Taylor & Francis
Taylor & Francis Group

Check for updates

Improving clinical records: their role in decision-making and healthcare management – COVID-19 perspectives

Yanti Desnita Tasri [a] and Evi Susanti Tasri[b]

aAcademy of Medical Record and Information (APIKES) IRIS, Padang, Indonesia; bFaculty of Economics, Universitas Bung Hatta, Padang, Indonesia

ABSTRACT

Background: The ability of healthcare system to face the COVID-19 pandemic requires a professional competency in maintaining medical records to increase information and healthcare services quality. This study analyses the competency influence to medical record and health information management on planning and decision-making of healthcare services. A case study was conducted to explore this phenomenon. The COVID-19 has impacted to the clinical records is also discussed.

Methods: The study uses a quantitative method to analyse correlation between medical record professional competencies, the quality and decision-making of healthcare services. Data analysis was used the structural equation model. The data were collected through purposive sampling of 49 respondents in case study hospital in Padang, Indonesia.

Results: The medical record competency construct has a less significant effect on the decision-making construct, although the latter is positively related to competency. The quality construct is positively related to and has a significant effect on the decision-making construct.

Conclusion: In the case study hospital revealed the competent medical record professional had a small influence on decision-making. In the COVID-19 pandemic situation, the new tools or systems such as telehealth or telemedicine might be an alternative by the healthcare service provider to improve their clinical record management information systems.

Introduction

Recently, the COVID-19 (COrona Virus Disease 2019) has greatly affected the human activities, especially in the healthcare management systems. The COVID-19 has been declared by WHO (World Health Organisation) as a pandemic. The COVID-19 can be transmitted from human to human via droplets. The people most at risk of contracting this disease are people who are in close contact with COVID-19 patients including doctors and other health professionals who provide health services. This makes COVID-19 a condition that needs to be dealt with very serious conditions, including good planning in the hospital service system. Good planning will be able to minimize inefficiencies in service. Many healthcare providers may be challenged to improve their clinical record systems as well as the staff professional competency to deliver the healthcare service quality in COVID-19 pandemic's circumstances.

Improving service and healthcare quality is not only measured by service user satisfaction and healthcare assessment, but also by the information on the patient's medical record [1–3]. According to Mann and Williams [4], the main role of medical records is to support patient care. A medical record is a file that contains records and documents about a patient's identity, examination, treatment, actions and other services that have been provided. The results of the processing of medical record data also serve as a material consideration in making policies to meet the needs of medical services, administration and health information for decision-making by hospital managers. To achieve its objectives, a hospital requires competent human resources and a professional and effective system. Medical record competency is crucial in decision-making and quality [2,3].

The main purpose of a patient's medical record is to accurately and completely document the patient's life and health history, including past and present illnesses and their treatment, with emphasis on events that affect the patient during treatment. This information is presented in the form of medical record reports [4]. The medical record service system aims to provide information to facilitate management of patient service and managerial decisions (planning, organizing, implementing, supervising, evaluating, and controlling) by clinical and administrative service providers at health service facilities. Therefore, it is necessary to organize a good medical record file with inputs, processes, outputs, feedback, and control. Good quality, competent

CONTACT Yanti Desnita Tasri ✉ zyri_bkt@yahoo.com 🖃 Academy of Medical Record and Information (APIKES) IRIS, Jl. Gajah Mada No. 23, Padang, Indonesia

medical records improve the decision-making process of healthcare management [1–6]. Health information management professionals should be competent in and responsible for [7,8]:

- understanding the workflow in the healthcare service organization,
- acting as a bridge between the clinical side, actions, and administrative functions,
- classifying diseases and treatments to ensure compliance with clinical, financial, and legal standards in health services,
- paying attention to the patient's condition through the availability of medical data,
- maintaining quality, integrity, and patient health information,
- coordinating with staff to ensure that the organization has the correct information available quickly when needed for data integrity, confidentiality, and security standards,
- heeding the code of ethics and etiquette,
- adapting to new methods of capturing information from the health department, storing, and retrieving it easily and evaluating it electronically,
- maintaining electronic data accurately.

The American Health Information Management Association (AHIMA)'s Global Health Information Curricula Competencies consist of 29 competencies for entry-level, intermediate, and advanced professionals to improve health record quality in effectively managing health data and information and delivering quality healthcare to the public [9]. Therefore, it is essential to identify the abilities and competencies of medical recording professionals and their role in maintaining good-quality health information systems [1,3,10,11].

To analyse the factors that influence medical recording professionals' quality management of health information systems in healthcare services, the structural equation modelling (SEM) method can be a powerful tool. Applications of SEM have been implemented in various healthcare management settings [12–14]; undoubtedly, SEM is an indispensable tool in the healthcare sector. Medical record competencies consist of many criteria, and are instrumental in quality and decision-making in healthcare services. SEM can be used to analyse the relationships between criteria, sub-criteria and inter-criteria. The SEM method can be obtained by the relationship between independent variables and construct dependent variables (structural models) that are modelled simultaneously, producing a single, systematic, and comprehensive analysis that can evaluate the model [15].

The SEM method is superior to the linear regression [15] and multivariate regression methods [16]. SEM can do path analysis with latent variables [17,18],

which are variables whose values are measured by several criteria or indicators that are realized through questions in a questionnaire. Moreover, the SEM method has higher flexibility for researchers to connect theory with data. The SEM method can determine the validity of theory even if it is supported by minimal and new theoretical concepts by checking the existing empirical data [19]. The SEM method makes it possible to conduct studies using a large number of variables with complex relationships supported by a low theoretical basis [18,20]. This paper predicts the relationships between decision-making variables based on government policies on the management of medical record information systems and quality in improving hospital services. The SEM method provides an output in the form of a prediction of the relationship between the analysed variables.

SEM is considered suitable in this research, because the aim is to build a new model of decision-making based on the implementation of government policies and retaining the basic theory of organizational management. This research is expected to contribute to the study of decision-making using medical records adopting government policies in the hospital service system. Some competencies may be difficult to explain or evaluate accurately. Therefore, it is important to study the medical recording of health information in processing patient data and medical record quality, and link competencies with specific performance indicators as a proxy for competency measurement.

