation A varies this assumption at 1% increments from 4 to 75%.
Percentage of F2F recommended who were premature referral	4.7%	This proportion is derived from findings for neurology within the SFGH eReferral program evaluation conducted by RAND.
Cost Parameters		
eConsult rate: Specialist reviewer	\$30	Connecticut Medicaid data for new referrals. This rate is the average of the amount paid for the CPT code 99201, which is for a 15-minute evaluation and management visit for new patients and the CPT code 99241, which is for a brief consultation visit.
Specialist care, average cost	\$136.51	Connecticut Medicaid data for new referrals. This value is the average paid cost for the first neurology visit and any follow-up visits within six weeks. Simulation C allows the user to observe the impact of \$10 changes in this assumption, ranging from \$55 to \$205.
PCP visit code only, average cost	\$59.11	Connecticut Medicaid data for new referrals. This is the average amount paid for the visit code (99201-99205, 99211-99215) portion of the PCP visit occurring prior to the neurology visit.

SReSM results for neurology—using, as model inputs, the Base Assumptions in Table 34 and those that are constant across specialty—are presented in Table 35. The SReSM projects a budget increase per neurology referral of \$44.76 if sixty percent of referrals result in a F2F neurology visit under Usual Care and \$16.98 if eighty percent of referrals result in a F2F neurology visit under Usual Care. To demonstrate sensitivity to changes in each of the five key assumptions, the initial values were increased and decreased by ten percent, holding other values at the Base Assumption levels. The initial projected budget impact of between \$16.98 and \$44.76 assumes that 36 percent of referrals would result in an “unnecessary F2F” determination by the specialist reviewer. As shown in Table 35, a ten percent change in unnecessary referrals changes the budget impact by \$8.18 per referral. For example, if 26 percent of referrals were ruled unnecessary, the projected budget impact would be between \$25.16 (\$16.98 + \$8.18) and \$52.94 (\$44.76 + \$8.18) per referral. On the other hand, if the proportion of referrals deemed unnecessary increased to 46 percent, the projected budget impact would be between \$8.80 (\$16.98 - \$8.18) and \$36.58 (\$44.76 - \$8.18) per referral. Similarly, a ten percent change in the fifty percent assumption for PCP follow-up care would change the projected budget impact by approximately \$2.40, resulting in a range of \$14.58 to \$42.37 in added costs assuming a forty percent rate of PCP follow-up care, and \$19.38 to \$47.16 for a sixty percent rate of PCP follow-up care. Finally, a ten percent change in the Base Assumption of the eConsult rate (\$45 = \$30 for the specialist reviewer + \$15 PCP incentive) would influence the cost of the eConsults program in neurology by \$4.50 per referral. Decreasing the eConsult rate from \$45 to \$40.50 would decrease the budget impact per referral to between \$12.48 and \$40.26. If the eConsult rate increased from \$45 to \$49.50, the projected budget impact per referral would increase to between \$21.48 and \$49.26.

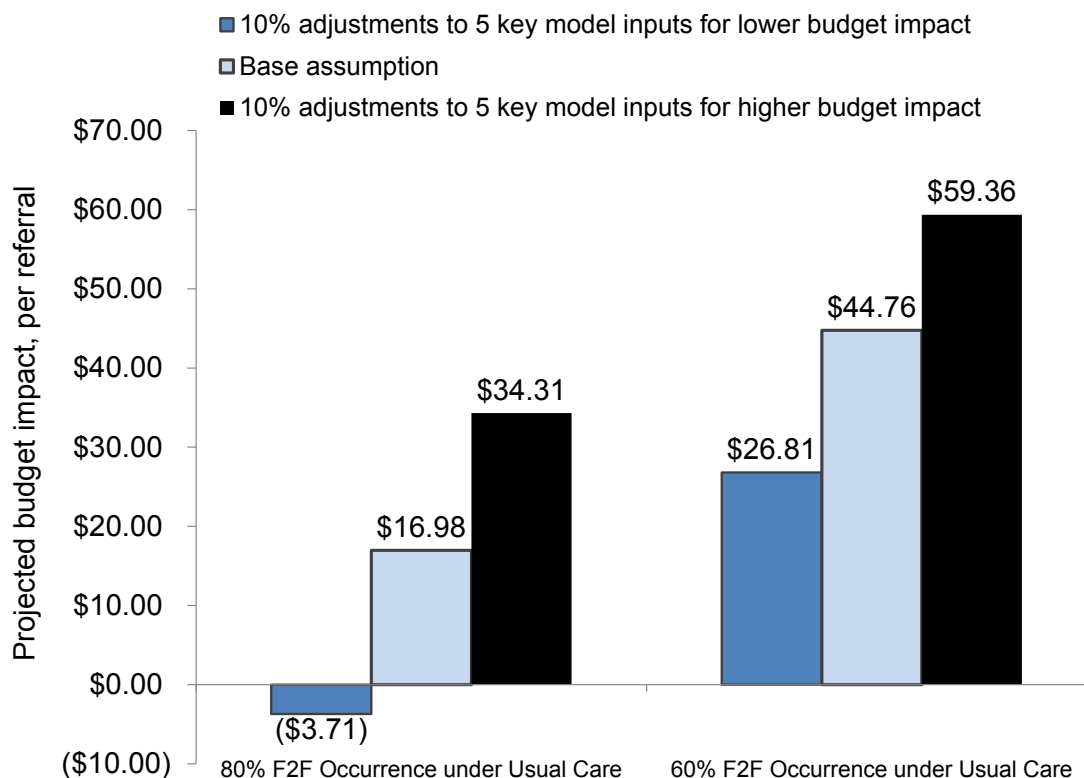
Table 35. SReSM projected initial budget impact per neurology eConsult for Base Assumptions and effects of ten percent changes in Base Assumptions

eConsult Base Assumptions	Usual Care Base Assumption—Percent of neurology referrals resulting in a F2F visit with the neurologist			
	80% (Low Budget Impact) →		60% (High Budget Impact)	
Base Assumptions	\$16.98		\$44.76	
— (50% PCP follow-up)				
— (36% of referrals considered unnecessary)				
— (\$45 eConsult rate)				
— (\$136.51 average cost of specialist care provided)				
Change in Base Assumptions	-10%	+10%	-10%	+10%
— Referrals considered unnecessary	+\$8.18	-\$8.18	+\$8.18	-\$8.18
— PCP follow-up care as a result of specialist review	-\$2.40	+\$2.40	-\$2.40	+\$2.40
—eConsult rate: amount paid per eConsult for specialist review and PCP incentive	-\$4.50	+\$4.50	-\$4.50	+\$4.50
— Average payment for specialist care provided	+\$3.93*	-\$3.93*	+\$1.20*	-\$1.20*
*Changes in cost of specialty care depend upon values of other model inputs; change is greater for larger percent of patients seen F2F by specialist				

The average cost of specialist care is another important consideration for potential budget impact. The value used in our Base Assumptions, \$136.51, is the average cost derived from Medicaid claims data of neurologic care provided by a specialist at the first specialist visit and any follow-up visits within six weeks. The budget impact from varying this cost is not fixed—it depends on the values of other assumptions. The change is larger when the percent of neurology referrals that would result in an office visit with the neurologist under Usual Care is higher (i.e. eighty versus sixty percent). For example, a ten percent change in average cost of specialist care would result in a per referral budget impact of \$1.20 at sixty percent of referrals that result in a F2F visit with a neurologist and \$3.93 at eighty percent. An additional consideration is that, under eConsults, patients who have a F2F neurology visit may require more expensive care than those for whom a F2F visit is deemed unnecessary. If this is the case, the cost of neurology eConsults may be greater than the projections shown.

To further explore the relationships between the key model inputs and overall budget impact, adjustments (in ten percent increments) were made to all of the key model inputs simultaneously in order to determine the lowest and highest budget impact. The values for unnecessary referrals and cost of specialty care were both increased by ten percent, to 46 percent and \$150.16 respectively, due to their negative relationship with budget impact. Conversely, percent PCP follow-up care and eConsults costs (specialist review and PCP incentive) were decreased by ten percent, to forty percent and \$40.50 respectively, because of their positive relationship with budget impact. These inputs were then used in the SReSM model to determine the projected budget impact using both eighty and sixty percent F2F under Usual Care. The budget impact from changing these model inputs concurrently differs slightly from the sum of the individual changes shown in Table 35. The resulting values, which ranged from a per-referral savings of \$3.71 to a per-referral spending increase of \$59.36, are shown in Figure 15 below.

Figure 15. SReSM projected budget impact per neurology referral for base assumption and ten percent adjustments to five key model inputs



To illustrate the potential total costs of implementing eConsults, the Base Assumptions and adjustments presented above were combined with referral volume estimates to obtain total cost estimates. During the one year period between 3/1/12 and 2/28/13, roughly 1,447 patients were seen by a neurologist following a PCP visit. If all of these patient visits identified from the Medicaid claims data were actually the result of a PCP referral and if referral trends remain constant into the future, the estimated number of PCP-neurologist referrals within CT Medicaid would be 1,809 to 2,412. Specifically, there would be 2,412 referrals if sixty percent of referred patients were seen by a neurologist and 1,809 referrals if eighty percent of referred patients were seen. Since it is almost certain that the Medicaid claims data captured a significant number of patients not referred by a PCP, Table 36 includes both of these higher values as well as two lower values derived using half of the patients identified in the Medicaid claims [i.e., $904 = (1,447 * 0.5) / 0.8$ and $1,206 = (1,447 * 0.5) / 0.6$]. Under these assumptions, the additional cost for implementing eConsults for all neurology referrals would range from a spending decrease of \$3,351 to a spending increase of \$143,187. The lower amount represents the cost for 904 referrals if eighty percent of referred patients were seen under Usual Care and the higher amount captures the projected increase for 2,412 referrals if sixty percent of referred patients were seen under Usual Care.

