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ORIGINAL RESEARCH

Implementation of an electronic surgical referral service. Collaboration, consensus and cost of the surgeon – general practitioner Delphi approach

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Background: Poor coordination between levels of care plays a central role in determining the quality and cost of health care. To improve patient coordination, systematic structures, guidelines, and processes for creating, transferring, and recognizing information are needed to facilitate referral routines.

Methods: Prospective observational survey of implementation of electronic medical record (EMR)-supported guidelines for surgical treatment.

Results: One university clinic, two local hospitals, 31 municipalities, and three EMR vendors participated in the implementation project. Surgical referral guidelines were developed using the Delphi method; 22 surgeons and seven general practitioners (GPs) needed 109 hours to reach consensus. Based on consensus guidelines, an electronic referral service supported by a clinical decision support system, fully integrated into the GPs' EMR, was developed. Fifty-five information technology personnel and 563 hours were needed (total cost 67,000 £) to implement a guideline supported system in the EMR for 139 GPs. Economical analyses from a hospital and societal perspective, showed that 504 (range 401–670) and 37 (range 29–49) referred patients, respectively, were needed to provide a cost-effective service.

Conclusion: A considerable amount of resources were needed to reach consensus on the surgical referral guidelines. A structured approach by the Delphi method and close collaboration between IT personnel, surgeons and primary care physicians were needed to reach consensus.

Keywords: hospital referrals, surgery, patient pathways, process health care assessment, electronic medical record

Introduction

Busy hospital clinics and increased waiting time for surgical treatment have made it necessary to develop new referral routines and to improve the patient flow and coordination between primary and secondary care. Poor coordination between different levels of care plays a central role in determining health care quality and cost.[1–3] To improve coordination, systematic structures, guidelines (clinical decision support [CDS] systems), and processes for creating, transferring, and recognizing information are needed to facilitate primary–secondary care communication and referral routines.[1] Improved referral routines have the potential to decrease waiting time and to decrease the workload for hospital clinics.[4–7] CDS systems can be used as a tool to improve referral quality and the coordination of care. CDS systems provide clinicians with patient-specific assessment tools or guidelines to aid their clinical decision-making and have been shown to improve health care quality.[8,9] CDS systems improve prescribing practices, reduce serious medication errors, enhance the delivery of preventive

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care services, improve adherence to guidelines, and result in lasting improvements in clinical practice.[10–13]

In this research project we focused on referrals to outpatient surgery. Outpatient surgery is a cost-effective solution for certain surgical patients because it decreases the time between the referral and the surgery and subsequently improves the patient flow.[5,14–19] Furthermore, outpatient surgery decreases the burden of internal hospital logistics by decreasing the number of administrative personnel involved in the referral process.[14–19]

In 2007, we initiated an outpatient surgical referral program, aiming to decrease waiting times and improve the patient flow at the outpatient clinics and operational theatres. We wanted to implement a CDS-supported referral system in the general practitioners' (GPs') electronic medical record (EMR) and thereby improve surgical referral quality, improve the coordination of care, and increase the rate of outpatient surgery (one stop surgery). The objective of this observational trial was to describe the Delphi method and resources needed (money, time, and personnel) to develop and implement a CDS-supported surgical referral system in the GPs' EMR.

Methods

This prospective observational study took place between June 2007 and June 2011 and was divided into three main phases: 1) reaching guideline consensus on the content of a CDS-supported referral service; 2) developing the CDS-supported referral software; and 3) large-scale implementation of an EMR-integrated referral service. The use of resources (surgeons, GPs, administrative staff, and technology) was prospectively registered. The primary objective of the survey was to describe the primary care physician–surgeon consensus process by the Delphi method. The secondary objective was to perform an estimate of the number of referrals needed to establish a cost-effective referral service (ie, cost of consensus and implementation = potential cost savings by improved referral routines).

Research setting

The Department of Digestive Surgery is divided into clinics located at three different hospitals. All of these clinics perform the surgical procedures included in the trial (pilonidal sinus: Bascom plasty; inguinal hernia: Lichtenstein repair; gallstone disease: laparoscopic cholecystectomy). In the county of Troms, there are 31 municipal GP practices with 139 GPs. All of the GP practices are connected to the Norwegian National Health Network, which sends referrals electronically to hospitals.

