

PROBLEM-SOLVING & DECISION MAKING IN THE WORKPLACE

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Table of Contents

Executive Summary	3
An Overview of Problems in Healthcare	4
The Problem of Using Paper Medical Records	4
Impact of the Problem on all the Stakeholders	6
Decision-Making Process and Relevant Legislation Regarding Medical Records.....	7
Alternative Solutions to the Problem of Maintaining Medical Records.....	8
Evaluating and Identifying the Most Appropriate Solution	10
Implementation and Communication of the Solution to all Stakeholders.....	14
Monitoring the Successful Implementation of the Solution	15
Conclusion	16
References.....	18

Executive Summary

Millions of patients in the UK go to a hospital each year. Millions consult their family doctor, and almost all of them have their information recorded in papers for analytical evidence. The enormous growth in healthcare activity poses a complex problem for hospitals of storing this huge amount of papers and data in millions of medical records. In most cases, hospitals are overwhelmed. The lack of space, human capacity, and technological support make management difficult. The current report will analyse how the problem can be solved using an electronic health record (EHR) system. Among the many benefits of implementing an EHR system include Integration of information; control of the population's clinical history; control of medical appointments, procedures, and hospitalisations; allows actions to be coordinated based on information obtained in the services; reduces bottlenecks in unproductive areas; and improves service, the productivity of professionals, providing schedules, and optimising all processes. The NHS needs to implement a modern, computerised health records management system that will bring efficiency to all stages of treatment, from making appointments to discharging the patient.

An Overview of Problems in Healthcare

There are several problems currently facing the healthcare system in the United Kingdom (UK). Some of these problems including long waiting times, an ageing population, increase in costs for caring for older people, lack of enough staff, increasing maintenance backlogs, health and social care inequalities, underequipped hospitals, evolving healthcare needs, increasing reliance and dependence on private hospitals, and maintaining paper medical records (Montgomery et al., 2020). It has become difficult for hospitals to serve patients efficiently because of two reasons; the constant growth in the number of patients and the lack of enough human (doctors) and capital resources (medical equipment). Currently, UK has 2.4 beds per thousand people (OECD, 2021). The recommended by the World Health Organisation is 5 (WHO, 2021). The number of beds is lower than recommended to serve the population. According to Medic Portal (2021), the UK will require about 17,000 more beds by next year because of the increasing ageing population.

Another problem is the difficulty in maintaining and storing medical paper records. Physical documents take up space and pose a risk to patient data security. The number of patients has been increasing over the years, and the volume of their information and data has been increasing (Boonstra et al., 2021). Consequently, hospitals that do not use automated systems need lockers and storerooms to archive patient information. The UK healthcare system is faced by many challenges, however, this report will primarily focus on paper medical records and their disadvantages. The report will explain why it is time for the National Health Service (NHS) to shift from the paper medical record system to the electronic health record systems.

The Problem of Using Paper Medical Records

According to Bloom et al. (2021), one of the main problems facing the healthcare system in the U.K is the failure to embrace electronic health record (EHR) systems. Bloom et al. (2021) added that this has resulted in high staff turnover, increased work pressure, and reduced patient statement. Every year in the UK, there are more than 30 million emergency

attendances and maintaining paper records of all these patients is not only inefficient and ineffective but also unsafe and tiresome (Bloom et al., 2021). When a patient arrives at the hospital, healthcare facility, or clinic, care providers need to locate all of their medical histories. In institutions that do not use technology, information is stored in folders within physical files. The process is not efficient or safe, and it takes a lot of time. It is inefficient, as it requires the professional to leave their post to find the information (Ley et al., 2019). It is not safe, as information can be lost, erased, and even suffer from the actions of time. It takes time, as the professional has to do a manual search (Shiells et al., 2019). Another process that hinders the storage and location of information is the duplication of records. Without computerised management, it is impossible to identify duplicate records, such as when the patient has been registered more than once.

