

Barriers and Enablers of Nurses' Adoption of Digital Health Technology to Facilitate Healthcare Delivery in Resource-Limited Settings

Million Bimerew

*University of the Western Cape, Cape Town, Western Cape
province, South Africa*

ORCID ID: Million Bimerew, <https://orcid.org/0000-0002-3516-9709>.....

Abstract. The study investigated barriers and enablers of nurse's adoption of digital health technology to facilitate the delivery of healthcare in resource-limited settings. Using a self-administered questionnaire, data were collected from ninety-three nurses. Descriptive statistics were conducted to analyse and summarise the data. The study found that barriers to digital technology use included workload, time constraints, limited access to computers and a lack of skills in searching for information, while positive attitudes and confidence were enabling factors. Providing access to technology and skills training will improve the adoption of technology in healthcare delivery by nurses.

Keywords. attitudes, barriers, enablers, knowledge and skills, nurses, technology adoption

1. Introduction

Recent studies have shown that nurses working in resource-limited areas have little or no access to information technology to facilitate the delivery of patient care [1, 7, 13]. Health information systems are fragmented in many resource-limited countries, including South Africa. Various barriers are hindering the use of digital health technology, such as lack of infrastructure, cost, skilled human resources, and system reliability [2]. This study aimed to investigate the barriers and enabling factors to adopt digital health technologies among nurses in the Western Cape.

2. Methods

To determine the barriers and enablers of nurse's adoption of digital technology in healthcare, a self-administered questionnaire which included scales to measure attitudes, knowledge, skills, and barriers were administered. The study was conducted in the primary health centres in the Cape Town metropole areas in the Western Cape, South Africa. Twenty-three primary healthcare centres were randomly selected from forty-two primary healthcare centres and all categories of nurses who worked at the primary healthcare centres for more than six months were included in the study. Agent nurses and other health professionals were excluded from the study. Convenient sampling was used to recruit the respondents and questionnaires were distributed to 130

nurses with a one-week turnaround and follow-up phone calls. The data were cleaned, coded, and analysed with the Statistical Package for the Social Sciences (SPSS Version 27) program. Descriptive and inferential statistical analysis were conducted to generate the summary of the findings [10]. Ethical approval of the study was received from the Biomedical Ethics Committee of the University of the Western Cape (REF. BM18/3/2).

3. Results

Ninety-seven ($n=97$) completed questionnaires were returned and four questionnaires were discarded due to incompleteness. Then respondents were mostly female (86%), with an average age of respondents was 44.71 ($SD=9.54$) years, and 19.25 years in the profession. Less than half of the respondents (44.2%) had a computer at home and 84.6% of respondents did not have knowledge and skills in Internet searching. Nearly all of the respondents (84.9%) did not have Internet access, 74.2 % did not have access to a computer and most of the respondents did not have training on how to search health information on the Internet. Less than half (47.2%) of the respondents never used the Internet in the last three years, and 84.6% lacked experience in computer applications. Over half of the respondents (58.1%) could not utilize digital health technology to search for evidence-based information, 67.3% did not know there is health databases exists, and closer to sixty percent never used social media, such as Facebook and Twitter.

Barriers

Workload and time constraints were identified as barriers by 92.5% of the respondents. Negative attitudes were a barrier with 55.9% of the respondents reported that searching health information on the Internet can reduce nurse-patient interaction, 36.6% believe Internet use during working hours decreased productivity and nearly a quarter of respondents (20.4 %) had a fear of using computers. There was a significant difference in rating barriers to access digital health technology use with professional nurses scoring lower than enrolled nurses respectively (5.1 vs 7.3, $U=2.3$, $p=.019$).

Enabling Factors

Enabling factors included positive attitudes with more than 75% of the respondents reporting positive attitudes toward the use of digital technology. Nearly all respondents (95.7%) supported the use of digital health technology for the registration of patient data, and sharing information related to treatment and care within the health team members and patients. In addition, most respondents (95.7%) agreed that digital health technology increases the accuracy of patient data recording, and increases the quality of the intervention, treatment, and patient care plan. More than two-thirds (77.4%) of respondent agreed that wireless Internet should be used in their healthcare practice, while 38.7% disagreed with the statement that effective patient care cannot be provided without using digital health technology. No statistically significant differences were found in attitude scores for gender or profession.

