CLINICIAN'S VIEW ON THE IMPORTANCE OF RADIOLOGY REPORT IN THEIR DAILY PRACTICE

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ABSTRACT

Bacground: *A radiology report is a medicolegal document and formal communication between a radiology radiologist and referring physician/clinician. The failure of radiologists to communicate good quality reports often occurs in the process of patient diagnosis. This study aims to determine the clinician's view on the importance of radiology reports in patient management of their daily practice in Papua and West Papua.* ***Method:*** *One hundred and eighty-four general practitioners and internship doctors answered an online questionnaire distributed randomly. Forty-five indicators assessed the accessibility to radiology reports, the importance of radiology reports, attached clinical information, clinician satisfaction, structure, and content of radiology reports. This study has seven variables with six paths tested using the Structural Equation Modeling (PLS-SEM) analysis method based on Partial Least Squares based using SmartPLS.* ***Result:*** *Data analysis showed that radiology reports, clinical information, clinician satisfaction, and structure of radiology reports had a positive and significant effect on patient management, while accessibility and content of radiology reports had no significant effect on patient management.* ***Conclusion:*** *Clinicians thought the radiology report was an important medical document that has a role in patient management of their daily practice.*

Keywords: *Clinician, patient management, radiologist, radiology report.*

ABSTRAK

Latar Belakang: Laporan radiologi adalah dokumen medikolegal yang merupakan komunikasi formal antara dokter spesialis radiologi (ahli radiologi) dengan dokter perujuk/dokter klinisi. Kegagalan ahli radiologi untuk mengkomunikasikan laporan radiologi yang berkualitas dan efektif sering terjadi dalam proses diagnosis pasien. Penelitian ini bertujuan untuk mengetahui pandangan klinisi mengenai pengaruh laporan radiologi terhadap manajemen pasien dalam praktek sehari-hari mereka di Propinsi Papua dan Papua Barat. **Metode:** Seratus delapan puluh empat dokter umum dan dokter *internship* (dokter magang)

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menjawab kuesioner yang disebarkan secara acak dan daring serta berisi 45 indikator yang menilai kecepatan akses laporan radiologi, pentingnya laporan radiologi, informasi klinis yang disertakan, kepuasaan klinisi, struktur, dan konten laporan radiologi terhadap manajemen pasien. Penelitian memiliki 7 variabel dengan 6 jalur yang diuji dengan metode analisis *Partial Least Squares-based Structural Equation Modeling* (PLS-SEM) pada aplikasi *SmartPLS*. **Hasil:** Analisis statistik menunjukkan bahwa laporan radiologi, informasi klinis yang disertakan, kepuasan klinisi, dan struktur laporan radiologi berpengaruh positif dan signifikan terhadap manajemen pasien sedangkan kecepatan akses dan konten laporan radiologi tidak berpengaruh signifikan terhadap manajemen pasien. **Kesimpulan:** Dokter klinisi melihat laporan radiologi sebagai dokumen medis yang memiliki pengaruh penting terhadap manajemen pasien dalam praktek sehari-hari mereka.

Kata Kunci: Dokter spesialis radiologi, dokter klinisi, laporan radiologi, manajemen pasien.

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INTRODUCTION

A radiologist's job is to analyze radiology images, similar to clinical pathologists' when looking at tissue. It implies that radiologists must be smart enough, broad-minded, and have high "detective" instinct to detect abnormalities.[1]

A radiology report (radiology expertise) is a medicolegal document, a formal communication of what has been found on radiology examination.[2] Effective communication between radiologists and clinicians through radiology reports is one of the main ways a radiologist can contribute to patient management.[3]

In the last 40 years, several studies have been conducted to assess the efficacy, efficiency, and utility of radiological reports. These studies reveal that radiology reports are indispensable for medical practice and important for effective communication between radiologists and clinicians.[4]

Delays in radiological reporting often lead to delayed patient management and poor outcomes. The Royal College of Radiologists (RCR) conducted several surveys in the UK in February 2015, September 2015, and February 2016 and revealed that there was too much backlog due to multifactorial causes, including the number of patients, human resource management, registration flow, equipment maintenance, long reports, as well as

emergency reporting and triage systems do not work properly. As a result, there will be a failure of investment in radiology which will cost more.[5]