This study aims to analyse medical record management competencies – the medical recording of health information in processing patient data and medical record quality – so that they can be used as material for planning and decision-making by top management in the field of healthcare services. This paper also discussed the impacting of COVID-19 pandemic to health information systems management.

Methods

This research uses a quantitative method to test the correlation between three groups of constructs: medical record competency, quality of medical record, and decision-making of healthcare services. Partial least squares structural equation modelling (PLS-SEM) was used to explore a causal relationship model between indicators among three groups of constructs.

The survey instrument was performed using purposive sampling in the case study hospital in Padang, Indonesia. Determination of the sample used the census method for a total of 49 respondents. The questionnaires were filled out by staff involved in making management reports and medical records, and management staff involved in decision-making in the field of health services.

Developed indicators of medical record competencies, quality, and decision-making

The developed indicators in the three groups of constructs were adopted from the Decree of the Minister of Health of Indonesia, Number: 377/MENKES/SK/III/2007, concerning Professional Standards for Medical Records and Health Information [7,8].

Indicators of medical record competencies

A1. Medical recorders are able to manage medical records and health information to meet the needs of medical services, administration, and health information needs as material for decision-making in the health department.

A2. The organization of medical records consists of function, quantitative, or qualitative analysis and the medical record system model.

A3. Archiving management (in the case study hospital in Padang, Indonesia) is in accordance with stipulated standards and has an efficient impact on patient care.

A4. Computer applications and information technology have been used in every section of patient healthcare services.

A5. The officers involved in the service of patient data have a good understanding of their work.

Indicators of quality

B1. Quality of service is always controlled and is the aim of healthcare service.

B2. Quality management of medical records and health information has been applied as a standard of service in the case study hospital in Padang, Indonesia.

B3. Quality assessment techniques are always used by the institution, which is run by staff competent in their fields.

B4. Quality improvement techniques are understood by all hospital administrators.

B5. Auditing of medical records is carried out regularly and transparently.

B6. Registration, licensing, and accreditation systems are manifestations of quality that are produced in accordance with performance.

Indicators of decision-making

C1. Medical record management reports are used as an input for the addition of human resources related to health services.

C2. Medical record management reports are used as an input for human resource development related to health services.

C3. Medical record management reports are used as an input for ensuring the availability of materials related to hospital facilities and equipment in health services.

C4. Medical record management reports are used as an input for budget planning related to health services at the case study hospital in Padang, Indonesia.

C5. Medical record management reports are in accordance with the information needs of decision-making in health services.

C6. Medical record management reports are used as an input for health science research and development.

C7. Medical record management reports are used as material for analysis and evaluation of the health services that have been provided.

C8. Medical record management reports are used as material for analysis and evaluation of the development of health services.

C9. Medical record management reports are always available when needed.

C10. Reports on the content of medical record management are understood by decision-makers.

C11. Medical record management reports are used as material for analysis in making policies related to health services.

Data analysis method

The analysis of SEM consists of regression analysis, factor analysis, and path analysis. SEM analysis is done by checking the validity and reliability of the instrument (confirmatory factor analysis), testing the model of the relationships between variables (path analysis), and activities to obtain a model that is suitable for prediction. The SEM methods can be grouped into two parts: covariance-based SEM (CB-SEM) and component-based SEM or PLS-SEM [21]. The PLS-SEM is a powerful analysis method as there are fewer assumptions, the data do not have to be multivariate normally distributed (indicators with a scale category, ordinal, interval to ratio can be used on the same model), and the samples do not have to be large [17,18,21,22]. Although PLS can be used to confirm theories, it can also be used to explain the presence or absence of relationships between latent variables [17]. The path analysis model of all latent variables in PLS consists of three sets of relationships: (1) inner models that are relationships between latent variables (structural models), (2) outer models that are relationships between latent variables with indicators or their manifest variables (measurement models), and (3) the weight relation in which case the value of latent variables can be estimated [20,23].

In this study, data analysis was conducted to investigate the relationship between competency and quality in decision-making using PLS-SEM and the following
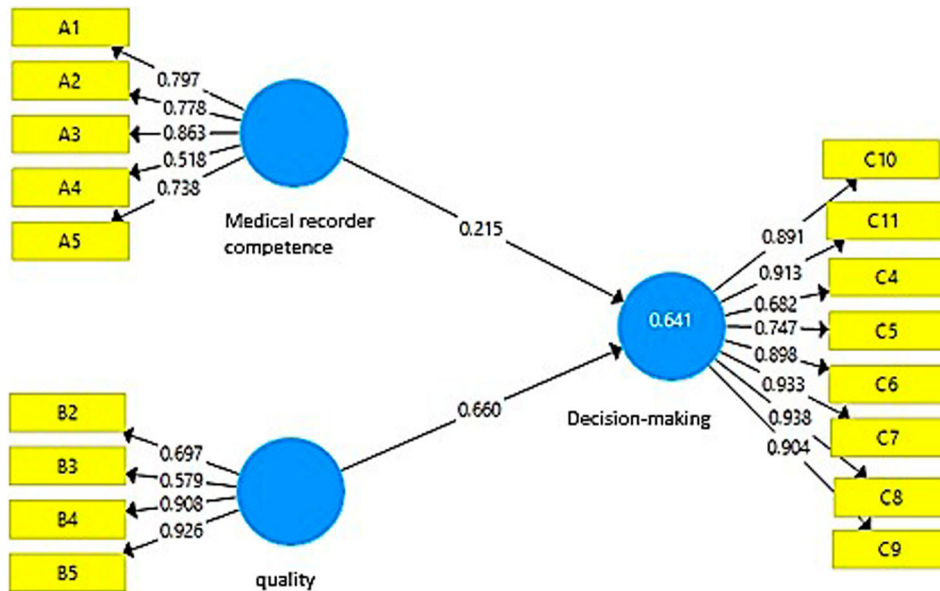
Figure 1. The results of the processed convergent validity data test.

research model

$$\eta_1 = \gamma_1 X_1 + \gamma_2 X_{2...N} + \zeta \qquad (1)$$

$$\eta_2 = \gamma_1 Z_1 + \gamma_2 Z_{2....N} + \zeta \qquad (2)$$

$$\eta_3 = \gamma_1 R_1 + \gamma_2 R_{2....N} + \zeta \qquad (3)$$

where η_1 is the competence, η_2 the quality, η_3 the decision-making, X_1–X_N the indicator of latent competency variables, Z_1–Z_N the indicator of latent variables of quality, and R_1–R_N the indicator of latent variables in decision-making.

