

# Hiding Patient Confidential Health Records with ECG Steganography

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**Abstract - Personal Health Record (PHR) is a promising application of health data transmission which permits individuals to access and manage their constant health records. The patient's confidentiality and safety are significant in the protection of healthcare privacy. Though, there have been extensive confidentiality concerns as personal health records could be uncovered to third party servers and to unofficial peoples. The chief concerns are threats of confidentiality disclosure and flexible access. To attain safety of PHRs, we can employ encryption to encrypt the records before transmit it. In this paper, we explore the literature on PHRs comprising design, functionality, implementation, applications, and advantages. However, prime care physicians play a key role in patient health; PHRs are likely to be linked to physician electronic medical record systems.**

**Index Terms - PHRs, EMR, PCC.**

## I.INTRODUCTION

Personal Health Record (PHR) system is the internet based (IT) portals or computer-based applications that records patient confidential health data in electronic version. The accessibility of health data on the web has made patients much more attentive of symptoms, diagnostic tests, diseases, and treatment options. Many individuals these day's maintains health records for themselves and their families [1, 2]. The patients confidential health records transmit through the public network should be sheltered and secure. Patient can control who will use his/her personal data, such as name, address, telephone number, and Medicare number and who can access health record. Observing patients at their home can decrease the bulk traffic at hospitals and medical centres. The main concern is to offer confidentiality, integrity, and availability. Several tryouts of electronic personal health record systems have shown that they supplement and recover

patient and family access to knowledge for self-management of health and wellness issues [3]. It was defined as electronic or paper-based collections of health or wellness data arising from multiple sources about an individual's health, that are managed, controlled, or shared by that individual or designate. Growth in PHR use parallels the adoption of electronic medical record systems by primary care physicians. Primary care physicians play a predominant role in advising and supporting patients in education and health self-management [4]. PHRs have the potential to change and possibly to improve patient-provider relationships, enhance patient-physician shared decision making, and enable the healthcare system to evolve toward a more personalized medical model [5]. The main aim of steganography is to hide patient's confidential data and other physiological information in ECG images. ECG images is used because the size of ECG is large compared to other medical images. Patients ECG images and other physiological readings such as temperature, blood pressure, glucose reading, position, etc., are collected at homes by using Body Sensor Networks (BSNs) will be transmitted and diagnosed by remote patient monitoring systems. At the same cost that the patient confidentiality is protected against intruders while data traverse in open network and stored in hospital servers.

In rural or remote places, people always cannot reach medical health centres as it takes long time to reach. Accordingly, to reduce the medical labour cost, the use of remote healthcare monitoring systems and Point-of-Care (Pock) technologies have become popular. Monitoring patients at their home can drastically reduce the increasing traffic at hospitals and medical centers [3].

The people in rural area may get treatment from doctors transmitting physiological readings of patients

to the hospital server or medical practitioners and hence provide treatments accordingly. This exchange involves large amount of patient information such as bio-signals and medical images. It is therefore important that patient confidentiality is protected while data is being transmitted over the public network as well as when they are stored in hospital servers. Hiding the confidential data is termed as steganography. Patient can control his/her confidential information that if anyone can access or control the information like name, age, gender, ID no., address, telephone number. Hiding patient's confidential information and other physiological data in ECG signal is the main goal. Medical images have smaller size whereas the ECG signal has greater size and hence widely used in steganography process [4-5].

## II. SYSTEM PARAMETERS

System parameters relate to the characteristics of PHR systems

### A. Content

The information included in PHRs and who can use that information is great concern. Information from practitioner sources should use easy-to-understand language. Information entered by patients may not be as complete, accurate, and organized as data exchanged between healthcare providers [6, 7]. Content must be important, understandable, and credible to patients and their caregivers. Physician experience has shown that patient problem lists, clinical notes, medication and allergy data, and laboratory and diagnostic test results can be shared with patients [8, 9]. An attempt should be made to adjust office workflows so physicians can discuss results with patients before they appear in online records.

