International Journal of Health Services Research and Policy
www.dergipark.org.tr/ijhsrp

IJHSRP

e-ISSN: 2602-3482

Case Study

STRATEGIES FOR IMPROVING THE IMPLEMENTATION OF ELECTRONIC HEALTH RECORDS- A SINGLE CASE STUDY

Ansam BIZZARI*[1]

[1]Yanbu University College. Health Education Faculty, Yanbu, Saudi Arabia
* Corresponding Author; ansam_bizzari@aol.com

Abstract: *Electronic health records are a healthcare quality improvement strategy. Healthcare organizations in middle-income countries face significant challenges in adopting and implementing electronic health records. In Jordan, implementation challenges delayed achieving the objective of a national initiative titled Hakeem. The initiative aimed to implement the Hakeem electronic health record system in all healthcare sectors by 2020. This delay may be attributed to inadequate implementation guidelines. The King Hussein Cancer Center successfully pioneered the Hakeem system in Jordan and fully used it in all departments. This study used a single case study design to explore and codify the center's strategies for system implementation. Data sources included a review of organizational documents related to the Hakeem system implementation and individual interviews with six healthcare leaders involved in the implementation process. Thematic data analysis included manual analysis and verification using NVivo 12, QRS International software. The emerging themes included (1) a phased approach and continuous planning, (2) stakeholders' active involvement, (3) collaboration with the facilitating agency/vendor, (4) training and continuous support, (5) managing resistance, and (6) recommendations for other organizations. The findings of this study may lay the foundation to lead healthcare organizations into successful implementation and effective use of electronic health records.*

Keywords*: Case Study Design, Electronic Health Records, Electronic Health Solutions, Hakeem System, King Hussein Cancer Center.*

Received: December 3, 2022 *Accepted: April 13, 2023*

1. Introduction

Electronic Health Record Solutions (EHRs) have gained worldwide momentum as a strategy to improve healthcare quality. EHRs are "digital forms of patient records that include patient information such as personal contact information, patient's medical history, allergies, test results, and treatment plan" [1]. EHR systems are an effective quality improvement strategy in healthcare organizations because they have the potential to improve care quality, process efficiency, and patient safety and outcomes [2, 3]. There was a steady growth in global ERHs adoption over the past fifteen years, but their level of adoption and implementation varies among world countries [4]. Developed and high-income countries were more successful in EHR implementation than developing and low to medium-income countries [5].

Healthcare organizations face several challenges as they adopt and implement EHRs. These challenges include healthcare providers' perceptions and resistance to EHRs' use, training and technical support issues, financial constraints, EHRs' systems' limitations, and concerns over patient safety and privacy [2,6-8]. These barriers are unique to organizations and countries' healthcare systems. Developed countries are more likely to face healthcare providers' resistance to new technology, while developing

countries are prone to organizational challenges like insufficient senior management and weak coordination among team members, besides resistance to new technology [5, 8, 9].

Jordan is a developing medium-income country that began a nationwide EHRs initiative called Hakeem in 2010. The objective of the Hakeem initiative was to achieve nationwide implementation by 2020 [10]. Through the Ministry of Health, the Jordanian government designated a nonprofit agency called Electronic Health Solutions (EHS) as the national body for facilitating and supervising Hakeem's nationwide implementation [11]. Three years before the target date, a nationwide survey showed that only ten percent of hospitals in Jordan had a comprehensive implementation of EHRs in all units, suggesting unresolved challenges [12]. Common challenges facing Jordanian healthcare organizations include providers' resistance to new technology, inadequate financial resources, technology infrastructure, and human resources concerns [6, 10, 13]. How healthcare organizations respond and overcome these challenges in Jordan is not clear.

One notable example of comprehensive EHRs implementation in Jordan is the King Hussein Cancer Center (KHCC). KHCC is a leading cancer care center in the Middle East. Hakeem's implementation at KHCC began in 2014 and was completed in 2019 with comprehensive use in all departments [14, 15]. The successful implementation and use of EHRs at KHCC suggest implementing strategies to overcome challenges. While several studies from Jordan addressed the challenges of EHRs implementation in Jordan, to the best of my knowledge, no studies focused on implementation strategies for facilitating successful execution and use.