Table 36. Total budget impact for SReSM projections for neurology using Base Assumptions and ten percent adjustments to Base Assumptions*

SReSM Simulations	Budget Impact per referral	Number of Referrals				
		904	1,206	1,809	2,412	
80% F2F occurrence under Usual Care						
10% Adjustment, lower budget impact	-\$3.71	-\$3,351	-\$4,470	-\$6,705	n/a	
Base Assumption	+\$16.98	\$15,351	\$20,480	\$30,720	n/a	
10% Adjustment, higher budget impact	\$34.31	\$31,018	\$41,381	\$62,071	n/a	
60% F2F occurrence under Usual Care						
10% Adjustment, lower budget impact	+\$26.81	n/a	\$32,328	\$48,492	\$64,656	
Base Assumption	+\$44.76	n/a	\$53,985	\$80,977	\$107,970	
10% Adjustment, higher budget	+\$59.36	n/a	\$71,593	\$107,390	\$143,187	

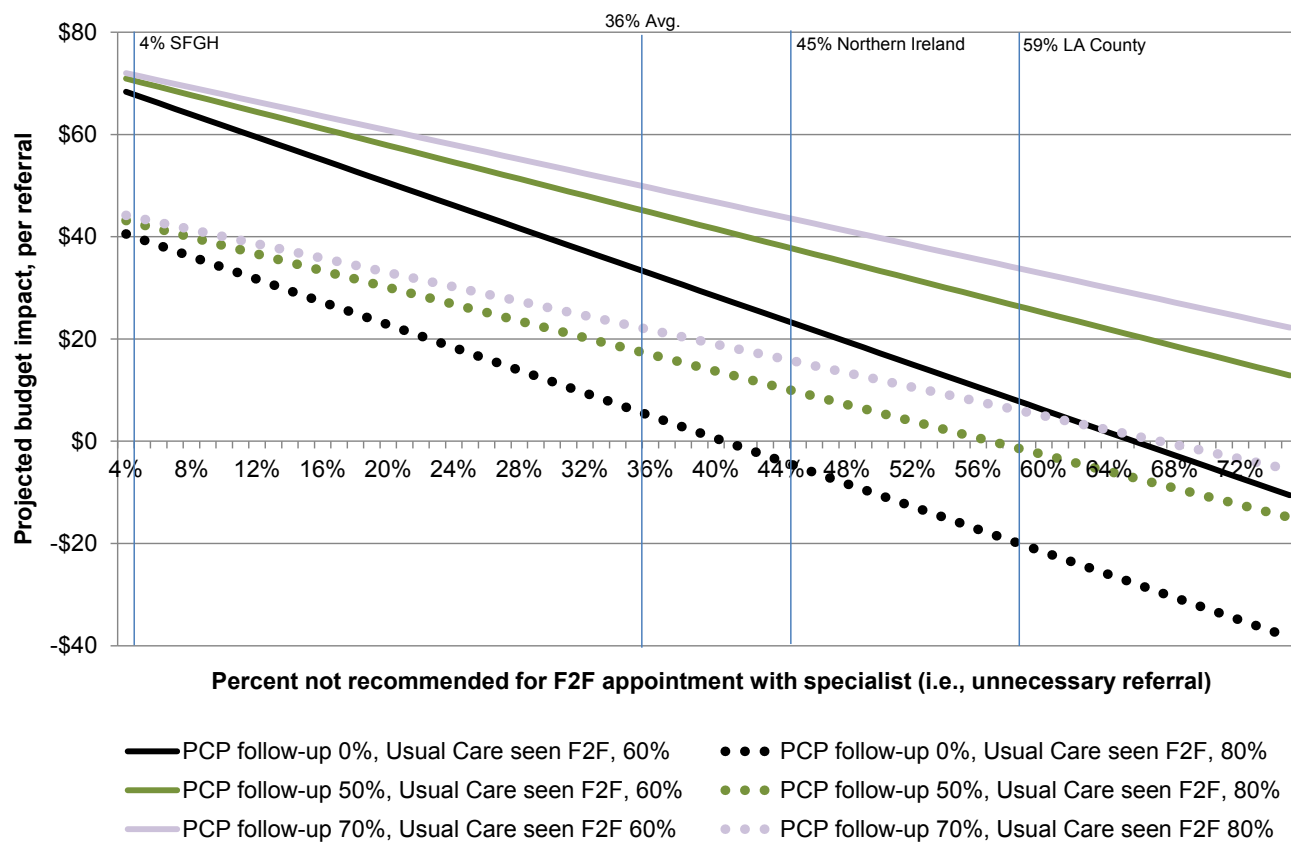
n/a: Number of referrals is considered beyond the range of likely referrals.

*These values were calculated using the SReSM. Total costs from calculations using the average cost per referral and the number of referrals differ slightly, due to rounding.

To provide another illustration of how changes in assumption values relate to changes in budget impact projections, Figure 16 illustrates differing budget impact projections for use of eConsults instead of Usual Care for neurology referrals when varying levels of three key assumptions: the proportion of patients under Usual Care seen at a F2F visit with a neurologist, the proportion of eConsult patients receiving PCP follow-up care, and the proportion of patients for whom an eConsult specialist review identifies an unnecessary referral. Figure 16 demonstrates that as the assumed percentage of patients with unnecessary referrals identified under eConsults increases, the cost of eConsults decreases. In addition, as the percentage of patients who are seen F2F under Usual Care increases from sixty to eighty percent, the budget impact decreases at all levels of unnecessary referrals. Similarly, as the percentage of patients needing PCP follow-up care (70 versus 50 versus 0 percent) decreases, the budget impact decreases regardless of the proportion of unnecessary referrals. Values from published electronic referral and/or consultation studies (summarized in Table 4), as well as the average of the three studies, are marked on Figure 16 as reference lines. In these studies, the proportions of unnecessary referrals to a neurologist were reported to be 4 percent, 45 percent and 59 percent, with an average of 36 percent.

Replacement of Usual Care with eConsults reaches the break-even point (no additional spending beyond Usual Care, where the line crosses \$0 in Figure 16), when at least 41 percent of neurology eConsults are considered unnecessary referrals by the specialist reviewer. Breaking even at 41 percent occurs only under assumptions most favorable to the budget impact of adopting eConsults: at least eighty percent of neurology referrals must be seen F2F by a neurologist under Usual Care and 0 percent of eConsults patients receive PCP follow-up care. The projected budget impact varies greatly at the three levels from the published studies (see reference lines on Figure 16). This illustrates the wide range of potential budget impact depending on the proportion of unnecessary referrals among CT Medicaid patients. In addition, the SReSM Base Assumption projection assumes that 36 percent of referrals are unnecessary. At the 36 percent unnecessary referral level (the average of the 3 studies), even combined with the most favorable levels of the other assumptions, eConsults is slightly more costly than Usual Care.

Figure 16. Projected budget impact for neurology eConsults at varying assumptions for patients seen face-to-face under Usual Care, and with PCP follow-up under eConsults



Orthopedic Surgery

Orthopedic surgery-specific SReSM input values, along with rationales and sources, are presented in Table 37.

Table 37. Rationale and sources for orthopedic surgery-specific SReSM base assumption values

SReSM Criteria	Model Input	Data source(s)/Explanation of Assumption
eConsults Approach		
Unnecessary Referral (Percentage not recommended for F2F within six months of eConsult review)	19%	The proportion was the observed value for orthopedic surgery in the SFGH eReferral program. Simulation A allows users to vary this assumption at 1% increments from 4 to 75%.
Percentage of F2F recommended who were premature referral	17.7%	This proportion is derived from findings for orthopedic surgery within the SFGH eReferral program evaluation conducted by RAND.
Cost Parameters		
eConsult rate: Specialist reviewer	\$30	Connecticut Medicaid data for new referrals. This rate is the average of the amount paid for the CPT code 99201, which is for a 15-minute evaluation and management visit for new patients and the CPT code 99241, which is for a brief consultation visit.
Specialist care, average cost	\$138.15	Connecticut Medicaid data for new referrals. This value is the average paid cost for the first orthopedist visit and any follow-up visits within six weeks. Simulation C allows the user to observe the impact of \$10 changes in this assumption, ranging from \$55 to \$205.
PCP visit code only, average cost	\$58.04	Connecticut Medicaid data for new referrals. This is the average amount paid for the visit code (99201-99205, 99211-99215) portion of the PCP visit occurring prior to the orthopedist visit.

