CHAPTER 2

REVIEW OF LITERATURE

2.1 Electronic Medical Records

The electronic medical record defined

An EMR electronically documents all information that is administratively and clinically relevant to a patient’s hospital stay. An EMR system typically includes business modules that are used for registering a patient/client and a suite of clinical modules that support the services provided by the hospital. To realize the full benefits of an EMR, the ICT system’s functionalities cannot be implemented in isolation as patient treatment generally has touch points across a variety of functions and requires integrated and interoperable implementations.

An EMR system is recognized as a toolkit that enables clinical transformation to become the source of truth for a patient's journey within hospitals and provides a framework for patient-centered healthcare delivery (Committee on Quality of Health Care in America, Institute of Medicine 2001; Bates & Gawande 2003; Hillestad 2005; Fickenscher 2010). Using an EMR enables continuous improvement in healthcare delivery by capturing structured
information, supporting interoperability across systems and by enabling active
decision support through the ability to access and interrogate atomic data
elements. Despite this, the EMR adoption rate is low (Ashish et al. 2008) and
there is currently no Australian hospital reaching Stage 7 on HiMSS EMR
Adoption Model.

According to Karim (2008), different terms are used in literature to explain electronic patient health care data such as Electronic Health Records (EHR), Electronic Patient Records (EPR), Electronic Medical Records (EMR), Computerized Patient Records (CPR), and Computerized Medical Records (CMR). These names are given from time to time in different nations and in different healthcare environments.

2.2 Wireless Communication

Introduction

Wireless means transmitting signals over invisible radio waves instead of wires. Garage door openers and television remote controls were the first wireless devices to become a part of everyday life. Now the cordless keyboard and mouse, PDAs and digital and cellular phones are commonly used as wireless.

The most important advantage of wireless communication systems are that a mobile user can make a phone call anywhere and anytime. Remote controllers, cordless telephones, handheld walkie-talkies, pagers, cellular telephones are some examples of mobile communication systems.
Difference between Wireless and Mobile

Mobile just means portable. A laptop is a mobile device. A mobile-device could be carried over by the user anywhere.

A wireless device has some sort of network connectivity. A cell phone is wireless and a laptop or PDA would be wireless if they had a wireless modem. Similarly, the application is wireless when they connect and exchange data with a network.

Types of Wireless

Wireless can be divided into:

*Fixed Wireless:* The operation of a wireless device or system in homes and offices and in particular equipment connected to the internet via specialized modems.

*Mobile Wireless:* The use of wireless devices or system aboard motorized, moving examples includes the automotive cell phone and personal communication services.

*Portable Wireless:* The operation of autonomous, battery powered wireless devices or systems outside the office, home, or vehicles.

*Infrared Wireless:* The use of devices that convey data via infrared radiation; employed in certain limited-range communications and controlled systems.
2.3 Mobile Communication

Mobile Computing: A technology that allows transmission of data via a computer, without having to be connected to a fixed physical link.

Mobile voice communication is widely established throughout the world and has had a very rapid increase in the number of subscribers to the various cellular networks over the last few years. An extension of this technology is the ability to send and receive data across these cellular networks. This is the principle of mobile computing.

Mobile data communication has become a very important and rapidly evolving technology as it allows users to transmit data from remote locations to other remote or fixed locations. This proves to be the solution to the biggest problem of business people on the move - mobility.

Bahensky, J. A., Jaana, M. and Ward, M. M. (2008) have published a paper in Health Care Information: Electronic Medical Record Adoption in that Continuing is a national political drive for investments in health care information technology (HIT) that will allow the transformation of health care for quality improvement and cost reduction. Despite several initiatives by the federal government to spur this development, HIT implementation has been limited, particularly in the rural market. The status of technology use in the transformation effort is reviewed by examining electronic medical records (EMRs), analyzing the existing rural environment, identifying barriers and factors affecting their development and implementation, and recommending needed steps to make this transformation occur, particularly in rural communities.

Williams and Faustine; Boren, Suzanne Austin (2008) have taken up an exclusive study on “A systematic review on Electronic medical record”. Most countries in Europe and the USA are increasingly using an electronic medical
record (EMR) to help improve healthcare quality. Unfortunately, most developers lack a robust healthcare infrastructure in the form of information and communications technology (ICT) to ensure continuity of patient health which many research studies consider a lifesaving resource. The aim of this systematic review is to examine the benefits of an EMR and its contribution to the development of healthcare delivery in developing countries.