Patients

Patients were included in the analyses if they were diagnosed and referred to hospital by their GP for an inguinal hernia, umbilical hernia, sinus pilonidalis, or gallstone disease requiring surgical treatment.

Consensus of a guideline-supported referral system

A modified Delphi approach was used,[21] divided into the following phases: generation of referral recommendations, a panel meeting of senior surgeons, a first consensus round with all surgeons (review results), a second consensus round with all surgeons (ratings), and the evaluation of the consensus. Relevant evidence regarding the different conditions was presented, and all of the participants in the process were asked to include only the "need to know" information about the surgical procedure. This information includes:

- Disease-specific guidelines: These guidelines included signs and symptoms, surgical indications and contraindications, blood samples, and radiological examinations needed prior to surgery (laparoscopic cholecystectomy).
- Standardized referral forms: The referral forms included information needed for anesthesia (mandatory), information needed for surgeons (mandatory), and additional information.
- Patient information: This information included the time of surgery, the surgical procedure, the instructions for the patient to follow after surgery, and the possible complications of surgery.

After we reached internal hospital department consensus, the referral templates and guidelines were discussed with a panel of three experienced GPs. The GPs provided comments and suggestions for further improvement of the referral forms, disease-specific guidelines, and patient information. All changes suggested by the GPs were then presented and accepted by the head of the surgical department.

All of the necessary resources (hours) used to reach consensus were prospectively registered.

Development of the CDS-supported EMR referral software

Two EMR companies were involved in the development, piloting, and implementation of the CDS solution. A third company was responsible for the software solution making communication between EMR 1 and EMR 2 possible. The development and implementation of the technology were adjusted to incorporate the features of CDS systems that have been proven effective for changing clinical practice.[20] All of the necessary resources were prospectively registered.

Referral piloting and large-scale implementation

A primary care office was chosen as the pilot office. The CDS-supported referral software was discussed with the GPs, and improvements were made after receiving feedback from the GPs. Test referrals were sent from the GP office to the hospital until all of the technological problems had been resolved. Information technology (IT) experts integrated the referral software into the GPs' EMR. The software was fully integrated into the GPs' EMR and triggered by the corresponding international classification of primary care (ICPC) codes.

Comparison of referral cost-effectiveness

Two referral routes were compared: a) the traditional referral route where all patients are referred by the GP to the outpatient clinic and the outpatient clinic surgeon then refers the patients to day case surgery; and b) The GP refers directly to day case surgery (Figure 1). The sensitivity analysis used both a societal and a hospital perspective. The referral costs included administrative hospital costs, the examination in the surgical outpatient department (surgeon time, nurse time), the surgical treatment (surgeon time, anesthetist time, and nurse time), the unused surgical outpatient capacity caused by incorrect referrals (both for new and traditional service), and the patients' travel costs. All of the cost estimates (Table S1) were created separately and compared. We assumed that 10% of the one-stop patients would be denied surgery because of inconsistent referral information and that 20% of the referred patients were on sick leave at the time of referral. The number of patients needed to break even (the threshold, ie, the point at which the cost savings from a one stop surgery (OSS) referral service equal the cost of implementation) was estimated. This value was obtained using the following equation:

$$\text{Potential savings of the referral service} = \text{Cost of the Delphi process} + \text{Cost of software development} + \text{Cost of implementation.} \quad (1)$$

We defined a potential decrease in waiting time as "total waiting time – intrahospital waiting time." Prehospital waiting time was defined as the time between the referral and the first consultation at the surgical outpatient clinic. Data from the national waiting list register was extracted (http://www.fritt-sykehusvalg.no/start/) to perform this analysis. Intrahospital waiting time was defined as the time between the first consultation at the outpatient clinic and the surgical treatment. The NOMESCO (Nordic Medico-Statistical Committee) Classification of Surgical Procedures codes were extracted from the hospital's EMR database to perform this analysis. To estimate the potential frequency of patients referred by the new service, consecutive referrals (an 18-month time interval) for sinus pilonidalis (International Classification of Diseases [ICD] 10: L05.0 and L05.9), gallstone disease (ICD 10: K80.2), inguinal hernia (ICD 10: K40.0, K40.2, K40.9), and umbilical hernia (ICD 10: K42.0, K42.9) were reviewed by two authors (Knut Magne Augestad [KMA] and Rolv-Ole Lindsetmo [ROL]). Cost data were converted from Norwegian kroner (NOK) into British pounds at the rate of 1 £ =9.39 NOK (based on the exchange rage according to the Norwegian National Bank on June 27, 2012). The BMJ guidelines for health-related economic evaluations were followed.[22]