SReSM results for orthopedic surgery—using, as model inputs, the Base Assumptions in Table 37 and those that are constant across specialty—are presented in Table 38. The SReSM projects a budget increase per orthopedic surgery referral of \$61.78 if sixty percent of referrals result in a F2F orthopedic surgery visit under Usual Care and \$33.67 if eighty percent of referrals result in a F2F visit under Usual Care. To demonstrate sensitivity to changes in each of the five key assumptions, the initial values were each increased and decreased by ten percent, holding other values at the Base Assumption levels. The initial projected budget impact of between \$33.67 and \$61.78 assumes that 19 percent of referrals would result in an “unnecessary F2F” determination by the specialist reviewer. As shown in Table 38, a ten percent change in unnecessary referrals changes the budget impact by \$8.75 per referral. For example, if 9 percent of referrals were ruled unnecessary, the projected budget impact would be between \$42.42 (\$33.67 + \$8.75) and \$70.53 (\$61.78 + \$8.75) per referral. On the other hand, if the proportion of referrals deemed unnecessary increased to 29 percent, the projected budget impact would be between \$24.92 and \$53.03 per referral. Similarly, a ten percent change in the fifty percent assumption for PCP follow-up care would change the projected budget impact by approximately \$2.01, resulting in a range of \$31.66 to \$59.77 in added costs assuming a forty percent rate of PCP follow-up care, and a range of \$35.67 to \$63.78 for a sixty percent rate of PCP follow-up care. Finally, a ten percent change in the Base Assumption for the eConsult rate (\$45 = \$30 for the specialist reviewer + \$15 PCP incentive) would influence the cost of the eConsults program in orthopedic surgery by \$4.50 per referral. Decreasing the eConsult rate from \$45 to \$40.50 would decrease the budget impact per referral to between \$29.17 and \$57.28. If the eConsult rate increased from \$45 to \$49.50, the projected budget impact per referral would increase to between \$38.17 and \$66.28.

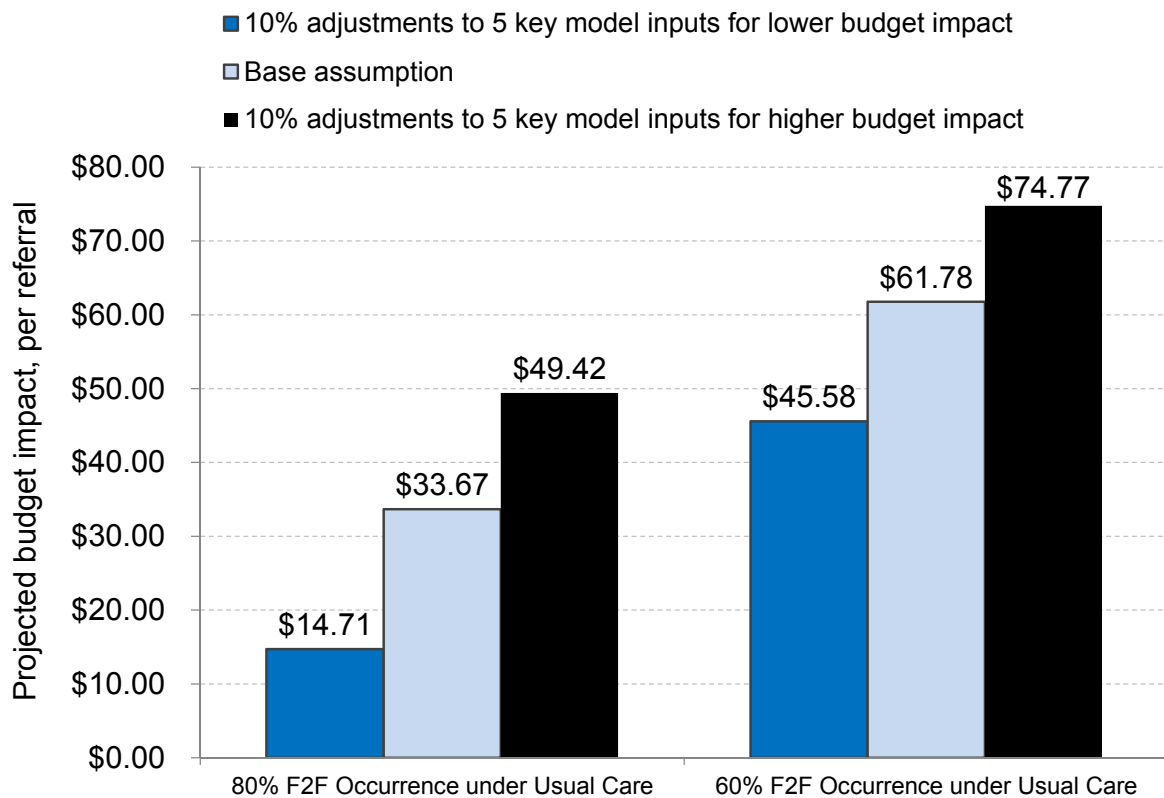
Table 38. SReSM projected initial budget impact per orthopedic surgery eConsult for Base Assumptions and effects of ten percent changes in Base Assumptions

	Usual Care Base Assumption—Percent of orthopedic surgery referrals resulting in a F2F visit with the orthopedic surgeon			
eConsult Base Assumptions	80% (Low Budget Impact) → 60% (High Budget Impact)			
Base Assumptions	\$33.67		\$61.78	
— (50% PCP follow-up)				
— (19% of referrals considered unnecessary)				
— (\$45 eConsult rate)				
— (\$138.15 average cost of specialist care provided)				
Change in Base Assumptions	-10%	+10%	-10%	+10%
— Referrals considered unnecessary	+\$8.75	-\$8.75	+\$8.75	-\$8.75
— PCP follow-up care as a result of specialist review	-\$2.01	+\$2.00	-\$2.01	+\$2.00
—eConsult rate: amount paid per eConsult for specialist review and PCP incentive	-\$4.50	+\$4.50	-\$4.50	+\$4.50
— Average payment for specialist care provided	+\$2.10*	-\$2.10*	+\$0.67*	-\$0.66*
*Changes in cost of specialty care depend upon values of other model inputs; change is greater for larger percent of patients seen F2F by specialist				

The average cost of specialist care is another important consideration for potential budget impact. The value used in our Base Assumptions, \$138.15, is the average cost derived from Medicaid claims data of orthopedic surgery care provided by a specialist at the first specialist visit and any follow-up visits within six weeks. The budget impact from varying this cost is not fixed—it depends on the values of other assumptions. The change is larger when the percent of orthopedic surgery referrals that would result in an office visit with the orthopedic surgeon under Usual Care is higher (i.e. eighty versus sixty percent). For example, a ten percent change in average cost of specialist care would result in a per referral budget impact of approximately \$0.67 at sixty percent of referrals that result in a F2F visit with an orthopedic surgeon and \$2.10 at eighty percent. An additional consideration is that, under eConsults, patients who have a F2F orthopedic surgery visit may require more expensive care than those for whom a F2F visit is deemed unnecessary. If this is the case, the cost of orthopedic surgery eConsults may be greater than the projections shown.

To further explore the relationships between the five key model inputs and overall budget impact, adjustments (in ten percent increments) were made to all of the key model inputs simultaneously in order to determine the lowest and highest budget impact. The values for unnecessary referrals and cost of specialty care were both increased by ten percent, to 29 percent and \$151.97 respectively, due to their negative relationship with budget impact. Conversely, percent PCP follow-up care and eConsults costs (specialist review and PCP incentive) were decreased by ten percent, to forty percent and \$40.50 respectively, because of their positive relationship with budget impact. These inputs were then used in the SReSM model to determine the projected budget impact using both eighty and sixty percent F2F under Usual Care. The budget impact from changing these model inputs concurrently differs slightly from the sum of the individual changes shown in Table 38. The resulting budget impacts, ranging from \$14.71 to \$74.77, are shown in Figure 17 below.

Figure 17. SReSM projected budget impact per orthopedic surgery referral for base assumption and ten percent adjustments to five key model inputs



To illustrate the potential total costs of implementing eConsults, the Base Assumptions and adjustments presented above were combined with referral volume estimates to obtain total cost estimates. During the one year period between 3/1/12 and 2/28/13, roughly 2,704 patients were seen by an orthopedic surgeon following a PCP visit. If all of these patient visits identified from the CT Medicaid claims data analysis were actually the result of a PCP referral and if referral trends remain constant into the future, the estimated number of PCP-orthopedic surgeon referrals within CT Medicaid would be 3,380 to 4,507. Specifically, there would be 4,507 referrals if sixty percent of referred patients were seen by an orthopedic surgeon and 3,380 referrals if eighty percent of referred patients were seen. Since it is almost certain that the Medicaid claims data captured a significant number of patients not referred by a PCP, Table 39 includes both of these higher values as well as two lower values derived using half of the patients identified in the Medicaid claims [i.e., $1,690 = (2,704 \times 0.5) / 0.8$ and $2,253 = (2,704 \times 0.5) / 0.6$]. Under these assumptions, the additional cost for implementing eConsults for all orthopedic surgery referrals would be within the range of \$24,853 to \$336,982.¹²⁵ The lower amount represents the cost for 1,690 referrals if eighty percent of referred patients were seen under Usual Care and the higher amount captures the projected increase for 4,507 referrals if sixty percent of referred patients were seen under Usual Care.

