Current Status and Implementation Challenges of Electronic Clinical Nursing Records for Students

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Abstract

This study examined the current status and implementation challenges of electronic clinical nursing records among nursing students in Japan. A survey of 400 nurses at clinical training facilities established that only 42.3% (n=169) of the facilities permitted nursing students to use digital devices during clinical training. Significant variations were observed across healthcare settings, with general hospitals comprising the largest group (52.1%) that allowed digital device use. Most facilities permit only offline entry of clinical records and self-learning materials, thus indicating a cautious approach to digitalization. Wi-Fi usage policies varied considerably; 24.3% of facilities prohibited Wi-Fi entirely, while 43.2% permitted usage under specific conditions. The primary implementation challenges were related to information security concerns, although opportunities exist for phased implementation approaches beginning with offline applications. The gap between digitally prepared nursing students from the GIGA School Initiative era and current clinical environments highlights the urgent need for strategic planning to advance digitalization. To better prepare future nursing professionals for increasingly digitalized healthcare environments, this research provides foundational data for developing effective implementation strategies, including security guidelines, digital literacy enhancement for clinical nurses, and strengthened collaboration between educational institutions and clinical facilities.

Keywords: Nursing education, electronic documentation, clinical training, digital transformation, information security

1. Background

In recent years, digital transformation (DX) has progressed rapidly in healthcare settings and educational fields, and its influence has expanded, particularly in nursing education. The World Health Organization (WHO, 2020) published the state of the world's nursing 2020: investing in education, jobs and leadership," which emphasizes that the utilization of digital technology (DT) in nursing education is essential for the future development of nurses' competencies. In Japan, the Ministry of Health, Labour, and Welfare has been promoting initiatives for ICT utilization in nursing education (MHLW, 2022).

Nursing students must accurately understand patients' conditions during clinical training to provide appropriate nursing care, and clinical training records are necessary to visualize these processes. Such records serve as an important tool for students to reflect on their learning and conduct self-assessment, while simultaneously providing a foundation for faculty and instructors to evaluate student growth. However, traditional paper-based recording methods present challenges in terms of information management and sharing, consequently raising concerns regarding wasted time and potential information leakage.

The Japanese Nursing Association (2021) has highlighted the importance of utilizing digital technology in nursing practice in its revised nursing practice standards. Furthermore, the recent coronavirus disease (COVID-19) pandemic has emphasized the necessity of digitalization in nursing education. The MHLW's "Nursing Basic Education Review Committee" also recommends the introduction of teaching methods utilizing ICT (MHLW, 2019).

Therefore, the digitalization of nursing students' clinical training records has garnered attention as a solution to these challenges. Digitalization facilitates the storage and retrieval of records, thereby enabling swift data analysis and sharing. In addition, data obtained from clinical training records may contribute to improving educational curricula and enhancing the quality of nursing practice.

However, the implementation of electronic clinical training records requires the understanding and cooperation of hospitals that accept nursing students in clinical training. Understanding how these hospitals perceive and conceptualize the digitalization of nursing students' clinical training records is extremely important in determining the direction of future initiatives. In particular, healthcare-specific challenges such as the confidentiality of medical information, protection of patient privacy, and response to security risks need to be considered.

This study investigated how hospitals accepting nursing students for clinical training perceive the digitalization of the aforementioned training records and clarified their current status and perspectives. Specifically, we aimed to contribute to the promotion of DX in nursing education by elucidating the actual record management practices in hospital nursing departments, their awareness of digitalization, challenges for implementation, and expectations.

2. Methods

2.1 Research Objective

To propose effective implementation strategies for digitizing clinical training records in nursing education, this study investigated the perceptions of nurses in clinical training facilities regarding the digitalization of such training records, clarify the current status of digital device usage, identify differences in perceptions based on facility types, and elucidate the advantages and challenges from the perspective of clinical nurses.

2.2 Definition of Terms

1. Nursing Clinical Training Records: Documents recording knowledge, skills, and patient interactions acquired by nursing students during clinical training. These included patient assessment data, care plans, implemented nursing interventions, outcome evaluations, and reflective records of learning experiences. The records presented here can serve as educational tools.

2. Digitalization of Nursing Records: The conversion of traditional paper-based records to a digital format for electronic management. This includes not only the transition from paper to electronic format but also the implementation of systems that enable data input, storage, and sharing through digital platforms.

3. Nursing Education: Educational curricula and programs for professional nursing development. These include theoretical instruction in classrooms, skill training in simulation laboratories, and supervised clinical practices in healthcare settings. Nursing education aims to develop competent professionals with the knowledge, skills, and attitudes necessary to provide safe, effective, and compassionate care to patients in diverse healthcare environments.