From the equation of the latent variables, path analysis can be done for the decision-making model as follows:

$$\text{Decision-making} = \beta1\text{Competency PM}$$
$$+ \beta2\text{Quality} + \varepsilon t \qquad (4)$$

Results

The simulation was performed to calculate the effect of medical record competency and quality on decision-making observed variables and their latent constructs in healthcare services. The PLS-SEM in this study was conducted to test (1) the outer model, which involved a convergent validity test, discriminant validity test, and composite reliability test and (2) the inner model, which involved a structural model for predicting causality between latent variables.

Test of the outer model

Convergent validity test
The test of convergent validity (Figure 1) was done to investigate the correlation between indicators and constructs.

Based on the results, the correlations between the indicator constructs have fulfilled convergent validity, because all loading factors were above 0.50. The results in Figure 1 can be proved by the competency variables reflected by five indicators, namely A1, A2, A3, A4, and A5; quality variables reflected by four indicators, namely B2, B3, B4, and B5; and decision-making variables reflected by eight indicators, namely C4, C5, C6, C7, C8, C9, C10, and C11.

Discriminant validity test
The discriminant validity test used an average variance extracted (AVE) output test, cross-loading, and latent variable correlation. The result of discriminant validity output with the AVE test is depicted in Table 1.

The AVE test aims to observe the validity of construct discriminants with the condition that the AVE value of each construct is >0.50. The AVE values for all constructs must be above 0.5 because the lowest 50% of the variance of the observed variables must be taken out by the latent construct in the model [24]. In this case study, the results show that the value of AVE for each construct is >0.50. The value of AVE for the competency construct is 0.560, 0.626 for the quality construct, and 0.753 for the decision-making construct. All constructs in this study have good discriminant validity.

Table 1. Discriminant validity of latent variables with AVE.

	Construct reliability and validity			
	Cronbach's alpha	Rho_A	Composite reliability	AVE
Medical recorder competence	0.807	0.861	0.861	0.560
Quality	0.790	0.829	0.866	0.626
Decision-making	0.951	0.957	0.960	0.753

Table 2. The AVE root value in the model.

	Medical record competence	Quality	Decision-making
Medical record competence	0.748		
Quality	0.562	0.791	
Decision-making	0.586	0.781	0.868

Next, the discriminant validity was measured by comparing the square root values of the AVE ($\sqrt{\text{AVE}}$) for each construct with the correlation between constructs and other constructs in the model. The model has good discriminant validity if the AVE roots for each construct are greater than the correlation between constructs and other constructs [22,25]. It can be seen in Table 2 that the root AVE of the quality construct of 0.791 ($\sqrt{0.626}$) was higher than the correlation between the quality and competence constructs, which was only 0.562. The AVE root of decision-making of 0.868 ($\sqrt{0.753}$) was higher than the correlation between the decision-making and quality constructs at 0.781 and the competence construct at 0.586. The AVE root of the competence construct of 0.748 ($\sqrt{0.560}$) was higher than the correlation between the quality and decision-making constructs. Therefore, all constructs in the estimated model meet the discriminant validity criteria.

Composite reliability test

The construct reliability test measures two criteria: composite reliability and Cronbach's alpha of the indicator block that measures the construct. The construct is declared reliable if the composite reliability and Cronbach's alpha values are above 0.70. The results of the test of construct reliability can be seen in Table 1. The value of Cronbach's alpha for the competence, quality and decision-making constructs was >0.70 at 0.807, 0.790, and 0.951, respectively. The composite reliability value of the competency, quality, and decision-making constructs was >0.70 at 0.861, 0.866, and 0.960, respectively. This means that the constructs have good reliability.

Inner model test (structural model test)

The inner model is a structural model for predicting causality between latent variables. The structural model evaluation used R^2 for the dependent construct, and the path coefficient value or the T-value of each path for the real level in hypothesis testing. A higher R^2 value means a better prediction model from the proposed study model [23,26]. Evaluating inner models evaluates the influence of latent constructs and hypothesis testing.

R^2 test

Based on the results of data processing, the value of R^2 was obtained at 0.641. This means that the decision-making variable affected the quality and competence of medical record variables at 0.641 or 64.1%. Therefore, the magnitude of influence of the quality and medical record competence constructs on decision-making was classified as moderate.

Significance test

The path significance test results of the PLS path modelling estimation for three groups of constructs are shown in Figure 2. The significance test in PLS-SEM determines the effect of exogenous variables on endogenous variables. Hypothesis testing using the PLS-SEM method was done using a bootstrapping process. The relationships between exogenous variables and endogenous variables can be seen in Table 3.
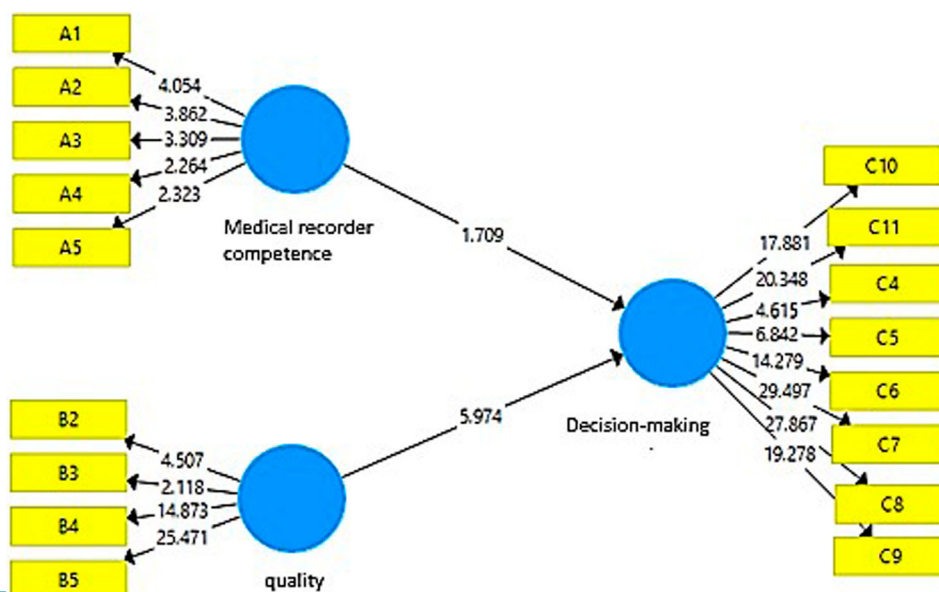

Figure 2. The significance test result of the PLS path modelling estimation model.

