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Problems with Information Reliability in Remote Patient Monitoring

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ABSTRACT: ***An increasing number of extramural applications in the personal healthcare industry provide new challenges in terms of medical data security. This article focuses on remote patient monitoring systems and information reliability issues. Instead of being collected by healthcare professionals in a supervised medical environment using authorized medical equipment, medical data is collected by individuals at their homes without supervision. As a consequence, healthcare professionals will have to place greater trust in patient information. It is proposing a variety of ways to address this issue, all of which decrease risks while retaining high information dependability. The growing number of older people, which results in rising healthcare costs, is one of the drivers for innovative methods to healthcare delivery. Furthermore, the expenses are rising due to an increase in the number of chronic illnesses, which account for the majority of the expenditures.***

KEYWORDS: Healthcare, Medical Data, Remote Patient Monitoring, Security.

1. INTRODUCTION

Healthcare delivery systems are now confronted with significant difficulties. Healthcare is one of the most significant service industries in the US economy, and it is always under pressure to improve efficiency. Finally, quality concerns are becoming more prominent, and patients are placing a greater emphasis on quality improvement and continuous advancements in medical research and technology[1].

Patients are becoming increasingly involved in their own healthcare management, including acquiring medical information, discussing it with physicians, monitoring symptoms, and treating their diseases. They are becoming more self-aware and accountable for their own health. As a result, there is a need for a change in treatment from reactive to proactive, with a focus on wellbeing. As a result of the aforementioned developments, the use of information technologies in healthcare is growing, with the hope that they will address the issues stated. These technologies will play a critical role in the future, despite the fact that they have yet to be effectively implemented in healthcare.

Clinical decision support systems, telemedicine, ubiquitous computing solutions, and, most critically, digital health records are all subject to high expectations[2], [3]. The effectiveness of its implementation will be critical in ensuring that information technologies are widely used in healthcare. Security and privacy are two of the most pressing concerns about the implementation of digital health records, especially electronic health records (EHRs) or personal health records (PHRs), apart from the challenges of integrating hundreds of different systems. In the medical field, data security and privacy have always been significant concerns. However, recent advances in EHRs, such as the establishment of national health record databases and extramural uses in the personal healthcare sector, have raised additional concerns about medical data security. Furthermore, present EHR adoption strategies are mostly focused on stakeholders in the 'traditional' healthcare sector. Other health-related businesses, such as home care organizations, illness management organizations, pharmaceutical enterprises, and wellness centres, get less attention. However, it is anticipated that in the near future, these organizations will also need access to digital health records. Furthermore, as commercial interest in consumer health information increases, health record

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infrastructures are anticipated to allow services outside of professional medical uses in the future. This raises a slew of security and trust concerns, necessitating the development of new security methods[4].

Another trend in the healthcare industry is greater patient engagement at all levels of care, which necessitates more personal and user-focused treatment. This may be seen in practice, as patients are taking a more active part in their health management e.g. obtaining educational information about disease from the Internet, taking measurements or monitoring symptoms of their illnesses. As a result, patients are increasingly engaged in collecting vital signs, as well as maintaining and monitoring essential medical records. This is also supported by laws such as HIPAA, which allows individuals greater control over their health records administration. Patients, for example, must agree to the use of their data and have the right to greater control over access to their medical information[5].

1.1.Personal Health Records:

Patients nowadays have limited access to their computerized health records. Patients also have extremely limited options for managing their health data in general. To address this issue, a variety of solutions have been brought to the market that enable patients to gather their own data and save it on portable devices, computers, an internet service, or a combination of these methods. Personal health record (PHR) systems are the common name for these solutions. They are primarily designed to empower patients. While Electronic Health Records are primarily intended for doctors, the patient/consumer is responsible for collecting, maintaining, and disseminating PHRs, and therefore has full authority over them. "An electronic application via which people may access, manage, and share personal health information, and that of those for whom they are allowed, in a private, secure, and confidential environment," according to the Markle foundation. A collection of Internet-based technologies that enables individuals to access and organize their lifetime health information, as well as make relevant portions of it accessible to others who need it[6].

Provides a comprehensive picture of your health, medical and treatment history, and interactions with healthcare professionals – Includes information input by providers and the person himself/herself, as well as data from clinical systems and data obtained from monitoring equipment. Sending email to physicians, transferring information to specialists, receiving test results, and accessing online self-help resources all need a communications hub. As previously stated, a variety of devices are currently available that enable patients to input measurements and other medical data into a database. This database may be kept on the patient's PC, on a dedicated storage device (usually USB-based), in an internet service, or a mix of the three, depending on the solution. The fact that information is electronically accessible (through online links with the service or the fact that the client carries all data on his portable device) via a password-protected interface is a significant advantage.