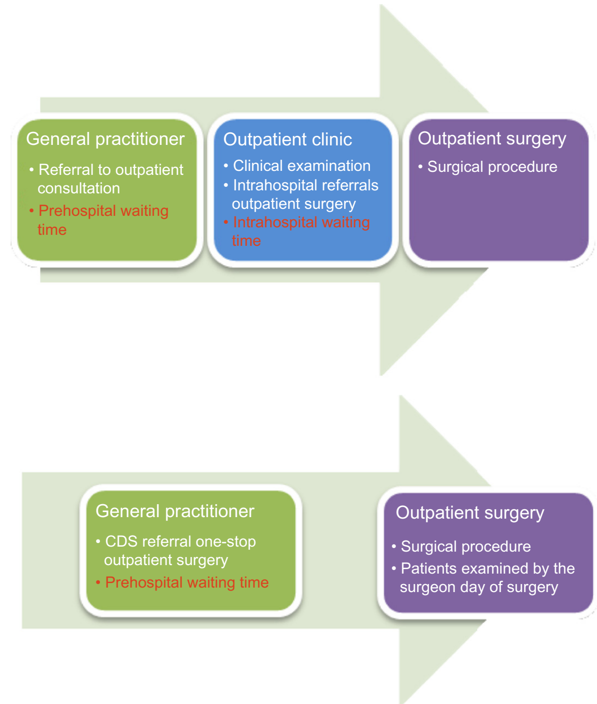

Figure 1 Principle of a guideline-supported surgical referral system to outpatient surgery.
Notes: The aim is to decrease time spent on intrahospital logistics, by omitting the outpatient clinical examination and intrahospital referral to day case surgery. The traditional referral pathways (upper arrow) may be decreased by high-quality GP referrals directly to outpatient surgery (lower arrow).
Abbreviations: CDS, clinical decision support; GP, general practitioner.

Results

The Delphi process

All of the surgeons approved the guidelines, and consensus was reached after a 3-month period. Overall, 109 hours were needed to reach guideline consensus, to an estimated cost of 10,800 £ (Tables 1 and 2).

Development and implementation of the referral software

IT personnel (n=24) from three different commercial vendors participated in the development of the CDS software, and the overall cost of the software development was estimated at 32,652 £. A total of 140 hours were needed to pilot and implement the software for 139 GPs, at a total cost of 23,581 £. The total cost of work phases 1 to 3 was 67,075 £ (Table 3).

Main effects of new referral routines

We reviewed 700 referrals (ie, 18 months consecutive referrals); 189 (27%) were classified as well-suited for the referral service. The median waiting time to the examination in the outpatient clinic was 84 days, and the median time from the examination until the outpatient surgery was 101 days (ie, the overall median waiting time was 185 days). The estimated cost savings from the referral service were 133 £ per patient from the hospital perspective and 18,909 £ from the societal perspective (Table 4).

A tornado chart was employed to analyze the uncertainties of referral implementation cost. Small variations in the cost of CDS technology development (phase 2) will have large effects on the overall cost compared with the other cost elements we analyzed (Figure 2).

Discussion

Summary of findings

To our knowledge, this survey is the first to address the time, resources, and funding needed to develop and implement an electronic hospital referral service supported by a CDS system. The decision support tool was fully integrated into the GPs' EMR and was triggered by the referring ICPC code. A total of 84 persons (surgeons, GPs, administrative personnel, and health IT personnel) and 550 hours (from the beginning of the project) were needed to implement the CDS referral software in the EMR for 139 GPs. The overall cost of the surgical Delphi consensus process, the development of the CDS technology, and the implementation of the technology was 67,000 £. A sensitivity analysis showed that unexpected technology obstacles had the greatest impact on the overall cost of CDS implementation. Finally, we estimated the effects of an integrated CDS referral system for patients and the health care system. This surgical referral system has the potential to reduce the waiting time for surgery by 101 days. Of the referrals for selected surgical conditions, 27% were well-suited for a one-stop surgical service, which means that the service was cost-effective (from the hospital perspective) after 504 CDS-supported referrals. Because of the decreased waiting time for surgical treatment, the length of sick leave will decrease, resulting in societal savings of approximately 1,809 £ for each patient who is referred to an expedited one-stop surgical service.