¹²⁵ This value was calculated using the SReSM. Results from calculations using the average cost per referral and the number of referrals differ slightly, due to rounding.

Table 39. Total budget impact for SReSM projections for orthopedic surgery using Base Assumptions and ten percent adjustments to Base Assumptions*

SReSM Simulations	Budget Impact per referral	Number of Referrals				
		1,690	2,253	3,380	4,507	
80% F2F occurrence under Usual Care						
10% Adjustment, lower budget impact	\$14.71	\$24,853	\$33,133	\$49,703	n/a	
Base Assumption	\$33.67	\$56,898	\$75,853	\$113,796	n/a	
10% Adjustment, higher budget impact	\$49.42	\$83,522	\$111,347	\$167,045	n/a	
60% F2F occurrence under Usual Care						
10% Adjustment, lower budget impact	\$45.58	n/a	\$102,690	\$154,058	\$205,425	
Base Assumption	\$61.78	n/a	\$139,185	\$208,808	\$278,431	
10% Adjustment, higher budget	\$74.77	n/a	\$168,453	\$252,717	\$336,982	

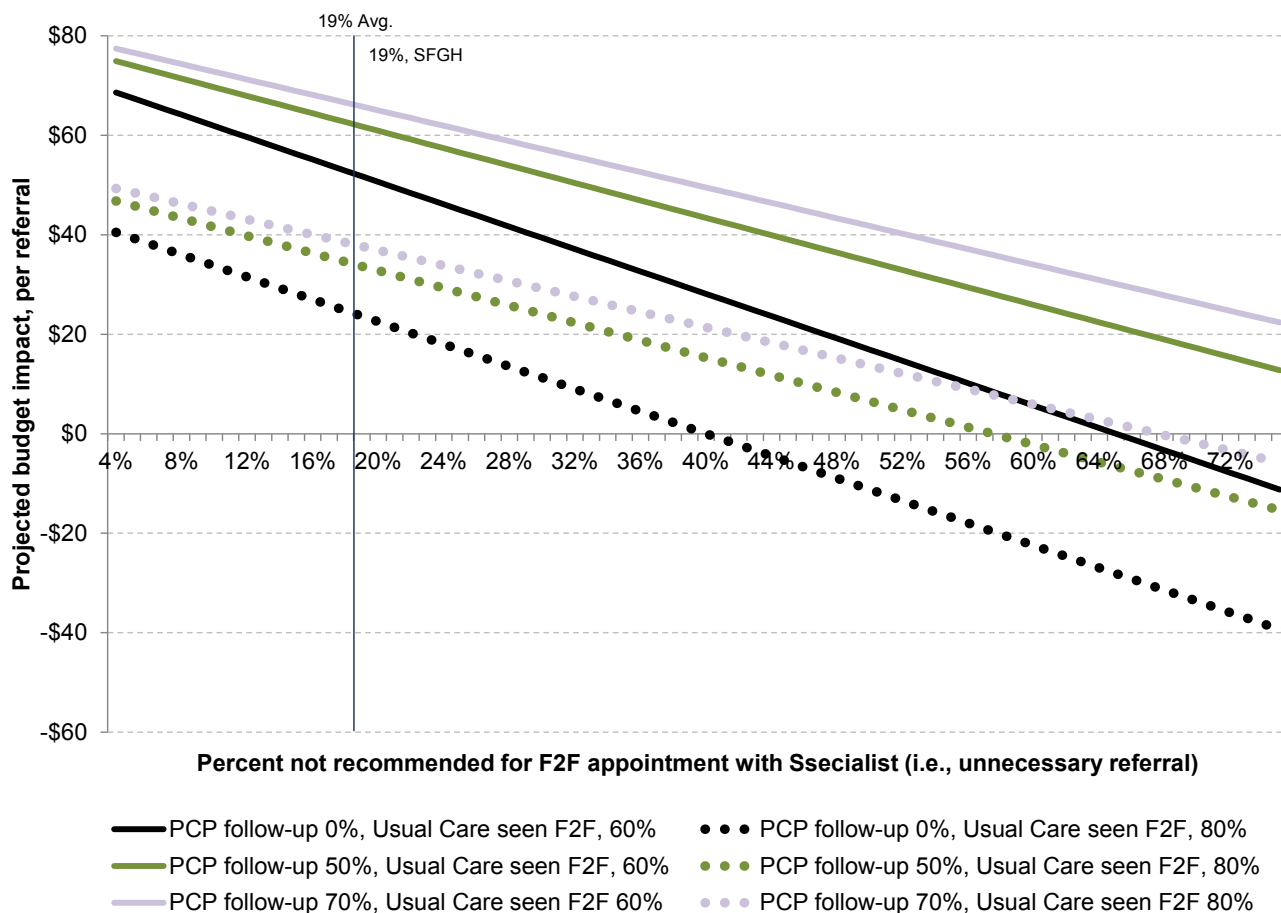
n/a: Number of referrals is considered beyond the range of likely referrals.

*These values were calculated using the SReSM. Total costs from calculations using the average cost per referral and the number of referrals differ slightly, due to rounding.

To provide another illustration of how changes in assumption values relate to changes in budget impact projections, Figure 18 illustrates differing budget impact projections for use of eConsults instead of Usual Care for orthopedic surgery referrals when varying levels of three key assumptions: the proportion of patients under Usual Care seen at a F2F visit with an orthopedic surgeon, the proportion of eConsult patients receiving PCP follow-up care, and the proportion of patients for whom an eConsult specialist review identifies an unnecessary referral. Figure 18 demonstrates that, as the assumed percentage of patients with unnecessary referrals identified under eConsults increases, the cost of eConsults decreases. In addition, as the percentage of patients who are seen F2F under Usual Care increases from sixty to eighty percent, the budget impact decreases at all levels of unnecessary referrals. Similarly, as the percentage of patients needing PCP follow-up care (70 versus 50 versus 0 percent) decreases, the budget impact decreases regardless of the proportion of unnecessary referrals. The value from the published electronic referral and/or consultation study (presented in Table 4) is marked on Figure 18 as a reference line. In this study, the proportion of unnecessary referrals to an orthopedic surgeon was reported to be 19 percent. With only one published study available as a reference, no information is available as to the possible uncertainty of this estimate.

Replacement of Usual Care with eConsults reaches the break-even point (no additional spending beyond Usual Care, where the line crosses \$0 in Figure 18), when at least forty percent of orthopedic surgery eConsults are considered unnecessary referrals by the specialist reviewer. Breaking even at forty percent occurs only under assumptions most favorable to the budget impact of adopting eConsults: at least eighty percent of orthopedic surgery referrals must be seen F2F by an orthopedic surgeon under Usual Care and 0 percent of eConsults patients receive PCP follow-up care. In addition, the SReSM Base Assumption projection assumes that 19 percent of referrals are unnecessary. At the 19 percent unnecessary referral level, even combined with the most favorable levels of the other assumptions, eConsults costs approximately \$24 more than Usual Care.

Figure 18. Projected budget impact for orthopedic surgery eConsults at varying assumptions for patients seen face-to-face under Usual Care, and with PCP follow-up under eConsults



Urology

Urology-specific SReSM input values, along with rationales and sources, are presented in Table 40.

Table 40. Rationale and sources for urology-specific SReSM base assumption values		
SReSM Criteria	Model Input	Data source(s)/Explanation of Assumption
eConsults Approach		
Unnecessary Referral (Percentage not recommended for F2F within six months of eConsult review)	28%	This value is the average of findings from Los Angeles County's eConsult system and the SFGH eReferral program. Simulation A allows users to vary this assumption at 1% increments from 4 to 75%.
Percentage of F2F recommended who were premature referral	16.2%	This proportion is derived from findings for urology within the SFGH eReferral program evaluation conducted by RAND.
Cost Parameters		
eConsult rate: Specialist reviewer	\$26	Connecticut Medicaid data for new referrals. This rate is the average amount paid for the CPT code 99201, the 15-minute evaluation and management visit for new patients.
Specialist care, average cost	\$129.03	Connecticut Medicaid data for new referrals. This value is the average paid cost for the first visit and any follow-up visits within six weeks. Simulation C allows the user to observe the impact of \$10 changes in this assumption, ranging from \$55 to \$205.
PCP visit code only, average cost	\$58.93	Connecticut Medicaid data for new referrals. This is the average amount paid for the visit code (99201-99205, 99211-99215) portion of the PCP visit occurring prior to the urology visit.