Bahlool Rahimi and Vivian Vimarlund (2007) in their published paper, bring out a Methods to Evaluate “Health information Systems in Healthcare Settings: A Literature Review” Although information technology (IT)-based applications in healthcare have existed for more than three decades, methods to evaluate outputs and outcomes of the use of IT-based systems in medical informatics is still a challenge for decision makers, as well as to those who want to measure the effects of ICT in healthcare settings. The findings show that economic and organizational aspects dominate evaluation studies in this area. However, the results focus mostly on positive outputs such as user satisfaction, financial benefits and improved organizational work. This review shows that there is no standard framework for evaluation effects and outputs for implementation and use of IT in the healthcare setting and that until today no studies explore the impact of IT on the healthcare system’ productivity and effectiveness.

Raymond G. Boyle, Leif I. Solberg, and Michael C. Fiore (2010) have published a paper in American Journal of Preventive Medicine. The expanded use of electronic medical records (EMRs) may provide an opportunity to increase the use and impact of clinical guidelines to promote tobacco-cessation treatment in primary care settings. The objective of this systematic review is to evaluate the evidence for such an effect.
After a systematic search of the English-language literature regarding an EMR effect on either smoking cessation or clinician behavior, relevant articles were abstracted and findings summarized from both observational studies and RCTs. Often identified studies of EMRs and tobacco, only two RCTs were found. Adding a tobacco status as a vital sign resulted in an increase in some clinical guideline recommended actions, particularly documentation of smoking status. There was insufficient evidence to quantify the effect of an EMR on changes in patient smoking behaviors. While the use of EMRs to prompt or provide feedback on the clinical treatment of tobacco dependence demonstrates some promising results, substantial additional research is needed to understand the effects of EMRs on provider and patient behavior.

D.A. Ludwick and John Doucette (2009) have prepared an exclusive case study on factors adopting electronic medical records in primary care: health information systems implementation experience in seven countries. The adoption of health information systems is seen worldwide as one method to mitigate the widening health care demand and supply gap. The goal was to understand the factors and influences affecting implementation outcomes from previous health information systems implementation experiences. A comprehensive systematic literature review of peer reviewed and gray literature was undertaken to identify the current state of knowledge regarding the implementation of health information systems. A total of 6 databases, 27 journal websites, 20 websites from grain sources, 9 websites from medical colleges and professional associations as well as 22 government/commission websites were searched. The searches returned almost 3700 article titles. Eighty-six articles met our inclusion and exclusion criteria.

The articles show that systems’ graphical user interface design quality, feature functionality, project management, procurement and users’ previous
experience affect implementation outcomes. Implements had concerns about factors such as privacy, patient safety, provider/patient relations, staff anxiety, time factors, and quality of care, finances, efficiency, and liability. The review showed that implements can insulate the project from such concerns by establishing strong leadership, using project management techniques, establishing standards and training their staff to ensure such risks do not compromise implementation success. The review revealed the concept of socio-technical factors, or “fit” factors, that complicate health information systems deployment. The socio-technical perspective considers how the technical features of a health information system interact with the social features of a health care worker environment.

The review showed that quality of care, patient safety and provider/patient relations were not, positively or negatively, affected by systems implementation. The fact that no articles were found reviewing the benefits or drawbacks of health information systems accruing to patients should be concerned to adopters, payers and jurisdictions. No studies were found that compared how provider–patient interactions in interviews are effected when providers used electronic health information systems as opposed to the paper equivalent. Very little information was available about privacy and liability.

Gilad J. Kuperman, Anne Bobb, Thomas H. Payne, Anthony J. Avery, Tejal K. Gandhi, Gerard Burns, David C. Classen, and David W. Bates have taken up an exclusive study on Medication-related Clinical Decision Support in Computerized Provider Order Entry Systems While medications can improve patients’ health, the process of prescribing them is complex and error prone, and medication errors cause many preventable injuries. Computerized provider order
entry (CPOE) with clinical decision support (CDS), can improve patient safety and lower medication-related costs.

To realize the medication-related benefits of CDS within CPOE, one must overcome significant challenges. Healthcare organizations implementing CPOE must understand what classes of CDS their CPOE systems can support, assure that clinical knowledge underlying their CDS systems is reasonable, and appropriately represent electronic patient data. These issues often influence to what extent an institution will succeed with its CPOE implementation and achieve its desired goals.

