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Research Article

A Proposed mHealth Model for Improving the Quality Care in Hospitals

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Abstract: As the hospitals face increasing demands to participate in a wide range of quality improvement activities, the role and influence of physicians and nurses in these efforts is also increasing. The growing population has led to increase the number of patients in hospital. Therefore, healthcare workers have to see more patients and do more with each patient than ever before. Thus, Hospitals confront challenges with regard tracking patient condition, share information about the patient and difficulty follow up all patients with the lack of the number of specialist physician at all levels. This marks mobile devices an important opportunity for the next generation healthcare delivery. This study proposed a mobile health model that could support hospitals in tracking patient's progress and improve the quality care in hospitals. It allows physicians and nurses to track the patients' conditions more efficiently and easily. It also able to assist in crucial clinical decisions 24/7 and available on call wherever physicians to manage their care process from start to finish and from inside and outside the hospital.

Keywords: Healthcare, mHealth, mobile, model, quality

INTRODUCTION

Healthcare is a huge problem in the world and improving health of individuals and communities and strengthening health systems (Sowon and Marwanga, 2011). Health care workers have to see more patients and do more with each patient than ever before. As the hospitals face increasing demands to participate in a wide range of quality improvement activities, the role and influence of physicians and nurses in these efforts is also increasing, according to a new study by the Center for Studying Health System Change (HSC). Hospital organizational cultures set the stage for quality improvement and physicians and nurses roles in those activities. Hospitals with supportive leadership, a philosophy of quality as everyone's responsibility, individual accountability, physician and nurse champions and effective feedback reportedly offer greater promise for successful staff engagement in improvement activities.

Hospitals confront challenges with regard of nursing involvement, including: scarcity of nursing resources; difficulty follow up all patients with the lack of the number of specialist physician at all levels, growing demands to share patient information, the burdensome nature of data collection and reporting; and shortcomings of traditional system from facing many problems with tracking the patient's condition. Where in natural case physician still relies on paper to record and track the patient's condition progress and this led to cause damages, misplaced and loss of some papers relating to information of the patients. In addition, patients are not regularly given written information about their care and treatment, making it difficult for physician/doctor and nurse to remember and manage their care effectively and time consuming. On the whole, healthcare professionals spend much of their time wandering between patients and offices. They have to see more patients and do more with each patient than ever before, while the supportive technology stays stationary (Wang and Liu, 2009). Mobile technology is helping to improve health outcomes and medical system efficiency for their evolving role in today's contemporary hospital setting.

Mobile technology has made a significant impact on healthcare industry. There has been an explosion of using mobile technology in healthcare activities around the world. A 2011 global survey of 114 nations undertaken by the World Health Organization found that mHealth initiatives have been established in many countries, but there is variation in adoption levels (World Health Organization, 2011).

The most common activity was the creation of health call centers, which respond to patient inquiries. This was following by using SMS for appointment reminders, using telemedicine, accessing patient records, measuring treatment compliance, raising health awareness, monitoring patients and physician decision support as shown in Fig. 1.

This study aimed to propose a handheld model solution that could support hospitals in tracking patient's progress. By the proposed model the physicians/doctors able to assist in crucial clinical decisions 24/7 and available on call wherever doctors to

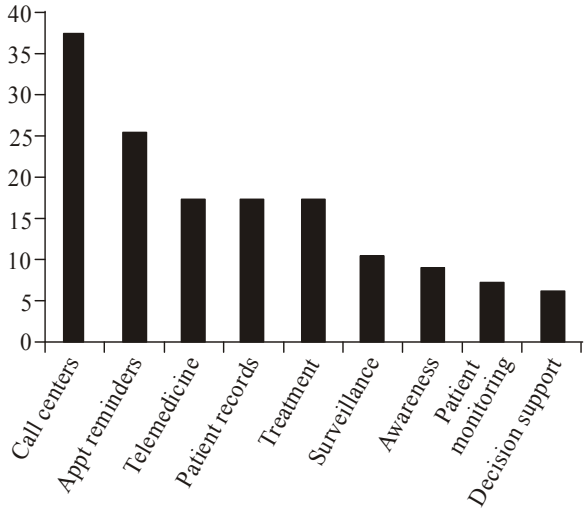

Fig. 1: Adoption for mHealth initiatives around the globe

manage their care process from start to finish and from inside and outside the hospital.