Paper medical records must be stored in a specific storage location, meaning other medical practitioners or hospitals will not have access to a patient's medical data (Chen et al., 2019). Therefore, when a patient goes to another hospital, the paper health record will not be there. The unavailability affects the effectiveness and quality of medical services (Atasoy, Greenwood and McCullough, 2019). Another issue is the fragility of paper health records since they are affected by constant handling, accidents, theft, floods, fires, rodents, and insects. The paper records filing location generally do not have the necessary humidity and temperature controls to preserve the document for the required time (Kulynych & Greely, 2017). The immediate consequence is the risk of proliferation of fungi and moths, which make the environment unhealthy and can compromise the entire archive, even recent records.

The space occupied by paper records is huge. Moreover, since the number of patients keeps increasing, more space will be required. More employees will be required to maintain and organise these records. All these costs and expenses will be borne by patients. Another problem of using paper medical records is the probability of underreporting information in some areas, which is generally due to the reporting behaviour of the personnel that consigns

it (Boonstra et al., 2021). In a physical registration system, information is lost through poor recording, inconsistent layouts, limited security, and the unscalability of the storage system. Lastly, paper records can be lost, and anyone can access the paper records, thus interfering with the patient's right to confidentiality.

Impact of the Problem on all the Stakeholders

Physical storage generates costs for health institutions, impairs information management, professionals' productivity, and does not guarantee security. Moreover, time and disasters can destroy physical documents, making it impossible to find or identify the information (Wilbanks et al., 2018). Additionally, whenever it is necessary to collect the patient's history, nurses or doctors will have to spend a few minutes or even hours looking for the information (Lewkowicz, Wohlbrandt and Boettinger, 2020). Using physical storage ends up generating more costs for the institution, reducing efficiency and productivity. Moreover, there can be a readability problem because of the professional's handwriting.

Institutions that perform many appointments per month and have a large number of professionals from different specialities need to manage the schedules so that there is no confusion of dates, times, and professionals (Kruse et al., 2016). Without an automated EHR system, management is done manually, generating inefficiency for care (Akhu-Zaheya, Al-Maaitah and Bany Hani, 2018). The image and brand of the hospital get affected because patients will associate it with poor customer services and low-quality services (Gagnon et al., 2016). There will be longer waiting times as nurses search for medical records, the workload will be high, burnout will increase, turnover will become a problem, and patients will become anxious and agitated. Consequently, the costs of running the hospital will be high, and the hospital will have to charge higher prices for inferior services.

Lack of proper medical records storing and maintenance results in management problems that hamper organisation and productivity in public health. Delay in care, lack of doctors, and availability of equipment are some of the problems generated by the lack of EHR

(Lewkowicz, Wohlbrandt and Boettinger, 2020). In many situations, the service is not quick because there is an imbalance in the volume of exams that each doctor performs and the difficulty in accessing a patient's medical history. Moreover, the lack of an EHR system means that patients will be forced to be going to the same hospital where their conditions are already known. Doctors, physicians, clinicians, and nurses will be overwhelmed, resulting in burnout (Akhu-Zaheya, Al-Maaitah and Bany Hani, 2018). For the patient, care takes a long time because the schedule was not well planned and the difficulties encountered in retrieving patient information.

Decision-Making Process and Relevant Legislation Regarding Medical Records

Healthcare professionals need to know that according to the General Data Protection Act, patient information is considered extremely sensitive data (Government of UK, 2021). Sensitive data are information that, if accessed, have a high risk of patient exposure both in social and professional life. That is why the healthcare area is perhaps one of the areas of the greatest attention to protecting the personal data of its patients, as it has information ranging from exams to extremely complex diagnoses. A medical record may reveal sensitive information that should only be known to the patient and their physician.

Health data unduly exposed can even generate discriminatory practices against the patient. Thus, it is up to the medical professional to ensure the proper and regulated use of data per the data protection law to avoid major problems and legal indemnity claims (Keshta and Odeh, 2021). The Law seeks to ensure the patient's access to information quickly and easily, being subject to possible sharing of medical records. Another important consequence is the disclosure of the infraction and the lack of care with personal data, which would lead to an immeasurable impact on the image and brand of the professional or the establishment of the healthcare area (Guo et al., 2018). It can undermine the patient's confidence.

Besides confidentiality, digitising medical records poses a signature problem. Both patients and doctors must sign discharge and discharge reports or consents for surgical operations.