Table 1 The Delphi approach of referral consensus for surgeons and GPs

Implementation phase	Description	Responsible	Participants (n)	Hours	Cost (£)
1	Analysis of referral routines, review of the literature	PM and senior surgeon	2	20	2,040
2	Surgical team plenum discussion	All surgeons	22	22	2,244
3	Development of CDS 1.0	PM Senior surgeon	2	10	1,020
4	Feedback on CDS 1.0 from expert surgeons	Expert surgeons	3	9	918
5	Development of CDS 2.0	PM and senior surgeon	2	5	510
6	Presentation of CDS 2.0 to all surgeons	PM	1	2	204
7	Plenum discussion	All surgeons	22	22	2,244
8	Development of CDS 3.0	PM and senior surgeon	2	5	510
9	Presentation of CDS 3.0 to general practitioners	PM and GPs	3	3	306
10	Final approval	Chief surgical department	1	2	204
11	Presentation of CDS 3.0 to EMR companies	PM and IT personnel	3	3	321
12	Presentation of CDS 3.0 to the IT department	PM and IT personnel	3	3	321
Total			29	109	10,842

Abbreviations: CDS, clinical decision support; EMR, electronic medical record; GP, general practitioner; IT, information technology; PM, project manager.

Table 2 Example of consensus guidelines for hernia surgery referral

Consensus guidelines for referring an inguinal hernia for surgical treatment
1. Actual disease (free text)
2. Previous anesthesia complications (free text)?
3. Heart function (scroll bar):
No valvular disease, no coronary heart disease
Asymptomatic valvular or coronary heart disease (NYHA 1 and/or EF 40%–50%)
Light valvular disease and or coronary heart disease induced by activity (NYHA 2–3 and/or EF 30%–40%)
Valvular heart disease and or coronary heart disease with symptoms at rest (NYHA 4 or EF <30%)
If NYHA > 2: refer for a cardiology consultation before surgery
4. Lung function (scroll bar):
Normal, no dyspnoea (FEV1 >80%)
Lightly reduced, dyspnea with high physical exercise (FEV1 80%–60%)
Moderately reduced, dyspnea with low physical exercise (FEV1 60%–40%)
Severely reduced, dyspnea at rest (FEV1 <40%)
If moderately or severely reduced lung function: refer for a lung function test before surgery
5. Renal function (scroll bar): kidney failure/kidney disease?
6. Other known diseases or risk factors (free text)?
7. Pharmacology and medicines (yes/no): anti-diabetics, anti-arrhythmia, steroids, anti-asthmatics, immunosuppressant, anti-coagulants
8. Allergies (yes/no and free text)?
9. Previous abdominal surgery (free text)?
10. Patient weight/height (scroll bar)?
11. Symptoms and signs of inguinal hernia (scroll bar): how often the hernia is present, size of the hernia, duration (in months) of hernia disease, pain when lifting, sick leave due to the hernia, frequency of pain.
12. Clinical examination (yes/no): Palpation of the inguinal canal: palpable hernia when coughing, testicle in scrotum, reducibility of the hernia
13. Supplementary information (free text).
14. Has the patient received information about the possible complications of the surgery (yes/no)?

Notes: Ten minutes were needed to complete the form. Most questions were answered with scroll bars or yes/no answers. Similar referral forms were developed for gallstone disease, umbilical hernia, and sinus pilonidalis.
Abbreviations: EF, ejection fraction; FEV1, forced expiratory volume in 1 second; NYHA, New York Heart Association classification.

Comparison with the existing literature

Effective communication is essential for coordinating health care; however, patient care is often compromised by poor communication between primary and secondary care services.[23–25] Poor coordination between primary and secondary care services contributes to avoidable patient morbidity and mortality.[26] Thus, effective communication between primary care physicians and hospital specialists regarding patient referrals, consultations, and treatment is necessary to improve patient outcomes and physician satisfaction.[27] Poor communication plays a central role in determining health care quality and cost, and systematic structures and tools (like CDS systems) are needed to facilitate primary–secondary care communication.[1–3]

To address the deficiencies in communication and the coordination of care, health care is increasingly turning to CDS systems, which provide clinicians with patient-specific assessments or recommendations to aid in their clinical decision-making and process management.[20] CDS systems have been shown to reduce errors and improve the coordination of care.[20] Several features of CDS systems are associated with improvements in clinical practice (automatic provision, integration with the EMR, and provision of recommendations). Of these features, automatic provision of decision support as part of the clinician's workflow is the single most important feature, with a reported odds ratio of 105.[20,28] In this project, we focused on similar CDS features associated with improvements in clinical practice. When we designed the user interface of the CDS, the CDS was triggered by the referral ICPC code, thus becoming an automatic part of the GPs' referral workflow.