### B. Architecture

Allowing patients to enter or view their own health data in their healthcare provider's EMR can convey much more to the patient than stand-alone PHRs, enabling patients to gather their entire fragmented medical history in one place. Information that patients may keep for their personal use may also be valued by healthcare providers. A personally controlled PHR, integrated with a primary care EMR, can manage communications for prescriptions and appointments at reasonable cost. System interoperability is critical to

giving consumers access to health records in hospital, physician, and laboratory systems [10, 11, 12].

### C. Privacy and Security

Consumers are very much concerned about the privacy and security of their health information, Current security protection mechanisms need to be enhanced for record protection, but to maintain privacy, and security levels must not become so tight that health records are unusable. However wireless transmission of patient medical data, including the privacy, integrity, and confidentiality of the data, and the authentication and authorization of users are great concern [13, 14].

### D. Functionality

PHR functionalities can be classified as: (1) information collection, (2) information sharing and exchange, and (3) information self-management. Functionalities include sending and receiving electronic messages to and from doctors' offices; completing prescription renewal forms, appointments, and referral authorizations; viewing lists of current medications and allergies; and accessing health and practice information. Decision support can also assist patients in managing chronic illnesses, based on monitoring data. The nature of the patient's illness affects preference for functionalities.

## III. PHRS PURPOSE

The purposes of PHR are outlines as

### A. Easy Communication to patient

The benefits and satisfaction with PHRs have included easy access to test results and better communication with healthcare practitioners. Physicians generally prefer telephone or face-to-face communication. One EMR web portal designed to assist the self-management of ambulatory patients with diabetes included secure e-communication with the physician's office, preventive healthcare reminders, and disease-specific tools and information [15, 16].

### B. Education and lifestyle change

In addition to personal data and data from the provider EMR and monitoring devices (eg, weight, blood glucose), a PHR could store other data on, for instance, social status, family history, or living and work environment. It could also include information on

healthy lifestyles (diet, exercise, smoking, weight loss, and working habits). In one study patients could access education and automated advice programs and add their own information to hospital systems. In this case, patients primarily reviewed laboratory results; patients and physicians reported enhanced communications and patient understanding.

#### C. Health self-management

Patient health self-management can be supported by PHRs that allow patients to record, edit, and retrieve their healthcare data, including blood glucose and blood pressure measurements, weight and activity logs, and stress scales. Frequent monitoring can lead to early detection of critical situations and timely intervention. Self-care monitoring tools are becoming more mobile and reliable, particularly in ‘smart home’ applications.

#### D. Adoption, acceptance, and usability

There are several inter-related measures of success, including system quality, use, user satisfaction, individual impacts, and organizational impacts. In this section we review findings on related PHR characteristics, such as adoption, use, acceptance, satisfaction, and usability. A sustainable PHR implementation depends on positive results from all these characteristics as well as favourable individual and organizational impacts.

#### E. Acceptance and satisfaction

Three compelling reasons motivating patients to maintain PHRs: serious chronic illnesses, unexpected health events, and the availability of inexpensive and secure computers. In a study of healthy, chronically ill, mentally ill, and pregnant patients, it is found that patient access to online medical records fitted three classifications: participation in care, quality of care, and self-care strategies. Patients felt that access helped reinforce trust and confidence in doctors and made them feel more like partners in healthcare. A measure of adoption success is sustainability- ‘the degree to which an innovation continues to be used after initial efforts to secure adoption are completed. Sustainability was rarely if ever mentioned in any of the papers reviewed, although satisfaction, a related term, was often reported.

The purpose of this review was to depict current electronic PHR research. Also, in this paper we establish whether PHRs can offer advantage to clients/patients. We study a lot of related papers, demonstrating a commonly rising interest in PHR use. In this paper we explain all the benefits and limitations of PHR system. We also explain how PHR play a beneficial role in supporting self-managed healthcare.

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#### IV.CONCLUSION

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