Medication-related decision support is probably best introduced into healthcare organizations in two stages, basic and advanced. Basic decision support includes drug-allergy checking, basic dosing guidance, formulary decision support, duplicate therapy checking, and drug–drug interaction checking. Advanced decision support includes dosing support for renal insufficiency and geriatric patients, guidance for medication-related laboratory testing, drug-pregnancy checking, and drug–disease contraindication checking. In this paper, the authors outline some of the challenges associated with both basic and advanced decision support and discuss how those challenges might be addressed. The authors conclude with summary recommendations for delivering effective medication-related clinical decision support addressed to healthcare organizations, application and knowledge base vendors, policy makers, and researchers.

Greenhalgh, T., Potts, H. W.W., Wong, G., Bark, P. And Swinglehurst, D. (2009), in their published paper, bring out a comparative study of various electronic medical presents challenges to systematic reviewers because it covers
multiple research traditions with different underlying philosophical assumptions and methodological approaches.

Using the meta-narrative method and searching beyond the Medline-indexed literature, this review used “conflicting” findings to address higher-order questions about how researchers had differently conceptualized and studied the EPR and its implementation.

Twenty-four previous systematic reviews and ninety-four further primary studies were considered. Key tensions in the literature centered on (1) the EPR; (2) the EPR user; (3) organizational context; (4) clinical work; (5) the process of; (6) implementation success.

The findings suggest that EPR use will always require input to recontextualize knowledge; that even though secondary work (audit, research, billing) may be made more efficient by the EPR, primary clinical work may be made less efficient; that paper may offer a unique degree of ecological flexibility; and that smaller EPR systems may sometimes be more efficient and effective than larger ones.

Thomas C. Rosenthal, in his empirical research, aims at studying The Medical Home: Growing Evidence to Support a New Approach to Primary Care. A medical home is a patient-centered, a multifaceted source of personal primary health care. It is based on a relationship between the patient and physician, formed to improve the patient's health across a continuum of referrals and services. Primary care organizations, including the American Board of Family
Medicine, have promoted the concept as an answer to government agencies seeking political solutions that make quality health care affordable and accessible to all Americans. Standard literature databases, including PubMed, and Internet sites of numerous professional associations, government agencies, business groups, and private health organizations identified over 200 references, reports, and books evaluating the medical home and patient-centered primary care. Evaluations of several patient-centered medical home models corroborate earlier findings of improved outcomes and satisfaction. The peer-reviewed literature documents improved quality, reduced errors, and increased satisfaction when patients identify with a primary care medical home. Patient autonomy and choice also contributes to satisfaction. Although the industry has funded case management models demonstrating value superior to traditional fee-for-service reimbursement adoption of the medical home as a basis for medical care in the United States, delivery will require effort on the part of providers and incentives to support activities outside of the traditional face-to-face office visit. Evidence from multiple settings and several countries supports the ability of medical homes to advance societal health. A combination of fee-for-service, case management fees, and quality outcome incentives effectively drive highest standards in patient experience and outcomes. Community/provider boards may be required to safeguard the public interest.

**Mobile Healthcare**

Wen-Yuan Jen and Ming-Chien Hung[2009]as part of a research in progress project, published a paper on Telemedicine and e-Health In an aging society, the issue of increased medical costs troubles both government agencies and families with aging parents. Many elderly people require long-term care, and
the medical and financial problems associated with long-term care worry their entire family. A mobile healthcare service (MHS) has been widely applied by medical practitioners and researchers for years. Unfortunately, the elderly often fear both the technology and the cost its use incurs; hence, they seldom actively adopt MHS without the prompting and support of other family members. This study highlights this issue of long-term health care for the elderly and extracts the factors affecting their family's intentions in adopting MHS. Based on the integration of the Theory of Planned Behavior and the Technology Acceptance Model, the factors associated with the family's intention of the aging people toward MHS are explored. Data were collected from 200 students in the “Job Master” track in a local “Executive Master of Business Administration” program. Half of them had at least one immediate family member who was older than 65 years of age. A partial least squares (PLS) analysis shows that “attitude” significantly affected the behavioral intention of adopting MHS, and “perceived usefulness” and “perceived ease-of-use” had an indirect effect via “attitude.” The PLS model explains the variance in intention (64.1%), attitude (58.1%), and perceived usefulness (33.8%). Overall, this study shows that attitude was an important determinant of MHS adoption. Gender also significantly affected the relationship between attitude and behavioral intention to adopt MHS.