The rate of referrals has been growing rapidly, with potential implications for health care spending.[29] There are no widely accepted guidelines for referring patients. Despite the push toward evidence-based decision-making, the referral of patients is driven primarily by the practice patterns of physicians, not by the patient case mix. Patient referrals can profoundly change the nature and cost of the care that patients receive. We need to understand the benefits and risks of specific referral patterns, as we do with any intervention.[30,31]

Strengths and limitations

This trial has some strengths. First, many trials have evaluated the clinical effects of CDS systems; however, few of these trials have assessed the effects of the systems on the coordination of care between different service levels of health care. Second, most studies that have assessed referral systems have been conducted without a fully integrated EMR system implemented in primary and secondary care. Although two separate EMR vendors support our EMR systems, they are fully integrated in the entire health care system, with referrals and text messages sent electronically between the two systems. This integration increases the potential of a CDS-supported referral service because it offers greater flexibility to adjust the CDS system to new routines or new referral patterns. The CDS referral system can be updated from one central server located at the university hospital (ie, no technical personnel have to travel to the GPs' offices).

There are also limitations to this study. First, the long-term implementation and routine use of CDS systems remains challenging. In a recently published review of randomized trials on decision support systems, only 18% discussed long-term implementation and long-term use.[32] At the present time, we have not succeeded in fully incorporating the referral service into routine use, a problem that has also been reported in other trials.[33,34] We acknowledge that there is a need to improve the GP reimbursement policy because of the increase in the referral workload. Second, as a quality improvement project, there are certain limitations that are inherent to our work.

The economic analysis has several limitations. There are uncertainties attached, especially with regard to the proportion of patients that can return faster back to work caused by decreased waiting times and the proportion of patients who are rejected because of improper clinical information in the referral. These uncertainties must be assessed using future prospective surveys.

Implications for patients and decision-makers

Higher-quality surgical referrals will have great implications for patients. We have analyzed the implications of a standardized surgical referral service, which produces a shorter waiting time before surgical treatment and subsequently a decrease in sick leave. For other conditions, high-quality referrals and closed communication loops improve the coordination of care. This means that there will be fewer hospital admissions, fewer radiologic exams, fewer blood samples, and more informed health care providers offering better continuity of care.[1,3,24,25] These aspects are especially important for patients with multimorbidity and chronic diseases, for whom new strategies are needed to coordinate

Table 3 Referral software development and implementation

Implementation phase	Description	Responsible	n	Hours	Cost (£)
Technology development					
1	Project planning/management	PM IT personnel	2	38	3,406
2	Developing the EMR CDS user interface and adopting it to existing standards	PM IT personnel	2	16	1,712
3	Presenting the suggested solution to users	PM IT personnel surgeons/GPs	30	30	2,550
4	Developing the technological CDS EMR solution	IT personnel	4	32	3,424
5	Developing the CDS triggers from the ICPC referral codes	IT personnel	4	60	6,420
6	Developing the interactor client*	IT personnel	4	80	8,560
7	Piloting the system in an EMR laboratory	IT personnel PM	4	80	6,580
Total technology development			24	314	32,652
Piloting GP-to-hospital referrals					
8	Installing the pilot software in GP offices	IT personnel	2	10	1,250
9	Holding discussions with the GPs	PM	6	5	625
10	Testing sending referrals	IT personnel	6	20	2,500
11	Holding discussions with office personnel	PM	3	10	410
12	Tracking "lost" referrals	IT personnel	10	30	3,750
13	Correcting technological problems	IT personnel	10	50	6,300
14	Adjusting the CDS after receiving GP feedback	IT personnel PM	2	10	1,250
15	Adjusting the CDS after receiving administrative feedback	IT personnel PM	2	5	625
Large scale implementation					
16	Installing the software for 139 GPs	IT personnel	7	57	6,871
Cost estimates					
Cost of piloting/implementation			31	140	23,581
Cost of technology/piloting/implementation			55	454	56,233
Cost of Delphi/technology/piloting/implementation			84	563	67,075

Notes: *Interactor client software that facilitates communication between two different EMR systems in the Norwegian Health Network. EMR system #1 is located in GP offices and EMR system #2 is located in the university hospital.