Table 3. The results of the path significance test.

Path	Path coefficients				
	Mean, STDEV, T-values, P-values				
	Original sample	Sample mean	Standard deviation	T-statistics	P-values
Medical recorder competence => Decision-making	0.215	0.231	0.126	1.709	.088
Quality => Decision-making	0.660	0.637	0.110	5.974	.000

Table 4. The cross-loading values.

	Competency PM	Quality	Decision-making
A1	0.797	0.564	0.618
A2	0.778	0.503	0.440
A3	0.863	0.365	0.407
A4	0.518	0.237	0.203
A5	0.738	0.303	0.362
B2	0.400	0.697	0.674
B3	0.151	0.579	0.366
B4	0.605	0.908	0.660
B5	0.515	0.926	0.689
C10	0.537	0.743	0.891
C11	0.557	0.706	0.913
C4	0.381	0.578	0.682
C5	0.416	0.580	0.747
C6	0.593	0.670	0.898
C7	0.508	0.717	0.933
C8	0.516	0.738	0.938
C9	0.537	0.666	0.904

The path coefficients of the significance test in Table 3 revealed the equation model of decision-making as follows:

$$\text{Decision-making} = \beta 1 \text{ Competency PM} + \beta 2 \text{ Quality} + \varepsilon t$$

$$\text{Decision-making} = 0.215 \text{ Competencies PM} + 0.660 \text{ Quality} + \varepsilon t$$

(5)

Discussion

This study analysed the relationship between the competency and quality of medical record health information and decision-making. PLS-SEM was employed to develop the outer and inner model, which involved a structural model for predicting causality between latent variables. Based on the results, the correlations between indicators and constructs have fulfilled convergent validity. This was proved for the medical report competency variables, which have five indicators: A1, A2, A3, A4, and A5. The quality variables consist of four indicators, namely B2, B3, B4, and B5. The decision-making variables have eight indicators, namely C4, C5, C6, C7, C8, C9, C10, and C11. Quality indicators B1 and B6 and decision-making indicators C1, C2, and C3 were excluded from the model, because they have cross-loading values <0.50 and were not significant. Furthermore, the model was re-estimated by the elimination of these indicators.

In addition, based on the cross-loading test, latent variable correlation also meets the requirements of good discriminant validity, as shown in Table 4. The cross-loading was applied to assess the discriminant validity and standard of a construct, which may not exceed its AVE value [26,27].

Table 4 shows the results of cross-loading for the discriminant validity value of the constructs. For the competency construct indicator (A1), a value of 0.797 was greater than the cross-loading value (A1) of the quality construct of 0.564 and the decision-making construct of 0.618. The cross-loading value of the quality construct (B2) of 0.697 was greater than the value of cross-loading (B2) of the competency construct of 0.400 and decision-making construct of 0.674. Likewise, the cross-loading of the decision-making construct (C10) of 0.891 was greater than the cross-loading value (C10) of the competency construct of 0.537 and the quality construct of 0.743. In other values of competency, all the cross-loading indicators were greater than the cross-loading of the quality and decision-making constructs. Therefore, indicators on all three constructs have a good level of discriminant validity.

The results of the path significance test revealed that the medical record competency construct has no significant effect on the decision-making construct, because the *T*-statistic value of 1.709 < the *T*-table of 1.96 and the *P*-value of .088 > alpha 0.05. The original value of the sample medical record competency was 0.215, so the medical record competency construct has a positive relationship with the decision-making construct. Therefore, higher medical record competency will improve decision-making. If the competency construct of the medical recorder increases by 1 unit and the quality construct remains stable, the decision-making construct increases by 0.215 units. The quality construct has a significant effect on the decision-making construct, because the *T*-statistic value of 5.974 > the *T*-table of 1.96 and the *P*-value of .000 < alpha 0.05. The value of the original sample quality construct was 0.660, so the quality construct has a positive relationship with the decision-making construct. If the quality construct increases by 1 unit and the medical record competency construct remains stable, the decision-making construct increases by 0.660 units.

The case study finding

Equation (5) reveals that medical record competency has a less significant effect on decision-making, although the latter is positively related to competency. Quality is positively related to and has a significant effect on decision-making. Therefore, in the case study hospital, the competency of medical recording

Table 5. The ranking of medical record competency indicators and quality indicators implemented in the case study hospital.

Ranking	Medical record competency indicators	Quality indicators
1	A3. Archiving management is in accordance with standards and has an efficient and effective impact on patient care	B5. Auditing of medical records is carried out regularly and transparently
2	A1. Medical recorders are able to manage medical records and health information to meet the needs of medical services, administration, and health information needs as material for decision-making in the health department	B4. Quality improvement techniques are understood by all hospital administrators
3	A2. The organization of medical records consists of function, quantitative, or qualitative analysis and the medical record system model	B2. Quality management of medical records and health information has been applied as a standard of service in the case study hospital in Padang, Indonesia
4	A5. The officers involved in the service of patient data have a good understanding of their work	B3. Quality assessment techniques are always used by the institution, which is run by staff competent in their fields
5	A4. Computer applications and information technology have been used in every section of patient healthcare services	

has a small influence on decision-making for healthcare management and the health information system.

The ranking of the indicators of medical record competencies and quality implemented in the case study can be seen in Table 5. The ranking of these indicators according to their impact on decision-making are showed in Table 6.