The purpose of this qualitative single case study is to explore KHCC's strategies for overcoming the Hakeem system implementation challenges. Other healthcare organizations can use these strategies to capitalize on the system's benefits. Study results helped build a guideline model that healthcare organizations in Jordan can use to achieve the EHR implementation objective.

This study's research question is:

What strategies did KHCC use to achieve full implementation of the Hakeem EHR program?

2. Materials and Methods

2.1. Study Design

This qualitative research study employed a single case study design to focus the lens on KHCC's experience with EHRs implementation. Qualitative research allows for a detailed understanding by talking to people in their natural settings and empowering them to reveal their perspectives [16]. The Case study approach requires triangulation to achieve rigor and depth in the research. Triangulation entails using a range of empirical data collection tools to answer the research question, increase the credibility and validity of the results, add richness and extensiveness to the study, and build an in-depth understanding [17- 19].

This study's primary data sources included a review of organizational documents related to implementing the Hakeem EHR system and individual open-ended interviews with six KHCC healthcare leaders involved in the implementation process. Approval by KHCC's Institutional Review Board (IRB) was obtained and allowed access to the organizational documents, recruiting and interviewing study participants, and publishing results.

2.2. Document Reviews

The first data collection phase for this study was the organizational document review. KHCC provided several documents related to the early planning stages, system assessment, and software configuration. After a thorough review, two primary documents provided substantial information. The

first document was titled *Transformational State Workflow*, and the second was *Design and Configuration Specifications.*

2.3. Interviews

The following phase was the open-ended interviews with KHCC healthcare leaders. The study sample included a purposive sample of six healthcare leaders from KHCC who agreed to participate. Recruitment for the study was done through email and informed consent. Criteria for inclusion included being a healthcare leader who participated in the Hakeem system implementation and was willing to consent to an audio recording of the interviews.

All interviews were virtual using Zoom. The primary tools for data collection during the virtual interviews included one-on-one semi-structured open-ended interview questions, audiotapes, and interview notes.

The one-on-one, semi-structured, open-ended interview technique facilitates an open discussion with the participant. It allows the researcher to engage in a flexible conversation with the study participant to attain subjective responses to the questions instead of receiving yes or no answers [16-18]. It also allows the researcher to probe participants for clarification to facilitate a deeper understanding of the phenomenon [17].

During the interview, I asked questions, listened carefully to responses, asked follow up questions, recorded responses, and audio-recorded the entire interview. Data collcetion continued until data saturation was reached and no newer information emerged. Data saturation means that the researcher reaches "the ultimate point of data collection" where no further information can be introduced and when the researcher begins to see a pattern of repetitive responses or no new responses [22, 23]. Data saturation is essential in qualitative case study design because it enhances the research quality and validity. I stopped data collection when new information generation ceased.

2.4. Thematic Data Analysis

Preparing the data for thematic analysis included transcribing the audio recordings into typed Word documents and member checking. Study participants received their transcribed interview script by email for member checking. Most participants replied with approvals and some with minor requests for modification.

The data was manually analyzed following the Braun and Clarke thematic analysis method [24]. The method involves "identifying, analyzing, and reporting patterns within data" [24]. A thorough analysis of the codes and potential themes revealed six primary emerging themes. They included (1) a phased approach and continuous planning, (2) stakeholders' active involvement, (3) collaboration with EHS, (4) training, and continuous support, (5) managing resistance, and (6) recommendations for other organizations.

The following step was data analysis verification using the NVivo 12, QRS International software. The process included organizing the interview scripts into NVivo files labeled with the themes' names generated from the manual data analysis and running two verification tests. The first test was a word frequency query from the interview data. This test lists the most frequently occurring words or concepts in specific files and helps identify possible themes [25]. The second test was a review of references in the data set. This test calculates the number of references and their percentage coverage in each code [26].

3. Results and discussion

3.1. Document Review Results

The review of the primary assessment reports revealed three main observations. First, the documents' developers were EHS and KHCC, indicating collaboration between the two organizations during the planning and assessment phases. Second, the reports addressed operational gaps in technology infrastructure and potential solutions before inception. They highlighted needed system improvements for Hakeem to meet KHCC's needs and enhance the providers' experience. Third, reviewing the reports instigated several questions that I inquired about later in the interviews.