Currently, in the absence of legal regulation, the digital signature has no value, so patients and health workers must have on paper all the documents that will possibly be used later (Wang et al., 2021). The same happens with access to information. It is regulated by law that only the doctors of each area and the nurses of the specialties will have access to the databases containing the medical records (Alghazo, 2019). It must be taken into account that generic passwords cannot be given or be known by everyone. Hospitals must have the permissions of the various data protection agencies and of the patients themselves that allow digitising all their medical data.

Alternative Solutions to the Problem of Maintaining Medical Records

There are two main ways through which the problem of maintaining medical records can be solved; EHR systems and electronic medical record (EMR) systems. Despite having a lot of similarities and, the EMR and the EHR are different. In the case of EMR, it is a digital version of the medical record. EMR stores the information in a local computerised system, where only the doctor and other authorised persons have access. There are several differences between the EMR and the EHR and they are shown in figure 1 below.

Differences between EMR and EHR

EHR (electronic health record)	EMR (electronic medical records)
A digital record of health information	A digital version of a patient chart
Allows access to tools that providers can use for decision making	Is mainly used by providers for diagnosis and treatment
Allows a patient's medical information to be accessed from different places	Patient record cannot easily be sent outside the practice
Simplified sharing of updated, real-time information	Not designed to be shared outside the individual practice

Figure 1. Differences between EMR and EHR (Garcia, 2016).

A SWOT analysis of both EHR and EMR is illustrated in figure 2 and 3 respectively.

EHR SWOT Analysis	
Strength 1) Timely and quick access to information 2) Low-volume storage of information 3) Reduction of duplicate testing including laboratory tests 4) Electronic exchange of information and participation in medical care 5) Increasing the speed of service delivery 6) Ability to computerize analysis and interpretation 7) Prevention of medical Errors 8) Accurate record of provided services	Weakness 1) Lack of necessary equipment and hardware appropriate for EHR implementation 2) Being time-consuming and difficult to link the information contained in legacy systems to that in new systems 3) Increasing the workload of healthcare providers 4) Creation of typing problems by secretaries 5) Jeopardising job positions through EHR implementation
Opportunity 1) Sharing of information between healthcare providers and better information management 2) Being used as the main source of training for physicians and providers of public services 3) Access to a variety of health statistics 4) Accurate records of services provided to perform individual tax refund 5) Ensuring the integrity of the entire system 6) Semantic coordination and communication between internal and external parts 7) Applying as legal document about the type of services provided	Threat 1) Lack of strategic planning in the field of electronic health records 2) Problems related to programming and software developed according to the needs 3) Physicians and other clinical staff's resistance in the use of electronic health records 4) Lack of funds for the design, implementation and use of electronic health records 5) Lack of expert human resources 6) Unauthorized access to patient information 7) Limited awareness of healthcare providers about the benefits of electronic health records

Figure 2. SWOT analysis of EHR (Shahmoradi et al., 2017, pp. 644-645).

EMR SWOT Analysis	
Strengths 1) Remote management of clinical information 2) Improved efficiency 3) Standardized classification of patient medical conditions and history	Weaknesses 1) Installment and maintenance cost is high 2) Synchronisation of records may be difficult 3) Has fewer effects compared to EHR
Opportunities 1) Data synthesis 2) Ability to synch up with mobile devices 3) Adjustment to NHS regulatory compliance	Threats 1) Adverse events may occur due to shortcomings of EMR system users, equipment of organisational/system capacity 2) Privacy and confidentiality concerns 3) Health professional liability concerns

Figure 3. SWOT analysis of EMR (De Benedictis et al., 2020).

While the EMR stores specific care data within a given institution, forming a partial clinical history, the EHR can gather complete information, associating care data in different locations and providing external access to the information. In EHR, physicians can access the patient's information from anywhere, whereas, in EMR, the patient records cannot be easily sent to other medical practitioners. Therefore, an EHR system is more beneficial compared to an EMR system.