It can be seen in Table 5 that the competency of archiving management indicator in the case study hospital is in accordance with standards and has an efficient and effective impact on patient care. This indicator received the highest value and was implemented the most in the case study hospital (first ranking). The competency of computer application and information technology indicator was implemented less in the case study hospital (fifth ranking), as was the quality management of medical records and health information applied as a standard of service indicator. This is understandable, because the use of health information systems in the case study hospital is relatively new. In addition, cost constraints are also affecting the implementation of health information systems [28–31].

Interestingly, the indicator of the competency of medical recorders in managing medical records and health information to meet the needs of medical services, administration, and health information needs as material for decision-making in the health department had the most significant influence on the decision-making indicators, as depicted in Table 6. According to Jamwal and Singh [32] and Albert and Grover [33], there are

strategies that ensure competency between systems in organisations. The case study hospital needs a strategy to change medical records to electronic medical records so that they can influence the role of professionals. The old strategy of traditional medical records focused on work units with the main task of processing and tracking files, rather than processing and searching for information. Currently, the intensive and environmentally friendly use of information aligns with the automation of health services. It is necessary to make changes that are transformational and fundamentally change health information management systems to electronic medical records in the case study hospital.

Healthcare information management is a profession that focuses on health service data and the management of health service information sources by describing the nature and structure of data, and translating it into various forms of information for the advancement of health services for individuals, patients, and the community. Moreover, the healthcare profession is responsible for ensuring the accuracy and protection of clinical information needed in carrying out health services for accurate health service decision-making. Healthcare information management professionals are health information administrators who are obliged to collect and analyse primary and secondary healthcare data, disseminate information, organize information sources for research and planning, and provide integrated health service evaluation system services. They are people who have received professional

Table 6. The ranking of medical record competency indicators and quality indicators according to their impact on decision-making.

Ranking	Medical record competency indicators	Quality indicators
1	A1. Medical recorders are able to manage medical records and health information to meet the needs of medical services, administration and health information needs as material for decision-making in the health department	B5. Auditing of medical records is carried out regularly and transparently
2	A2. The organization of medical records consists of function, quantitative, or qualitative analysis and the medical record system model	B4. Quality improvement techniques are understood by all hospital administrators
3	A3. Archiving management is in accordance with standards and has an efficient and effective impact on patient care	B2. Quality management of medical records and health information has been applied as a standard of service in the case study hospital in Padang, Indonesia
4	A4. Computer applications and information technology have been used in every section of patient healthcare services	B3. Quality assessment techniques are always used by the institution, which is run by staff competent in their fields
5	A5. The officers involved in the service of patient data have a good understanding of their work	

training in the field of health data management and health service information system flow.

According to AHIMA's [9] definition of the role of medical and health information recorders, a clinical data specialist is responsible for data management functions in a variety of applications including clinical codes, management outputs, handling special registrations, and databases for research purposes. A data resource administrator is tasked with handling organizational data sources and is responsible for data storage, data banks as a form of future health records, and guaranteeing long-term data integrity. The job of research and decision support specialists (research analysts) is to help leaders obtain information in making decisions and developing strategies by using various data analysis tools and databases.

Organizing hospital medical records aims to support orderly administration in the context of efforts to improve health services in hospitals. Based on these objectives, several aspects of the use of medical records can be determined: administrative, medical, legal, research, educational, and documentation aspects. For health service facilities, medical records have data that can be used to:

- evaluate the performance of health workers working at the facility,
- evaluate the use of resources such as special diagnostic equipment and services provided by medical records,
- complete surveys by certification issuing and accreditation licensing bodies in evaluating the care provided,
- report diagnoses or reasons for treatment and actions so that bills can be submitted properly,
- protect healthcare institutions from lawsuits, because all evidence exists in the medical records.

Therefore, the organization of medical records must be managed by professional personnel. Medical records in health services contribute optimally with good collaboration between medical personnel such as doctors and nurses, so that an accurate and complete medical record is produced that is very supportive in providing health services to patients.

Recommendation

The hospital management' information system is very important in the pandemic era of COVID-19 [34]. According to Avery et al. [35], in pandemic conditions, public health planning is largely based on expert opinion and may not have a connection with the problem of public health practice in the field. To identify planning problems and anticipate capacity building for health service surges, coordination problems, institutional structures in the health care system, and lack of resources are significant obstacles. This is in line with the findings of Farias et al. [36], conducting a study of integrated data management systems and measurable indicators on strategic decision-making in the hospital system. This study concludes that daily pandemic surveillance motivates the planning committee to reallocate hospital resources to treat patients during the peak pandemic period. It is also found that the importance of advanced integrated pandemic planning and information for the management of healthcare facilities during a pandemic.

The hospital health information management is also demanded to be able to present accurate data for internal and external information effectively and efficiently. For this reason, steps are needed to prevent the spread of COVID-19, one of which is by limiting face-to-face health services. One method that can be used is telehealth or telemedicine [37–41], which provides health services using information and communication technology. In this system, patients can get health services without having to visit the hospital so that this will be able to prevent the spread of COVID-19. This system can be used in hospital management such as (1) taking a queue number, (2) providing administrative services such as payments that can be made in non-cash, documents can be made online, and (3) provide healthcare in the form of determining the diagnosis, prescribing drugs, this can be done for cases that do not require direct examination.

Implications for international healthcare managers

Information about the health system [42] and the medical record professionals to combat COVID-19 has not been widely studied by researchers. The awareness and willingness in managing COVID-19 infection are needed to prevent further spread of the disease. A multinational survey is needed which aims to assess the level of ability of hospital staff and practices regarding COVID-19 and their readiness to deal with outbreaks. Then a reliable, quality hospital management is needed in the face of this COVID-19 pandemic condition. The quality of staff and the clinical records service system will be able to adapt quickly to changing needs and service targets, including information system technology and management in the era of an emergency pandemic. So in line with the findings in this study, planning is a very significant relationship with the quality of hospital service staff. The quality determines how the planner can have the ability to adapt to changing demands and conditions.