The first report, The Transformational State Workflow, summarized the workflow procedures in the Outpatient clinics. This document indicated close collaboration between KHCC and EHS at a highly detailed level. The report highlighted needed system improvements for Hakeem to meet KHCC's needs and enhance the providers' experience. The second report, titled The Design and Configuration Specifications, described the method that EHS used to configure the Hakeem solution in coordination with KHCC. Later in the interviews, I learned that KHCC had used two homegrown electronic systems to manage some operations. One study participant explained that the system configuration required integrating the data from the existing systems into the new Hakeem solution. Both reports were developed by KHCC and EHS in 2012. Table 1 below summarizes the two primary reports reviewed for this study.

Table 1: Reviewed KHCC organizational documents related to the Hakeem System Implementation.

Title	Description
Transformational State Workflow	• Summarizes departments' workflow procedures. • Describes the patient's journey from appointments and scheduling until case closing. • Includes a process diagram depicting the patient's journey from start to finish.
Design and Configuration Specifications	• Describes EHS's method to design the Hakeem solution in coordination with KHCC. • EHS's design was customized upon KHCC's request. • EHS designed added services and treating specialties.

Note. This table briefly describes the two primary reviewed documents.

3.2. Interviews Results

The thematic data analysis revealed six emerging themes. They included

1. Phased approach and continuous planning,
2. Stakeholders' active involvement,
3. Collaboration with ehs,
4. Training and continuous support,
5. Managing resistance, and
6. Recommendations for other organizations.

The results generated from the NVivo 12, QRS International software Word Frequency test showed the most occurring words and concepts in the data files. Figure 1. represents the generated visual word cloud. It depicts the most frequent fifty words in the interview scripts. The word cloud exercise helped verify the emerging themes. It reflected five major word counts that pertained to the first five identified themes from the manual analysis. The recommendations for other organizations' theme did not appear with the same strength as the other five in the word cloud.

Figure 1. Word cloud indicating the word frequency of the interview data. Created from NVivo 12, QRS International.

The results from the *Review of References* verification test showed the codes' number of references and percentage coverage. The purpose of this test was to check the manual data accuracy. The results are presented in Table 2. and Figure 2. below.

Table 2: Number of Occurrences per the theme

Theme Name	References Coded	% Coverage
Phased approach and continuous planning	43	8.66
Stakeholders' active involvement	40	8.06
Collaboration with EHS	33	6.65
Training and continuous support	28	5.64
Managing resistance	30	6.04
Recommendations	18	3.29

Note. References coded indicate the number of data references coded to the identified theme and the % coverage indicates the percentage of the data file that the coding represents. Created from NVivo 12, QRS International.

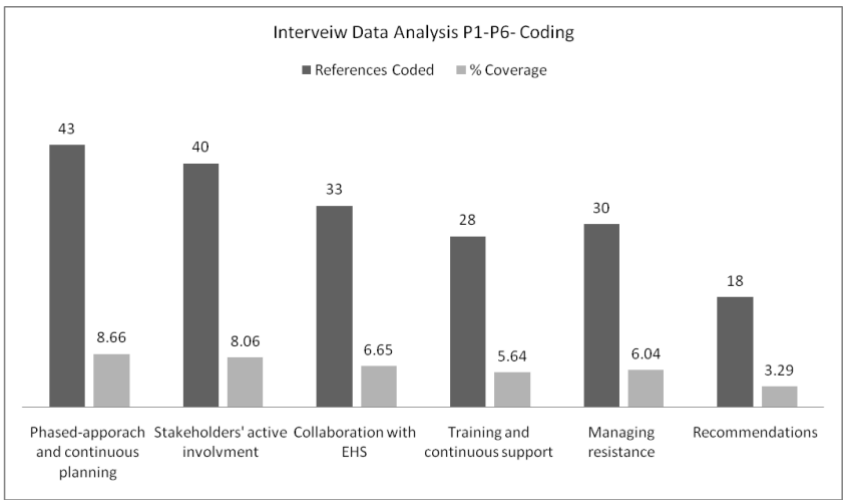

Figure 2. Graph indicating the coding references and percentage coverage of the interview data. The chart reflects the themes identified in the data analysis.

These tests helped verify that the themes identified in the manual analysis method pertain to the NVivo results method. They illustrate that the first five themes had similar strength while the last,

recommendations to other organizations, appeared with lesser strength. Although it is an important theme for this study, it does not qualify as an implementation strategy.

