ASSESSMENT OF READINESS FOR IMPLEMENTATION OF ELECTRONIC MEDICAL RECORDS IN THE INPATIENT UNIT OF PORT HOSPITAL JAKARTA, INDONESIA

Ivonia Kenahin Bahi, Daniel Happy Putra, Dina Sonia, Putery Fannya

Medical Record, Faculty Of Medicine, Esa Unggul University, Jakarta, Indonesia.

ABSTRACT

This study aims to assess Port Hospital Jakarta's readiness to implement Electronic Medical Records (EMR) in inpatient units using the Doctor's Office Quality Information Technology (DOQ-IT) method. EMR systems are essential in modern healthcare, enhancing efficiency, accuracy, and data security while ensuring compliance with government regulations, such as the Ministry of Health Regulation No. 24 of 2022. Port Hospital Jakarta has implemented EMR only in outpatient services, while inpatient services rely on conventional medical records. This study employed a descriptive quantitative approach, collecting primary data from 127 respondents using a non-probability purposive sampling technique. Data were analyzed using Microsoft Excel to assess organizational readiness in two key aspects: organizational alignment and capacity. The findings indicate that the hospital's inpatient units fall within Range II regarding organizational alignment, with a score of 17.19, categorized as "Moderately Ready". Similarly, the organizational capacity aspect also falls within Range II, scoring 33.72, which is also categorized as "Moderately Ready." Overall, the hospital's readiness level for EMR implementation in inpatient services, considering both organizational alignment and capacity, is in Range II with a total score of 50.91, indicating a "Moderately Ready" status. These findings suggest that while Port Hospital Jakarta has made progress toward EMR adoption in inpatient units, further organizational alignment and capacity improvements are needed to ensure a seamless and effective implementation.

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Corresponding author
Ivonia Kenahin Bahi
✉
ivonia.bahi@student.esaunggul.ac.id
Medical Record, Faculty Of Medicine, Esa Unggul University, Jakarta, Indonesia.

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Highlights:

1. This manuscript highlights Port Hospital Jakarta's readiness assessment for implementing Electronic Medical Records (EMR) in inpatient units using the Doctor's Office Quality Information Technology (DOQ-IT) method.
2. The study reveals that organizational alignment and capacity fall within the "Moderately Ready" category, indicating that progress has been made; further improvements are necessary to ensure a successful EMR implementation.

INTRODUCTION

According to Minister of Health Regulation No. 3 of 2020, hospitals are healthcare institutions that provide comprehensive individual health services, including outpatient, inpatient, and emergency care[1]. Hospitals must ensure patient satisfaction through efficient and effective service delivery as healthcare providers. A critical element in this is the rapid and efficient processing and storage of data, particularly medical records[2]. Medical records contain essential patient information such as identification, treatment history, examination results, procedures, and other services provided[3].

The advent of Industry 4.0 has significantly advanced technology, especially in healthcare. Artificial Intelligence (AI) technologies, like the Internet of Things (IoT), have transformed data processing and storage capabilities through cloud-based solutions. In hospitals, these technologies support the development of Electronic Medical Records (EMRs). An Electronic Medical Record (EMR) is a system that includes a patient's medical and disease history, diagnostic test results, information on medical expenses, and other medical data[4]. The implementation of EMRs has become a global priority, both in developed and developing countries, with several healthcare facilities in Indonesia beginning to adopt them[5].

Government regulations, such as Minister of Health Regulation No. 24 of 2022, mandate that all healthcare facilities in Indonesia implement EMRs by December 31, 2023. However, as of 2024, only 53% of hospitals have integrated EMRs, indicating challenges such as institutional readiness[6]. Assessing readiness is crucial for effective implementation, and frameworks like the Electronic Health Record Assessment and Readiness Starter Assessment by Doctor's Office Quality Information Technology (DOQ-IT) provide valuable insights for designing training and implementation strategies[7].

Port Hospital Jakarta is one such facility that has not fully adopted integrated EMRs. While outpatient services have transitioned to electronic records, inpatient units still rely on paper-based records. Observations reveal resource shortages in the filing and assembling departments, leading to excessive paperwork and risks of damage or loss. Implementing EMRs addresses these challenges and ensures compliance with regulatory standards. Therefore, readiness assessments are essential for hospitals like PortHospitas Jakarta to minimize errors and failures in system implementation.

This study analyzes Port Hospital Jakarta's readiness to implement electronic medical records (EMR), focusing on two aspects: Organizational Alignment (Culture, Leadership, Strategy) and Organizational Capacity (Information Management, Staff, Training, Workflow, Accountability, Finance, Patient Engagement, IT Support, Technology Infrastructure). These aspects are adapted from the DOQ-IT method for assessing EMR readiness.