The clinical records service system can determine the quality of healthcare services. A good clinical records service system is influenced by many factors and varies in many countries. An available patient clinical records service system facilitates government control and policy in healthcare services [43]. Real

conditions in the field are that healthcare institutions such as hospitals face increasing pressure to reduce costs, increase efficiency and guarantee quality of services. Therefore, control of healthcare and hospital management is needed [44]. The application of healthcare management in terms of clinical records management is very dependent on the availability and professionalism of healthcare staff, who are actors in clinical service activities. This can be realized through appropriate regulatory mechanisms and professional development, through formal education and continuing clinical education. All healthcare staff has a profound impact on the quality and effectiveness of healthcare service quality.

The quality of healthcare service depends not only on clinical services that meet professional standards, but also on customer-focused services. The entire structure in the clinical setting will function properly if it is supported by an adequate information system and knowledge management. The availability of this information system can make it easy for patients and clinical practitioners to communicate and interact. A well-organized information system can support the clinical decision-making process, thereby improving the quality of health service delivery. In this paper, the variable quality of medical recording staff has a significant effect on the quality of healthcare services. This supports the concept that electronic health records improve the quality of healthcare services [45,46] and the ability of qualified staff to carry out their duties. This finding reinforces the need for a high-quality clinical record system using information technology to create electronic clinical records. However, the effectiveness of clinical record system implementation is influenced by the support of healthcare managers [47].

Success in adopting information technology [48,49] and innovation [50] depends on managers understanding the importance of creating an electronic health record that focuses on patients with a commitment to provide patient safety and quality healthcare. Support from healthcare managers, especially information technology managers, is urgently needed in adopting and applying information technology systems for effective decision-making. The new tools or systems such as telehealth or telemedicine [37–41] might be an alternative by the healthcare service provider to improve their clinical record management to face rapid changing situation due to COVID-19 pandemic in the world. The latter can be influenced by the availability of and timely access to data, the organization of information, and the competency of medical recording staff.

The competency of medical recording staff is a key to hospital management making decisions for the improvement and development of a health service at the hospital [51–53]. To be able to produce quality information for hospital management, medical record management professionals must have optimal capabilities in the field of medical record management and health information. A good medical recorder will be able to produce quality information. This was also conveyed by Edmund et al. [54], who showed that a medical recorder capable of managing medical records and health information to meet the needs of services, medical administration, and health information needs was essential for decision-making in healthcare. In making decisions related to healthcare, hospital management requires quality information from medical recording professionals. According to He et al. [55], applying a medical record information system requires continuous supervision so that management can conduct an evaluation. Competent medical recording professionals in the field of medical record management and health information will be able to meet the needs of patients in health services, so as to improve public health in general.

In this paper, the competency of medical recording staff was found to have a small effect on decision-making in the case study hospital. This was confirmed by Bhoomadevi et al. [14] which discovered different perceptions between healthcare providers and patients. Healthcare managers should be able to understand the needs of the patient by improving the service-based clinical records health information management system.

The use of an Electronic Medical Record (EMR) system [42] is important in supporting the clinical needs of the health system that manages the COVID-19 pandemic [56]. The qualified and competent health information management professionals will be able to adapt to any conditions including changes in the use of the EMR system. Adane et al. [57] state using electronic devices in healthcare institutions must be able to ensure safe and efficient data management. The competence of medical record officers in the use of EMR for the pandemic period will be very supportive by the College or Institution which provide curriculum related to the EMR competency. This will make the medical records officer have the ability to carry out work effectively, efficiently, and safely. This is also conveyed by Niedermier [58], the importance of teaching wise documentation in the use of electronic health records.

Furthermore, a model could be developed and adopted by all employees to reduce the disregard of patient-centred care. It is therefore very important to have institutional reforms, needs-based training, and coordination between education in various health systems to produce health professionals who provide efficient and effective healthcare services [49,59,60]. Better implementation of a healthcare service system requires competent and qualified clinical recording staff. They can assist in appropriate and effective decision-making by providing clinical record data information services. Healthcare managers can make

decisions and plan optimally if clinical record system services are improved. Therefore, they can adopt quickly to face a rapid changing situation such as COVID-19 pandemic.

To prevent the spread of COVID-19, one of the solutions is limiting face-to-face health services through the use of information and communication technology such as telehealth or telemedicine. Telemedicine services are health services performed by doctors and clinical management using information and communication technology to diagnose, treat, prevent, and/or evaluate the health condition of patients according to their competence and authority. Doctors and clinical management who provide telemedicine services to patients are responsible for the health services they provide, including ensuring the safety of patient data accessing telemedicine services. The results of telemedicine services are recorded in digital records that are used by doctors and clinical management as the medical record documents and are the responsibility of doctors and clinical management, must be kept confidential, and be used in accordance with statutory provisions. However, to be able to apply telehealth or telemedicine in healthcare, there are challenges and obstacles such as cost factors, human resources, policies, and behaviours.

Conclusion

The change in the paradigm of medical records as health information and electronic medical records are becoming a source of data for decision-making and planning activities in hospitals. Given the main task of medical recording professionals in the field of medical record management and health information, the smooth running of healthcare for patients in a hospital is very dependent on professional competency. This paper analysed the correlation between medical recording professional competency and quality, and their impact on decision-making in healthcare services. A case study was conducted in a hospital in Padang, Indonesia. The results indicated that the medical record competence construct has a less significant effect on the decision-making construct. The original value of the sample medical record competency construct is 0.215, so the construct has a positive relationship with the decision-making construct. A more competent medical recorder improves decision-making. The quality construct has a significant effect on the decision-making construct. The value of the original sample quality construct is 0.660, so the quality construct has a positive relationship with the decision-making construct. A higher quality medical record leads to better decision-making. Decision-making in practice may vary in certain hospitals, so it is necessary to develop collaborative inter-hospital studies to examine this phenomenon further. A multinational survey is needed which aims to assess the level of readiness of hospital staff and practices regarding COVID-2019 and their readiness to deal with outbreaks. It is also necessary to measure the level of awareness of hospital staff about crises and how they react to limit and prevent further transmission in term of health information technology and management systems.

Notes on contributors

Yanti Desnita Tasri has worked as Director of Academy of Health Record and Information (APIKES) IRIS, Padang, Indonesia since 2015. Her research interests focus on field on Health Information Management in Medical Records, Medical Record Competency and Information Technology.