HEALTH CARE

The growing population has led to increase the number of patients in hospital. Therefore, healthcare workers have to see more patients and do more with each patient than ever before. In the other side, little has done in hospital to improve the health of patients. In particular the improvement hospital quality and healthcare works, it largely depends on how they assess, plans, implements, evaluates and diagnoses the patient in a short (Ashraf *et al*., 2007). In addition, physicians assume significant responsibility for monitoring patient status, managing their recovery and communicating with other clinicians from inside and outside the hospital for following up patient condition (Prentza *et al*., 2006). Consequently, we can see that there has been a huge revolution in healthcare in a short period. This dramatic increase was due to the development of new techniques such as imaging machines and healthcare technology that could only be delivered in an institutional setting. Glenn *et al*. (2004) Stated that there is another factor helped enhancing healthcare in that time is the rise of the nursing profession that improved hygiene and the quality of care. It is important to realize that healthcare system has three primary goals: the provision of high-quality care, ready access to the system and affordable costs. The practical problem in healthcare policy is that the pursuit of any two of these goals aggravates the third. Thus, a more accessible system of high-quality care will tend to lead to higher costs, while a low-cost system available to everyone is likely to be achieved at the price of diminishing quality. In order to have a good healthcare service, healthcare providers must work as a group; they have to share all their experiences to solve any problems faced by them. Therefore, it is imperative for the healthcare providers to work together and the demand now is creating new needs to help and make better choices. Thus, require implementation and propose mobile model for improving the quality care in hospitals.

MOBILE HEALTH

Advances in mobile technology have the potential to transform the way healthcare is delivered. Mobile health or mHealth, is the application of mobile technologies in healthcare systems that enables the transformation from physician-centric to patient-centric healthcare delivery. mHealth enables critical decision support, ensuring the accuracy of clinical information and leading to higher quality patient outcomes while reducing medical errors. Early in its development, in 2003, m-health was defined as wireless telemedicine involving the use of mobile telecommunications and multimedia technologies and their integration with mobile healthcare delivery systems (Istepanian *et al*., 2003). Since then it has come to encompass any use of mobile technology to address healthcare challenges such as access, quality, affordability, matching of resources and behavioral norms. Thus it can involve a wide variety of people and products, as well as the actions that connect them. The crux of these connections is the exchange of information. Mobile technologies cannot physically carry drugs, doctors and equipment between locations, but they can carry and process information in many forms: coded data, text, images, audio and video. Despite the myriad technologies involved.

The term mHealth has been described extensively by several authors (Istepanian and Lacal, 2003; Istepanian *et al*., 2004). Generally the term refers to the use of mobile telecommunications in provisioning healthcare. Preliminary research has already shown that the application of mobile devices within the health sector is promising. Literature presents the use of mobile devices in health (Grasso *et al*., 2002; Peterson, 2002; Fischer *et al*., 2003; Farmer *et al*., 2005) though those that seem to have drawn keen interest especially for use in developing countries are those that implement text messaging (Ferrer-Roca *et al*., 2004; Downer *et al*., 2005; Leong *et al*., 2006; Lim *et al*., 2008; Gerber *et al*., 2009; Vital Wave Consulting, 2009) a feature of mobile phones, commonly known as SMS.

The main technologies carrying mHealth information are GSM, GPRS, 3G and 4G-LTE mobile telephone networks; Wifi and Wi MAX computer-based technologies; and Bluetooth for short-range communications. These technologies operate on hardware networks that include mobile phones, mobile computers (including net books, tablets and personal digital assistants), pagers, digital cameras and remote sensors. These software platforms are just as diverse, from open-source operating systems like Linux, Google's Android and Nokia's Symbian to proprietary ones like Apple's iOS and Microsoft's Windows 7 Mobile. Overlaid with these operating systems are ways

of capturing and processing data such as image recognition, text recognition and text-to-speech conversion and on all these foundations sit the millions of applications that have been developed for mobile devices, most of them accessible to the general public through online application stores.