4. GIGA School Initiative: This national educational policy initiative was launched by the Japanese Ministry of Education, Culture, Sports, Science, and Technology in 2019. It aimed to provide every student with one computing device and establish high-speed internet infrastructure in all elementary and secondary schools by 2023. GIGA stands for “Global and Innovation Gateway for All,” representing Japan’s commitment to integrating digital technology into education to foster 21st-century skills and prepare students for a digitalized society (Ministry of Education, Culture, Sports, Science and Technology, 2019).

5. Digital Transformation (DX): This refers to the comprehensive integration of digital technology into all areas of business, education, and healthcare which fundamentally changes how organizations operate and deliver value to their stakeholders. In the healthcare context, DX encompasses the adoption of electronic health records, telemedicine, digital communication systems, and data analytics to improve the quality of patient care, operational efficiency, and decision-making processes. DX represents not only the digitization of existing processes but also a fundamental rethinking of how technology can enhance and transform traditional practices (Ministry of Health, Labour and Welfare, 2020).

2.3 Methods

1. Survey period and subjects
Survey period: May 1–31, 2024
Survey subjects: 400 nurses at hospitals accepting training

2. Data gathering and analysis method
The questionnaires were distributed online. The questions covered topics such as nursing students' awareness, expectations, and concerns regarding the digitalization of training records. Responses were gathered in a multiple-choice format.

Only nurses who answered "our facility allows nursing students to use digital devices (computers and tablets) in the hospital" were extracted from the obtained data, which were tabulated and analyzed to understand the situation. Specifically, the frequency of responses to the choices was calculated, the proportion of each item was determined, and cross-tabulation was performed to clarify trends in nurses' awareness and attitudes.

2.4 Ethical Considerations
The objectives and content of the research, as well as the freedom to participate, were thoroughly explained to the nurses participating in the survey. To protect privacy, responses were provided anonymously so that individuals could not be identified, and personal information and response content were strictly managed. In the research results, measures were also taken to prevent individuals from being identified. Data handling was restricted to a limited number of members of the research team with access privileges.

This study was approved by the Shubun University Research Ethics Review Committee (2023SR003).

3. Results

3.1 Overview of Research Subjects
Among 400 nurses working in facilities that accept nursing students for clinical training, this study focused on 169 nurses currently working in hospitals that permit them to use digital devices (computers/tablets). The remaining 231 nurses worked at facilities that did not permit digital device use by nursing students at the time of this study. Responses from these nurses were excluded from the analysis to examine the current practices and perceptions of digitally enabled facilities.

The breakdown of the types of facilities where the participants worked was as follows: 88 (52.1%) in general hospitals, 17 (10.1%) in advanced treatment hospitals, 13 (7.7%) in psychiatric hospitals, and 13 (7.7%) in clinics. The other category includes facilities covered by long-term care insurance and health facilities.

3.2 Perceptions and Actual Conditions of Bringing in Digital Devices
When nurses working at facilities that allow digital devices to be brought in were asked about the "specifics of permitted use" when nursing students use such devices within the facility, the responses predominantly indicated that offline text reading and record-keeping were recommended (Table 1).

Table 1

Specifics of Permitted Use by Nursing Students of Digital Devices (Computers/Tablets) in Hospitals

Spesifics	Cases (N)	Percentage (%)
1. Students are allowed to use Wi-Fi independently at any time and location	34	20.1%
2. Students are allowed to use Wi-Fi independently at designated times and locations	39	23.1%
3. Students are allowed to use Wi-Fi at any time and location if a faculty member is present	15	8.9%
4. Students are allowed to use Wi-Fi at designated times and locations if a faculty member is present	21	12.4%
5. Students are allowed to use Wi-Fi independently only when contacting their supervising faculty members (instructors)	6	3.6%
6. Students are allowed to use Wi-Fi if a supervising faculty member is present, but only when contacting their supervising faculty members	19	11.2%
7. Wi-Fi use is not permitted at any location within the facility	41	24.3%
8. Other	14	8.3%

When asked about Wi-Fi usage, “Wi-Fi use is not permitted at any location within the facility” was the most common response, with 41 cases (24.3%), followed by “students are allowed to use Wi-Fi independently at designated times and locations,” with 39 cases (23.1%), and "students are allowed to use Wi-Fi independently at any time and location," with 34 cases (20.1%).

The perceptions of each facility type for each specific permission are listed in Table 2.

In the breakdown of permission for offline use, “keeping training records and self-study notes offline” was the most recommended use. By facility type, facilities covered by long-term care insurance were the highest at six cases (66.7%), followed by advanced treatment hospitals at 10 cases (58.8%), and general hospitals at 40 cases (45.5%). This variation may reflect differences in digital infrastructure and risk management approaches across facility types. Long-term care facilities often have less comprehensive IT infrastructure than acute care hospitals, making offline solutions more practical and secure for initial digital implementation (Ministry of Health, Labour and Welfare, 2020). Advanced treatment hospitals, despite having sophisticated medical technology, may prioritize cautious approaches to student digital device use owing to heightened security concerns. These concerns may relate to sensitive patient data and complex clinical environments. Clinics were the facilities that most recommended “reading digital textbooks (e-texts) offline” with nine cases (69.2%).