Dasun Weerasinghe, Muttukrishnan Rajarajan and Veselin Rakocevic [2009] has extensively studied and has derived a logical framework for defining the rapid growth in mobile technology which makes the delivery of healthcare data and services on mobile phones a reality. However, the healthcare data is very sensitive and has to be protected against unauthorized access. While most of the development work on security of mobile healthcare today focuses on data encryption and secure authentication in remote servers, protection of data on the mobile device itself has gained very little attention. This paper analyses the requirements and the architecture for a secure mobile capsule, specially designed
to protect the data that is already on the device. The capsule is a downloadable software agent with additional functionalities to enable secure external communication with healthcare service providers, network operators and other relevant communication parties.

Kevin Patrick,, William G. Griswold, Fred Raab, and Stephen S.[ 2008] as part of a research in progress project, published a paper “Health and mobile phone” Within the next 8 years, annual U.S. expenditure on health care is projected to reach $4 trillion/year, or 20% of the gross domestic product. Whether resource consumption of this order of magnitude is sustainable is an open question, but at the very least it suggests the need for population-level solutions for everything from the primary prevention of disease to improving end-of-life care. Ours is a society that often views challenges like this as being solved through the application of technology, and one technology in particular is emerging that may become very important to the delivery of health care: mobile phones. By June 2007 there were 239 million users of mobile phones in the U.S. or 79% of the population, and users are highly diverse. Mobile phones are beginning to replace landline telephones for some, and except for very young children, may ultimately reach an effective penetration of “one phone: one person” as is already the case in some countries such as Finland.

This paper provides an overview of the implications of this trend for the delivery of health care services. In addition to addressing how mobile phones are changing the way health professionals communicate with their patients, a summary is provided of current and projected technological capabilities of mobile phones that have the potential to render them an increasingly indispensable personal health device. Finally, the health risks of mobile phone use are addressed, as are several unresolved technical and policy-related issues.
unique to mobile phones. Because these issues may influence how well and how quickly mobile phones are integrated into health care, and how well they serve the needs of the entire population, they deserve the attention of both the healthcare and public health community.

Jen-Her Wu, Shu-Ching Wang, Li-Min Lin[2007], have published a paper that presents a revised technology acceptance model to examine what determines mobile healthcare systems (MHS) acceptance by healthcare professionals.

Conformation factor analysis was performed to test the reliability and validity of the measurement model. The structural equation modeling technique was used to evaluate the causal model.

The results indicated that compatibility, perceived usefulness and perceived ease of use significantly affected healthcare professional behavioral intent. MHS self-efficacy had strong indirect impact on healthcare professional behavioral intent through the mediators of perceived usefulness and perceived ease of use. Yet, the hypotheses for technical support and training effects on the perceived usefulness and perceived ease of use were not supported.

This paper provides initial insights into factors that are likely to be significant antecedents of planning and implementing mobile healthcare to enhance professionals’ MHS acceptance. The proposed model variables explained 70% of the variance in behavioral intention to use MHS; further study is needed to explore extra significant antecedents of new IT/IS acceptance for
mobile healthcare. Such as privacy and security issue, system and information quality, limitations of mobile devices; the above may be other interesting factors for implementing mobile healthcare and could be conducted by qualitative research.

Sutirtha Chatterjee, Suranjan Chakraborty, Saonee Sarker, Suprateek Sarker, Francis Y. Lau[2009], have published an excellent paper on Mobile work which is emerging as an area of major importance in healthcare. However, past literature on this topic remains largely anecdotal, fragmented, and theoretical. In this paper, we address this gap and adapt the DeLone and McLean model of IS success to the context of mobile work in healthcare, and articulate specific propositions. We then deductively evaluate each proposition based on studies reporting mobile device use in the healthcare context. Through this rigorous evaluation process, we are able to deliver a revised theoretical model that presents a consolidated view of the literature in the area of mobile work in healthcare.

