Health innovation for patient safety improvement

Renukha Sellappans[1], Siew Siang Chua[2], Nur Amani Ahmad Tajuddin[1], Pauline Siew Mei Lai[1]

1. Department of Primary Care Medicine, University of Malaya Primary Care Research Group (UMPCRG)

2. Department of Pharmacy, Faculty of Medicine, University of Malaya, Kuala Lumpur, Malaysia

REVIEW

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Corresponding Author:
Pauline Siew Mei Lai
Department of Primary Care Medicine, Faculty of Medicine, University Malaya, 50603 Kuala Lumpur, Malaysia
Email: plai@ummc.edu.my

Abstract

Medication error has been identified as a major factor affecting patient safety. Many innovative efforts such as Computerised Physician Order Entry (CPOE), a Pharmacy Information System, automated dispensing machines and Point of Administration Systems have been carried out with the aim of improving medication safety. However, areas remain that require urgent attention. One main area will be the lack of continuity of care due to the breakdown of communication between multiple healthcare providers. Solutions may include consideration of "health smart cards" that carry vital patient medical information in the form of a "credit card" or use of the Malaysian identification card. However, costs and technical aspects associated with the implementation of this health smart card will be a significant barrier. Security and confidentiality, on the other hand, are expected to be of primary concern to patients. Challenges associated with the implementation of a health smart card might include physician buy-in for use in his or her everyday practice. Training and technical support should also be available to ensure the smooth implementation of this system. Despite these challenges, implementation of a health smart card moves us closer to seamless care in our country, thereby increasing the productivity and quality of healthcare.

Key Words
Health innovation, patient safety

Introduction

There exists a paucity of research in patient safety that is only recently beginning to be addressed. The release of the report "To Err Is Human: Building a Safer Health System" in 1999 highlights the importance of safety to policymakers as the first step in improving quality of care.[1] Patient safety however, is a broad area consisting of several domains in which medication safety has been identified as a major factor.[2-6] Medication error has serious implications in terms of higher hospitalisation risk, more outpatient visit days and higher medical costs.[7] Studies have reported that nearly half of elderly Japanese were prescribed at least one potentially inappropriate medication,[7] whilst 1 in 20 patients in a university-based primary care setting were prescribed contraindicated drugs.[8]

Human beings are prone to making errors. To minimise medication error, a system is needed that makes it difficult for errors to occur. Health innovation is the way to go in creating a more efficient and safer environment.[9] This is especially so with population growth, growth of the geriatric population, and lengthened life expectancies.

Literature review

In the past decade, many innovations were designed to improve medication safety, targeting the various processes in medication use. Computerised Physician Order Entry (CPOE) has been used widely.[10,11] Although CPOE has reduced prescription writing error, it is expensive and challenging to implement.[10] It also produces large number of irrelevant alerts that tend to be ignored by physicians.[12] The Pharmacy Information System is another technology-driven innovation that has enabled pharmacists to review all medication orders prior to dispensing medication.[10,11] The dispensing process has also been made more safe through the use of automated dispensing machines, with only a modest impact on the

reduction of medication error.[10,11] With the implementation of Point of Administration Systems, nurses (with the help of the system) can now ensure that the right drug and the right dose is given to the right patient, at the right time.[10,11] In addition, intelligent infusion pumps have also been introduced to assist nurses in delivering intravenous medication safely.[10,11]

Other examples of innovations in medication safety include computerised adverse drug event surveillance systems, electronic medication administration records and medications reconciliation systems.[11,13] Tools have also been developed to assess medication error and to improve medication safety.[14,15]

Though there are many innovations available to ensure medication safety, most solutions tend to be organisation specific. Information transfer between systems and between organisations is a major challenge. Some computer systems within the same organisation are not linked to each other, creating the opportunity for error.

Potential areas for developing health innovation

One of the main problems in healthcare has been the transfer and sharing of health information among healthcare providers and institutions to ensure continuity of care for a patient. Incomplete medical records lead to difficulties in obtaining a comprehensive medical history of a patient. Many patients, especially those in developing countries, do not know the name of their medications or even their own medical conditions, as they usually leave their medical concerns to the healthcare providers.[16] In addition, frequent doctor or pharmacy-shopping by patients leads to discontinuity of care, and may result in potential medication errors such as duplicate medications.

