Nurses' perception of their readiness using technology information to face Omicron according to the technology acceptance model

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ABSTRACT

Background: The emergence of a new variant of Omicron in 132 countries at the beginning of 2022 leaves concerns for nurses. The experience of nurses handling the COVID-19 pandemic makes a question mark on how prepared the profession is to deal with the spreading of the virus. This article attempts to analyze the perceptions of nurses' readiness to use information technology (IT) when facing the new Omicron variant.

Methods: The study used a quantitative approach with a descriptive cross-sectional design supported by the Technology Acceptance Model. This study used a questionnaire to assess respondents' perceptions. A total of 180 eligible respondents were involved in the study. Technology Acceptance Model (TAM) was used to measure the respondents' perception, and SPSS version 26 was used for analytical data.

Results: The results showed that 96% of nurses were vaccinated, 45% never attended COVID-19 training (External Variables), 45.6% ready with information technology facilities (Perceived Ease to Use), 47.2% were mentally/psychologically prepared, 47.2% supported by family, and 37.8% they had public support (Perceived Usefulness). Those 3 components shaped different perceptions (Attitudes) towards using the IT in which 44.4% were ready, 27.2% were in the process, 25.3% were not prepared and 3.1% had no idea (3.1%). As a result (Behavior), out of 180 population, 63.6% of participants were categorized as not ready.

Conclusion: The findings recommend that nurses using IT in dealing with Omicron 100% must be vaccinated and participate in COVID-19 training.

Keywords: Nurses' Perception, Omicron, Technology Acceptance Model.
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INTRODUCTION

The emergence of a new variant of Omicron originating from South Africa towards the end of 2021 has left its concerns for the nursing profession.[1] This is because the nursing profession, the most dominant health profession in this health system, plays a vital role in overcoming the pandemic.[2] They are at the forefront of almost all health care centers.[3] Nurses are one of the most high-risk professionals in handling COVID-19.[4] Nurses account for 60% of all health professions worldwide.[5] The large portion, on the one hand, and the shortage of nurses, on the other hand, have a major impact on every existing health service.[6] During the pandemic, the world experienced a shortage of nurses of up to 20%.[7] According to studies, those roles pose various risks.[4,8,9] From fatigue, difficulty sleeping, stress, and others, to death. A study noted that 50.5% of nurses experienced positive stress responses, and 49.5% responded negatively.[10] In another study, it was stated that nurses experienced ostracism.[11] Other risks that befall nurses cannot be separated from their roles, duties and responsibilities, work environment and facilities, and infrastructure.

In handling COVID-19 in connection with the readiness of nurses to face the new variant of Omicron, from an information technology (IT) point of view, the nursing profession is required to master certain skills.[12] Otherwise, nurses encounter various IT problems. IT training in dealing with COVID-19 is a demand but has not been given optimally.[13] Besides, nurses' workload and ethical challenges.[14] The unprepared nurses are vulnerable to exposure due to decreased physical conditions and prolonged severe stress.[15] The obstacle poses nurses with a dilemma between prioritizing the profession's interests by providing optimal nursing services or prioritizing personal, family interests, public, and patients' interests. Not to mention the COVID-19 volunteer nurse recruitment system, which has not maximized the use of IT, the efficiency and effectiveness of the recruitment process.[16] In a study of nursing students' involvement with computers, 77% of students gained experience operating a computer outside of the workplace, and 33% had minimal experience.[17] As many as 84% have access to computer use and 26% do not have

it. The interest in nursing IT in some universities has been going on for more than two decades.[18] The development of information technology in the field of nursing indicates that nursing science technology is trying to keep pace with the dynamic development of IT.[19]

This article attempts to analyze the perception of nurses' readiness in Indonesia regarding the use of IT in dealing with the new variant of Omicron. The objective is to measure the nurses' readiness that needs emphasizing and improvement so that they can be used as materials to improve the nursing services during COVID-19 pandemics. The method used in this research was quantitative with a descriptive cross-sectional design supported by the Technology Acceptance Model (TAM). The implication is that it will provide an added value to the nursing management in dealing with the spreading threat of new variants of Omicron.

METHODS

This study used a quantitative method with a descriptive cross-sectional design. The aim is to see the extent of nurses' perceptions of their IT readiness in dealing with the new variant of Omicron. The design was chosen because of the different perceptions of nurses regarding the mastery level of the use of information technology in preparing them for the new variant of Omicron. The study began by distributing validated questionnaires to 337 online respondents. It was conducted from 20 December 2021 to 10 January 2022. The population was taken randomly from 337 Indonesian nurses (n=337) of Sumatera, Java, Papua, West Papua, Sulawesi, Maluku, and other regions. The inclusion criteria were Indonesian nurses working in health care facilities, such as public health centers, hospitals, and clinics in five major islands in Indonesia (Sumatera, Java, Papua, Sulawesi and Maluku). The exclusion criteria were out of those health care facilities and those five islands.