3.2.1 Phased Approach and Continuous Planning

The phased approach was a critical strategy that studies participants unanimously noted. According to the study participants, the process began with establishing a steering committee and a project management office to carry out the project planning and execution. The planning phase comprised intense assessment exercises of technology infrastructure, human resources capacities, and training and system needs. The following steps included system configuration, piloting in one department, gradual implementation in the outpatient clinics, and the final step of going live in the inpatients' words. Time and human resources were allocated for each phase of the process.

3.2.2 Stakeholders' active involvement

Study participants emphasized that stakeholders' active involvement was an effective implementation strategy. Stakeholders are all individuals involved in the Hakeem system implementation, including KHCC leaders, health care providers from all departments, IT and support staff, patients, and the EHS team. Study participants assured that actively involving representatives from each department throughout the project lifecycle was crucial. One study participant echoed, "*Never force people to do things. Involve them instead and take their input, concerns, and recommendations seriously*". Study participants appeared to attribute this strategy to top management's support. They thought highly of the project leadership and viewed leadership buy-in, involvement, and support as significant success factors.

3.2.3 Collaboration with EHS

The third emerging theme is related directly to the level of coordination between KHCC and EHS. Study participants unanimously agreed that coordination was high on all levels. One study participant emphasized, "*Top management from each organization was actively involved in process planning, project aspects, and execution details''*. Study participants unanimously agreed that EHS's and KHCC's roles were well-defined since the project inception with minimal duty overlap. EHS was responsible for system configuration, while KHCC was responsible for all internal processes. They attributed this understanding to the project's leadership vision and their strategic collaboration with EHS.

3.2.4 Training and continuous support

The participants recognized training and continuous support as critical strategies. They unanimously agreed that training was a considerable and challenging undertaking. The training was tailored to needs and capacities. KHCC used a training-of-trainers approach, where each department allocated and comprehensively trained *Super Users*, and Super Users then trained end-users in each department with ongoing support. One study participant echoed, "*There were different levels of training to prepare end-users, and there was also intense training for Super Users*". Trainees received hands-on preparation for their departments' interfaces.

3.2.5 Managing Resistance

The fifth identified theme was managing resistance to the Hakeem system implementation. Study participants had varied impressions about end users' resistance to implementation. For example, a study participant thought resistance was not significant and preferred to call it "*hesitation or skepticism*". On the other hand, another study participant asserted that resistance was a considerable hurdle, especially in the early implementation phases. He elaborated, "*We had whole departments that refused to use the system and came up with a million excuses of why not and how it interfered with their work*". Overall, study participants agreed there was some degree of resistance to system implementation. KHCC used

various mitigation strategies corresponding to resistance causes, not a one-fit-all approach. These strategies included tailored training, using shadows and personal assistants, simplifying data entry and documentation, capitalizing on early adopters' experiences, and mandating organizational policies.

3.2.6 Recommendations for other organizations

The last question to the study participant was about their recommendations for other organizations that strive to implement an EHR system. A primary recommendation was that every organization approach system implementation from their perspective and understand their capacities before implementing. Study participants emphasized that every organization is unique and has no one-fit all solution, and what worked for KHCC only sometimes work for others. One study participant elaborated that an organization should thoroughly analyze its business processes and recognize the importance of implementing an EHR system. According to one study participant, identifying clear objectives for the organization is a "prerequisite" to successful implementation.

4. Discussion

EHR system implementation is challenging and complex, and employing effective implementation strategies is crucial to capitalize on the system benefits. Primary benefits of EHR use include provider integration and health care quality, improved medical diagnosis, improved medical outcomes, and potential financial savings [2, 3, 7, 27, 28, 30]. EHR systems support care system integration and communication between providers. They allow healthcare providers instant access to patient records and patient history, clinical results, and clinical reports and allow instant communication with other clinicians on the team [7, 9, 30]. The advanced access and communication features in EHR systems have been shown to improve clinical diagnosis and enhance the decision-making process [2]. Implementing EHR systems can yield significant long-term potential cost savings, especially with nationwide implementation [7, 9, 30]. EHRs' potential benefits can outweigh challenges when healthcare organizations make an effort to mitigate and institutionalize successful implementation strategies [30]. Having a roadmap for effective implementation can facilitate better and more successful outcomes.