Abbreviations: CDS, clinical decision support; EMR, electronic medical record; GP, general practitioner; ICPC, international classification of primary care; IT, information technology; PM, project manager.

Table 4 Estimates of time and cost savings of the new referral routines

Variable	Perspective	Explanation	Cost/patient (£)	Sensitivity analyses
Traditional referrals routines				
In-hospital logistics	H	30 min/referral	20	
Senior surgeon referral appraisal	H	15 min/referral	26	
Hospital travel for outpatient appointment	H	Mean hospital travel	88	
In-hospital logistics	H	30 min/referral	20	
Hospital travel for outpatient surgery	H	Mean/travel	88	
Outpatient surgery	H	Mean three conditions	1,299	
Total hospital cost			1,541	±25%
Range				1,156–1,926
Sick leave[a]	S	185 days before 28 days after	3,535	
Total cost			5,076	±25%
Range				3,807–6,345
Guideline-supported referral routines				
Hospital travel	H		88	
Outpatient surgery denied because of inconsistent referrals[a]	H	30 surgeries (10%) Lichtenstein 11,190 £ Cholecystectomy 19,610 £ Bascom 8,170 £	39	
Increased frequency of surgical consultations[a]	H	270 new consultations	−19[c]	
Outpatient surgery[b]	H	Mean three conditions	1,299	
Total hospital cost	H		1,408	±25%
Range				1,056–1,760
Sick leave[a]	S	84 days before 28 days after	1,859	
Total cost	S		3,267	±25%
Range				2,451–4,083
Referrals needed to provide a cost-effective service				
Hospital savings/pt (range)			133	100–167
Hospital refferal C/E threshold n (range)			504	401–670
Societal savings/pt (range)			1809	1,357–2,261
Societal referral C/E threshold n (range)			37	29–49

Notes: [a]Estimated for 1,000 patients surgically treated for selected surgical conditions. One-stop weight: 0.27 × 1,000 patients =270 one-stop patients. We assumed that 20% of the patients were on paid sick leave; [b]the estimated mean for inguinal hernia, sinus pilonidalis, and laparoscopic cholecystectomy. The threshold is defined as the number of OSS patients needed to establish a cost-effective service. [c]Estimated saving per patient due to decreased outpatient consultations.
Abbreviations: C/E, cost-effectiveness; H, hospital perspective; min, minute; pt, patient; S, societal perspective; OSS, one stop surgery.