Evi Susanti Tasri is an Associate Professor in Department of Economic Development, Economic Faculty of Universitas Bung Hatta, Padang, Indonesia. Her research interest include Healthcare Management, Decision Making based Structural Equation Model and Green Economics.

ORCID

Yanti Desnita Tasri http://orcid.org/0000-0002-8556-4547

References

[1] Leisner BA, Wonch DE. How documentation outcomes guide the way: a patient health education electronic medical record experience in a large health care network. Qual Manag Health Care. 2006;15 (3):171–183.

[2] Goedert J. Health information management: what a ride it has been. Health Data Manag. 2013;21(10):22–27.

[3] Safian SC. Factors influencing students to enroll in health information management programs. Perspect Health Inf Manag. 2012;9:1–18.

[4] Mann R, Williams J. Standards in medical record keeping. Clin Med. 2003;3:329–332.

[5] Bennett V. Health information management workforce – when opportunities abound. Health Infor Manag J. 2010;39(3):4–6.

[6] Sandefer RH, DeAlmeida DR, Dougherty M, et al. Keeping current in the electronic era: data age transforming him's mandatory workforce competencies. J AHIMA. 2014;85(11):38–44.

[7] Menkes RI. Standar profesi perekam medis dan informasi kesehatan. Departemen kesehatan RI – Jakarta: Indonesia; 2008. Available from: http://www.pormiki-dki.org/lain-lain/download/29-download-standar-profesi-perekam-medis-dan-informasi-kesehatan.

[8] Menkes RI. Peraturan menteri kesehatan nomor 55 tahun 2013 tentang penyelenggaraan pekerjaan rekam medis. Jakarta, Indonesia; 2013; Available from: www.kemhan.go.id/itjen/wp-content/uploads/2017/03/bn1128-2013.pdf.

[9] Global Health Workforce Council. Global academic curricula competencies for health information professionals. 2015. Available from: http://www.ahima.org/about/global/global-curricula.

[10] Mollerup PA, Søndergaard J, Barwell F, et al. The relationships between use of quality-of-care feedback reports on chronic diseases and medical engagement in general practice. Quality Manag Health Care. 2018;27(4):191–198.

[11] Hall LW, Headrick LA, Cox KR, et al. Linking health professional learners and health care workers on action-based improvement teams. Qual Manag Health Care. 2009;18(3):194–201.

[12] Guo R, Berkshire SD, Fulton LV, et al. Predicting intention to use evidence-based management among U.S. healthcare administrators: application of the theory of planned behavior and structural equation modeling. Int J Healthcare Manag. 2019;12(1):25–32.

[13] Samhan B. Can cyber risk management insurance mitigate healthcare providers' intentions to resist electronic medical records? Int J Healthcare Manag. 2017. doi:10.1080/20479700.2017.1412558.

[14] Bhoomadevi A, Ganesh M, Panchanatham N. Improving the healthcare using perception of health professional and patients: need to develop a patients centered structural equation model? Int J Healthcare Manag. 2019. doi:10.1080/20479700.2019.1607014.

[15] Gefen D, Rigdon E, Straub D. An update and extension to SEM guidelines for administrative and social science research. MIS Q. 2011;35(2):3–14. doi:10.2307/23044042.

[16] Fornell C. A second generation of multivariate analysis: classification of method and implications for marketing research. In: MJ Houston, editor. Review of marketing. Chicago: American Marketing Association; 1987. p. 407–450.

[17] Hwang H, Malhotra NK, Kim Y, et al. A comparative study on parameter recovery of three approaches to structural equation modeling. J Mark Res. 2010;47:699–712.

[18] Wong KK. Review of the book handbook of partial least squares: concepts, methods and applications, by Vinzi VE, Chin WW, Henseler J, Wang H. (Eds). Int J Bus Sci Appl Manag. 2011;6(2):52–54.

[19] Cheng EWL. SEM being more effective than multiple regression in parsimonious model testing for management development research. J Manage Dev. 2001;20(7):650–667. doi:10.1108/02621710110400564.

[20] Henseler J, Hubona G, Ray PA. Using pls path modeling in new technology research: updated guidelines. Ind Manag Data Syst. 2016;116:2–20.

[21] Wong K. Partial least square structural equation modeling (pls-sem) techniques using smartpls. Mark Bull. 2013;24:1–32.

[22] Kazár K. Pls path analysis and its application for the examination of the psychological sense of a brand community. Procedia Econ Finance. 2014;17:183–191.

[23] Henseler J, Ringle CM, Sinkovics RR. The use of partial least squares path modeling in international marketing. In Sinkovics R, Ghauri P. (Ed.) New challenges to international marketing. Adv Int Mark. 2009;20:277–319.

[24] Barclay D, Thompson R, Higgins C. The partial least squares (pls) approach to causal modeling: personal computer adoption and use an illustration. Technol Stud. 1995;2:285–309.

[25] Sarstedt M, Ringle CM, Smith D, et al. Partial least squares structural equation modeling (pls-sem): a useful tool for family business researchers. J Fam Bus Strateg. 2014;5:105–115.

[26] Peng DX, Lai F. Using partial least squares in operations management research: a practical guideline and summary of past research. J Oper Manag. 2012;30:467–480.

[27] Fornell C, Larcker DF. Evaluating structural equation models with unobservable variables and measurement error. J Mark Res. 1981;18:39–50.

[28] Frisse ME, Holmes RL. Estimated financial savings associated with health information exchange and ambulatory care referral. J Biomed Inform. 2007;40:6.

[29] Hillestad R, Bigelow J, Bower A. Can electronic medical record systems transform health care? Potential health benefits, savings, and costs. Health Aff (Millwood). 2005;24(5):1103–1117. doi:10.1377/hlthaff.24.5.1103.

[30] Parks R, Wigand RT, Othmani MB, et al. Electronic health records implementation in Morocco: challenges of silo efforts and recommendations for improvements. Int J Med Inform. 2019;129:430–437. doi:10.1016/j.ijmedinf.2019.05.026.

[31] Highfill T. Do hospitals with electronic health records have lower costs? A systematic review and meta-analysis. Int J Healthc Manag. 2020;13(1):65–71. doi:10.1080/20479700.2019.1616895.