The findings of this study revealed several strategies that KHCC used to implement the Hakeem system. The primary strategies identified in this study include (1) a phased approach and continuous planning, (2) stakeholders' active involvement, (3) collaboration with EHS, (4) training and continuous support, and (5) managing resistance. Study findings also outline specific recommendations that the interviewees offered that may facilitate implementation.

One significant recommendation is to realize that each organization has its unique culture and business processes. Factors like the organization's size, structure, business workflow, IT infrastructure, human resources, and the objectives for the EHR implementation are significant to successful implementation [29]. Organizations need to approach system implementation from their perspective and understand their capacities before implementing by thoroughly analyzing and describing their organizational business processes.

Effective leadership was a significant factor in the successful Hakeem implementation at KHCC. Study participants persistently noted that upper management's active involvement, buy-in, and support were crucial to project success. They assured that active involvement positively affected the team's attitude towards system implementation. One study participant echoed, "*Management and leadership buy-in is an absolute must. The project cannot go forward without an actively involved leadership that provides direction, support, and resources*". The leaders at KHCC seemed to realize that leadership is the impetus for change and acted accordingly. Study participants were positive that the decision-making

process was a collaborative approach among the project team and increased the teams' ownership of the project.

Planning system implementation is crucial for process success. EHRs implementation is complex, lengthy, and resource-costly. Study participants emphasized that organizations should invest considerable time planning exercises to minimize implementation errors. An implementation plan should include workflows for every department and accommodate all needed resources. A system implementation plan begins with identifying the appropriate approach for the organization's business environment. KHCC's phased approach worked well in achieving the implementation goals, but it may not be the best for other organizations. Only the organization can select what works best for it. Healthcare organizations that begin selecting a suitable strategy are more likely to succeed in facilitating implementation and minimizing delays [29].

Another significant recommendation is to create a core project team that actively involves stakeholders. The study participants unanimously agreed that involving representatives from each department and from EHS was an effective strategy to improve outcomes and develop buy-in. Team members were assigned specific roles and were actively involved in all planning and execution activities. It is up to the organization to decide the size and representation of a core project team that meets its particular situation [9]. The project team plans and steers the implementation process considering the organizational environment.

Planning is a considerable element in the implementation process. Before implementing the system, organizations should devote reasonable time and resources to developing clear project plans. A project plan should outline tasks, timelines, system configuration, and training and support activities that meet the organization's needs and objectives [9]. Establishing clear guidelines could significantly enhance EHRs' implementation and use and help healthcare organizations benefit from EHR systems effectively. While executing the project plan, monitoring and evaluation are significant for achieving goals [7]. The project team should be ready to address any issues during system implementation [3].

Recommended steps for implementing the Hakeem system implementation according to the KHCC team, included the following.

• First, the organization must prepare and engage stakeholders to understand change and create a core project team.

• Once a project team is established, it should devote the most considerable portion of operations to planning activities.

• During the planning phase, the organization must thoroughly analyze its business processes, needs, and capabilities. This exercise should allow decision-makers to understand their environment better and select the proper implementation approach. It should also help the organization determine the project cost, timeline, human resources need, and other resources to implement successfully. One study participant clarified, "*The phased approach worked well for KHCC, but that does not mean it will necessarily work well for other organizations*".

• When an overarching plan is in place, a clear timeline and proper monitoring system should be in place for execution.

• Plan execution involves system implementation within the designated timeline, workforce, and system infrastructure. Continuous plan monitoring and improvement are a must to achieve the end goal.

This study's findings align with several research studies that explored success factors involved in EHRs implementation, especially in developed countries. The review of the literature revealed similar results to this study. For example, an umbrella literature review focused on successful EHRs implementation emphasized the significance of the differences among the implementing agencies' organizational factors, such as structure, leadership, size, and governance. [30]. It also highlighted the

importance of involving end-users and creating champions to ensure stakeholders' active participation in the implementation process. The significance of training, support, resources, and workflows was also highlighted as considerable success factors [7, 9, 27, 28, 29,30]. While most of the literature reviewed was conducted in developed countries, no studies were found to address identifying that proved successful in healthcare organizations in Jordan. Establishing clear implementation guidelines could significantly enhance EHRs' implantation and use and help healthcare organizations benefit from EHR systems effectively [9]. This research study is specific to the strategies that KHCC used in EHR implementation and would provide foundational aspects for future researchers trying to advance the scholarly discussion surrounding this research angle.