MATERIALS AND METHODS

This research was conducted from January to March 2024 at the Port Hospital Jakarta. The study utilized a cross-sectional approach with the Doctor's Office Quality Information Technology method, employing a descriptive quantitative approach. This research has received an

ethical certificate from the Health Research Ethics Committee, Research Ethics Committee Esa Unggul University, with approval number 0925-05.075/DPKE-KEP/FINAL-EA/UEU/V/2025 dated May 22, 2025. The population consisted of 172 individuals, with a sample of 127 respondents calculated using Slovin's formula, with a significance level of 0.05.

Sampling was carried out using proportional random sampling. Respondents filled out a modified 28-item questionnaire based on the Doctor's Office Quality Information Technology tool, previously validated and tested for reliability[8]. Participants included nurses from inpatient units, medical record and health information personnel, IT staff, financial department members, doctors, and pharmacy personnel from the inpatient unit.

Data analysis employed descriptive analysis with a quantitative approach. Quantitative results were obtained by summing scores from respondents' answers. Each question had six options: (a) scored as 0, (b) scored as 1, (c) scored as 2, (d) scored as 3, (e) scored as 4, and (f) scored as 5. The readiness assessment of the DOQ-IT method is comprised of two aspects: organizational alignment and organizational capacity. Each element had three readiness categories with different score ranges. Organizational alignment ranged from 0-15 (not ready), 16-30 (moderately ready), and 31-45 (ready). Organizational capacity ranged from 0-33 (not ready), 34-66 (moderately ready), and 67-100 (ready). Overall readiness assessment ranged from 0-43 (not ready), 44-96 (moderately ready), and 97-140 (ready).

Data analysis was performed using Microsoft Excel to calculate the average score for each aspect and determine readiness scores per aspect. The overall readiness score was calculated by summing the average scores of both aspects to ascertain the overall readiness level.

RESULTS

The Readiness For Implementing EMRs In Inpatient Care At Port Hospital Jakarta In Terms Of Organizational Alignment Aspect.

Table 1. Organization Alignment Readiness

Questions	Average Score
Organizational Culture Readiness	
Q1	2.91
Q2	2.11
Q3	2.66
Q4	0.93
Sub-total	8.61
Average	2.08
Leadership Readiness	
Q1	3.16
Q2	1.65
Sub-Total	4.81
Average	2.40
Strategy	
Q1	2.45
Q2	1.61
Sub-Total	4.06
Average	2.03
1 Organizational Alignment Readiness	17.19 (Moderately Prepared)

Figure 1. Diagram of Organizational Alignment Readiness

Based on the research results, the readiness of the organizational alignment aspect falls within Range II, which is categorized as moderately ready, with a score of 17.19. This can be illustrated in the figure1.

Organizational Capacity Readiness for Implementing EMRs in Inpatient Care at Port Hospital Jakarta

Based on the research results, the readiness of the organizational capacity aspect falls within Range II, categorized as moderately ready, with a score of 50.91. This can be depicted in figure 2 and table 2.

