

## Preparing legal electronic medical record case: A process analysis and improvement plan

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**Abstract**—The healthcare sector has recently aimed to reduce the use of paper and take advantage of technology by implementing electronic medical records (EMRs). However, some EMR users find the technology time-consuming due to the inappropriate design of the system's screens. Thus, it is important to ensure that the implemented system fulfills the users' needs and supports them in efficiently completing their tasks. This study aimed to analyze the preparation legal records using an EMR at a specialist hospital in Saudi Arabia. Data was collected from interviews and observation of the users while they completed their daily tasks. The findings highlighted the key issues related to screen design when preparing legal records and developed an improvement plan. The findings could help reduce time wasted and assure the adequacy of the needed information.

**Keywords:** system analysis, electronic medical records, improvement plan, system evaluation

### I. INTRODUCTION (HEADING 1)

The development of technology changes healthcare dramatically. Although the implementation of technology is expected to improve workflow, technological issues might be related to the limited use of new technology. The inappropriate design of electronic medical record (EMR) screens might affect the use of the system [1]. Thus, EMRs should be tested for accuracy and to determine if they contain all the required functions to result in a comprehensive use of the system, minimize paperwork until reaching a paperless stage, and reduce the time and effort required to accomplish daily tasks [2–6,7–10]. Any newly implemented EMR should be reviewed for process errors, inaccurate results, missing functions, missing reports, and any issues that increase the task time or negatively affect the work [3, 11]. System developers can begin this review by running some system tests. Then, they should assign staff members in each department to test the system and identify areas for improvement [3, 4]. If the users identify an area for improvement, end users should be interviewed and observed to ensure that the reported concern is a system issue rather than a user mistake or system misuse [11–13].

In the medical record department, many functions are conducted using an EMR, such as analyzing documentation, sending deficient tasks to the doctor, tracking the paper record, coding diseases and procedure, and preparing legal files [14]. One important function in the medical report department is preparing the legal case

report. Any mistakes made when producing these reports could be hazardous. Thus, it is important to ensure that the staff is confident in using the system to generate these reports. Moreover, it is important to ensure that these reports are accurate and error-free. Thus, this study aimed to analyze the current process for preparing legal case reports using EMRs at one of the specialist hospitals in Saudi Arabia and to identify areas of improvement.

### II. METHODOLOGY

The study was conducted at the legal case preparation department in a specialist hospital in Saudi Arabia. The hospital had already implemented the EMR. The study population included the two staff members working in the legal case preparation. This study was conducted using two qualitative methods: unstructured, face-to-face interviews and observation. The interviews were carried out with both staff members in the legal case preparation department. Before each interview, researchers sent the main objective of the interview to the participant. Researchers decided to use unstructured interviews because of the method's potential to explore a certain topic [15]. Moreover, the method gives interviewees space to comfortably express their points of view. Immediately after the interview, the interviewer wrote summary report that included the key issues with the EMR screens used in the legal case was written by the interviewer. The summary report was returned to each staff member to ensure that all information was correctly recorded and to determine if there was any missing information.

Researchers also conducted observation to learn more about the actual work processes and to complement the interviews. They observed staff performing tasks in their daily work area, ensuring that there were no interruptions. Data was collected in the interview and observation by immediately recording the findings in specified forms. Researchers analyzed the interview data using narrative analysis. Finally, they used system analysis and design tools, including a case diagram and activity diagram, to illustrate the current process [1].

### III. RESULTS

The current process of legal case report preparation was as follows (see Figure 1 for more details): The legal department contacts the medical record department about

the legal case, and the medical record department prints the associated medical record. The responsible staff in the legal case department opens the medical record, goes to episode inquiry, records the medical record number, and searches for the file. If the file appears on screen, the employee selects one of the patient episodes. Then, the employee selects the electronic patient record (EPR) and chooses the proper document. Two kinds of reports can appear on the screen—a discharge report and a legal report. The employee selects the legal report and clicks the “new” button. Another screen appears to select the needed episode and type of report. All the medical information appears on the screen and is divided into the following sections: summary of diagnosis, progress notes by date, lab results, medication, and radiology report. Then, the employee selects all the detailed information one by one (i.e., they select each lab result separately).

