Jurnal Ners

Volume 20 Issue 2, May 2025, p. 108-116
http://dx.doi.org/10.20473/jn.v20i2.60596

Original Article

Open Access

Nurses' experience of using platform for phlebitis assessment based on telemedicine consultation system: a qualitative descriptive study

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Responsible Editor: Ferry Efendi

Received: 19 July 2024○ Revised: 24 February 2025 ○ Accepted: 18 March 2025

ABSTRACT

Introduction: Current methods for assessing phlebitis rely on nurses' experiences. Integrating advanced systems, such as a Clinical Decision Support System and a Telemedicine Consultation System, is essential for more comprehensive and expert-driven diagnosis and treatment recommendations. This study explored nurses' experiences using a platform for phlebitis assessment based on a telemedicine consultation system.

Methods: A qualitative study based on constructivist theory was conducted using focus group interviews with 12 registered nurses recruited from a community hospital in Thailand, between November 2022 and March 2023. The interviews were then recorded and transcribed. Data analysis followed Miles and Huberman's framework, which comprised three stages: (1) data reduction, involving the selection, organization, and coding of key data; (2) data display, structuring the data into themes to identify patterns; and (3) conclusion drawing and verification to ensure accuracy and validity through systematic comparison and cross-checking.

Results: Four themes emerged: accuracy, referring to the precision of the assessments; feasibility, which pertains to how practical the system is for daily clinical use; propriety, concerning ethical and professional considerations such as patient confidentiality and alignment with nursing practices; and utility, evaluating the overall usefulness and value of the platform in enhancing assessment efficiency.

Conclusions: The platform for phlebitis assessment based on the telemedicine consultation system can accurately evaluate and diagnose phlebitis. It is suitable for practical use in clinical settings and can improve patient care quality.

Keywords: experience, nurses, phlebitis assessment, telemedicine consultation system

Introduction

Insertion of a Peripheral Intravenous Catheter (PIVC) is an invasive procedure that plays a significant role in patient care. The extended and continuous administration of medication, fluids, blood components, or nutrition, with its potential impact or complications on patients, can be classified into seven types. Inflammation (indicative of infection) (Osório *et al.*, 2023), phlebitis (Simin *et al.*, 2019, Lulie *et al.*, 2021a), leakage, issues related to the exit of fluid or medication from the system (infiltration) (Ben Abdelaziz *et al.*, 2017, Simin *et al.*, 2019), catheter dislodgement (Simin *et al.*, 2019), obstruction (Simin *et al.*, 2019), venous air embolism (VAE), and inflammation associated with blockage within blood vessels, commonly referred to as thrombophlebitis (Heng *et al.*, 2023). Mishandling or delays in diagnosing and treating adverse events can lead to severe consequences, posing significant risks to the patient. Studies documenting the incidence of adverse events linked to the insertion of PIVCs have consistently identified phlebitis as the most prevalent occurrence. The reported incidence of phlebitis varies widely between studies. According to a meta-analysis, the incidence of phlebitis associated with using peripheral intravenous catheters during infusion is 31%. Severe phlebitis develops in 4% of patients (Lv and Zhang, 2020). Phlebitis occurs in 9.1% of patients in Japanese intensive care units (Yasuda *et al.*, 2022). The incidence of phlebitis was 70% at the University of Gondar Hospital, Northwest Ethiopia (Lulie *et al.*, 2021b). Importantly, phlebitis is an

adverse event that preventive measures can mitigate. Therefore, early evaluation, diagnosis, and prompt treatment of patients are imperative to reduce the impact and severity of such adverse events (Pathomjaruwat *et al.*, 2021).

Phlebitis, indicating inflammation of the veins, can result from the chemical processes associated with administering fluids and medications or bacterial infection (Simões *et al.*, 2022, Kaphan *et al.*, 2024). This complication adversely affects the patient, presenting as pain and contributing to an extended hospitalization duration (O'Grady et al., 2002). Intermittent treatment or medication regimens contribute to a prolonged recovery from the disease. Additionally, inserting a new catheter incurs equipment costs and places an additional burden on the nursing workload. Another aspect to explore is reduced time spent on patient assessments or interventions related to phlebitis. If the system results in faster recovery, it would improve patient outcomes and reduce overall healthcare costs by minimizing the need for extended treatment (Ray-Barruel et al., 2014). The reported incidence of phlebitis varies widely, displaying considerable variability across individual studies (Tagalakis *et al.*, 2002, Webster *et al.*, 2008, Ray-Barruel *et al.*, 2014). Consequently, each study established a distinct definition for phlebitis, encompassing the tools and methods employed for assessment and the populations under consideration (Webster *et al.*, 2008, Ray-Barruel *et al.*, 2014). Hence, the accuracy of the reported incidences of phlebitis may be questionable, potentially influencing care management planning and medical interventions to ensure patient safety under such conditions.