PROPOSED MODEL

The challenge is that the existing regulatory and reimbursement structure in how the physicians will track the patient condition from inside and outside the hospitals and distribute healthcare responsibilities between physicians and nurses. This proposed mobile model offers an opportunity to help distribute healthcare responsibilities, with an eye to relegating hospitals more to their proper place as a last resort for care. A huge number of medical companies and institutions have already recognized the potential of mobile applications for healthcare. They allocate budgets and invest in developing healthcare industry for mobile devices, such as, popular smart phones, tablets and PDAs. mHealth has come to address healthcare challenges such as access, quality, matching of resources and behavioral norms. Thus it can involve a wide variety of healthcare works, as well as the actions that connect them. The crux of these connections is the exchange of information about the patient. PDAs are one tool that can be used to provide a good healthcare assistant. Our proposed mHealth model designed based on PDAs due to the advantages held by a PDA in facilitating collaborative mHealth environments such as: Portability; Social interactivity; Context sensitivity; Connectivity and Individuality. This mobile model for tracking patient condition is a unique model of healthcare service delivery available following up patients wherever the doctor to enhance the quality of patient treatment from tracking their status always. Mobile tracking model for healthcare is an effective alternative of lack specialist physicians and allows physicians to assist in crucial clinical decisions all the time from inside and outside of the hospital. It also, offers an opportunity to help distribute healthcare responsibilities between healthcare workers.