5. Study Limitations

The limitation identified in this study is the lack of generalizability from the case study design. Lack of generalizability means that study results can apply to a narrow population or a specific situation [31]. Generalizing results from a case study design with a small sample is difficult. However, this study did not intend to generalize results to a large population. Instead, it is concerned with result transferability from one situation to other similar situations [32]. Transferability entails "findings gained in a particular context can offer valuable lessons to other similar settings" [33]. This study aimed to explore and codify KHCC's strategies for overcoming the Hakeem system implementation challenges so that other healthcare organizations can use them and capitalize on the system benefits.

6. Recommendations for Further Research

Further research may focus on the appropriate strategies that fit an organization's unique environment. The findings from this study revealed that a phased approach was adequate for the Hakeem implementation at the KHCC. However, the study participants emphasized that the phased approach worked for their particular situation but may not necessarily work for other organizations. Further research may investigate grounds for selecting a proper implementation strategy that fits a particular organization's culture. Healthcare organizations that begin selecting a suitable strategy are more likely to succeed in facilitating implementation and minimizing delays [34]. Further research may focus on the organizational factors that affect the decision-making process for selecting the proper approach.

Further research may focus on the role of government policy and legislation in achieving Jordan's Hakeem system objectives. The Hakeem initiative was Jordan's first national e-health system in Jordan to reach nationwide EHR implementation by 2020 [6]. The adoption and implementation levels were generally slower than anticipated, but a higher adoption rate and use were noted in large public and teaching hospitals in urban areas [13, 35]. The higher adoption rate in public healthcare facilities suggests better government policy and legislation compliance. Enhancing the Hakeem system objectives beyond the national initiative scope to a national policy that mandates implementation may significantly improve implementation compliance. The lack of policies and legislation is a primary challenge that hinders EHRs' adoption and implementation in Jordan [11]. The global experience with EHRs implementation emphasizes the role of government policy in enhancing implementation. For example, the enactment of the Health Information Technology for Economic and Clinical Health Act (HITECH) in the United States and the European Innovative Medicines Initiative in Europe correlated positively with higher implementation rates [13, 36]. Further research may address the role of government policy in promoting and mandating the Hakeem system adoption and implementation in Jordan.

7. Conclusion

This qualitative single case study aimed to explore and codify KHCC's strategies for overcoming the Hakeem system implementation challenges so that other healthcare organizations can use them and capitalize on the system benefits. The study addressed the problem that many of Jordan's healthcare organizations that lack clear guidelines for implementing EHRs may be reluctant to adopt and implement the Hakeem system and miss the system's potential benefits. The study used a case study design approach to focus on KHCC's experience with EHRs implementation. The findings of this study demonstrated that KHCC used five primary strategies to implement the Hakeem system in all departments. These strategies included a phased approach and continuous planning, stakeholders' active involvement, Collaboration with EHS, training and continuous support, and managing users' resistance.

Ethical statement:

The King Hussein Cancer Center granted the institutional review board (IRB) approval to conduct this study and publish its findings. IRB approval (study number 21 KHCC 139). Informed consent forms were obtained from all study participants and stored in a password-secured database.

Acknowledgment:

The author would like to thank the King Hussein Cancer Center (KHCC), Dr. Nour Awad, KHCC's internal study facilitator, and all the study participants. There was no funding for this study.

Conflict of interest:

The author declares that there is no conflict of interest.

Author's Contributions:

A. B: Design, Conceptualization, Literature Review, Methodology, Resources and Materials, Data Collection and Analysis, Investigation, and Writing.

References

[1] Kruse, C. S., & Beane, A.,"Health information technology continues to show a positive effect on medical outcomes: Systematic review", *Journal of Medical Internet Research*, 20(2), 1–9, 2018. https://doi.org/10.2196/jmir.8793

[2] Heath, M., & Porter, T. H. "Change management overlooked: physician perspectives on EHR implementation", *American Journal of Business*, 34(1), 19–36, 2019.