Ing-Long Wu, Jhao-Yin Li, Chu-Ying Fu [2011], in their empirical research state that adoption rate of mobile healthcare is relatively low in the hospital. In practice, a study of how healthcare professionals adopt mobile services to support their work is imperative. An integration of TAM and TPB, concerning both technological and organizational aspects, is important for understanding the adoption of mobile healthcare. However, mobile healthcare is a wireless device which is often used in a voluntary motive. Service provisions for pervasive and timely usage and individual psychological states are critical in determining its use. Accordingly, perceived service availability (PSA) and personal innovativeness in IT (PIIT) may be the important drivers to be included
in TAM and TPB. This study thus proposed such a research framework from a broader and integrative perspective. The empirical examination showed high predictive power for adoption intention and the influential role of these important variables.

Wen-Yuan Jen [2009], has extensively studied and has been deprived of logical framework for defining In Taiwan, Campus health problems are placing more and more pressure on school-based health centers (SBHCs). Moreover, SBHCs have insufficient resources to actively provide follow-up health care for students and faculty found to be overweight, chronically ill, or at high risk. In order to improve the quality of SBHC health care, a project was begun to enhance the efficiency of campus health care services by employing web-based and cell phone-based services. This project employed the Mobile Automated Medical Alert (MAMA) system, which was designed especially for campus health center use. Before implementing the MAMA system, a focus group of healthcare related staff identified areas in which SBHC healthcare services might be improved by the system and created a questionnaire to measure student and faculty response to the proposed services. Modifications to the MAMA design and service offerings were made based upon these questionnaire results.

Chien-Chih Lai, Ren-Guey Lee, Chun-Chieh Hsiao, Hsin-Sheng Liu, Chun-Chang Chen[2009], in their research, aim at study. It is necessary to constantly monitor their physiological parameters, especially the electrocardiogram (ECG), to effectively prevent and control their health condition and even to provide urgent treatment or care while an emergency such as the abnormal variation of heart rate (HR) occurs. In this paper, a wireless in-home physiological monitoring system, based on multi-hop relay
communications, which can ubiquitously and continuously monitor the patient's ECG at any time or any place at home without space limitations and the “dead spot” due to the extended communication coverage by multi-hop wireless connectivity, is proposed. The system consists of a mobile-core device, which is responsible for capturing and wirelessly sending the patient's ECG data, a wireless multi-hop relay network (WMHRN) that is in charge of relaying the data sent by the former, and a residential gateway (RG), which is responsible for gathering and uploading the received ECG data to the remote care server through the Internet to carry out the patient's health condition monitoring and the management of pathological data. However, in order to assure that the ECG data can be effective and timely forwarded, from the mobile-care device to the RG through the WMHRN, to meet the health care quality of service (H-QoS) demand for reliable and real-time

End-to-end ECG transmission, the analysis of WMHRN latency in data-forwarding state and the deployment consideration of wireless relay nodes are investigated in detail in this work. Moreover, an emergency alert service using short message service (SMS), based on the detection of abnormal variation of HR, is also used in the RG to further enhance the healthcare service quality. A prototype of this system has been developed and implemented. Finally, the experimental results are presented to verify the feasibility of the proposed system.

Karl Doerner, Axel Focke, Walter J. Gutjahr[2007], in their paper” Multicriteria tour planning for mobile healthcare facilities in a developing country “ A multi objective combinatorial optimization (MOCO) formulation of the following location-routing problem in health care management is given: For a mobile healthcare facility, a closed tour with stops selected from a given set of population nodes has to be found. Tours are evaluated according to three criteria:
(i) An economic efficiency criterion related to the tour length, (ii) the criterion of average distances to the nearest tour stops corresponding to \( p \)-median location problem formulations, and (iii) a coverage criterion measuring the percentage of the population unable to reach a tour stop within a predefined maximum distance. Three algorithms to compute approximations to the set of Pareto-efficient solutions of the described MOCO problem are developed. The first uses the P-ACO technique, and the second and the third use the VEGA and the MOGA variant of multi objective genetic algorithms, respectively. Computational experiments for this region in Senegal were carried out to evaluate the three approaches on real-world problem instances.