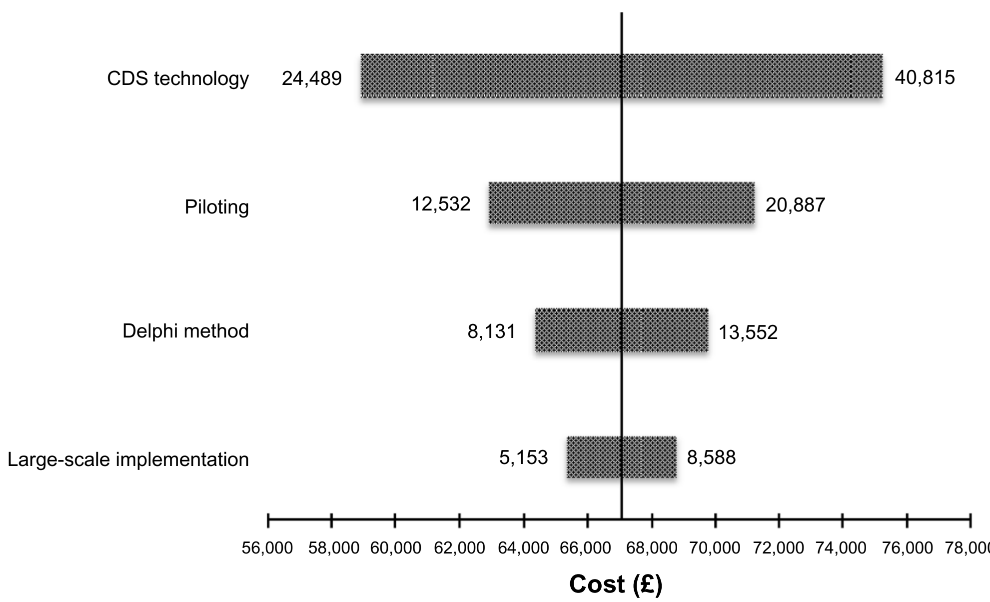

Figure 2 Cost uncertainty of guideline implementation in the GP EMR.
Note: The variables with the highest impact on cost are listed at the top and ranked thereafter.
Abbreviations: CDS, clinical decision support; EMR, electronic medical record; GP, general practitioner.

care.[35] For hospital decision-makers, high-quality referrals and better communication between GPs and hospital specialists might have large implications for the quality of care. Our hospital trust receives approximately 140,000 referrals annually, imposing a huge burden in terms of coordination and the workload for physicians and administrative personnel. A CDS referral system can improve coordination, decrease hospital travel time by improving process management, and reduce the burden on busy outpatient clinics.[27] Improved coordination has been shown to have large economic implications.[2] However, better technological coordination of EMR systems and greater standardization of patient pathways are needed. Our analyses show that the waiting time for surgery will decrease, thus decreasing the burden for patients and resulting in cost savings for society as the duration of sick leave decreases. Finally, fewer resources will be used by admitting hospitals because of the improvements in logistics and the coordination of care.

Conclusion

As referral rates and reports of poor coordination between primary and secondary care increase, quality improvement projects focusing on referral quality are needed.[2,29,31] CDS systems have the potential to improve communication and coordination between primary and secondary care and thus increase the OSS rate.[32] This study has two main conclusions. First, many resources (personnel, time, and funding) were needed to implement a CDS-supported referral service, mainly because of the time-consuming process of establishing a medical consensus, unexpected technology obstacles, and organizational obstacles in the interface between primary and secondary care. Increased efforts are needed to make CDS referral systems more attractive for GPs, and incentives must respond to the increase in the referral workload.

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The internal review board of University Hospital North Norway provided ethical approval for this project.

Author contributions

All authors contributed toward data analysis, drafting, and revising the paper and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

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Supplementary material

Table S1 Details of the unit costs assigned to health care resource use data

Variable	Unit cost (£)*	Sensitivity analyses
Cost of travel[a]		±25%
Mean costs of hospital travel	88	
Cost of surgeon		±25%
Mean salary/hour[b]	102	
Surgeon outpatient consultation, 30 minutes[c]	69	
Cost of hospital administrative personnel[b]	40	
Cost of IT expert[b]	107	
Cost related to sick leave		±25%
Governmental reimbursement of 1 day work absence[i]	83	
Cost related to surgery		±25%
Cost of hernia surgery	1,119	
Cost of cholecystectomy	1,961	
Cost of sinus pilonidalis	817	

Notes: *Exchange rate on June 29, 2012: 1 £ =9.36 NOK. http://www.dnb.no/en/currencylist?la=EN&site=DNB_NO; [a]personal communication (September 1, 2010) North Norwegian Health Administration (JN): 828 NOK per travel =88 £ per travel; [b]local data: Based on a mean salary of 102 £ (965 NOK)/hour for a hospital physician, and a mean salary for administrative personnel of 40 £. Data from hospital administration; [c]Norwegian Health Authorities. Reimbursement and DRG weighting in Norwegian Hospitals 2012: http://www.helsedirektoratet.no/publikasjoner/regelverk-innsatsstyrt-finansiering-2012/Sider/default.aspx. 1 DRG weight: 38,209 NOK; Outpatient consultation (day and night-time): DRG 923, weight 0.017; Cost of hernia surgery: DRG 1,62O, weight 0.275: 1,119 £; Cost of cholecystectomy: DRG 4,94O, weight 0,482: 1,961 £; Cost of sinus pilonidalis: DRG 1,58O, weight 0,201: 817 £; [i]Estimated from a median income of 276,000 NOK/year/patient as reported by Statistics in Norway: http://www.ssb.no/english/.
Abbreviations: DRG, Diagnoses Related Groups; JN, Jan Norum; NOK, Norwegian Kroner; IT, information technology.