Evaluating and Identifying the Most Appropriate Solution

Between the EHR and the EMR, the EHR is the most appropriate solution. The EHR provides a holistic database of health information and all digital patient records. In contrast, the EMR is only a digital record of patient's paper-based medical charts used by a doctor. Moreover, in EHR, medical data can easily be shared and accessed by multiple users in real-time, and patients have role-based access to the system that allows them to enter and edit data (Melnick et al., 2021). However, in EMR, the only people who can view data are patients. While EMR is only useful for diagnosis and treatment purposes whereas EHR is

useful for making informed medical decisions, enhancing communication between doctors, and helps in tracking patient data. EHR opens up extensive possibilities for hospitals, and it is cost-effective and efficient in the long run.

The EHR eliminates all the problems of paper records. The registration is done in the system, so there is no risk of confusion with the readability of the content. Even if the patient is registered more than once, the system recognises demographic information, test and laboratory results, insurance information, and medical histories and synchronises them in a single registration. If a professional enters a patient who already exists, the system will notify him (Boonstra et al., 2021). After that, the patient's exams and reports, which were stored in the system, are synchronised with their registration. All information is recorded in the system and can be quickly accessed from any mobile device. A doctor, nurse, or any other medical practitioner will just log into the system, initiate a search using the patient's name, document, or registration number, and all the information will be available in the system.

A technology such as EHR that gathers all the patient's information allows the institution to improve its service capacity without having to change the team. It also increases the level and satisfaction of patients (Melnick et al., 2021). EHR systems organize progress notes, medications, and all other crucial administrative, clinical data in an automated way, according to the priority and need of each case and the availability of professionals and equipment (Nagasubramanian et al., 2020). Inevitably, activities within each institution are carried out with greater productivity, increasing the number of procedures performed, and patients cared for. In the end, it reduces the waiting time for appointments and makes better use of hospital resources.

The implementation of the EHR technology in the administration of public health generates positive impacts for the cost management of institutions. The centralisation of information allows all processes to be interconnected. If the patient has a history of frequent visits to the health facility, the physician can consult the information and check what procedures the patient has already performed, preventing the patient from having to repeat exams (Blijleven

et al., 2017). In this way, the patient will also not occupy queues for these procedures, making room for someone else. The automation of processes provides better use of resources in public health. It reduces the time between procedures, both medical and administrative, reduces service lines, speeds up service, eliminates expenses, centralises information and other benefits that are perceived in the first few months of using the EHR system.

The process of digitising medical records, when done professionally, has safety devices that practically nullify the chances of loss. The main device is data backup, which allows full restoration of files after any unexpected event. The web access, protected by login and password, to computerised systems offered by companies specialised in digitising medical records allows physicians to access their records remotely, at any time, by cell phone, tablet, or computer (Boonstra et al., 2021). Moreover, since all individual treatment steps are recorded in the electronic patient file, the medical staff has access to current patient data at all times and all workstations (Melnick et al., 2021). The introduction of electronic patient records not only significantly reduces the risk of incorrect information but also speeds up diagnosis and treatment. In this way, the worsening of the patient's condition due to errors can be prevented.

Lastly, EHR results in cost-cutting (Ratwani et al., 2018).. It is common to see doctors moving to smaller and more economical spaces after digitising their records. Without the steel shelves and files, the gain in the usable area is noticeable. Besides the spatial reduction, the change facilitates information retrieval: the physician only needs to type the name to find the file that will show the patient's entire medical history (Petrides et al., 2017). A PMI (Plus, Minus, Interesting) of EHR is as shown in figure 4 below. Figure 4 summarises the positive, negative, and interesting concepts of EHR.