There were three groups of data that we collected in the study. The first was demographic data which contained age, gender, occupation, work experience, and domicile. The second group was the readiness data of medical-related information, namely the status of COVID-19 vaccination and training on COVID-19. We put the first and second data in a table and explained them descriptively. The third group was the perception data which was analyzed using the Technology Acceptance Model (TAM). The SPSS version 26 was used for statistical analysis with separated demographic and questionnaire data.

Data Collection

Data was collected through questionnaires covering demographic data (age, gender, place of work, length of work, vaccination status, and training), while nurses' readiness in using technology used TAM analysis. The validated questionnaire was taken from the Evaluation of Hospital Management Information Systems research using the Technology Acceptance Model (TAM) Method in the Inpatient Section of the Abepura Jayapura Hospital, Papua Province.[20] The primary data collection we used was a questionnaire distributed with the help of Google Forms. A total of 11 questions include 5 demographic questions (age, gender, place of work, length of work, origin), two questions about vaccination status and training, and 4 questions covering perceptions of readiness (facilities and infrastructure, mental psychological, family support, and public support).

Data Measurement

Data measurement was carried out using a self-administered questionnaire. Questionnaires were distributed to 337 respondents. They were all practicing nurses who worked in hospitals (n=87 or 48.3%), clinics (n=36 or 20%), and public health centers (n=57 or 31.7%). The eligible population that fulfilled the inclusion requirements (hospital nurses, clinics, and health centers) were 180 respondents after being processed by Statistical Package for the Social Sciences (SPSS) version 26 for Windows. At the same time, the ineligible ones were 57 nursing students and lecturers. The sampling technique was simple random sampling with a total sample of 180 respondents. The number of samples was determined through the *R* program with a confidence level of 95% and a margin of error of 5%. The independent variable was the nurses' perception of readiness, and the dependent variable was the nurses.

Technology Acceptance Model

A supporting tool was needed to measure the perception of nurses' readiness to use the IT, namely the Technology Acceptance Model (TAM). Many researchers in the healthcare sector have used the model.[21–23] What we measured were the External Variables, Perceived Usefulness (U), Perceived Ease to Use (E), Attitude toward using (A), and the final result is behavior (B).

In the study, what we included in the External Variables category were the status of nurses' vaccination and COVID-19 training that affected the nurses' readiness to use the technology. The IT facilities and infrastructure were under the Perceived Ease to Use (E) category. Mental/psychological readiness, family and community support were in Perceived Usefulness (U). Those two aspects (E and U) would affect the Attitude towards using the IT (ready, ongoing, not ready, and no idea) before coming to a conclusion which was the nurses' behavior (B) either ready or not.

RESULTS

Table 1 above shows that the majority of respondents are female nurses (70.6%), aged less than 40 years (52%), and working in hospitals (48.3%). Most had more than five years of experience (54.4%). The three dominating regions are Sumatra (42.8%), Papua, and West Papua (38.3%) (Table 1). Figure 1 below shows that there are still nurses who have not received complete vaccinations (n=7 or 4%) as an External Variable of TAM. Figure 2 above shows that all respondents have never received training on COVID-19 (n=180 or 100%) as an External Variable (TAM).

Table 2 above shows the readiness of nurses in using IT to face the new variant of Omicron based on TAM. Broadly, nurses perceive that they were ready with the existing IT facilities and infrastructure (n=82 or 45.6%), most of them mentally/psychologically perceived ready (n=85 or 47.2%), and perceived they received support from their families (n= 85 or 47.2%) and communities (n=68 or 37.8%).

DISCUSSION

The shortcomings of this study are compared to a large number of Indonesian nurses across the archipelago; only a minimal population joined the research. In addition, the focus of nurses' readiness was not discussed in detail, i.e., types of IT skills, the content of COVID-19 training, and the vaccine. Previous researchers have mostly addressed nurses' IT experience in various healthcare settings.[21,23,24] However, the gaps have helped to provide additional insight into this study.