Hak Jong Lee, Sun Hee Lee, Kyoo-Seob Ha, Hak Chul Jang, Woo-Young Chung, Ju Young Kim, Yoon-Seok Chang, Dong Hyun Yoo [2009], have studied to investigate the efficacy of a u-healthcare service using Zigbee and mobile phone for elderly patients with diabetes mellitus or heart diseases. From July to October, 2005, 29 patients were enrolled in our study. Two selected u-healthcare items, ECG and blood glucose measurement, were monitored. Twenty patients were provided with ZigBee built-in blood glucometer and mobile phones, and were instructed on using a web service where the measured blood glucose could be transmitted directly to the web and be administrated. Nine patients participated in ECG monitoring, by using a wireless, transmittable ECG recording instrument equipped with ZigBee protocol attached to their chest. Daily average transmission frequency, rate of transmission loss, and error reasons were analyzed. In addition, the patients were asked to score their degree of satisfaction about the sensors and u-healthcare services. The mean transmission frequencies were 2.1 times/day in blood glucose monitoring and 6.1 times/day in ECG. The patients’ satisfaction scores of the blood glucometer and service used in this research were 8.59 and 9.01 of 10 points, respectively. The
mean satisfaction scores about ECG sensor and ECG monitoring services were 5.79 and 7.29, respectively. Despite the many problems still encountered such as technological problems related to sensors and some problems like battery replacement, we could transfer the data of glucometer and ECG sensors to webserver via ZigBee protocol. Authors think the ZigBee could be one of components of wireless u-healthcare systems in the future due to its advantages of lower power consumption.

Iris Junglas, Chon Abraham, Blake Ives[2009] have published a paper that provide a Mobile information communication technologies (MICTs) have considerable promise in patient care settings. But that promise can only be realized if the MICT applications are used by the medical staff. This paper reports on a study examining nurses' decisions to utilize MICTs. A mixed-methods approach is used, consisting of both qualitative and quantitative elements, that reveals and empirically tests the significance of novel constellations of fit (i.e., identification, information, patient interaction, physical, time criticality, user comfort, and workflow fit) and individual characteristics, presented as basic human drives (i.e., drive to acquire, bond, defend, and learn). Findings indicate that fit is a multi-faceted constructs and that archetypical human drives have an influence on these various notions, which in turn, impact technology adoption in the healthcare context.

This study contributes to the existing literature by applying the Technology Acceptance Model (TAM) in the context of mobile health information seeking, for which there has been a lack of studies, and demonstrated that the inclusion of additional variables can enhance TAM's predictive power. The empirical presence of an intention–behavior gap calls for future research to investigate the reasons behind the gap. Finally, the findings from this study can
serve as input to promote women's use of mobile phones for better self-management of health.

Prajakta Kulkarni, Yusuf Ozturk[2011] in their paper “mPHASiS: Mobile patient healthcare and sensor information system” state that Pervasive care and chronic disease management to reduce institutionalization is a priority for most western countries. The realization of next generation ubiquitous and pervasive healthcare systems will be a challenging task, as these systems are likely to involve a complex structure. Such systems will consist of various devices, ranging from resource-constrained sensors and actuators to complex multimedia devices, supporting time critical applications. This is further compounded by cultural and socio-economical factors that must be addressed for next generation healthcare systems to be widely diffused and used. In this study, the requirement for a vital sign monitoring solution space is derived and mPHASiS is developed based on these requirements. mPHASiS is an end to end solution not only providing sensor networking and vital sign monitoring but also closing the loop by signaling alert messages to the caregiver and allowing pervasive access to vital signs of a patient using smart phones over a heterogeneous network. A role based access control mechanism is developed to limit access to sensitive data. The end to end delay and delay variations for both vital sign data collection and pervasive access are analyzed. mPHASiS is developed as a complementary solution augmenting functionality of a hospital information system and can be loosely couple with the hospital information system using web services.

Andreas Lorenz, Reinhard Oppermann[2009], as part of their research state that in the field of mobile health monitoring the current most important user groups are those aged 50+. In our project senSAVE we developed a user
interface for monitoring vital personal parameters that is specifically adapted to the needs of this group. The group is said to show less perception and control capability and has less experience in the use of information technology. More realistically, the group of 50 + users show more diversity in their cognitive, sensory and motor skills than younger people. User interfaces for elderly people should therefore be designed for different capabilities and needs. For a mobile health monitoring system three design types were developed and evaluated in this study: three basic interfaces, two professional interfaces and an interface in between as a compromise of the two former types. Beyond monitoring the vital parameters of the user during mobile phases a stationary module for the inspection of aggregated data was included on a standard TV set together with a remote control device. The paper describes the user interface design and a comparative evaluation of the interfaces during and after the development, i.e. formative and summative evaluation. It also describes first user feedback about the stationary component.