SReSM results for urology—using, as model inputs, the Base Assumptions in Table 40 and those that are constant across specialties—are presented in Table 41. The SReSM projects a budget increase per urology referral of \$49.97 if sixty percent of referrals result in a F2F urology visit under Usual Care and a budget increase of \$23.69 if eighty percent of referrals result in a F2F under Usual Care. To demonstrate sensitivity to changes in each of the five key assumptions, the initial values were each increased and decreased by ten percent, assuming that other values remained at the Base Assumption level. The initial projected budget impact of between \$23.69 and \$49.97 assumes that 28 percent of referrals would result in an “unnecessary F2F” determination by the specialist reviewer. As shown in Table 41, a ten percent change in unnecessary referrals changes the budget impact by \$7.94 per referral. For example, if 18 percent of referrals were ruled unnecessary, the projected budget impact would be between \$31.63 (\$23.69 + \$7.94) and \$57.91 (\$49.97 + \$7.94) per referral. On the other hand, if the proportion of referrals deemed unnecessary increased to 38 percent, the projected budget impact would be between \$15.75 (\$23.69 - \$7.94) and \$42.03 (\$49.97 - \$7.94) per referral. Similarly, a ten percent change in the fifty percent assumption for PCP follow-up care would change the projected budget impact by approximately \$2.43, resulting in a range of \$21.26 to \$47.55 in added costs assuming a forty percent rate of PCP follow-up care to \$26.12 to \$52.40 for a sixty percent rate of PCP follow-up care. Finally, a ten percent change in the Base Assumption for the eConsult rate (\$41 = \$26 for the specialist reviewer + \$15 PCP incentive) would influence the cost of the eConsults program in urology by \$4.10 per referral. Decreasing the eConsult rate from \$41 to \$36.90 would decrease the budget impact per referral to between \$19.59 and \$45.87. If the eConsult rate increased from \$41 to \$45.10, the projected budget impact per referral would increase to between \$27.79 and \$54.07.

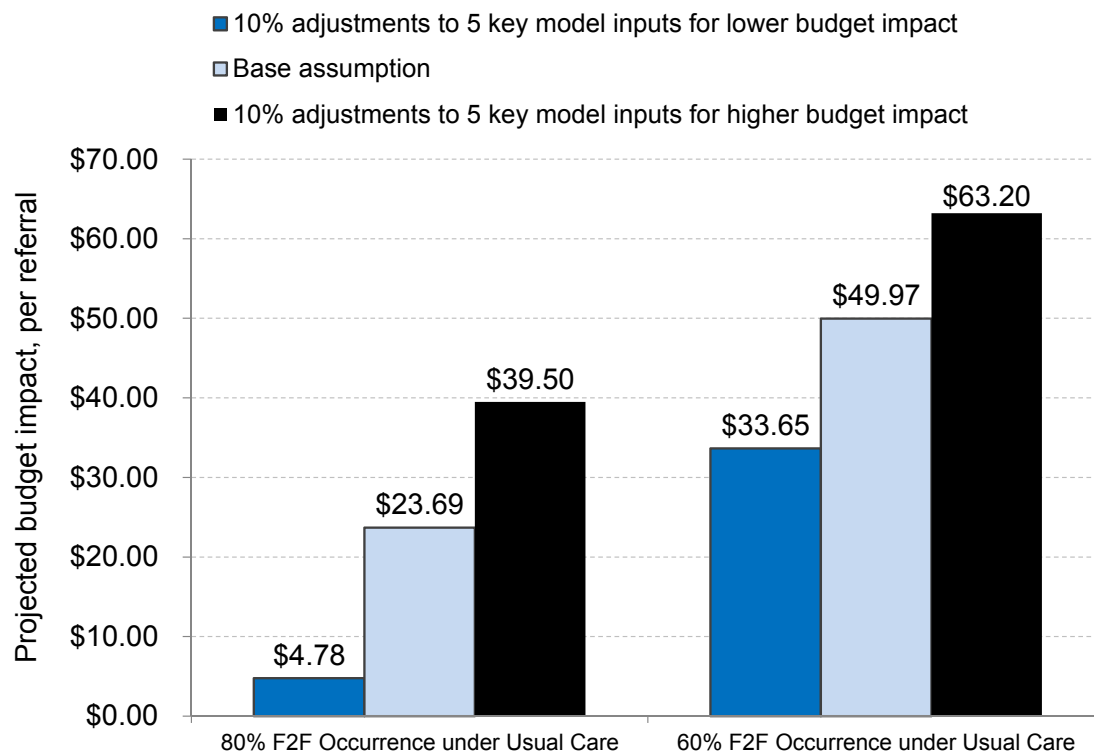
Table 41. SReSM projected initial budget impact per urology eConsult for Base Assumptions and effects of ten percent changes in Base Assumptions

eConsult Base Assumptions	Usual Care Base Assumption—Percent of urology referrals resulting in a F2F visit with the urologist			
	80% (Low Budget Impact) →		60% (High Budget Impact)	
Base Assumptions	\$23.69		\$49.97	
— (50% PCP follow-up)				
— (28% of referrals considered unnecessary)				
— (\$41 eConsult rate)				
— (\$129.03 average cost of specialist care provided)				
Change in Base Assumptions	-10%	+10%	-10%	+10%
— Referrals considered unnecessary	+\$7.94	-\$7.94	+\$7.94	-\$7.94
— PCP follow-up care as a result of specialist review	-\$2.43	+\$2.42	-\$2.42	+\$2.43
—eConsult rate: amount paid per eConsult for specialist review and PCP incentive	-\$4.10	+\$4.10	-\$4.10	+\$4.10
— Average payment for specialist care provided	+\$2.89*	-\$2.89*	+\$0.31*	-\$0.31*
*Changes in cost of specialty care depend upon values of other model inputs; change is greater for larger percent of patients seen F2F by specialist				

The average cost of specialist care is another important consideration for potential budget impact. The value used in our Base Assumptions, \$129.03, is the average cost derived from Medicaid claims data of urologic care provided by a specialist at the first specialist visit and any follow-up visits within six weeks. The budget impact from varying this cost is not fixed—it depends on the values of other assumptions. The change is larger when the percent of urology referrals that would result in an office visit with the urologist under Usual Care is higher (i.e. eighty vs sixty percent). For example, a ten percent change in average cost of specialist care would result in a per referral budget impact of \$0.31 at sixty percent of referrals that result in a F2F visit with a urologist and \$2.89 at eighty percent. An additional consideration is that, under eConsults, patients who have a F2F urology visit may require more expensive care than those for whom a F2F visit is deemed unnecessary. If this is the case, the cost of urology eConsults may be greater than the projections shown.

To further explore the relationships between the key model inputs and overall budget impact, adjustments (in ten percent increments) were made to all of the key model inputs simultaneously in order to determine the lowest and highest budget impact. The values for unnecessary referrals and cost of specialty care were both increased by ten percent, to 38 percent and \$141.93 respectively, due to their negative relationship with budget impact. Conversely, percent PCP follow-up care and eConsults costs (specialist review and PCP incentive) were decreased by ten percent, to forty percent and \$36.90 respectively, because of their positive relationship with budget impact. These inputs were then used in the SReSM model to determine the projected budget impact using both eighty and sixty percent F2F under Usual Care. The budget impact from changing these model inputs concurrently differs slightly from the sum of the individual changes shown in Table 41. The resulting budget impacts, which ranged from \$4.78 to \$63.20, are shown in Figure 19 below.

Figure 19. SReSM projected budget impact per urology referral for base assumption and ten percent adjustments to five key model inputs



To illustrate the potential total costs of implementing eConsults, the Base Assumptions and adjustments presented above were combined with referral volume estimates to obtain total cost estimates. During the one year period between 3/1/12 and 2/28/13, roughly 1,085 patients were seen by a urologist following a PCP visit. If all of these patient visits identified from the Medicaid claims data were actually the result of a PCP referral and if referral trends remain constant into the future, the estimated number of PCP-urologist referrals within CT Medicaid would be 1,356 to 1,808. Specifically, there would be 1,808 referrals if sixty percent of referred patients were seen by a urologist and 1,356 referrals if eighty percent of referred patients were seen. Since it is almost certain that the Medicaid claims data captured a significant number of patients not referred by a PCP, Table 42 includes both of these higher values as well as two lower values derived using half of the patients identified in the Medicaid claims [i.e., $678 = (1,085 \times 0.5) / 0.8$ and $904 = (1,085 \times 0.5) / 0.6$]. Under these assumptions, the additional cost for implementing eConsults for all urology referrals would be within the range of \$3,244 to \$114,267. The lower amount represents the cost for 678 referrals if eighty percent of referred patients were seen under Usual Care and the higher amount captures the projected increase for 1,808 referrals if sixty percent of referred patients were seen under Usual Care.