[32] Jamwal D, Singh N. Management information system competencies and strategies. Int J Comput Sci Technol. 2011;2(1):109–112.

[33] Segars A H, Grover V. Strategic information system planning: an investigation of the construct and its measurement. MIS Quarterly. 1998;22(2):139–163. doi:10.2307/249393.

[34] Majumdar A, Malviya N, Alok S. An overview on COVID-19 outbreak: epidemic to pandemic. Int J Pharm Sci Res. 2020;11(5):1958–1968. doi:10.13040/IJPSR.0975-8232.11(5).1958-68.

[35] Avery G, Lawley M, Garrett S, et al. Planning for pandemic influenza: lessons from the experiences of thirteen Indiana counties. J Homeland Secur Emerg Manag. 2008;5. doi:10.2202/1547-7355.1430.

[36] Farias D, Raffo L, Bacigalupo S, et al. Data for decision making: strategic information tools for hospital management during a pandemic. Disaster Med Public Health Prep. 2010;4:207–212. 10.1001/dmp.2010.29.

[37] Aiyegbajeje FO, Ajayi DD. Mobile health communication: effective reduction of patients' travel needs to hospitals. Int J Healthc Manag. 2020;13(1):28–34. doi:10.1080/20479700.2018.1434862.

[38] Uz-Zaman T, Alqahtani F, Alsairafi A, et al. The role of mobile health applications in preventing sleep-related health problems – a pilot study in the Makkah city of Saudi Arabia. Int J Healthc Manag. 2020;0(0):1–7.

[39] Iyamu T. Health information systems: developing solutions to support patients' mobility. Int J Healthc Manag. 2019. doi:10.1080/20479700.2019.1604935.

[40] Shipchandler T, Nesemeier B, Parker N, et al. Telehealth opportunities for the otolaryngologist: a silver lining during the COVID-19 pandemic. Otolaryngol Head Neck Surg. 2020. 019459982092964.

[41] Wosik J, Fudim M, Cameron B, et al. Telehealth transformation: COVID-19 and the rise of virtual care. J Am Med Inform Assoc. 2020;27(6):957–962.

[42] Monachino M, Moreira P, Janela F. (2016). eHealth and organizational change in hospital setting: a case study on electronic health records in encyclopedia of E-health and telemedicine. IGI Global, USA; p. 46–61. ISBN: 9781466699786.

[43] Iyamu T. Health information systems: developing solutions to support patients' mobility. Int J Healthc Manag. 2019: 1–12. doi:10.1080/20479700.2019.1604935.

[44] Barzdins J. Process-oriented knowledge system for health professionals as a tool for transition to hospital process orientation. Int J Healthc Manag. 2016;9 (4):245–250. doi:10.1080/20479700.2016.1219831.

[45] Alrahbi D, Khan M, Hussain M. Exploring the motivators of technology adoption in healthcare. Int J Healthc Manag. 2019. doi:10.1080/20479700.2019.1607451.

[46] Mohapatra S, Murarka S. Improving patient care in hospital in India by monitoring influential parameters. Int J Healthc Manag. 2016;9(2):83–101. doi:10.1080/20479700.2015.1101938.

[47] Hariyati RTS, Hamid AY, Eryando T, et al. Usability and satisfaction of using electronic nursing documentation, lesson-learned from new system implementation at a hospital in Indonesia. Int J Healthc Manag. 2018: 1–8. doi:10.1080/20479700.2018.1504387.

[48] Garets DE, Horowitz JK. Healthcare ICT in Europe: understanding trends in adoption and governance. J Manage Market Healthc. 2008;1(3):286–296. doi:10.1179/mmh.2008.1.3.286.

[49] Kaye R, Kokia E, Shalev V, et al. Barriers and success factors in health information technology: a practitioner's perspective. J Manage Market Healthc. 2010;3(2):163–175. doi:10.1179/175330310X12736577732764.

[50] Prada G. Exploring technological innovation in health systems: is Canada measuring up? J Manage Market Healthc. 2008;1(4):362–374. doi:10.1179/mmh.2008.1.4.362.

[51] Raja EE, Mahal R, Masih VB. An exploratory study to assess the computer knowledge, attitude and skill among nurses in healthcare setting of a selected hospital in Ludhiana, Punjab, India. Medinfo. 2004;11:1304–1307.

[52] Phil W. An assessment of strategies for information system evaluation: lessons for education. Int J Educ Res. 1996;25:361–371.

[53] Ammenwerth E, Brender J, Nykanen P, et al. Visions and strategies to improve evaluation of health information systems. Reflections and lessons based on the HIS-EVAL workshop in Innsbruck. Int J Med Inform. 2004;73:479–491.

[54] Edmund LCS, Ramaiah CK, Gulla SP. Electronic medical records management systems: an overview, DESIDOC. J Lib Inf Technol. 2009;29:3–12. doi:10.14429/djlit.29.273.

[55] He X, Cai L, Huang S, et al. The design of electronic medical records for patients of continuous care. J Infect Public Health. 2019; doi:10.1016/j.jiph.2019.07.013.

[56] Reeves JJ, Hollandsworth HM, Torriani FJ, et al. Rapid response to COVID-19: health informatics support for outbreak management in an academic health system. J Am Med Inform Assoc. 2020;27(6):853–859. doi:10.1093/jamia/ocaa037.

[57] Adane K, Gizachew M, Kendie S. The role of medical data in efficient patient care delivery: a review. Risk Manag Healthc Policy. 2019;12:67–73. doi:10.2147/RMHP.S179259.

[58] Niedermier VE. Teaching electronic health record documentation to medical Students. J Grad Med Educ. 2017;9(1):135, doi:10.4300/JGME-D-16-00628.1.

[59] Chhabra S. Challenges in health professionals' training and health care for wellness. Int J Healthc Manag. 2019: 1–6. doi:10.1080/20479700.2019.1641951.

[60] Rasmi M, Alazzam MB, Alsmadi MK, et al. Healthcare professionals' acceptance electronic health records system: critical literature review (Jordan case study). Int J Healthc Manag. 2018. doi:10.1080/20479700.2017.1420609.