The results of the research found 3 issues of nurse perception that need to be underlined and discussed. They greatly affected the readiness of nurses to use IT to handle the new variant of Omicron. The results show that most respondents (96%) had been vaccinated, but 4% had not. Regardless of their reasons for not having the vaccination completed, the study signal that there are still nurses who have not met the achievement target. Nurses know that health workers are the main priority that should be 100% vaccinated.[25] Vaccination for health workers in Indonesia has been regulated by the Government through the Ministry of Health, especially for healthcare workers who provide direct health services to patients.[26] Vaccine status of healthcare workers influences aspects of COVID-19 prevention measures.[27] Vaccination is an absolute and concrete requirement that health workers must meet. In Indonesia, during the COVID-19 pandemic, obtaining a vaccine is a working condition that must be proven by showing a vaccine card as evidence of having been vaccinated.[28] The vaccination application states the status, accessed via mobile phone, laptop, or computer. The basic ability to access the web is recommended to nurses who provide healthcare services to COVID-19 patients. Without those skills, it is difficult for nurses to provide health education to individuals, families or communities because IT skills are integral to the nursing services.

The study shows that 100% of respondents have never attended COVID-19 training. The role of COVID-19 training for health workers is crucial, including the need for regular IT training.[29] Nurses have a unique role that distinguishes them from other health professions where nurses are involved in preventive, curative, and rehabilitative efforts.[30] In the preparation program, nurses, must prevent the spread of new variants of Omicron. The learning need can be met using IT, at least through online learning.[31] Besides clinical skills, IT online-related skills are important, considering that nurses will be involved in data analysis and reporting. The comprehensive COVID-19 training can be carried out at any healthcare service center at the provincial level by inviting regional representatives or professional organizations (OP). The regional representatives can help transfer the materials to their colleagues.

By implementing that system, nurses can be appointed as coordinators for handling COVID-19, considering their central role in healthcare services. Another advantage is that by establishing the center's nurses, accurate statistical data can be obtained through focal points, which are nurses. The registered nurses who underwent COVID-19 training who can operate IT will help reduce the incorrect information in data entry. The rapid development of information technology (IT) related to COVID-19 cases in the healthcare sector and medicine has a major impact on nursing service procedures.[32,33] Nursing professional standards (nursing process) include assessment, planning, implementation, and evaluation.[34] In the assessment, the patient's identity, chief complaint, medical history, and general examination results require computer data entry. After the assessment stage, nurses need to document the client's or patient's examination plan, whether it is an antigen swab or Polymerase Chain Reaction (PCR), in which all the data to enter is connected to a computer device.

Table 1. Baseline characteristics of respondents.

Variables	Total (N=180)	Percentage (%)
Gender		
Males	53	29.4
Females	127	70.6
Age (Years)		
< 40	94	52.2
≥ 40	86	47.8
Workplace		
Hospitals	87	48.3
Clinics	36	20.0
Public Health Centers	57	31.7
Work Experience (Years)		
1-5	82	45.6
≥ 5	98	54.4
Domicile		
Sumatera	77	42.8
Java	26	14.4
Papua and West Papua	69	38.3
Other Islands	8	4.5

Table 2. Nurses' Perception of their Readiness against New Varian Omicron.

Variables	Behavior, n (%)				Total
	Ready	On-going	Not yet ready	No idea	
IT Facilities and Infrastructure (Perceived Ease to Use)	82 (45.6)	68 (37.8)	8 (4.4)	22 (12.2)	180
Mental/ Psychology (Perceived Usefulness)	85 (47.2)	52 (28.9)	43 (23.9)	0	180
Family Support (Perceived Usefulness)	85 (47.2)	45 (25.0)	50 (27.8)	0	180
Public support (Perceived Usefulness)	68 (37.8)	31 (17.2)	81 (45.0)	0	180

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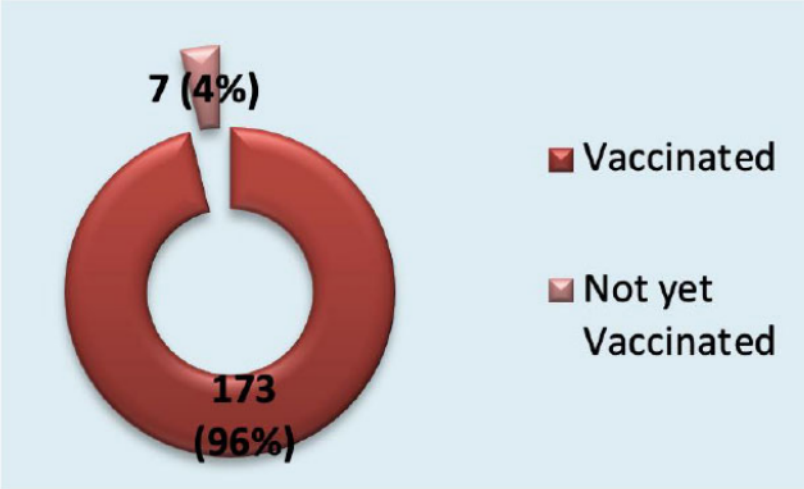

Figure 1. Vaccination status.