Table 42. Total budget impact for SReSM projections for urology using Base Assumptions and ten percent adjustments to Base Assumptions*

SReSM Simulations	Budget Impact per referral	Number of Referrals				
		678	904	1,356	1,808	
80% F2F occurrence under Usual Care						
10% Adjustment, lower budget impact	\$4.78	\$3,244	\$4,325	\$6,487	n/a	
Base Assumption	\$23.69	\$16,060	\$21,413	\$32,119	n/a	
10% Adjustment, higher budget impact	\$39.50	\$26,778	\$35,704	\$53,555	n/a	
60% F2F occurrence under Usual Care						
10% Adjustment, lower budget impact	\$33.65	n/a	\$30,420	\$45,631	\$60,841	
Base Assumption	\$49.97	n/a	\$45,175	\$67,763	\$90,351	
10% Adjustment, higher budget	\$63.20	n/a	\$57,133	\$85,700	\$114,267	

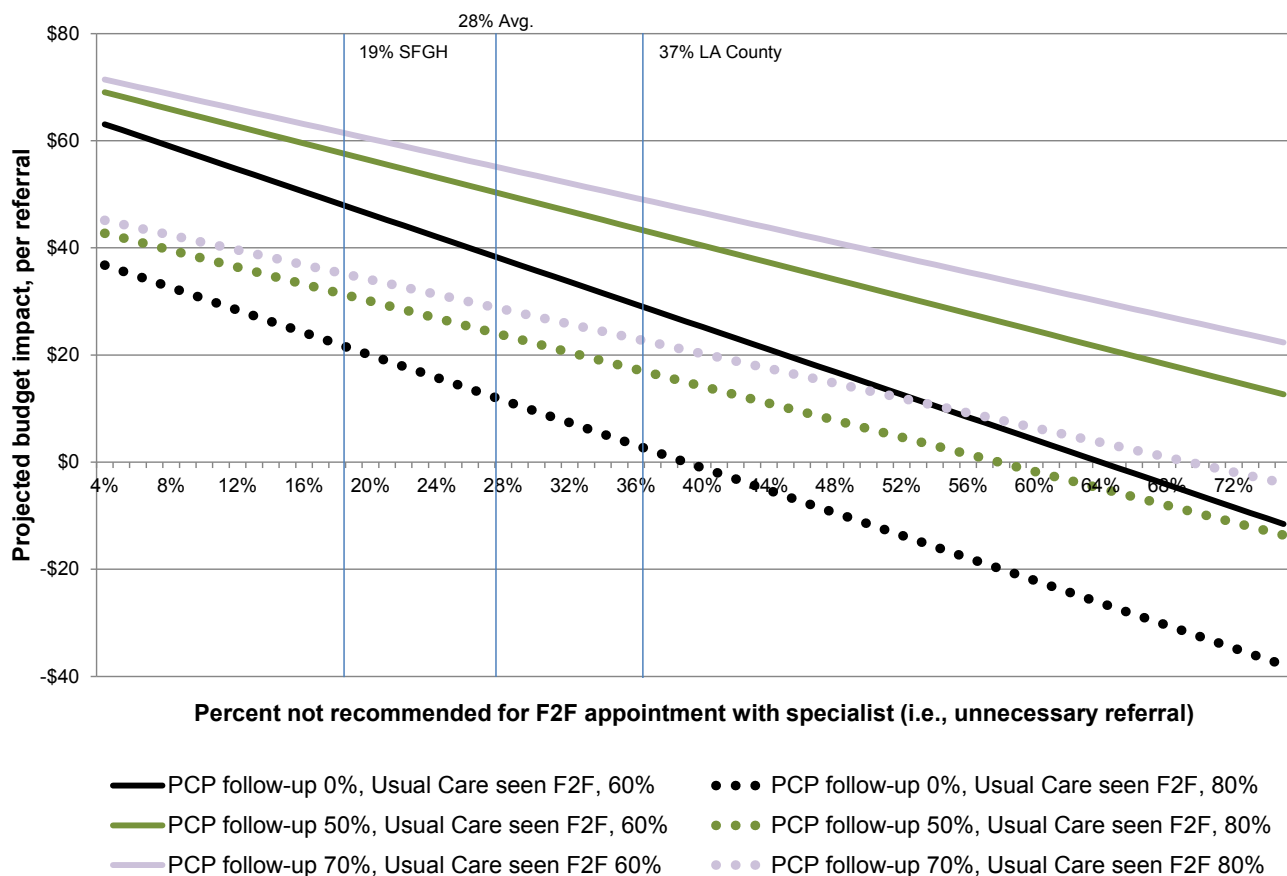
n/a: Number of referrals is considered beyond the range of likely referrals.

*These values were calculated using the SReSM. Total costs from calculations using the average cost per referral and the number of referrals differ slightly, due to rounding.

To provide another illustration of how changes in assumption values relate to changes in budget impact projections, Figure 20 illustrates differing budget impact projections for use of eConsults instead of Usual Care for urology referrals when varying levels of three key assumptions: the proportion of patients under Usual Care seen at a F2F visit with a urologist, the proportion of eConsult patients receiving PCP follow-up care, and the proportion of patients for whom an eConsult specialist review identifies an unnecessary referral. Figure 20 demonstrates that as the assumed percentage of patients with unnecessary referrals identified under eConsults increases, the cost of eConsults decreases. In addition, as the percentage of patients who are seen F2F under Usual Care increases from sixty to eighty percent, the budget impact decreases at all levels of unnecessary referrals. Similarly, as the percentage of patients needing PCP follow-up care (70 versus 50 versus 0 percent) decreases, the budget impact decreases regardless of the proportion of unnecessary referrals. Values from the published electronic referral and/or consultation studies (summarized in Table 4), as well as the average of the two studies, are marked on Figure 20 as reference lines. In these studies, the proportions of unnecessary referrals to a urologist were reported to be 19 and 37 percent, with an average of 28 percent.

Replacement of Usual Care with eConsults among new urology patients reaches the break-even point (no additional spending beyond Usual Care, where the line crosses \$0 in Figure 20) when at least 39 percent of urology eConsults are considered unnecessary referrals by the specialist reviewer. Breaking even at 39 percent occurs only under assumptions most favorable to the budget impact of adopting eConsults: at least eighty percent of urology referrals must be seen F2F by a urologist under Usual Care and 0 percent of eConsults patients receive PCP follow-up care. The projected budget impact varies somewhat at the two levels from the published studies (see reference lines on Figure 20). In addition, the SReSM Base Assumption projection assumes that 28 percent of referrals are unnecessary. At the 28 percent unnecessary referral level (the average of the 2 studies), even combined with the most favorable levels of the other assumptions, eConsults costs approximately \$12 more than Usual Care.

Figure 20. Projected budget impact for urology eConsults at varying assumptions for patients seen face-to-face under Usual Care, and with PCP follow-up under eConsults



SUMMARY AND CONCLUSIONS

Results from our review of the available literature and from SReSM analyses for Medicaid patients receiving Usual Care versus eConsults for specialty referrals lead to the following conclusions:

- ♦ **Available evidence leaves a high level of uncertainty about the actual cost and outcomes if DSS implemented the use of eConsults for specialty referrals.** More data are needed to lend greater confidence to our estimates of the budget impact of eConsults for these 5 specialties. Projected costs from the SReSM are largely dependent on data derived from a very sparse research literature and limited Medicaid claims data. Further, we had no actual data related to PCP-specialist referral practices within the Connecticut Medicaid Program; these numbers were inferred based on the proximity of PCP visits to specialist visits and the coding of the specialty visit. The actual number of Medicaid referrals that occur in the specialties of interest and the number of referrals resulting in an office visit with a specialist are unknown.
- ♦ **Results of our SReSM projections using the specialty-specific Base Assumptions indicate that, for all 5 specialties examined, replacing Usual Care with eConsults for patients without an existing relationship with a specialist will likely increase Medicaid spending for these services.**
 - However, modest alterations to the assumptions used to estimate overall costs yield very different budget impact scenarios, highlighting the uncertainty of our projections:
 - Under more favorable cost assumptions, eConsults would result in a total of \$37,901 in additional annual Medicaid spending for new patients referred to neurologists, dermatologists, gastroenterologists, orthopedists, and urologists
 - Under less favorable cost assumptions, eConsults would result in a total of \$808,258 in additional annual Medicaid spending for new patients referred for specialty care in these 5 areas
 - Under both sets of assumptions a large portion of the additional spending was associated with referrals to orthopedists
 - We emphasize that the conclusions from the simulations are highly sensitive to several of the model's primary assumptions: 1) the proportion of patients under Usual Care seen at a F2F visit by the specialist, 2) the proportion of eConsult patients receiving PCP follow-up care, 3) the proportion of patients for whom an eConsult specialist review identifies an unnecessary referral, 4) the cost of specialty care, and 5) the cost of an eConsult. More precise data on each of these assumptions for Connecticut Medicaid patients would improve confidence in projected costs.
- ♦ **Results from our analysis of Medicaid claims data and a review of the literature suggest substantial opportunities for eConsults to improve access to, and the timeliness of, care.**
 - eConsults may dramatically reduce wait times for specialty care: For CT Medicaid patients, the median wait times for F2F office visits with specialists following a PCP visit ranged between 70 and 77 days across the five specialties. In contrast, one eConsult program reported wait time reductions of fifty to ninety percent. In the CHC, Inc. cardiology eConsults pilot study the median time to an eConsult review and subsequent F2F appointment (if necessary) was five days.

- ♦ **One limitation of this analysis is our inability to project the potential “downstream” savings from reduced hospitalizations associated with more timely specialty care.**
 - In our companion report on cardiology eConsults, we calculated the annual Medicaid costs for hospitalizations resulting from ambulatory-sensitive cardiovascular conditions using the Agency for Healthcare Research and Quality’s standardized measure set. No comparable measures of preventable hospitalizations that might be influenced by an eConsult system are available for the 5 specialty areas examined in this report. It is possible that improving access to, and the timeliness of, specialty care could reduce future hospital costs. However, with the data available for this analysis and in the absence of standardized measures, we had no basis for calculating what, if any, savings might be achieved from reduced hospitalizations.