From a management point of view, the role of radiology is very helpful in providing further management for patients, especially in remote areas such as Papua. For patients who visit a primary health facility (ex: Puskesmas), the disease they are experiencing can be treated more precisely, and if it is not needed, they will not be referred to the hospital.[6,7] The failure of the radiologist to effectively communicate radiological reports in a timely manner is a frequent finding in the diagnosis process. Potential harm to patients can be prevented by direct communication. Ineffective communication is often caused by confusing report structures, disorganization, unintelligible word choice, and even grammatical errors.[8]

In contrast to previous studies in European countries, the United States, and the Philippines, this study was conducted with the addition of a quantitative survey section on accessibility to radiology and how radiology reports affect patient management. Synergistic with the strategic issues focus of this study, the medium-term target of the Papua Government in 2019-2023 is to increase accessibility and facilities for health services.[9] This research was conducted in different demographics (in the easternmost of Indonesia, Papua, and West Papua) where the human resources (radiologists) are limited, the demand for radiological examinations is high, the number of patients is large, the modalities of information systems and radiology reporting technology are still traditional, and not-integrated into the hospital information technology system. Based on those backgrounds, how do clinicians view the importance of radiology reports in influencing patient management in daily practice.

SUBJECT AND METHODS

The object of the research is patient management in daily practice, with research variables: accessibility to radiology reports, the importance of radiology reports, clinical information, clinician satisfaction, as well as the structure and content of radiology reports.

The research population includes all general practitioners and internships in Papua and West Papua. The inclusion criteria include general practitioners and/or internship doctors who have practiced in clinics, pharmacies, health centers, or hospitals in Papua and West Papua for more than six months and are willing to be respondents. The exclusion criteria were

specialists/ subspecialists, dentists, dentists, or refusing to be respondents.

The research was carried out after obtaining ethical approval from Komite Etik Penelitian Kesehatan Jayapura No. 06/KEPK-JYP/II/2022. Research data were collected from February 2022 to March 2022. Determination of the minimum sample size using Partial Least Squares-based Structural Equation Modeling (PLS-SEM) and the inverse square root method, with the minimum number of samples at least 160 respondents.[10]

This study uses primary data from a survey using a questionnaire consisting of 45 indicators and distributed online to clinicians in Papua and West Papua. Using a Likert scale with intervals of 1-5, where 1 stated "strongly disagree" and 5 stated "strongly agree". Data were collected from 184 general practitioners and internship doctors.

The study has seven variables with six paths and uses analytical methods PLS-SEM from SmartPLS as it is complex, consists of many indicators and relationships, and can provide explanations and predictions for further research.[11] There are two types of models generated by PLS-SEM: external model and internal model. External model tests the relationship between indicators and variables, including reliability and validity. The internal model aims to establish the relationship between model components, evaluate the model's quality, and test the effectiveness and importance of coefficient analysis.

The next step is to test the hypothesis taken with the bootstrap or resampling in SmartPLS. This study uses a significance level of 0.05 and infinite degrees of freedom so that the T-table value for the one-tail test is 1.645.[12]

RESULTS

The 184 respondents who have met the research criteria can be seen in the following respondent profiles (Table 1).

Table 1 shows that all respondents work as general practitioners, as the research target. Respondents are divided between the ages of 20 to 50 years, and from the data can be assumed that the respondents have good emotional maturity. The majority have worked for more than six months and have had sufficient experience.

Table 1. Respondent Profile

Description	Category	Number	%
Job	General practitioner	179	97.3
	Intership doctor	5	2.7
Sex	Female	71	38.6

	Male	113	61.4
Age	< 21 years old	0	0
	21 - 30 years old	82	44.6
	31 – 40 years old	69	37.5
	41 – 50 years old	33	17.9
	51 – 60 years old	0	0
	> 61 years old	0	0
Working place	Pharmacy	7	3.8
	Clinic	31	16.8
	Private practice	23	12.5
	Public health care	15	8.2
	Hospital	108	58.7
Length of working	< 6 months	29	15.8
	> 6 months	155	84.2
			Total respondent = 184 (100%)

Discriminant validity is the correlation value of the variable itself with other variables. To test the discriminant validity on the outer PLS model is by measuring the heterotrait-monotrait ratio (HT/MT) between variables.[11] In table 2, the discriminant validity test with the HT/MT ratio of each variable is less than 0.9. It indicates that all indicators in the model are reliable and valid to measure their respective constructions. The next step is to run a significance test on six paths to check whether the model's influence on the variables can be applied to the population level.