PMI Analysis of EHR		
Positive	Negative	Interesting
• Quick access to patient records • More Accurate Patient Information • Increase treatment effectiveness • Recommends potential treatment options • Patient portals give patients access to their medical details • Makes patient-physician communication better • Improves preventive care • Makes accessing patient information easier • Reduces the risk of theft of sensitive data • Lowers mistakes due to handwriting • Update and access patient information in real time • Continuity of treatment	• EHRs add a layer of complexity to the already complex delivery of healthcare, leading to unintended adverse consequences such as dosing errors, failure to detect serious illnesses, and delays in treatment due to poor human-computer interactions or loss of data. • Expensive. • Requires time to adapt fast. • Over-dependency on technology. • Susceptibility to network hackers.	• Due to the easy accessibility to their health records through EHR, people can keep track of their health better. • 2 out of 3 people would consider a physician who has access to the medical records through a secure internet connection. • EHR implementation will often make a practice run more efficiently, and force more organized record keeping behavior. • EHRs actually encourage more communication with patients. EHRs can integrate seamlessly with many different practice management software systems that subsequently serve as an educational tool

Figure 4. PMI Analysis of EHR (Image by author)

Implementation and Communication of the Solution to all Stakeholders

The implementation of the EHR depends on an intense mobilisation of financial, technological, and human resources, promoting new management and organisational forms. The NHS will publish a circular communicating to all involved stakeholders (patients, doctors and clinicians, hospitals and their staff, and policymakers) about the implementation of EHR, its benefits, challenges that will be encountered, and the steps followed in implementing EHR. It should not be an abrupt process but a gradual and sure process. Hospitals must ensure the readiness of the computer and telecommunications infrastructure of their organisations, for example, computer equipment for organising workplaces, local area networks, the Internet, and secure communication channels.

Besides complying with the security requirements established by current legislation, hospitals need to be prepared for the specific security level for digital data management. Thus, it is essential to have a digital signature, the most advanced and secure type of electronic signature. Digital signatures comply with the strictest regulations in the world. They offer high reliability on the signatory's identity and guarantee the authenticity of documents (Nagasubramanian et al., 2020). Additionally, the security of information when digitally signed is ensured by using a digital ID, which works from a certificate and is issued by a certification authority (CA) or a trusted service provider.

All hospitals need to train their staff to ensure the privacy and protection of patient data; control access to patient records and information; invest in collected data security solutions; keep track of access and requests for access to personal information and medical records, and formulate internal data control procedures and privacy policies (Boonstra et al., 2021). Even if the doctor, physician, or clinician is not a computer scientist, he must have basic knowledge of how EHR works and remain vigilant. For example, if a data error occurs, he should know what action should be taken. If the doctor notices that data is missing, has moved, is corrupted, or is not properly classified in his EHR, it is imperative that he immediately notifies his EHR and technology service providers and initiate an investigation

process (Nagasubramanian et al., 2020). Maintenance of hardware and software solutions will also be necessary to ensure the uninterrupted operation of the EHR.

Contractual protections must be obtained to ensure that the supplier takes all precautions to reduce the risk of loss or modification of patient data. The contract must include measures such as logging (which allows continuous updating and the recovery of the most recent information in the event of a system shutdown) and data redundancy (Boonstra et al., 2021). These contractual measures constitute a way for the doctor and all other stakeholders to fulfil their obligations. Figure 5 below shows a fishbone diagram of the factors needed for the successful implementation of EHR.