[3] Rumball-Smith, J., Ross, K., & Bates, D. W., "Late adopters of the electronic health record should move now", *BMJ Quality and Safety*, 29(3), 238–240, 2020. https://doi.org/10.1136/bmjqs-2019-010002

[4] World Health Organization., "Electronic Health Records", 2022. https://www.who.int/gho/goe/electronic_health_records/en/

[5] Afrizal, S. H., Hidayanto, A. N., Handayani, P. W., Budiharsana, M., & Eryando, T. "Narrative review for exploring barriers to readiness of electronic health record implementation in primary health care", *Healthcare Informatics Research*, 25(3), 141– 152, 2019. https://doi.org/10.4258/hir.2019.25.3.141

[6] Al-Rawajfah, O., & Tubaishat, A., "Barriers and facilitators to using electronic healthcare records in Jordanian hospitals from the nurses' perspective: A national survey", *Informatics for Health and Social Care*, 44(1), 1–11, 2019. https://doi.org/10.1080/17538157.2017.1353998

[7] Janett, R. S., & Yeracaris, P. P., "Electronic medical records in the American health system: challenges and lessons learned", *Ciencia e Saude Coletiva*, 25(4), 1293–1304, 2020. https://doi.org/10.1590/1413-81232020254.28922019

[8] Neamah, A. F., bin Ahmad, A., Alomari, E. S., Nuiaa, R. R., & UTeM, F, "The e-health state in Middle East countries: an overview" *The Turkish Online Journal of Design, Art, and Communication*, 2, 2974-2990, 2018.

[9] Sunil, R. A., Vishwanath, L., Naveen, T., Pallad, S., Mandal, S. K., Pasha, T., & Raj, S., "Implementation of the electronic medical record system in the radiation oncology department of a government health-care facility: A single-center experience Introduction", *Cancer Research, Statistics, and Treatment*, 3, 748–754, 2021.

[10] Klaib, A. F., & Nuser, M. S., "Evaluating EHR and health care in Jordan according to the international health metrics network (HMN) framework and standards: A case study of Hakeem" *IEEE Access*, 7, 51457–51465, 2019. https://doi.org/10.1109/ACCESS.2019.2911684

[11] Jalghoum, Y., Tahtamouni, A., Khasawneh, S., & Al-Madadha, A., "Challenges to healthcare information systems development: The case of Jordan", *International Journal of Healthcare Management*, 14(2), 447-455, 2021.

[12] Tubaishat, A., & AL-Rawajfah, O. M., "The use of electronic medical records in Jordanian hospitals: A nationwide survey", CIN - Computers Informatics Nursing, 35(10), 538–545, 2017. https://doi.org/10.1097/CIN.0000000000000343

[13] Rasmi, M., Alazzam, M. B., Alsmadi, M. K., Almarashdeh, I. A., Alkhasawneh, R. A., & Alsmadi, S., "Healthcare professionals' acceptance electronic health records system: critical literature review (Jordan case study*)", The International Journal of Healthcare Management*, 2(1), 1–13, 2018. https://doi.org/10.1080/20479700.2017.1420609

[14] Electronic Health Solutions. (2022). Hakeem program. ehs.com.jo/hakeem-program

[15] AlSobeh, A. M. R., Klaib, A. F., & Yahya, A. Al., "A national framework for e-health data collection in Jordan with current practices", *International Journal of Computer Applications in Technology*, 59(1), 64–73, 2019. https://doi.org/10.1504/IJCAT.2019.097118

[16] Kegler, M. C., Raskind, I. G., Comeau, D. L., Griffith, D. M., Cooper, H. L. F., & Shelton, R. C., "Study design and use of inquiry frameworks in qualitative research", *Health Education and Behavior*, 46(1), 24–31, 2019. https://doi.org/10.1177/1090198118795018

[17] Creswell, J. W., & Poth, C. N, *Qualitative inquiry and research design: Choosing among five approaches*, Sage Publications, 2018.

[18] Yin, R. K., *Case study research and applications: Design and method*, Sage publications, 2017.

[19] Rashid, Y., Rashid, A., Warraich, M. A., Sabir, S. S., & Waseem, A., "Case study method: A step-by-step guide for business researchers", *International Journal of Qualitative Methods*, 18, 1–13, 2019. https://doi.org/10.1177/1609406919862424

[20] Etikan, I., & Bala, K. , "Sampling and sampling methods", *Biometrics & Biostatistics International Journal*, 5(6), 215–217, 2017.