Next, the employee clicks on the “include in the report” button. They change the report’s status from “in process” to “authorized” and click “update.” The report is generated and appears on screen. To print the report, the employee clicks the “generate report” button and selects “print.” Two options appear; one is “print summary” and the other is “print detailed report.” The employee selects the detailed report, which then appears on screen. To print, they click the “print” button. After printing the report, the employee places it in a new medical record folder and sends it to the legal department.

Based on employee feedback, the current process is time-consuming, especially if the medical record contains several episodes with long lengths of stay and extensive investigation. In this case, the process may take an hour to finish. Moreover, if the employee leaves the system without moving the keyboard or mouse for five minutes, the system automatically logs the user out, and the progress on the report is lost.

#### IV. DISCUSSION AND CONCLUSION

Although the hospital is using EMRs to generate legal case reports, there are some issues that need to be resolved to improve the workflow. Some of these issues were reported by the department’s employees, while other issues were apparent from observation. For example, the screen that contains all the patient’s medical information only allows a limited number of ways to select the required information. The staff should have multiple ways to select the needed information, including the following: 1) select all patient information, 2) select all information related to the needed episode of care, 3) either select all information for a specific episode or select all information one by one (for cases that are episode-based), and 4) select all information one item at a time (i.e., the current way).

This newly suggested structure will help reduce medical record staff’s wasted time spent preparing legal reports, reduce the chance of mis selecting the necessary information, give the user more options to generate the legal file and select the required data (become more user friendly), reduce the chance of interruption that may lead

to information selection loss, reduce the legal department’s waiting time, and reduce mouse-clicking that may positively affect the staff’s hand health [16].

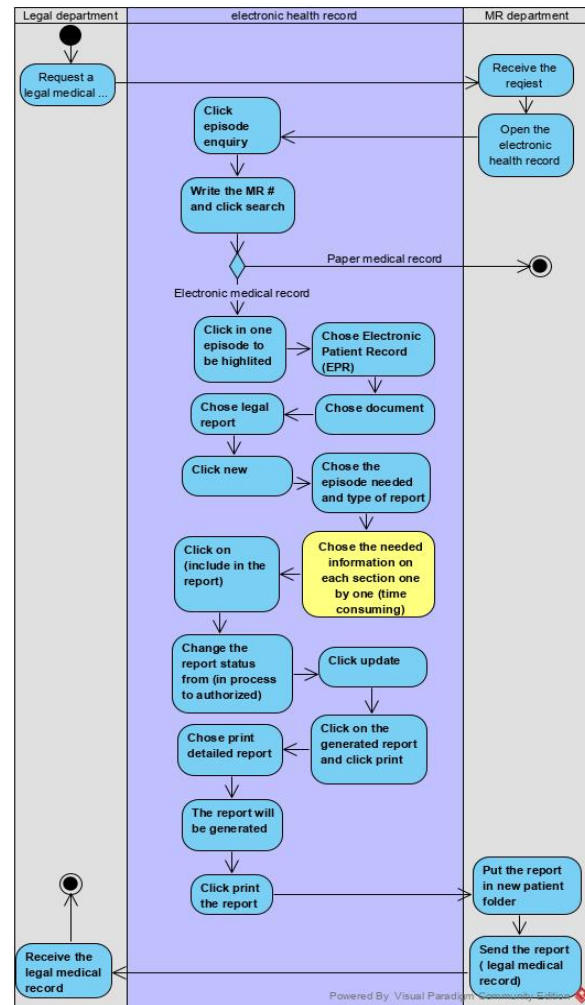


Figure 1. Activity diagram of the preparation of an EMR for a legal case

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#### REFERENCES

- [1] Kendall KE, Kendall JE. Systems Analysis and Design. 10th ed: Pearson; 2019.
- [2] Hillah LM, Maesano A-P, De Rosa F, Kordon F, Willemin P-H, Fontanelli R, et al. Automation and intelligent scheduling of distributed system functional testing: Model-based functional testing in practice. International journal on software tools for technology transfer. 2017;19(3):281-308.
- [4] Maulik PK, Tewari A, Devarapalli S, Kallakuri S, Patel A. The Systematic Medical Appraisal, Referral and Treatment