Both the patient as well as the care provider may use a PHR system's features (mainly general practitioners). This enables health-care professionals to add information to patients' medical records. Aside from cooperation with healthcare services, a PHR system will have the ability to exchange data with other organizations that the 'patient' may be interested in. Wellness-oriented enterprises, such as fitness clubs and weight control firms, such as Weight Watchers, are examples of this kind of company. Some of the measures that the patient makes may be automated to make the data collection procedure easier and perhaps improve the quality of the data obtained. A weight scale, for example, may transmit its data via wireless to the application or device that gathers the data in the health record (e.g. Philips Telemonitoring Services). Another example is a system that uses a wireless link to a mobile phone to gather

Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 10, October 2022

ECG data. These are common methods to remote health monitoring systems, which will be discussed in more depth in the next section[7][8].

1.2.Patient Monitoring from A Distance:

Remote patient monitoring systems link patients and their care providers through consumer devices and the Internet, allowing new care models. They enable patients to remain connected to monitoring devices/sensors that are becoming smaller and more wireless (some are even integrated in clothing known as "smart textiles"). This allows for the collection and transmission of a patient's physiological as well as other contextual data to distant care professionals for evaluation or action. A remote patient system often consists of a medical hub device that gathers data from measurement devices and transmits it to a backend service, as well as multiple measurement devices (such as a blood pressure meter, weighing scale, or glucose meter). A hospital's electronic health record (EHR) or personal health record (PHR) system is also included in this eco system (the measurement data is sent from the medical hub to a PHR system, but in certain cases it is sent from the medical hub to a backend service which forwards it to an EHR or PHR system).

1. *Medical observation equipment:* these devices monitor vital indicators including such weight blood pressure, heart rate, or electrocardiogram (ECG). They may be fixed, portable, or worn by the patients.
2. *Medical hub*: a PC, specialized medical gadget, set-top box, or mobile phone that is either fixed or portable. It gathers measures (vital-signs observations) from medical monitoring equipment, saves them if necessary, and sends them to a service. It may also be used to get feedback from patients (e.g. based on questionnaires).

The personal/local area network interface links medical observation equipment to a medical hub. This interface may be cable or wireless (low-power). The Continua direct correlation, among example, offers interoperability rules for utilizing medical profiles of USB and Bluetooth standards, which are built on top of the IEEE 11073-20601 basic framework protocol and ten device specializations.

Backend service: this system gathers patient data and makes it accessible to healthcare professionals. It usually provides data processing and decision assistance (e.g., trend detection) to help healthcare professionals be more efficient. Wide area network interface: this interface connects the backend service to the medical hub at the patient's house (or his mobile phone). The first remote patient monitoring systems were phone-based, while newer ones utilize the Internet or cellular networks.

1.3.Reliability of Information:

When data collected by patients is utilized by medical experts, healthcare providers will have to put more faith in the information provided by patients. Then there's the issue of data quality and consistency. Consider taking your blood pressure. It's critical to know that the registered user's blood pressure was measured (not his friends' or children's), that the measurement was taken with such a certified machine, under standard conditions (e.g., with blood pressure monitor on the arm at the heart level), that it wasn't obtained as a result of device malfunction or failure, and that it wasn't changed on the way to healthcare providers. As a result, user, device, and data authenticity, as well as quality, must be supported. As a result, it is necessary to maintain confidence in the data source while also preventing illegal data changes. The following are some of the advantages:

- The safety of the patient (diagnosis and health decisions are based on reliable data)

Research paper UGC CARE Listed (Group -I) Journal Volume 11, Iss 10, October 2022

- Cost reductions (reuse of patient provided data in the consumer health or the professional healthcare domain).
- The patient's convenience (they can take healthcare measurement at home).

1.4.The following measures should be done to guarantee information reliability:

- The patient uses sensors to gather health data and saves it on the application hosting devices; the sensors (or the applications hosting device) identify the user and include provenance data as well as metadata that allows the data quality to be judged.
- The integrity of the data being measured is safeguarded. The information is kept in the medical hub. Furthermore, the hub saves information about the user over time, enabling a medical expert to evaluate the overall quality of the data provided by the patient.
- A medical practitioner has access to the measured data, which is connected to metadata and quality indicators, allowing him to verify the patient/device/legitimacy data's as well as assess the data's quality.
- The medical professional has the option of feeding quality data back into the system to affect future quality indicators. In the next two parts, we will discuss various approaches to addressing the aforementioned issues.

1.5.Authentication of The Patient and The Device:

As previously stated, when telehealth services or medical professionals utilize data remotely measured by patients, healthcare practitioners must put more confidence in the information that patients provide. They must verify, in particular, that a measurement is coming from the correct patient and that the proper equipment was utilized to obtain the measurement. As a result, user and device authentication must be provided.