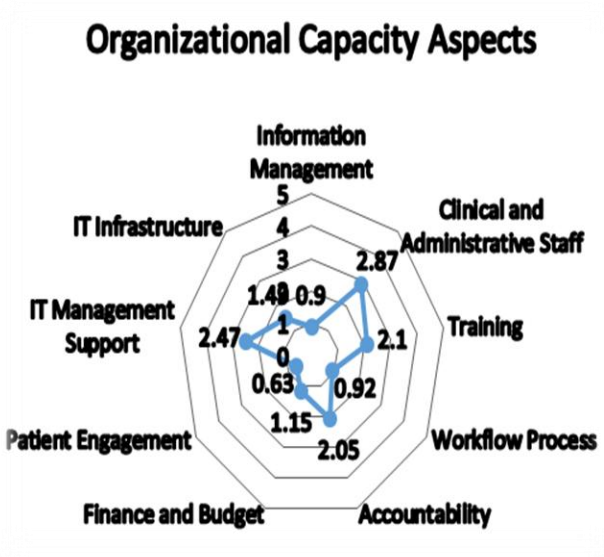

Figure 2. Diagram of Organizational Capacity Readiness

Table 2. Organizational Capacity Readiness

Question	Average Score
Information Management Readiness	
Q9	0.69
Q10	0.10
Sub-Total	0.79
Average	0.81
Clinical and Administrative Staff Readiness	
Q11	3.67
Q12	2.14
Q13	2.81
Sub-Total	8.62
Average	2.87
Training Readiness	
Q14	2.27
Q15	1.94
Sub-Total	4.21
Average	2.10
Workflow Process Readiness	
Q16	1.20
Q17	1.06
Sub-Total	2.26
Average	0.92
Accountability Readiness	
Q18	2.05
Sub-Total	2.05
Average	2.05
Financial and Budget Readiness	
Q19	1.19
Q20	1.11
Sub-Total	2.30
Average	1.15
Patient Engagement Readiness	
Q21	0.56
Q22	0.55
Q23	0.78
Sub-Total	1.89
Average	0.63
IT Management Support Readiness	
Q24	3.44
Q25	1.81
Q26	2.37
Sub-Total	7.62
Average	2.47
IT Infrastructure Readiness	
Q27	1.84
Q28	1.14
Sub-Total	2.98
Average	1.49
2 Organizational Capacity	33.72
Hospital Readiness (1+2)	50.91

DISCUSSION

The Readiness For Implementing EMRs In Inpatient Care At Port Hospital Jakarta In Terms Of Organizational Alignment Aspect.

In organizational alignment readiness, most respondents from the organizational culture aspect understand the importance of EMR in supporting healthcare services as a system that integrates data to improve service quality. A positive perception of a system to be implemented can lead to quality services, as personnel with a strong understanding will use the system more effectively[9,10]. However, staff involvement in system design and planning is not comprehensive and only includes specific teams, which can hinder system implementation. Mardani et al. (2022) suggest that involving all staff in system design ensures that the resulting system meets the needs of end-users[11].

Regarding leadership readiness, respondents stated that leaders must have a clear and well-planned vision and mission. However, the decision-making process for system design primarily depends on vendors, indicating a need for improvement. This is likely because most respondents are healthcare workers, such as nurses and midwives, who are not involved in the system design process. Nevertheless, the IT team mentioned that decision-makers at Port Hospital Jakarta dedicate significant time to the system design process, ensuring it is not solely reliant on the vendor. Effective decision-making enables an organization to achieve its goals more efficiently[12]. Therefore, the involvement of decision-making teams is crucial in system design to ensure the successful implementation of EMR at Port Hospital Jakarta.

The research findings indicate that the hospital's strategic readiness aspect is still under-prepared. Most discussions related to system implementation have not been fully addressed. However, respondents involved in the planning process mentioned that planning discussions have begun for subsequent system implementation. The strategy aspect is crucial in realizing system implementation. With a good strategy, the key factors for the successful implementation of ERP lie in a company's strategic and tactical planning[13]. Port Hospital Jakarta should focus on developing comprehensive strategies that prioritize quality in EMR implementation, aligning with its vision and mission to enhance the effectiveness of technology in healthcare services.

Organizational Capacity Readiness for Implementing EMRs in Inpatient Care at Port Hospital Jakarta

Based on the research findings, most respondents have not fully evaluated the readiness of the information management aspect in optimizing medical services and generating reports for management purposes. Information management plays a crucial role in implementing electronic medical records. It helps organize, manage, and maintain patient health data effectively, improving healthcare quality and hospital operational efficiency[14]. The lack of evaluation is due to the absence of an ESDM system at the Port Hospital Jakarta. However, most respondents understand that EMRs can enhance service quality and generate valuable data for hospital management processes.

The readiness in the aspect of Clinical and Administrative Staff, in terms of staff needs analysis, is perceived by most

respondents as having been analyzed but not yet documented in staffing structures, not detailing current structures and future staffing needs, and staffing requirements not being included in staffing planning processes. Appropriate staffing needs can influence the success of information system implementation and enhance staff satisfaction and organizational performance. Employee engagement can have a significant impact on the success of an industry or company in achieving its goals[15]. The importance of meeting staffing needs in enhancing organizational performance is relevant to various contexts, including hospitals like Port Hospital Jakarta. Port Hospital Jakarta can prioritize developing strategies that support staff welfare and needs, which are expected to impact the quality of services it provides to patients positively.

The study results on the training readiness aspect at Port Hospital Jakarta indicate that not all staff have attended the training. EMR implementation training is still limited to staff in head positions and their subordinates, while lower-level staff have not yet attended training. Awol et al. (2020) stated that healthcare professionals who have attended EMR training are about 3.63 times more prepared for the EMR system than those who do not use the EMR system[9,16]. Furthermore, training and education can also shape a person's views and perceptions. Comprehensive training at all levels of healthcare staff at Port Hospital Jakarta on using the EMR system is crucial for improving implementation effectiveness and readiness to adopt this technology.

