Electronic Medical Record System: Have we Bitten off More Than we Can Chew?

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First used for management and administrative purposes, Electronic Medical Record (EMR) systems are now being increasingly employed to collect and synthesize medical information. The EMR system offers support in medical decision-making, promotes use of guidelines, increases coordination between different health care providers and is believed to improve overall quality of care. The Sultan Qaboos University Hospital (SQUH) had a functioning Healthcare Information System (HIS) since its inception in 1991, which mainly functioned in the Departments of Radiology, Laboratory Medicine and Pharmacy. The hospital adopted a fully integrated EMR system for patient care and administrative purposes in June 2006. As the hospital acclimatizes to new technology, the need for assessment of quality and improvement of patient care and health delivery has been perceived.

Electronic Medical Record Systems in Health Care

There has been a growing recognition of the role of EMR systems in the provision of health care in recent years, and use of an EMR system in a department has been proposed as a criterion of quality.[1] Given the competing demands of stakeholders (patients, providers, regulatory agencies, accreditation organizations, vendors, payers, and users), the structure and function of these applications are quite diverse.[2]

Patient Care

EMR systems, described as "complex systems used in complex organizations," handle the storage, distribution and processing of information needed for health care delivery of patients. By providing a coordinated delivery of clinical services, the EMR system has been accepted as an enabling technology that allows physicians to pursue more powerful practices than is possible with paper-based records.

Studies have shown that the use of EMR systems has resulted in improved health outcomes.[3,4] The use of information technology systems has been linked to a decrease in medical errors.[1,5] Patient access to health information and personal health records through EMR systems is becoming increasingly possible,[6] with the "patient-centered" approach of providing care having the potential of incorporating patient preferences in clinical decision-making.

Research

EMR systems have also been reported to be helpful to physicians in conducting research. They are a valuable resource as medical research databases.[7] However, the need for the research community to make certain that strong security measures are developed and in place for ensuring the confidentiality of data relating to research participants has also been emphasized.[8]

Physician participation in clinical research recruitment efforts is critical to many studies' success, but is often limited. Use of an EMR system-based, point-of-care Clinical Trial Alert (CTA) approach has been reported to have led to significant increases in physician-generated recruitment.[9]

Administration

Billing often requires additional documentation from a patient's medical record. An integrated EMR system has the potential to both expedite and make billing more accurate. By improving availability at many locations at once, EMR systems prevent duplication of laboratory tests, diagnostic imaging, workups, and other services; thereby proving to be very beneficial to hospital administration. The electronic nature of reports within the system allows the use of search engines to find specific text in reports, facilitating analysis.

Challenges in Acceptance

Despite the benefits of EMR systems, particularly in the areas of improved quality of health care and patient safety, adoption has been slow.[10] Health care providers seeking to use EMR systems in their practices face many challenges.

Previous studies have shown that factors that influence the successful implementation and acceptance of an EMR system include: amount of dedicated time for training to bring all users to an appropriate level of familiarity with the specific EMR system software, presence of a 'champion' or EMR problem-solver and an efficient 'Help Desk,' and baseline levels of computer knowledge among the users. The researchers found that novice users might not understand the scope of change required in implementing an EMR, and a very large time commitment may be required prior to successful implementation.[4]

Barriers to EMR systems implementation also include difficulty in adding older paper-based records to the EMR system, issues about long-term preservation and storage of data and how to ensure the physical and virtual security of the archives, as well as software problems of codification (standards that help ensure that clinical information input and retrieval are not arbitrary), and customization (system adapted for the users and tailored to workflows specific to a user site). Additional challenges such as

hardware limitations including interfacing with older technology, security and confidentiality issues, a dearth of integrated delivery systems, reluctant providers, and prohibitive (start-up and maintenance) costs have also been important considerations negatively impacting acceptance of EMR systems.

Evaluating the Efficacy of Electronic Medical Record Systems

After implementation of the EMR system, evaluating its efficacy is a challenging but necessary activity. Decision-makers may be swayed by the general presumption that technology is of benefit to health care and should be wholeheartedly embraced. EMR systems should be evaluated for multiple tasks, and tests should employ both qualitative and quantitative methods. In addition, the evaluation should include a comparative element, and rely heavily on how humans react to the system.[11,12] Evaluation is not just for accountability, but for development and knowledge-building in order to improve understanding of the role of information technology in health care and ability to deliver high-quality systems that offer a wide range of clinical and economic benefits.

Clinical information systems are a different kind of intervention from drugs and techniques used to evaluate drugs (particularly randomized, controlled trials) are not always appropriate to evaluate EMR systems. Questionnaires are frequently used as a quantitative evaluation method in medical informatics, and measures of validity tell us whether an item measures what it is supposed to measure. There are very few validated questionnaires addressing clinical use of EMR systems. A good questionnaire should include both closed and open-ended questions, and could be regarded as a significant tool to get an insight into what people consider and feel.

Electronic Medical Systems in Oman

World Health Organization (WHO) categorized Oman in 2000 as a country with the most efficient health system in the world in terms of outcome.[13] Although a form of computer system existed in most hospitals in Oman as early as 1990, they functioned only in some departments such as radiology and laboratory medicine.

With the initiation of the Sultanate of Oman's digital society initiative, Oman in 2006, the country started moving towards a paperless society. In keeping with this initiative, to promote the computerization of healthcare information, the Ministry of Health

undertook the installation of EMR systems in various hospitals in the country. Computerizing healthcare had obvious benefits such as: (i) patients finding it easier to make choices between medical institutions; (ii) patients having access to easy-to-understand medical information; (iii) shortened patients' waiting times; (iv) physicians able to provide the best medical care based on the latest medical information; (v) smoother referrals to specialists; (vi) patients able to obtain more objective second opinions; and (vii) reduction of medical accidents.

A fully integrated EMR system was first installed in Sur. A study evaluating physician satisfaction with this EMR system identified a positive impact in areas of communication, data entry and retrieval, overall patient care, and reduction of medical errors. However, the study also identified some negative aspects namely: loss of confidentiality of information and software-related problems particularly related to diagnosis codes.[14]

To date, a formal evaluation of the system adopted by SQUH has not been performed. A study has recently been initiated by us to evaluate the knowledge, attitude and usage of the EMR system in SQUH. Research shows that satisfaction with information technology is more correlated with users' perceptions about a system's effects on productivity than its actual effect on quality of care.[1] The focus of this study is therefore on practitioners' performance and system efficiencies, and their perception of how the EMR system has impacted patient care. We believe that our study will not only provide information about the efficacy of the EMR system, but it will serve as a benchmark while considering future system updates. Further, the method adopted in this study can be used subsequently to compare the EMR systems being used in SQUH with other EMR systems used in the country.

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