In developing countries like Malaysia, the main gap in the health system is the availability of an accurate and complete medical history to enable accurate diagnosis to be made and appropriate medications to be given. Consequently, the key areas for health innovation should be to provide prompt, accurate and complete information about a patient that can be easily shared between healthcare providers. A health smart card with data on patient-level medical and medication history will fill this gap to address this dilemma.

A smart card is a plastic card that contains a built-in microcomputer chip with a large memory capacity to store and process large amounts of data. It is superior to the "magnetic strip" and can be readily updated.[17] Health smart cards can serve as portable patient medical records. It can be programmed with a personal identification number (PIN) and would require an authorised card reader system to access information without the need for computer network access. It can also be configured to reveal only certain information depending on the person seeking access.[17]

Such health smart cards have been used in Australia and studies had shown some of the advantages and disadvantages of this e-health system.[17] The main advantage of a health smart card is the continuity of care regardless of the national location the patient seeks healthcare interventions. Healthcare providers such as doctors and pharmacists would have easier access to more accurate and complete patient medical history, and would no longer need to depend solely on patients' or their caregivers' memory.[18,19]

Patients would be able to carry this pocket-sized card around easily. The retrieval of health information will be more efficient and will facilitate better care. Immediate access to patient medical history in an emergency situation will expedite management which can even save lives. Prescriptions issued can be transmitted using the smart card. Hence, errors due to illegible handwriting of prescribers will not arise.[20,21] In addition, health-smart cards help physicians detect potential duplicate medications.[22] Consequently, the incidence of medication errors will be reduced and patient safety will be enhanced. With such innovation, information loss is minimised, and less storage space is required compared to the space required for hard copies of patient records. A smart card would also be more environmentally friendly as less paper will be required. In the long-term, the use of a smart card to store, transfer and exchange health information can be expected to improve communication between healthcare providers. This will also have an important impact on the quality of healthcare and a reduction in healthcare budget.

The initial implementation of the health smart card can be focused on patients with chronic diseases, or with mental health problems and the elderly; as it is essential for these groups of patients to have continuity of care. Health smart cards armed with a CPOE reminder system also have the potential to decrease adverse effects of medications when prescribed to pregnant patients.[23]

Barriers, challenges and facilitators in the health innovation

A barrier in the implementation of a health smart card includes its technical aspects: software, hardware and system problems, concerns of the system becoming obsolete,[24] lack of efficiency in the storage of information,[25] and incompatibility between different systems.[26] Hence, the implementation of a health smart

card should come from a centralised medical record database where information can be kept in one system, and with one operator to ensure its compatibility among all users.

Security and confidentiality are also major concerns among healthcare professionals[24] and patients.[27] Patients worry that their health information may be used without permission. Some worry that their mental and sexual health issues will be made known to healthcare providers not directly involved in their care,[26] thus compromising patient confidentiality and doctor-patient relationships. Thus, access to certain aspects of a patient's medical record should be restricted to certain healthcare providers. Patients also worry that their family may access their health records by pretending to be the patient.[26] Implementation of a security policy, PIN and encrypted firewalls will further enhance confidentiality and security.[27] However, a weak password or PIN can be easily cracked. Thus, the use of credentials, in addition to a PIN, might be more secure to prevent unauthorized access.

Cost is another major barrier. Will the organisation or relevant government ministry be able to allocate sufficient funds for the high start-up cost and maintenance of the system?[24]

The challenges in the development of a health smart card are many. Healthcare professionals might be reluctant to use the system as they are busy and have little time for training.[26] In addition, the use of a health smart card that requires internet access has the potential to increase health inequality in practices where internet access in unavailable. [28] If the system is internet dependent, it must be compatible and operable at all times. Professional technical support would be required at all times. Privacy policies would be required to identify those authorized to update patient information on the health smart card, and to avoid unauthorised alteration of information and resources. [27]

Facilitators to the implementation of the health smart card include increased productivity, improved patient care, reductions in medical error that affect patient safety. This implementation can improve patient satisfaction of health care delivery. Most health care organisations are already using information technology in their daily work. Hence, the introduction of a health smart card will not be foreign.

Conclusion

In meeting the economic transformation programme, the development of the health smart card is in line with the Malaysian Government's mission. This project could perhaps be implemented in the upcoming health metropolis project by the University of Malaya, as a critical part of the ASEAN Healthcare ecosystem.[29] With success, it will provide a nationwide health database for Malaysia which can be transformed into an up-to-date chronic disease/therapeutic database for Malaysian physicians and patients.

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CONFLICTS OF INTEREST

The authors declare that they have no competing interests