Table 3 shows that four of the six hypotheses were statistically significant and have a direction consistent with the proposed hypothesis, which concludes that all four hypotheses are supported. At the same time, two paths were found to be not-statistically significant and have the opposite direction from the proposed hypothesis.

Table 2. Discriminant Validity

Variable	Clinical information	Accessibility to radiology report	Content of radiology report	Clinician's satisfication	Patient management	Importance of radiology report	Structure of radiology report
Clinical information	0.868						
Accessibility to radiology report	0.506	0.879					
Content of radiology report	0.166	0.098	0.759				
Clinician's satisfication	0.373	0.460	0.250	0.875			
Patient management	0.567	0.496	0.139	0.534	0.824		
Importance of radiology report	0.281	0.447	0.093	0.399	0.600	0.877	
Structure of radiology report	0.361	0.339	0.134	0.473	0.423	0.227	0.813

Table 3. Test Results

No.	Path	*Standardized Coefficient*	T-statistic	Significance	Result
H1	Accessibility to radiology report → patient management	0.026	0.564	Non-significant	Hypothesis not supported
H2	Importance of radiology report → patient management	0.394	6.947	Significant	Hypothesis supported
H3	Clinical information → patient management	0.332	5.571	Significant	Hypothesis supported
H4	Clinician's satisfication → patient management	0.190	3.315	Significant	Hypothesis supported
H5	Structure of radiology report → patient management	0.118	2.222	Significant	Hypothesis supported
H6	Content of radiology report → patient management	-0.019	0.360	Non-significant	Hypothesis not supported

DISCUSSION

Four paths proved statistically significant and had a positive effect on the direction of the hypothesis. According to structural model analysis, this research model shows intermediate prediction accuracy and intermediate predictive relevance. Four independent variables in this model have a considerable influence and from the strongest to the lowest are the importance of the radiology report, the clinical information, satisfaction with the radiology report, and the structure of the radiology report.

The radiology report has an important role in patient management. This is in line with Wairimu et al. (2020), which stated that around 82.2% of clinicians (n=94) read radiology reports as soon as they are available, and 77.8% of doctors (n=88) see

the radiology reports are sufficient to answer clinical questions. Clinicians believe that radiologists are the most capable professionals in interpreting radiology images. Radiologists need to redouble their efforts in communicating effectively and promptly in order to improve patient care. The radiologist is also responsible for selecting the type of procedure to be performed and part of his/her job to recommend other appropriate investigations. Research by Mehta et al. (2019) shows that nowadays, there is a tendency for radiologists to take greater responsibility in patient management as recommendations and proposed follow-up investigations are an important part.

A complete written clinical information will improve patient management in the hospital. Clinical information increases the accuracy of diagnosis to realize appropriate patient management and management. Clinical information data included in the radiology request form will indirectly reduce radiological image interpretation time and waiting time for examination results, thereby speeding up the patient management process and reducing hospitalization time.[13] The results of this study align with previous research from Wairimu et al. (2020) which stated that clinicians agree that writing more complete statements will help radiologists interpret radiological images more accurately.[2] Hospital management needs to encourage clinicians to write complete clinical information.

This study shows that clinicians are satisfied with radiological reports, which is in line with previous research from Bosmans et al. (2011), which showed that 7 out of 10 doctors were satisfied with the reports they received ($p = 0.001$). They did not find it difficult to understand what the radiologist was saying in their report.[3,14] The American College of Radiology and The European Society of Radiology recommend structured radiology reports using universal medical terminology to promote effective communication.[15,16] In January 2006, The Royal College of Radiologists emphasized the importance of clinical information, image analysis, interpretation, recommendations, and communication with clinicians and patients and recommendations for appropriate patient management. Most clinicians expect recommendations, referrals, investigations, and initial treatment suggestions in the radiology report.[17]

However, this study showed that increased radiological report content had no effect on patient management in the hospital, in line with previous research from Sistrom and Honeyman-Buck in the study of Grieve et al. (2010). Clinicians

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show different preferences depending on the case, clinical scenario, and type of examination. Short report content is preferred in normal cases, while in abnormal findings in symptomatic cases, clinicians prefer more detailed report content.[17] However, the wide variation in how radiology reports are styled is proof that an ideal format for radiology reports has not yet been found or that there is not yet a single, universally accepted format.