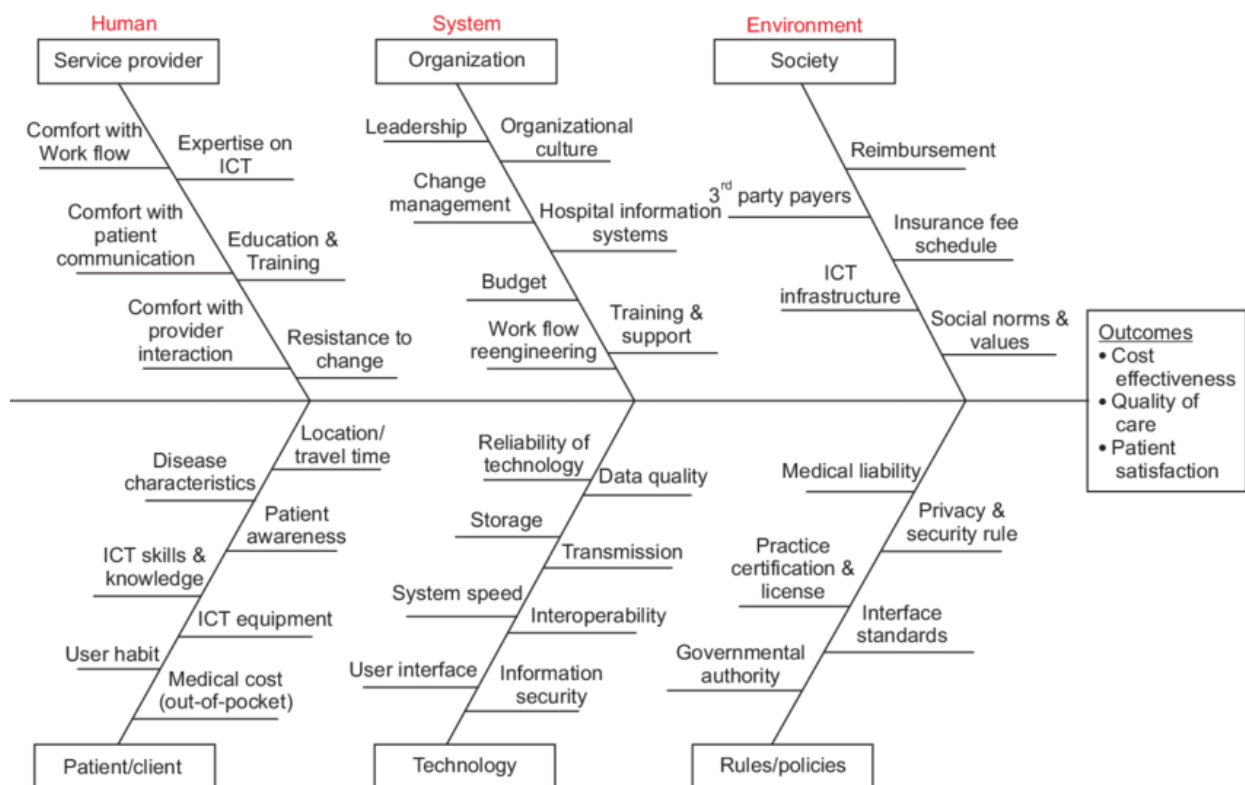


Figure 5. Prerequisite factors for the successful implementation of EHR (Chang, 2015).

Monitoring the Successful Implementation of the Solution

The implementation of EHR is not easy. Information systems need to be meticulously planned to reconcile routines, flows, and processes for obtaining, processing, and using data, with the ultimate purpose of enhancing health care. The EHR is intended to simplify

communication between doctors, pharmacists, and therapists both with one another and the patient, thereby improving medical processes.

Several metrics will be used to monitor the successful implementation of EHR. Every hospital will develop survey tools for measuring physician and doctors tasks before and after EHR implementation and assessing hospital office processes. These processes will be measured six months before EHR implementation and one year after implementation of EHR. The first metric that will be measured is the time taken to conduct administrative tasks before and after implementing EHR. The second metric that will be measured is the time taken to retrieve patients' records, and the third metric will be waiting times for patients(Melnick et al., 2021). The fourth will be patient engagement by tracking whether patients are using EHR to access their clinical records. The last metric will be return on investment (ROI) that will provide a benchmark on whether costs have been saved after implementing EHR. An improvement in the performance of all the metrics above will mean the implementation process has been successful.

Conclusion

The transition from a paper-based method of maintaining medical records to an electronic one has not been fully embraced by the UK health care system. Paper records have several disadvantages. First, professionals spend more time searching for medical records. Second, there is a risk of loss of information due to human errors, accidents, fires, thefts, and forgery, among others. Third, there is a risk of information leakage. Fourth, it wastes resources, occupies a vast volume of space, and is costly. EHR systems have several benefits. They provide a continuous record of the patient's history, which helps in decision-making. Secondly, there is greater information security and no risk of leakage or access to unauthorised personnel. Third, records can be quickly accessed, and in a few clicks, all information is available to interested parties. Fourth, the visual structure speeds interpretation and easy reading of data. Fifth, permission is required to access the records. Thus, only professionals authorised by the institution and the patient can access the

Problem Solving & Decision Making in the Workplace

information in the medical record. The implementation of EHR will enhance patient care and make doctors' works easier, reduce patient waiting time, and improve the quality of health care.

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