Recommendations

- ♦ **We recommend that DSS explore additional scenarios using SReSM to see how changes in assumptions related to eConsults result in different projected outcomes.** The projections presented in this report are sensitive to assumptions regarding the cost of eConsults, the proportion of eConsults deemed to be unnecessary referrals, and other values used for each of the twelve model inputs. Different scenarios using different sets of assumptions could be developed and tested in the model.
- ♦ **We recommend that DSS pursue further research to assess the potential for eConsults to lower costs of, and improve access to care among, Connecticut Medicaid patients.** Under the scenarios presented in this report, eConsults have the potential to improve access to specialty care at a modest cost. Additional research on the factors influencing the total costs associated with eConsults and possible avenues for achieving cost savings is warranted. Potential research projects that could quantify cost parameters and identify factors associated with successful use of eConsults might include:
 1. Reviews of medical records to determine a) the percent of specialty visits that are tied to a PCP referral and hence eligible for an eConsult and b) the percent of Medicaid referrals that result in a F2F visit across different specialty areas
 2. Calculation of downstream costs among patients who receive an eConsult versus those receiving a traditional referral
 3. Surveys of physicians to determine the types of conditions and types of patients that are best suited to management through electronic communications between PCPs and specialists
 4. Surveys of PCPs and specialists regarding adequate reimbursement for utilizing and providing eConsults for Medicaid patients. Results from this study could be especially important in determining the cost-effectiveness of eConsults
 5. More thorough analysis of the impact of eConsults on reducing missed appointments and reducing Medicaid transportation costs
- ♦ **We recommend DSS capitalize on the research currently being conducted through the New England eConsults Network Project.** This project entails a pilot of eConsults among four specialties (cardiology, endocrinology, dermatology, and orthopedics) over the next two years under a grant from the Jesse B. Cox Charitable Trust Fund to CHC, Inc. Replication of this study in other Connecticut FQHCs would provide greater clarity regarding the impact of eConsults on the Connecticut Medicaid population and the DSS budget.

APPENDIX

Table A-1. Values and Rationale for Dermatology Simulation using SReSM for New Patient Referrals

SReSM Criteria	Model Input	Data source(s)/Explanation of Assumption
Percent of referrals for which an eConsult is completed	100%	100% represents the maximum success rate for PCP adoption and transmission of referrals via eConsults. There is some evidence to suggest eConsults get lost or adoption rates are poor. If this is the case, the average cost per referral would be less than projected. The maximum of 100% was selected because this value better reflects the maximum potential costs of adopting eConsults.
Usual Care Approach		
Percent of referrals seen at office visit	60% and 80%	No direct data source. The converse of this criterion is patients who are never scheduled or do not show up for an appointment. In the CHC, Inc. cardiology eConsult pilot 81% of new patient referrals were seen by a cardiologist. For patient referrals, including new and established patients, 75% were seen. A value of 60% was used as a lower bound placeholder because limited evidence suggests that patients may be less likely to be seen than those in the cardiology study. Simulation A varies this assumption at 1% increments from 60 to 80%.
eConsults Approach		
Unnecessary Referral (percent not recommended for F2F within six months of eConsult review)	40%	Data is from the evaluation of Los Angeles County's eConsult system, conducted by Sheridan and Howard (2013). Simulation A varies this assumption at 1% increments from 4 to 75%.
Percent of F2F recommended who were premature referral	18%	No data source. The value was derived from the SFGH eReferral program evaluation conducted by RAND.
Percent of recommended patients seen F2F by specialist	80%	No direct data source. This is loosely based on the CHC, Inc. study. Roughly 80% of new patient cardiology referrals were seen by a cardiologist under traditional care. A lower proportion of recommended patients, 69%, were seen with eConsults. The remaining patients are those never scheduled for an appointment or who did not attend their appointment. If the value observed for the traditional approach reflects relatively good follow-up and visit attendance within the safety net population, then 80% may be appropriate. Assuming 100% would substantially increase cost estimates and presumes all patients recommended for a F2F visit attended such a visit.
Percent of premature and unnecessary referral with PCP follow-up visit(s)	50%	No direct data source. Findings from the SFGH eReferral program and anecdotal evidence from the CHC, Inc. cardiology pilot suggest that PCP follow-up is common. Simulation B allows the model user to observe the impact of 10% changes in this assumption, ranging from 0% to 70%.
Cost Parameters		
Transportation (cost per participant seen at office visit)	\$2.40	Connecticut Medicaid data. This rate is not specialty specific.
eConsult rate: PCP incentive	\$15	No data source. The value is roughly 58% the amount paid for the CPT code 99201, which is a 15-minute new patient visit.
eConsult rate: Specialist reviewer	\$26	Connecticut Medicaid data for new referrals. This rate is the average amount paid for the CPT code 99201, which is for a 15-minute visit for new patients.
Specialist care, average cost	\$94.73	Connecticut Medicaid data for new referrals. This value is the average paid cost for the first dermatology visit and any follow-up visits within six weeks. Simulation C allows the user to observe the impact of \$10 changes in this assumption, ranging from \$55 to \$205.
PCP visit code only, average cost	\$56.77	Connecticut Medicaid data for new referrals. This is the average amount paid for the visit code (99201-99205, 99211-99215) portion of the PCP visit occurring prior to the dermatology visit.

Table A-2. Values and Rationale for Gastroenterology Simulation using SReSM for New Patient Referrals		
SReSM Criteria	Model Input	Data source(s)/Explanation of Assumption
Percent of referrals for which an eConsult is completed	100%	100% represents the maximum success rate for PCP adoption and transmission of referrals via eConsults. There is some evidence to suggest eConsults get lost or adoption rates are poor. If this is the case, the average cost per referral would be less than projected. The maximum of 100% was selected because this value better reflects the maximum potential costs of adopting eConsults.
Usual Care Approach		
Percent of referrals seen at office visit	60% and 80%	No direct data source. The converse of this criterion is patients who are never scheduled or do not show up for an appointment. In the CHC, Inc. cardiology eConsult pilot 81% of new patient referrals were seen by a cardiologist. For patient referrals, including new and established patients, 75% were seen. A value of 60% was used as a lower bound placeholder because limited evidence suggests that patients may be less likely to be seen than those in the cardiology study. Simulation A varies this assumption at 1% increments from 60 to 80%.
eConsults Approach		
Unnecessary Referral (percent not recommended for F2F within six months of eConsult review)	28%	This value is the average of findings from Los Angeles County's eConsult system and the SFGH eReferral program. Simulation A varies this assumption at 1% increments from 4 to 75%.
Percent of F2F recommended who were premature referral	13.6%	This proportion is derived from findings for gastroenterology within the SFGH eReferral program evaluation conducted by RAND.
Percent of recommended patients seen F2F by specialist	80%	No direct data source. This is loosely based on the CHC, Inc. study. Roughly 80% of new patient cardiology referrals were seen by a cardiologist under traditional care. A lower proportion of recommended patients, 69%, were seen with eConsults. The remaining patients are those never scheduled for an appointment or who did not attend their appointment. If the value observed for the traditional approach reflects relatively good follow-up and visit attendance within the safety net population, then 80% may be appropriate. Assuming 100% would substantially increase cost estimates and presumes all patients recommended for a F2F visit attended such a visit.
Percent of premature and unnecessary referral with PCP follow-up visit(s)	50%	No direct data source. Findings from the SFGH eReferral program and anecdotal evidence from the CHC, Inc. cardiology pilot suggest that PCP follow-up is common. Simulation B allows the model user to observe the impact of 10% changes in this assumption, ranging from 0% to 70%.
Cost Parameters		
Transportation (cost per participant seen at office visit)	\$2.40	Connecticut Medicaid data. This rate is not specialty specific.
eConsult rate: PCP incentive	\$15	No data source. The value is roughly 58% the amount paid for the CPT code 99201, which is a 15-minute new patient visit.
eConsult rate: Specialist reviewer	\$26	Connecticut Medicaid data for new referrals. This rate is the average amount paid for the CPT code 99201, which is for a 15-minute visit for new patients.
Specialist care, average cost	\$110.12	Connecticut Medicaid data for new referrals. This value is the average paid cost for the first gastroenterology visit and any follow-up visits within six weeks. Simulation C allows the user to observe the impact of \$10 changes in this assumption, ranging from \$55 to \$205.
PCP visit code only, average cost	\$59.86	Connecticut Medicaid data for new referrals. This is the average amount paid for the visit code (99201-99205, 99211-99215) portion of the PCP visit occurring prior to the gastroenterology visit.