The use of digital technology in the medical world has pushed the field of radiology to shift from conventional radiology to digital images. In fact, data from the Association of Clinical Radiologists for the Papua and West Papua regions in 2021 shows that there is no information system and radiology technology that is integrated with hospital information systems (especially at the level of primary health services such as clinics/pharmacies), or installed on personal devices.[19] In such cases, the radiologist, and the referring physician interacts through radiology reports and multidisciplinary meetings.[2]

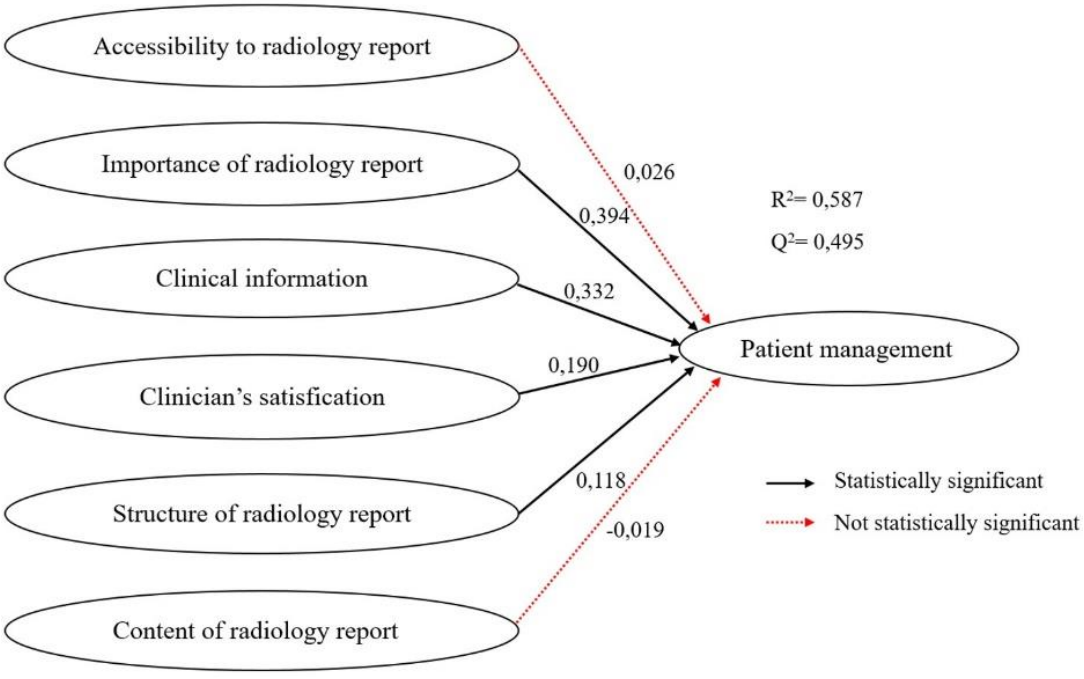

Figure 1. Empiric Model

This affects the results of research in the Papua and West Papua regions. Some teleradiology consultations are carried out by telephone/device communication without waiting for the official radiology report to be issued so that the accessibility to radiology reports has no significant effect on patient management.

For doctors in remote islands, teleradiology is one of the supporting factors for a successful diagnosis and the most influential on services. Since August 2020, there have been 41 uses of teleradiology from Raja Ampat Hospital, two of which were responded from Makassar and the rest from Sorong. A large number of teleradiology illustrates the high need for radiologists and shows the uneven distribution of radiologists in Papua and West Papua.[6,7] If the needs of users (clinicians) are evaluated properly, the system that has been designed will be suitable and satisfy the users.[20]

In general, the findings of this study suggest that timely reporting of radiological results in faster patient management, possibly a better prognosis (outcome), preventing useless examinations, and reduced length of stay.

CONCLUSION

Radiology reports have an important influence on patient management, and most clinicians were satisfied with the radiology reports they received. This study has limitations: the demographics of the area where radiologists are not evenly distributed, and the research sample is only of general practitioners. The further recommendation is to be carried out on a larger scale (national) and by using research samples from general practitioners and specialists.

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