1.6.Quality of Information:

The issue that healthcare measurement data received from patient measuring devices is not always of acceptable quality and that distant healthcare practitioners have no practical and effective methods to alter the quality is addressed in this paper. Related to the aforementioned issue is the question of how a health care practitioner may assist a patient and make a diagnosis using remote monitoring and telehealth without having any clue of the measurement's accuracy or reliability (e.g. the circumstances or the conditions in which the measurement is taken). Currently, the health care practitioner cannot objectively assess how effectively the measurement was carried out, even using the patient's knowledge or experience. In most cases, the individual taking the measurement has had little or no training on how to operate the equipment. Healthcare providers, on the other hand, demand that the measurement data be of adequate quality, which can only be achieved if the measurement is performed under certain settings and parameters that make the data more trustworthy for diagnosis.

As previously stated, the data and metadata are used to evaluate the measurement data quality. The health care provider (or any other party) chooses whether to act on the received data and metadata, for example, by performing (an update) of a patient's diagnosis and/or treatment, based on the quality. The quality indicator is an important element that is used to provide a feedback signal to the patient and his equipment in order to enhance the quality of the measurements made. This feedback signal is used to reconfigure the measurement device's functionality, for example, by altering the measurement process to assist the patient in overcoming recurrent errors or by providing additional functionality to those patients who consistently perform measurements of sufficient quality. Alternatively, the feedback signal

informs the patient about the accuracy of his measurements, as well as providing further instructions or training on how to use the measuring equipment. In the next section, we'll look at two instances of qualifiers that may be used to calculate quality indicators[9], [10].

2. DISSCUSION

This research presents new, practical dependability measures for a home-based remote monitoring system. When developing such systems, it emphasizes the need of taking into account both passive electrical and active human components. Overall, the system performed well in this group of reasonably healthy senior citizens. This research showed, in combination with previous remote monitoring studies, that a well-designed system has the potential to offer substantial assistance in the homes of older people and those with chronic care requirements. People who are remotely watched may expect to stay in their homes for extended periods of time, possibly improving their well-being. Its cost-effectiveness of installing and training for remote monitoring devices is still an open question. Such solutions may help to decrease healthcare expenses by decreasing expensive hospitalizations and reducing travel costs for both patients or healthcare professionals.

3. CONCLUSION

Researchers provide an overview of patients monitoring devices, including their architecture, relevant standardizations, and related efforts such as personal health records, in this article. Then we go through the security issues with remote patient monitoring systems, with an emphasis on data dependability. Several methods of addressing these issues are shown. They demonstrate that, although it may be challenging for healthcare professionals to place more confidence in observation data collected by patients in an uncontrolled setting, there are methods to reduce hazards and guarantee high information dependability.

REFERENCES:

[1] D. Awasthi and S. Madhe, “Evaluation of wavelet based ECG steganography system by using Percentage Residual Difference (PRD) measurements,” 2015, doi: 10.1109/ICCSP.2015.7322548.

[2] H. J.E. *et al.*, “GDm-health: Development of a real-time smartphone solution for the management of women with gestational diabetes mellitus (GDM),” *BJOG An Int. J. Obstet. Gynaecol.*, 2015.

[3] J. E. Hirst *et al.*, “GDm-health: Development of a real-time smartphone solution for the management of women with gestational diabetes mellitus (GDM),” *BJOG An Int. J. Obstet. Gynaecol.*, 2015.

[4] P. J. *et al.*, “Performance of dias real-time web monitoring application in outpatient trials of artificial pancreas (AP) and continuous glucose monitoring (CGM),” *Diabetes Technol. Ther.*, 2013.

[5] R. Chakrabarti, “The Need for an Evidence-Base in Mobile Technology in Medicine,” *J. Mob. Technol. Med.*, 2012, doi: 10.7309/jmtm.2.

[6] S. Manfredi, “A proportional fair quality of service allocation scheme for telemedicine applications,” *Int. Rev. Comput. Softw.*, 2013.

[7] K. S. Raja and U. Kiruthika, “An Energy Efficient Method for Secure and Reliable Data Transmission in Wireless Body Area Networks Using RelAODV,” *Wirel. Pers. Commun.*, 2015, doi: 10.1007/s11277-015-2577-x.

[8] M. Petković, “Remote patient monitoring: Information reliability challenges,” *9th Int. Conf. Telecommun. Mod. Satell. Cable, Broadcast. Serv. TELSIKS 2009 - Proc. Pap.*, pp. 295–301, 2009, doi: 10.1109/TELSKS.2009.5339520.

[9] J. Place *et al.*, “Performance of dias real-time web monitoring application in outpatient trials of artificial pancreas (AP) and continuous glucose monitoring (CGM),” *Diabetes Technol. Ther.*, 2013.

[10] M. Petković, “Remote patient monitoring: Information reliability challenges,” 2009, doi: 10.1109/TELSKS.2009.5339520.