Table A-3. Values and Rationale for Neurology Simulation using SReSM for New Patient Referrals		
SReSM Criteria	Model Input	Data source(s)/Explanation of Assumption
Percent of referrals for which an eConsult is completed	100%	100% represents the maximum success rate for PCP adoption and transmission of referrals via eConsults. There is some evidence to suggest eConsults get lost or adoption rates are poor. If this is the case, the average cost per referral would be less than projected. The maximum of 100% was selected because this value better reflects the maximum potential costs of adopting eConsults.
Usual Care Approach		
Percent of referrals seen at office visit	60% and 80%	No direct data source. The converse of this criterion is patients who are never scheduled or do not show up for an appointment. In the CHC, Inc. cardiology eConsult pilot 81% of new patient referrals were seen by a cardiologist. For patient referrals, including new and established patients, 75% were seen. A value of 60% was used as a lower bound placeholder because limited evidence suggests that patients may be less likely to be seen than those in the cardiology study. Simulation A varies this assumption at 1% increments from 60 to 80%.
eConsults Approach		
Unnecessary Referral (percent not recommended for F2F within six months of eConsult review)	36%	This value is the average of findings from Los Angeles County's eConsult system, the SFGH eReferral program, and Northern Ireland's email referral system. Simulation A varies this assumption at 1% increments from 4 to 75%.
Percent of F2F recommended who were premature referral	4.7%	This proportion is derived from findings for neurology within the SFGH eReferral program evaluation conducted by RAND.
Percent of recommended patients seen F2F by specialist	80%	No direct data source. This is loosely based on the CHC, Inc. study. Roughly 80% of new patient cardiology referrals were seen by a cardiologist under traditional care. A lower proportion of recommended patients, 69%, were seen with eConsults. The remaining patients are those never scheduled for an appointment or who did not attend their appointment. If the value observed for the traditional approach reflects relatively good follow-up and visit attendance within the safety net population, then 80% may be appropriate. Assuming 100% would substantially increase cost estimates and presumes all patients recommended for a F2F visit attended such a visit.
Percent of premature and unnecessary referral with PCP follow-up visit(s)	50%	No direct data source. Findings from the SFGH eReferral program and anecdotal evidence from the CHC, Inc. cardiology pilot suggest that PCP follow-up is common. Simulation B allows the model user to observe the impact of 10% changes in this assumption, ranging from 0% to 70%.
Cost Parameters		
Transportation (cost per participant seen at office visit)	\$2.40	Connecticut Medicaid data. This rate is not specialty specific.
eConsult rate: PCP incentive	\$15	No data source. The value is roughly 58% the amount paid for the CPT code 99201, which is a 15-minute new patient visit.
eConsult rate: Specialist reviewer	\$30	Connecticut Medicaid data for new referrals. This rate is the average of the amount paid for the CPT code 99201, which is for a 15-minute evaluation and management visit for new patients and the CPT code 99241, which is for a brief consultation visit.
Specialist care, average cost	\$136.51	Connecticut Medicaid data for new referrals. This value is the average paid cost for the first neurology visit and any follow-up visits within six weeks. Simulation C allows the user to observe the impact of \$10 changes in this assumption, ranging from \$55 to \$205.
PCP visit code only, average cost	\$59.11	Connecticut Medicaid data for new referrals. This is the average amount paid for the visit code (99201-99205, 99211-99215) portion of the PCP visit occurring prior to the neurology visit.

Table A-4. Values and Rationale for Orthopedic Surgery Simulation using SReSM for New Patient Referrals		
SReSM Criteria	Model Input	Data source(s)/Explanation of Assumption
Percent of referrals for which an eConsult is completed	100%	100% represents the maximum success rate for PCP adoption and transmission of referrals via eConsults. There is some evidence to suggest eConsults get lost or adoption rates are poor. If this is the case, the average cost per referral would be less than projected. The maximum of 100% was selected because this value better reflects the maximum potential costs of adopting eConsults.
Usual Care Approach		
Percent of referrals seen at office visit	60% and 80%	No direct data source. The converse of this criterion is patients who are never scheduled or do not show up for an appointment. In the CHC, Inc. cardiology eConsult pilot 81% of new patient referrals were seen by a cardiologist. For patient referrals, including new and established patients, 75% were seen. A value of 60% was used as a lower bound placeholder because limited evidence suggests that patients may be less likely to be seen than those in the cardiology study. Simulation A allows users to vary this assumption at 1% increments from 60 to 80%.
eConsults Approach		
Unnecessary Referral (percent not recommended for F2F within six months of eConsult review)	19%	The proportion was the observed value for orthopedic surgery in the SFGH eReferral program. Simulation A allows users to vary this assumption at 1% increments from 4 to 75%.
Percent of F2F recommended who were premature referral	17.7%	This proportion is derived from findings for orthopedic surgery within the SFGH eReferral program evaluation conducted by RAND.
Percent of recommended patients seen F2F by specialist	80%	No direct data source. This is loosely based on the CHC, Inc. study. Roughly 80% of new patient cardiology referrals were seen by a cardiologist under traditional care. A lower proportion of recommended patients, 69%, were seen with eConsults. The remaining patients are those never scheduled for an appointment or who did not attend their appointment. If the value observed for the traditional approach reflects relatively good follow-up and visit attendance within the safety net population, then 80% may be appropriate. Assuming 100% would substantially increase cost estimates and presumes all patients recommended for a F2F visit attended such a visit.
Percent of premature and unnecessary referral with PCP follow-up visit(s)	50%	No direct data source. Findings from the SFGH eReferral program and anecdotal evidence from the CHC, Inc. cardiology pilot suggest that PCP follow-up is common. Simulation B allows the model user to observe the impact of 10% changes in this assumption, ranging from 0% to 70%.
Cost Parameters		
Transportation (cost per participant seen at office visit)	\$2.40	Connecticut Medicaid data. This rate is not specialty specific.
eConsult rate: PCP incentive	\$15	No data source. The value is roughly 58% the amount paid for the CPT code 99201, which is a 15-minute new patient visit.
eConsult rate: Specialist reviewer	\$30	Connecticut Medicaid data for new referrals. This rate is the average of the amount paid for the CPT code 99201, which is for a 15-minute evaluation and management visit for new patients and the CPT code 99241, which is for a brief consultation visit.
Specialist care, average cost	\$138.15	Connecticut Medicaid data for new referrals. This value is the average paid cost for the first orthopedist visit and any follow-up visits within six weeks. Simulation C allows the user to observe the impact of \$10 changes in this assumption, ranging from \$55 to \$205.
PCP visit code only, average cost	\$58.04	Connecticut Medicaid data for new referrals. This is the average amount paid for the visit code (99201-99205, 99211-99215) portion of the PCP visit occurring prior to the orthopedist visit.

Table A-5. Values and Rationale for Urology Simulation using SReSM for New Patient Referrals		
SReSM Criteria	Model Input	Data source(s)/Explanation of Assumption
Percent of referrals for which an eConsult is completed	100%	100% represents the maximum success rate for PCP adoption and transmission of referrals via eConsults. There is some evidence to suggest eConsults get lost or adoption rates are poor. If this is the case, the average cost per referral would be less than projected. The maximum of 100% was selected because this value better reflects the maximum potential costs of adopting eConsults.
Usual Care Approach		
Percent of referrals seen at office visit	60% and 80%	No direct data source. The converse of this criterion is patients who are never scheduled or do not show up for an appointment. In the CHC, Inc. cardiology eConsult pilot 81% of new patient referrals were seen by a cardiologist. For patient referrals, including new and established patients, 75% were seen. A value of 60% was used as a lower bound placeholder in case patients may be less likely to be seen than those in the cardiology study. Simulation A allows users to vary this assumption at 1% increments from 60 to 80%.
eConsults Approach		
Unnecessary Referral (percent not recommended for F2F within six months of eConsult review)	28%	This value is the average of findings from Los Angeles County's eConsult system and the SFGH eReferral program. Simulation A allows users to vary this assumption at 1% increments from 4 to 75%.
Percent of F2F recommended who were premature referral	16.2%	This proportion is derived from findings for urology within the SFGH eReferral program evaluation conducted by RAND.
Percent of recommended patients seen F2F by specialist	80%	No direct data source. This is loosely based on the CHC, Inc. study. Roughly 80% of new patient cardiology referrals were seen by a cardiologist under traditional care. A lower proportion of recommended patients, 69%, were seen with eConsults. The remaining patients are those never scheduled for an appointment or who did not attend their appointment. If the value observed for the traditional approach reflects relatively good follow-up and visit attendance within the safety net population, then 80% may be appropriate. Assuming 100% would substantially increase cost estimates and presumes all patients recommended for a F2F visit attended such a visit.
Percent of premature and unnecessary referral with PCP follow-up visit(s)	50%	No direct data source. Findings from the SFGH eReferral program and anecdotal evidence from the CHC, Inc. cardiology pilot suggest that PCP follow-up is common. Simulation B allows the model user to observe the impact of 10% changes in this assumption, ranging from 0% to 70%.
Cost Parameters		
Transportation (cost per participant seen at office visit)	\$2.40	Connecticut Medicaid data. This rate is not specialty specific.
eConsult rate: PCP incentive	\$15	No data source. The value is roughly 58% the amount paid for the CPT code 99201, which is a 15-minute new patient visit.
eConsult rate: Specialist reviewer	\$26	Connecticut Medicaid data for new referrals. This rate is the average amount paid for the CPT code 99201, the 15-minute evaluation and management visit for new patients.
Specialist care, average cost	\$129.03	Connecticut Medicaid data for new referrals. This value is the average paid cost for the first visit and any follow-up visits within six weeks. Simulation C allows the user to observe the impact of \$10 changes in this assumption, ranging from \$55 to \$205.
PCP visit code only, average cost	\$58.93	Connecticut Medicaid data for new referrals. This is the average amount paid for the visit code (99201-99205, 99211-99215) portion of the PCP visit occurring prior to the urology visit.