- (SMART) Mental Health Project: Development and Testing of Electronic Decision Support System and Formative Research to Understand Perceptions about Mental Health in Rural India. *PloS one*. 2016;11(10):e0164404.
- [4] Bruns EJ, Hyde KL, Sather A, Hook AN, Lyon AR. Applying User Input to the Design and Testing of an Electronic Behavioral Health Information System for Wraparound Care Coordination. *Administration and policy in mental health and mental health services research*. 2015;43(3):350-68.
- [5] Wright A, Aaron S, Sittig DF. Testing electronic health records in the “production” environment: an essential step in the journey to a safe and effective health care system. *Journal of the American Medical Informatics Association*. 2017;24(1):188-92.
- [6] Corrao NJ, Robinson AG, Swiernik MA, Naeim A. Importance of testing for usability when selecting and implementing an electronic health or medical record system. *Journal of oncology practice*. 2010;6(3):120-4.
- [7] Archer N, Cocosila M. A comparison of physician pre-adoption and adoption views on electronic health records in Canadian medical practices. *Journal of medical Internet research*. 2011;13(3):e57.
- [8] Electronic Medical Records Really Do Work. PR Newswire U6 - ctx\_ver=Z3988-2004&ctx\_enc=info:ofi/enc:UTF-8&rft\_id=info:sid/summonserialssolutionscom&rft\_val\_fmt=info:ofi/fmt:kev:mtx:journal&rftgenre=article&rftatitle=Electronic+Medical+Records+Really+Do+Work&rftjtitle=PR+Newswire&rftdate=2008-02-14&rftpub=PR+Newswire+Association+LLC&rftexternalID=BID=8GL&rftexternalDocID=A174746432&paramdict=en-US U7 - Newspaper Article. 2008.
- [9] Franz B, Murphy JW. Electronic Medical Records and the Technological Imperative: The Retrieval of Dialogue in Community-Based Primary Care. *Perspectives in biology and medicine*. 2015;58(4):480-92.
- [10] Hertzum M, Simonsen J. Positive effects of electronic patient records on three clinical activities. *International Journal of Medical Informatics*. 2008;77(12):809-17.
- [11] Walia GS, Carver JC. A systematic literature review to identify and classify software requirement errors. *Information and Software Technology*. 2009;51(7):1087-109.
- [12] Amatayakul M, Books24x I. *Process Improvement with Electronic Health Records: A Stepwise Approach to Workflow and Process Management*. Portland: Productivity Press; 2012.
- [13] Taylor N, Clay-Williams R, Hogden E, Braithwaite J, Groene O. High performing hospitals: a qualitative systematic review of associated factors and practical strategies for improvement. *BMC health services research*. 2015;15(1):244.
- [14] Sinha PK, Bendale P, Dande A, Mantri M, Sunder G, Books24x I. *Electronic Health Record: Standards, Coding Systems, Frameworks, and Infrastructures*. 1. Aufl.;1, ed. Somerset: Wiley-IEEE Press; 2012.
- [15] Doody O, Noonan M. Preparing and conducting interviews to collect data. *Nurse researcher*. 2013;20(5):28-32.
- [16] Ijmker S, Huysmans MA, van der Beek AJ, Knol DL, van Mechelen W, Bongers PM, et al. Software-recorded and self-reported duration of computer use in relation to the onset of severe arm–wrist–hand pain and neck–shoulder pain. *Occupational and environmental medicine (London, England)*. 2011;68(7):502-9.