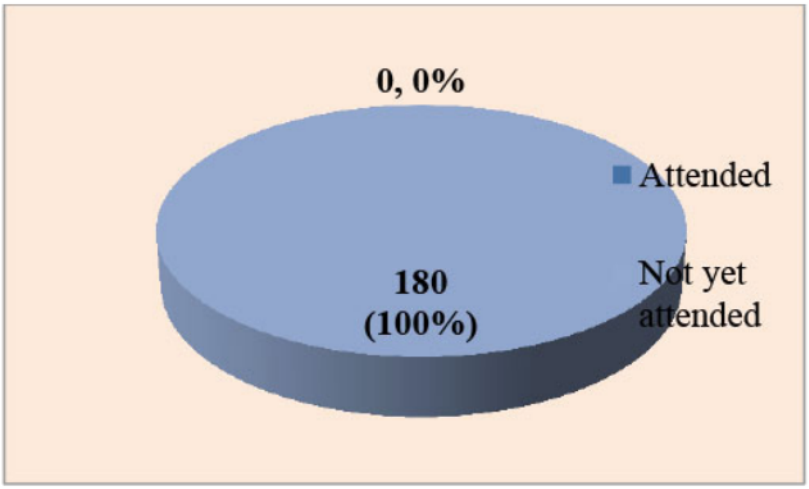

Figure 2. Training on COVID-19.

They store the patient's all information, and the final report of the examination can be transferred to the patient/client's mobile phone (WhatsApp). The next stage is implementation (intervention), in which all treatment/nursing interventions are kept electronically. The last stage is the evaluation stage, in which the outcomes of nursing interventions should be reviewed and well documented.

The four stages in the nursing process described above show that the primary role of clinical training combined with IT is mandatory for nurses in handling COVID-19 patients. The involvement of IT training proves that the future development of nursing should align with and relies on IT.

This study's results indicate that nurses' perception of their IT facilities-related readiness is 45.6%. Many studies discussed the readiness of nurses in efforts to prevent and control COVID-19.[14,35,36] Their weaknesses are not specifically stated in IT nursing during COVID-19. The role of IT facilities and infrastructure related to the nurses' readiness to anticipate the possibility of the expansion of new variants of Omicron needs to be considered. More concretely, nurses' readiness should include the following:

Firstly, the provision of education. The role of IT in nursing education is so important[19], from teaching materials, delivery of teaching materials, references, research tools and equipment, learning evaluation systems and other aspects of the teaching and learning process all require IT support.[19,37] In the era of globalization, nursing students' learning emphasis on IT competencies is everyone's need.[17] Mastery of IT will help their independence in solving solutions because, with IT assistance, nursing students can communicate with lecturers, fellow students to clients.[38] During the COVID-19 pandemic, many nursing students participated as COVID-19 volunteers.[39] Enriching knowledge and sharpening skills using IT facilities raises their readiness, especially in the event of an Omicron outbreak.

Secondly, the workload. According to the International Council of Nurses (ICN), during the COVID-19 pandemic, there was an increase in the workload of nurses.[40] That fact was supported by various studies on similar issues.[40] The workload results in stress or mental pressure, often decreasing the nurse's condition and then getting sick.[15] Even the death rate in health professionals due to workload is unavoidable.[41] Moreover, many nurses are involved in work related to IT. Therefore, intensive research is needed regarding the nurses-patients ratio. This is where the important role of IT facilities and infrastructure exists and concretely supports the nurses' readiness during the pandemic.

The weakness of this study is that it was not supported by direct research involving more population with more nursing IT-related components in different regions of Indonesia. Therefore, more intensive studies are essential.

CONCLUSION

The study results from five regions of Indonesia showed the unpreparedness of Indonesian nurses up 63.6%. TAM analysis indicates the perception of nurses' unpreparedness includes vaccines and training status as external variables, minimal readiness of IT facilities (perceived ease to use) and

less than optimal mental/psychological readiness, and limited family support and public support (perceived usefulness). We clinically recommend the need for achieving the 100% vaccination for nurses and technically suggest COVID-19 training supported by the use of IT in dealing with Omicron.

ETHICAL CLEARANCE

The study was conducted after obtaining the consent of the client. It was started after approval from the Health Research Ethics Committee of the Ministry of Health, Jayapura, Ministry of Health No.081/KEPK-J/XII/2021.

CONFLICT OF INTEREST

The authors did not have any conflict of interest during the research process.

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AUTHOR CONTRIBUTION

All authors equally contribute to the study from the conceptual framework, data acquisition, data analysis, until reporting the study results through publication.

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