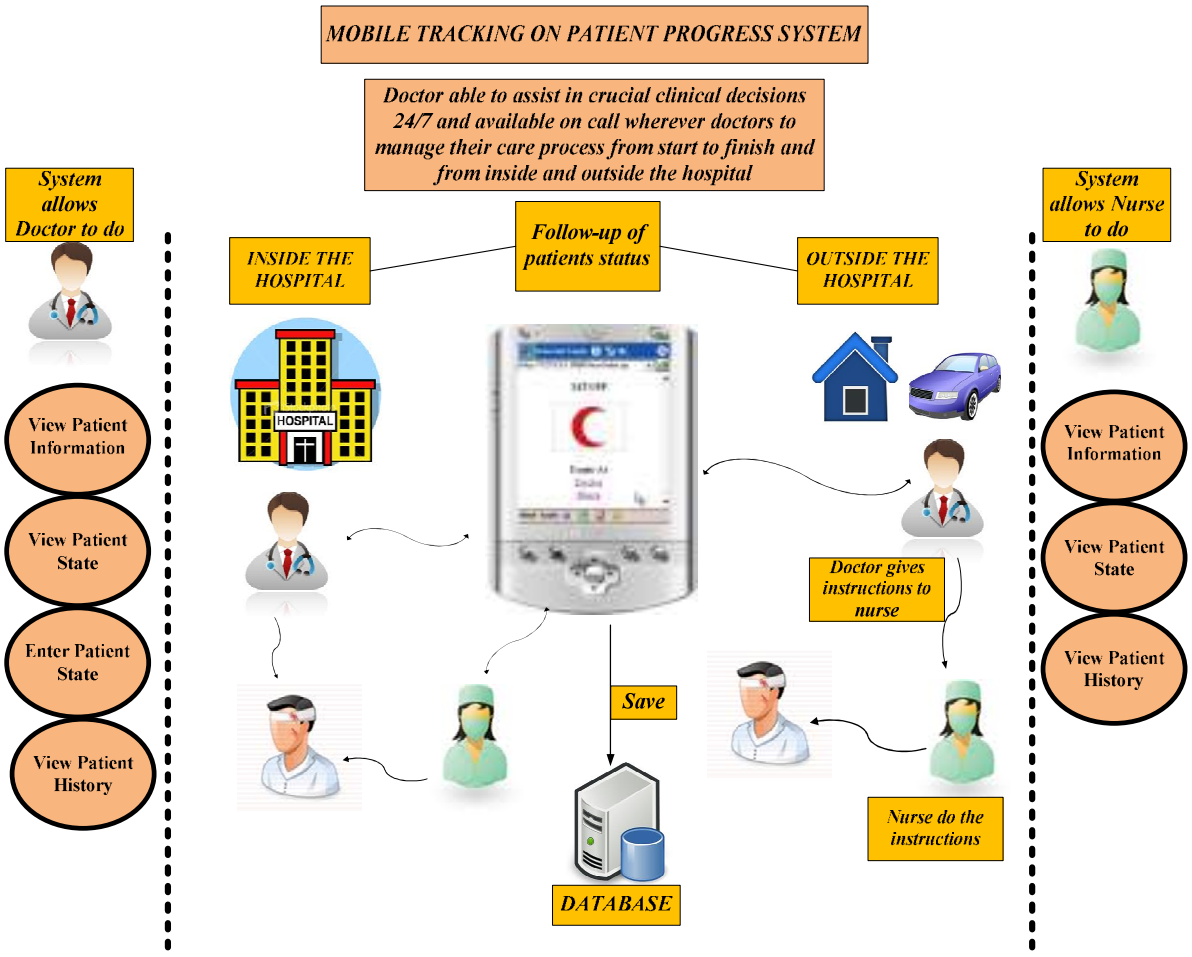

Fig. 2: Mobile tracking model for healthcare industry

Proposed mobile model for tracking patient condition in healthcare industry enables physicians and nurses to do many tasks that can such as:

- Physicians and nurses assess patient condition quite often through traditional way, but this takes time and effort (Rodriguez *et al*., 2003). The mobile technology model allows accessing and assessing patient health profile from the PDA.
- Physicians and nurse evaluate the patient's response to the care provided manually by writing everything in the papers (Berglund *et al*., 2007). The mobile technology model allows evaluating and checking response of patient of the care provided.
- The mobile technology model helps to hand over shift report and a summary of the patients' condition can also be made available to the next shift, through data transfer to the next physician and nurse on shift so they willk no wall the information needed about the patients.
- The mobile technology model enables the physicians to follow up the patient condition from outside of the hospitals and give some instructions to the nurses if that needed based on the patient profile.
- The mobile technology model enables the physicians to decide which patient case need to visit firstly.
- The mobile technology model enables to overcome the damages, misplaced and loss of some papers relating to information of the patients and share information of the patient (Fig. 2).

One of the most commonly cited benefits for patient tracking mobile technology is assisting in crucial clinical decisions 24/7 and available on call wherever doctors to manage their care process from start to finish and from inside and outside the hospital. The benefits of mobile tracking on patient progress model computing are significant. Some of these benefits include:

- Mobile tracking on patient model provides healthcare specialists with real-time access to the medical records of patients and allow tracking their physical state indicators, symptoms, disease flow, nutrition habits from inside and outside the hospitals
- Healthcare enhances time consuming such procedures as visiting tour, decide which patient should be visit first depend in checking the patient conditions in the system
- Proposed model facilitate communication between physicians/doctors and nurses and sharing information of the patients
- Reduced medical errors
- Higher collaboration between physicians to physicians and physicians to nurses
- Elimination of duplicate entries
- Increased accuracy of data
- Improved patient care
- Treated patient conditions from inside and outside the hospitals
- Improved utilization of resources
- Physician time saved looking up information
- Nursing time saved looking up information and looking for equipment

CONCLUSION

Mobile health model will empower physicians and nurses to take control and responsibility for patients health and follow up patients conditions, through the power of new portable solutions, with a target of delivering improved healthcare efficiency, reductions in costs and provide a wide choice and better level of service to patients due to their speed, convenience and flexibility. The above benefits evidently the potential of using mobile technology in health care industry. Mobile is directed impact in hospitals as well as in clinics in order to provide a better healthcare to patients. Recent findings of healthcare research companies indicate that mobile technology are redefining the medical industry and led to better results in the sphere of medical care. The practice of using mobile technology devices, such as smart phones, tablets and PDAs, for health services and information has got the name of mHealth or we can call it mobile health. Thus, mHealth applications allow managing and improving health care industry by sharing information about the patient, follow up patient condition from inside and outside the hospitals in order to receive the appropriate consultations or treatment. However, health care industry are taking advantage of mobile technologies, since mHealth applications are to a great extent designed for healthcare professionals, including doctors and nurses that support real-time access to patients' histories, appointment schedules, drug prescription details, billing data and other practice related information. This study proposed mHealth for improving the quality care in hospitals and showed how mobile technology can overcome different problems and challenges that may be faced by healthcare works.

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