Usage of digital health technology

In contrast with the positive beliefs about the usefulness of digital health technology, 62.4% use internet technology to search for health information to educate patients, but only 46.2% of the respondents reported using computers to capture patient data, to plan patient care and discharge.

4. Discussion

The study highlighted the challenges currently impeding the applications of digital technology in clinical practice. Though there has been an improvement in Internet access at health facilities, most respondents' lacked knowledge of digital health technology and Internet searching skills, with forty seven percent never using the Internet in the last three years. A major factor contributing to this was that computer access was restricted to health managers. A second issue is that the ability to use digital health is determined by the familiarity of the users with technology [11], but nurses are lagging in digital technology as they often have insufficient or low level of digital training [4] in resource-constrained countries, such as South Africa. In this study two-thirds of nurses did not have knowledge about health databases, where most evidence-based health information is stored for users. This is supported in other studies with reports of low levels of digital literacy among nurses in Sub-Saharan Africa [6]. Most nurse's digital knowledge was limited to cellphone use for personal use including email, text and WhatsApp messages. To transform and integrate the use of digital technology into patient care, nurses require to be proficient and competent [12].

Data from the present study identified that workload and time constraints were among the common barriers to use digital health technology. This may be due to the lack of understanding that the use of digital technology especially electronic health systems can simplify administrative workloads, by minimizing the time spent looking for the lost or misplaced paper-based recordings, and conducting online consultation on minor cases could minimize patient loads. Contrary to the above finding, previous scoping review study indicated that many nurses believed that technologies could save their time [8] and can have a positive impact on nursing workload, depending on context [8]. In this study few nurses believed that the use of digital health technology during working hours could interfere with nurse-patient interaction and reduces productivity. However, research on the effect of technology use to nurse-patient interaction is generally limited, probably future study to focus on the impact of technology use has on nurse-patient interaction.

A second major barriers were that over two-third of nurses lacked access to computers and the Internet, had poor connectivity. A similar study identified that infrastructure, technological devices and technical barriers were frequently described among nurses as barriers [8]. Lastly, inadequate training in digital health was a major barrier. Training and educating healthcare workers play a significant role in the implementation of digital health technology [8] and is crucial in the adoption of digital technology in health care delivery. Previous studies [6] reported a lack of technical skills, and digital literacy training in the use of health technologies as well as awareness of the benefits of technologies to healthcare deliveries are among the barriers. A lack of digital skills contributed to feelings of increased incompetency as a result, nurses in resource-limited countries have difficulties adjusting to the digital health technology practices.

Positive attitudes were a major enabling factor with more than 75% of the nurses reporting positive attitudes toward the use of digital technology in the registration of patient data and patient treatment. It is encouraging to see more and more nurses are gradually understanding the relevance of digital health technologies for nursing and some nurses are adopting digital health technologies in the healthcare where it accessible for the use. This finding is consistent with previous study [11] that nurses had positive attitudes toward health information technology. The study had also highlighted positive attitudes enhance the willingness of nurses to use digital technology [11]. In this study, nurses reported that digital health technology increases the accuracy of patient data recording, and improves the quality of intervention, treatment, and care of patient; and the belief that computer technology is a useful tool for patient information sharing, for accurate recording and processing of patient data, which could increase the quality of patient care.

5. Limitation

The use of a self-reported questionnaire often has self-reflection bias. The study had small sample size and a nonrandom sampling technique was used, which could constitute a threat to the external validity of the results, and the findings may not be generalizable to a similar population and context. The study did not look at the experiences, the cost implications to those nurses use their own data, and policy around the adoption of technology into healthcare practices.

6. Conclusion

Organizational barriers, such as digital health technology infrastructure, shortage of connectivity and workload, and individual barriers, such as low level of digital knowledge and lack of training are the main factors for the low level of digital health technology use. Nurse's positive attitudes toward digital health technology use and understanding the usefulness of digital health technology to improve quality of patient care are some of the enabling factors. To address the challenges of digital health technology use, government planning is important to provide digital skills training for nurses and improve the accessibility of internet technology and computer devices. Further large-scale studies, which includes all healthcare providers, is necessary to strengthen the current findings and influence local government to support the application of digital health care for better evidence informed health care decision and management.

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