Table 2

Specific Permissions for Each Facility (Multiple Answers Allowed)

Facility type	Total	Reading digital textbooks (e-text) online	Reading digital textbooks (e-text) offline	Keeping training records and self-study notes online	Keeping training records and self-study notes offline	Other
General hospital	88	26	25	17	40	11
	100.0%	29.5%	28.4%	19.3%	45.5%	12.5%
Advanced treatment hospital	17	4	5	1	10	3
	100.0%	23.5%	29.4%	5.9%	58.8%	17.6%
Regional medical care support hospital	8	1	3	2	0	3
	100.0%	12.5%	37.5%	25.0%	0.0%	37.5%
Mental hospital	13	3	3	2	5	2
	100.0%	23.1%	23.1%	15.4%	38.5%	15.4%
Clinic	13	7	9	5	6	1
	100.0%	53.8%	69.2%	38.5%	46.2%	7.7%
Birthing center	2	0	1	0	1	0
	100.0%	0.0%	50.0%	0.0%	50.0%	0.0%
Home nursing station	7	4	2	4	3	0
	100.0%	57.1%	28.6%	57.1%	42.9%	0.0%
Facility for long-term care, etc	9	1	2	3	6	0
	100.0%	11.1%	22.2%	33.3%	66.7%	0.0%
Social welfare facility	1	1	0	0	0	0
	100.0%	100.0%	0.0%	0.0%	0.0%	0.0%
Prefecture	1	0	0	0	0	1
	100.0%	0.0%	0.0%	0.0%	0.0%	100.0%
Municipality	4	1	0	4	1	0
	100.0%	25.0%	0.0%	100.0%	25.0%	0.0%
Place of business	3	0	1	0	2	0
	100.0%	0.0%	33.3%	0.0%	66.7%	0.0%
Other	3	1	1	1	1	0
	100.0%	33.3%	33.3%	33.3%	33.3%	0.0%

The high percentage of clinics recommending reading digital textbooks offline may be attributed to their characteristics. These facilities operate on a smaller scale and have less comprehensive IT infrastructure, making offline access of digital resources more manageable and cost-effective than online systems, which require robust network security and maintenance (Japan Nursing School Council, 2024).

Conversely, at home nursing stations, both “reading digital textbooks (e-texts) online” and “keeping training records and self-study notes online” were permitted, with four cases (57.1%) each.

This higher acceptance of accessing digital resources online aligns with recent digitalization initiatives in home-visit nursing services. The Ministry of Health, Labour and Welfare's notice regarding the digitalization of home-visit nursing claims and online eligibility verification beginning in 2024 has likely accelerated digital adoption in these settings (Ministry of Health, Labour and Welfare, 2023). Home nursing stations, operating in community-based care environments, may also have more flexibility to implement digital technologies than hospital-based facilities with stricter institutional policies and security protocols.

4. Discussion

Since only 169 of the 400 nurses (approximately 42.3%) work at facilities that permit nursing students to use digital devices, we can conclude that facilities implementing digital device utilization for nursing students in Japan have not yet reached half. This result reflects the progress of digitalization in Japanese medical institutions. According to a survey by the MHLW, the adoption rate of electronic medical records varies significantly by hospital size, reaching 91.2% in hospitals with 400 or more beds and remaining at 48.8% in those with fewer than 200 beds, thus indicating disparities in healthcare digitalization (MHLW, 2020).

While healthcare digitalization is globally recognized as important for modernizing medical education, Japan's 42.3% implementation rate suggests that the country faces unique challenges that warrant further investigation in the healthcare education context.

However, students receiving nursing education benefitted from the GIGA School Initiative, implemented in 2022, which provides each student with one computing device. Therefore, "considering students who have studied in such learning environments are entering nursing programs, an urgent need exists to consider the development of learning environments suited to these students, specifically, the digitalization of nursing education institutions" (Japan Nursing School Council, 2024).

Additionally, while over half of the survey respondents worked in general hospitals, such hospitals without specific specializations and with 20 or more beds are the most common in Japan. Therefore, many of the facilities used by nursing students for clinical training are likely to be general hospitals. Consequently, we need to consider response strategies to understand that only approximately 40% of facilities support the introduction of digital devices.