J. Ramesh, A.O. Carter, M.H. Campbell, N. Gibbons, C. Powlett, H. Moseley Sr, D. Lewis, T. Carter[2008] have taken up many case studies to basically understand the members of medical staff, including students, who were asked to participate in a self-administered questionnaire concerning patterns of mobile phone use and care. Participants' phones were cultured for micro-organisms. Healthcare professionals working in close proximity to sensitive equipment were surveyed concerning adverse events associated with mobile phones. Telephone operators were asked to monitor time elapsed as they attempted to contact medical staff by various methods. Of 266 medical staff and students at the time of the study, 116 completed questionnaires (response rate = 44%). Almost all (98%) used mobile phones: 67% used their mobile phones for hospital-related matters; 47% reported using their phone while
attending patients. Only 3% reported washing their hands after use and 53% reported never cleaning their phone. In total, 101 mobile phones were cultured for micro-organisms; 45% were culture-positive and 15% grew Gram-negative pathogens. The survey of staff working in close proximity to sensitive equipment revealed only one report of minor interference with life-saving equipment. Telephone operators were able to contact medical staff within 2 min most easily by mobile phone. Mobile phones were used widely by staff and were considered by most participants as a more efficient means of communication. However, microbial contamination is a risk associated with the infrequent cleaning of phones. Hospitals should develop policies to address the hygiene of mobile phones.

Ren-Guey Lee, Kuei-Chien Chen, Chun-Chieh Hsiao, Chwan-Lu Tseng have published an excellent paper which states that Hypertension and arrhythmia are chronic diseases, which can be effectively prevented and controlled only if the physiological parameters of the patient are constantly monitored, along with the full support of health education and professional medical care. In this paper, a role-based intelligent mobile care system with alert mechanism in chronic care environment is proposed and implemented. The roles in our system include patients, physicians, nurses, and healthcare providers. Each of the roles represent a person who uses a mobile device such as a mobile phone to communicate with the server setup in the care center such that he or she can go around without restrictions. For commercial mobile phones with Bluetooth communication capability attached to chronic patients, we have developed physiological signal recognition algorithms that were implemented and built-in in the mobile phone without affecting its original communication functions. It is thus possible to integrate several front-end mobile care devices with Bluetooth communication capability to extract patients’ various physiological parameters
[such as blood pressure, pulse, saturation of hemoglobin (SpO$_2$), and electrocardiogram (ECG)], to monitor multiple physiological signals without space limit, and to upload important or abnormal physiological information to healthcare center for storage and analysis or transmit the information to physicians and healthcare providers for further processing. Thus, the physiological signal extraction devices only have to deal with signal extraction and wireless transmission. Since they do not have to do signal processing, their form factor can be further reduced to reach the goal of microminiaturization and power saving. An alert management mechanism has been included in the back-end healthcare center to initiate various strategies for automatic emergency alerts after receiving emergency messages or after automatically recognizing emergency messages. Within the - - time intervals in system setting, according to the medical history of a specific patient, our prototype system can inform various healthcare providers in sequence to provide healthcare service with their reply to ensure the accuracy of alert information and the completeness of early warning notification to further improve the healthcare quality. In the end, with the testing results and performance evaluation of our implemented system prototype, we conclude that it is possible to set up a complete intelligent health care chain with mobile monitoring and healthcare service via the assistance of our system.

Over the past few years, much research attention has been afforded to the application of remote patient monitoring using embedded mobile devices. However, relatively little research has been done to investigate the security aspects of such scenarios. The present work describes the implementation of a cryptographic algorithm based on elliptic curves on an embedded mobile device useful for healthcare purposes. A personal digital assistant (PDA) has been chosen to be the hardware platform for the implementation as it is particularly suitable for remote patient monitoring applications. The motive of this paper was
to formulate a secure protocol which comprises of signature, encryption and authentication (SEA) as a combined ingredient of secure remote patient monitoring application using mobile devices. This needed to be easy to use and computationally efficient in order to be acceptable to both clinicians and patients and the results indicate a positive outcome.

**Research Gap in available literature**

Maintenance of Medical records like - Patient Charts/Case Sheets ,Family Card, Rx History, Drug Interactions ,Medications ,Allergies ,Problems/Diagnosis ,Population Based Care ,Paper medical records cause harm, They are easily lost and damaged and disappear during emergencies They are often incomplete with incorrect or missing information. Hence doctors end up duplicating tests, making uninformed decisions and delaying care.

But are electronic charts really any better? - Unless it is available to providers.