[21] Maher, C., Hadfield, M., Hutchings, M., & de Eyto, A., "Ensuring rigor in qualitative data analysis: a design research approach to coding combining NVIVO with traditional material methods", *International Journal of Qualitative Methods*, 17(1), 1–13, 2018. https://doi.org/10.1177/1609406918786362

[22] Alam, M.K. , "A Systematic qualitative case study: Questions, data collection, NVivo 119 Analysis and saturation", *Qualitative Research in Organizations and Management*, 16(1), 1- 31, 2020. https://doi.org/10.1108/QROM-09-2019-1825

[23] Fusch, P., Fusch, G. E., & Ness, L. R., "Denzin's paradigm shift: Revisiting triangulation in qualitative research", *Journal of Social Change*, 10(1), 19–32, 2015. https://doi.org/10.5590/josc.2018.10.1.02

[24] Braun, V., & Clarke, V., "Using thematic analysis in psychology", *Qualitative research in psychology*, 3(2), 77-101, 2006.

[25] NVivo 12. Review of references in a node. Help-nv.qsrinternational.com/12/win/v12.1.110-d3ea61/Content/nodes/review-references-in-a-node.htm. 2022

[26] NVivo 12. Word frequency query. help-nv.qsrinternational.com/12/win/v12.1.110-d3ea61/Content/queries/word-frequency-query.htm. 2022

[27] Graber, M. L., Byrne, C., & Johnston, D., "The impact of electronic health records on diagnosis", *Diagnosis*, 4(4), 211–223, 2017. https://doi.org/10.1515/dx-2017-0012

[28] Stanhope, V., & Matthews, E. B., "Delivering person-centered care with an electronic health record", *BMC Medical Informatics and Decision Making*, 19(1), 1–10, 2019. https://doi.org/10.1186/s12911-019-0897-6

[29] Vainiomäki, S., Heponiemi, T., Vänskä, J., & Hyppönen, H., "Tailoring EHRs for specific working environments improves work well-being of physicians*", International Journal of Environmental Research and Public Health*, 17(13), 1–10, 2020. https://doi.org/10.3390/ijerph17134715

[30] Fennelly O, Cunningham C, Grogan L, Cronin H, O'Shea C, Roche M, Lawlor F, & O'Hare N., "Successfully implementing a national electronic health record: a rapid umbrella review", *International Journal of Medical Informatics*, 1(144), 104281, 2021. https://doi.org/10.1016/j.ijmedinf.2020.104281

[31] Wikfeldt, E. S., "Case study inference: Four generalization methods and how they may be integrated", 2017 [Online]. Available: https://libraryguides.vu.edu.au/ieeereferencing/webbaseddocument 1–11.

[32] Takahashi, A. R. W., & Araujo, L., "Case study research: opening up research opportunities", *RAUSP Management Journal*, 55(1), 100–111, 2020. https://doi.org/10.1108/RAUSP-05-2019-0109

[33] Daniel, B. K., "What constitutes a good qualitative research study? Fundamental dimensions and indicators of rigor in qualitative research: The TACT framework", *Proceedings of the European Conference of Research Methods for Business & Management Studies*, 101-108., 2019.

[34] Fragidis, L. L., & Chatzoglou, P. D., "Implementation of a nationwide electronic health record (EHR): The international experience in 13 countries", *International Journal of Health Care Quality Assurance*, 31(2), 116–130, 2018. https://doi.org/10.1108/IJHCQA-09- 2016-0136

[35] Ayaad, O., Alloubani, A., ALhajaa, E. A., Farhan, M., Abuseif, S., Al Hroub, A., & Akhu-Zaheya, L., "The role of electronic medical records in improving the quality of health care services: Comparative study", *International Journal of Medical Informatics*, 127(1), 63– 120, 2019. https://doi.org/10.1016/j.ijmedinf.2019.04.014

[36] Nordo, A. H., Levaux, H. P., Becnel, L. B., Galvez, J., Rao, P., Stem, K., Prakash, E., & Kush, R. D., “Use of EHRs data for clinical research: Historical progress and current applications”, *Learning Health Systems*, 3(1), 1–10, 2019. https://doi.org/10.1002/lrh2.10076