Based on the research results, most respondents perceive the workflow process aspect regarding the planning of SOPs related to the use of EMR as not yet discussed. Suryani et al. (2023) stated that these SOPs help ensure that all healthcare workers and hospital staff have a common understanding of how to manage electronic medical records, thereby enhancing service efficiency and speed as well as improving professionalism and future hospital management performance[17]. Port Hospital Jakarta has not yet discussed EMR SOPs as the discussion process is still in its early stages. Introducing SOPs in the early planning stages will help build a strong foundation for future successful implementation. By establishing SOPs, the hospital can ensure that all involved parties consistently understand procedures for managing electronic medical records.

The study results indicate that readiness in the accountability aspect is categorized as not ready. This is reflected by most respondents stating that those responsible for product analysis and other tasks will be formed and assigned, potentially being part of the management team. In moving towards EMR implementation, roles in product analysis and vendor negotiations are significant. Accountability enables doctors and medical staff to carefully manage and use patient information and ensure the technology meets established security and privacy standards. One hindrance to EMR implementation is the reluctance of doctors or medical staff due to concerns about patient data privacy guarantees[9]. Ensuring patient data privacy is crucial to building trust between patients and healthcare providers. Patients may be reluctant to provide important information for accurate diagnosis and treatment without this trust.

The study results on the financial and budgeting aspect regarding acquiring budgets for sustainable system maintenance indicate that most respondents said this is

already being planned. The importance of careful financial management and return on investment analysis in the success of information technology implementations such as EMR is relevant to consider in planning at Port Hospital Jakarta so that information technology investments help minimize project failure risks and ensure that investments in information technology provide optimal added value for the hospital. Financial issues consistently become a primary focus in planning and implementing EMR, with statistics showing that about 50-75% of EHR implementation efforts fail due to exceeding available budgets, schedule overruns, and not meeting user expectations or satisfaction[11].

The study results indicate that patient engagement at Port Hospital Jakarta is categorized as not ready. This is evidenced by respondents' statements that patient engagement with the system does not yet exist, mainly because the EMR system itself does not yet exist, so patients have not been involved in using it. However, patient engagement is important as patient interaction with the information system can affect patient satisfaction and the effectiveness of the information system in providing healthcare services. Patient interaction can involve online applications, registration, and accessing relevant information[18].

The study results on the IT Management Support readiness aspect, regarding the establishment of IT staff in the implementation, maintenance, infrastructure, and system users, indicate that most respondents said this had been analyzed but generally not understood. However, IT staff respondents indicated that this can usually be understood but has not been identified in the planning process. Implementing a technology-based information system naturally requires qualified human resources in information technology management and knowledge of system integration. A hindrance to information system implementation is the lack of understanding of information technology among human resources and budget constraints [19,20].

Based on the research results on the IT Infrastructure aspect, the assessment of hardware needs, terminals, desktops, and other hardware, as well as plans for technical infrastructure using high-availability platforms, upgraded to standard, scalable, and easy to maintain, most respondents said that the need assessment is generally understood but has not yet been further evaluated, and system needs will be upgraded according to standard needs that might arise when the system is newly acquired. The low technology capacity in the hospital is due to the lack of hardware needs assessment and substandard systems[11]. The lack of evaluation of technology infrastructure needs at Port Hospital Jakarta, particularly related to hardware and system standards, can cause serious obstacles in EMR implementation, such as limited network availability, inadequate databases, and potential data security risks.

Strengths and limitations

The strength of this study lies in its ability to serve as a robust benchmark for assessing Port Hospital Jakarta's overall readiness to implement Electronic Medical Records (EMR). The findings provide valuable insights for the hospital in identifying and prioritizing units that require improvement to facilitate a smooth EMR implementation in the future. However, this study has limitations, particularly in exploring leadership and

management aspects, because most respondents were staff members. Additionally, varying respondents across different units may have influenced the overall readiness scores.

CONCLUSION

Port Hospital Jakarta shows moderate readiness (Grade II) for EMR implementation in organizational capacity and alignment. Enhancing cross-functional involvement and assessing IT infrastructure for compliance with standards like HIPAA and HL7 are essential. Given the respondent profile, future research should include more diverse roles to improve the generalizability of findings.

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ETHICS CONSIDERATION

This research has received an ethical certificate from the Health Research Ethics Committee, Research Ethics Committee Esa Unggul University with approval number 0925-05.075/DPKE-KEP/FINAL-EA/UEU/V/2025 dated 22 May 2025 granted by Ethics Code Enforcement Board of Esa Unggul University.

CONFLICT OF INTEREST

All Authors have no conflict of interest. All respondents involved in this study agreed to participate in filling out the questionnaire by signing a consent form for completing the questionnaire.

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AUTHOR CONTRIBUTION

All authors have contributed to all process in this research, including preparation, data gathering, analysis, drafting, and approval for publication of this manuscript.

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