There are significant economic barriers to implementation, particularly in smaller facilities. As noted in the Japan Nursing School Council (2024) survey on digital transformation in nursing education institutions, the economic burdens on both educational institutions and clinical facilities present major DX implementation challenges. Initial investments include hardware procurement, software licensing, system integration, and cybersecurity measures. Infrastructure challenges, particularly inadequate broadband connectivity in rural areas and cybersecurity requirements, further complicate DX implementation for smaller facilities with limited budgets and resources.

Regarding Wi-Fi usage, 24.3% responded that "Wi-Fi use is not permitted in any area within the facility," which indicates a limiting factor for digital device implementation in clinical training. This likely stems from concerns about security risks in medical institutions. The MHLW's (2024) "Guidelines for Safety Management of Medical Information Systems" include countermeasures against cyber-attacks on medical institutions and data protection, ultimately emphasizing the importance of information security.

Regarding information ethics in digitalizing nursing students' clinical records, Sumai and Ishii (2024) note that "digitalized clinical records may contain not only patients' but also students' personal and confidential information from clinical facilities." They also warn about digital-specific information leakage risks, stating that "if information leaks, it is easily duplicated and disseminated, potentially causing greater losses than with handwritten records." As countermeasures, they emphasize the importance of maintaining awareness as record

management supervisors and implementing “thorough security measures,” “appropriate file sharing settings,” and “regular deletion of unnecessary files.”

However, our findings indicate that relatively many facilities (43.2% = 23.1% + 20.1%) permit Wi-Fi use at designated times and places, which suggests the possibility of digital device implementation under certain conditions. Kitae (2024) reports on the digitalization of clinical records using Learning Management Systems, beginning with offline use in limited locations and times and gradually transitioning to online environments, and suggests the effectiveness of such a phased approach.

Furthermore, the results clarified that online usage was permitted at home-visit nursing stations. This background includes the notification from Japan’s MHLW (2023) that electronic claim processing for home-visit nursing (medical insurance claims) and online eligibility verification for home-visit nursing would begin in 2024. The timing of the expanding role of DT in nursing education and the digitalization of home-visit nursing are considered factors that contribute to greater acceptance.

This survey also revealed that many facilities recommend offline entry of clinical records as well as offline self-learning. This indicates that digitalization may be initiated for medical institutions that do not initially have an Internet connection.

As the online use of digital textbooks and clinical records progresses, students can learn more flexibly, potentially leading to improved practical skills.

Future research is needed to verify the impact of digital device utilization on nursing students’ learning outcomes and performance in clinical training. Meanwhile, improving the Wi-Fi environment at each facility and providing digital literacy education for nurses have been identified as important for promoting digital device use. Currently, we are continuing research on balancing digitalization in nursing education with approaches to hedge the risks inherent in digitalization. We hope that these foundational efforts will lead to future development of DX in nursing education.

5. Limitations of Research

This study has several important limitations that should be considered when interpreting the findings. Notably, the analysis was restricted to facilities that accept nursing students rather than including all hospitals nationwide; therefore, careful consideration is required when interpreting the research results.

Including the perspectives and circumstances of hospitals that do not accept nursing students would facilitate a more comprehensive and balanced analysis. Such hospitals may have different management policies, organizational structures, or operational challenges, potentially strengthening our research conclusions through comparative examination. A comparative examination of these facilities could provide a clearer understanding of how their characteristics differ from that of student-accepting facilities.

Additionally, excluding hospitals that do not accept nursing students may have introduced selection bias. By overlooking the unique operational patterns and practices of these hospitals, we may not have adequately captured the important factors influencing hospital operations and digital transformation outcomes.

Consequently, future research should include both types of hospitals—those that accept nursing students and those that do not. This approach would establish a more reliable analytical framework and improve the generalizability of the research findings.

6. Conclusion

From the results, the following conclusions were drawn regarding the current status and challenges of digitalizing nursing students' clinical training records.

1. Facilities permitting nursing students to use digital devices comprised approximately 42% of the total, which indicates that the progress of digitalization in Japanese nursing education is still developing.

2. Differences exist in digital device usage permissions by facility type; home-visit nursing stations have relatively high online usage permission rates, whereas general hospitals tend to have more restrictions.

3. Regarding Wi-Fi usage, approximately 24% of facilities completely prohibit it, with security concerns serving as barriers to digitalization.

4. Offline entry of clinical records and self-learning are most commonly permitted, thus suggesting that phased digitalization that does not require an Internet connection is a realistic approach.

5. To promote the digitalization of clinical training records, guidelines addressing medical institutions' security concerns need to be developed, education provided to improve nurses' digital literacy, and the collaboration between educational institutions and medical facilities strengthened.

These results provide fundamental data for promoting DX in nursing education and will contribute to the development of strategies for digitalizing clinical training records.

Continuous research and practical accumulation are required to realize nursing education that responds to students from the GIGA School Initiative.

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