A systematic review of the literature on tools and methods for assessing phlebitis determined that 233 studies have examined the incidence of phlebitis resulting from intravenous fluid administration. The study's findings revealed that there are 71 tools available for assessing the occurrence of phlebitis, with only three tools being of particular significance: 1) The Phlebitis Scale of Infusion Nurses Society Phlebitis Scale (INS) 2) Visual Infusion Phlebitis Score (VIP score) and 3) 45 items Peripheral Venous Catheterization (PVC) Assess. Only the accuracy and reliability of the instrument are analyzed. Currently, assessment tools widely used in clinical practice have not undergone comprehensive validation (Ray-Barruel et al., 2014). Most current tools depend on individual nurses' experiences, perceptions, perspectives, and judgments, representing a limitation in their application. The difference between professional nurses and expert nurses in phlebitis assessment is essential. Most nurse practitioners have varying confidence levels in determining the signs and symptoms of suspected phlebitis (Thangkratok *et al.*, 2019). This variability may lead to incorrect incidence reports and inappropriate management. This is due to the inherent variability in nurses' experiences, perceptions, perspectives, and decision-making processes. Such diversity may lead to delays and inaccuracies in diagnosis. Inadequate management of these complications can pose serious risks to the patient. Including the incidence reporting may lead to inaccuracies, rendering it challenging to compare the rates of phlebitis across different healthcare facilities (Thangkratok *et al.*, 2019).

Current methods for assessing phlebitis rely on individual nurses' experiences. Most etiologies for phlebitis are rooted in experiential knowledge, forming the primary basis for nursing actions. This approach may lead to confusion, potentially affecting individuals in positions of authority. To address this issue, we propose designing and developing a platform that evaluates the occurrence of phlebitis. This can be achieved by integrating the principles of a Clinical Decision Support System and a Telemedicine Consultation System (Wiwatkunupakarn *et al.*, 2023). Assessing the validity and feasibility of a system requires determining whether it has been tested in clinical settings, as results from such applications provide valuable insights into its effectiveness and adaptability (Teresi *et al.*, 2022). Evidence from previous pilot studies can establish its reliability, while ensuring the security of patient data through compliance with regulations, encryption, access controls, audit trails, and regular security audits is essential.

Nurses' adoption of technology is influenced by individual attributes, team dynamics, leadership support, and socio-cultural barriers, with nurse leaders playing a pivotal role in fostering digital competencies (Wynn *et al.*, 2023). However, usability concerns, lack of training, and professional identity issues often hinder adoption. Despite the potential benefits of digital tools, their effectiveness is not always well-established due to limited empirical evidence. Addressing these barriers requires leadership support, structured training programs, and a focus on usability. Studying nurses' experiences with telemedicine platforms for phlebitis assessment is crucial for addressing diagnostic subjectivity, ensuring usability, and enhancing clinical integration. Their insights can reveal barriers to technology adoption, highlight the need for adequate training and support, and assess the impact on patient care and decision-making. Understanding these factors can improve platform design, increase nurses' confidence and acceptance, and promote standardized assessment practices, ultimately leading to better patient outcomes and more efficient healthcare delivery. Therefore, considering the phenomena above and the identified research gap, our study aimed to investigate nurses' experiences utilizing a platform for phlebitis assessment based on a telemedicine consultation system. The findings from this study will provide valuable insights for shaping future healthcare services.

Materials and Methods

Study Design

The research utilized a qualitative descriptive design, selected for its appropriateness in providing a comprehensive summary of phenomena within a natural setting, allowing for flexibility in exploration (Doyle *et al.*, 2020). This approach was deemed the most suitable for clarifying these phenomena by incorporating essential data to augment comprehension. Adopting a naturalistic inquiry as a foundational research orientation, the study underscored the importance of observing phenomena unaltered, devoid of pre-selection, manipulation, or a predetermined commitment to a specific target phenomenon (Sandelowski, 2010). Constructivism is also reflected in the approach, as the research aims to clarify the experiences and perceptions of nurses regarding the platform used for phlebitis assessment. By exploring nurses' lived experiences, the researchers are interested in how individuals construct meaning from their interactions with the telemedicine consultation system. This aligns with a constructivist perspective, which focuses on the social processes through which individuals make sense of their environments (Given, 2008). This methodology facilitated the exploration of nurses' experiences in utilizing a platform for phlebitis assessment based on a telemedicine consultation system at a community hospital in Thailand from November 2022 to March 2023.

Population Sample and Sampling

The study involved professional and expert nurses with experience using a platform to assess the occurrence of phlebitis. Professional nurses are well-trained and competent in providing patient care. In contrast, expert nurses have developed a higher level of specialization and advanced clinical skills through experience and additional training, allowing them to handle more complex situations independently**.** The defined qualification criteria, encompassing more than 1 year of nursing work experience and a minimum of 10 uses of the platform, were fulfilled by a total of 8 participants **(**Stewart and Shamdasani, 1990**)**. Expert nurses, totaling four individuals who met specified qualifications, including more than 5 years of work experience and a minimum of 10 uses of the platform, were selected to assess the incidence of phlebitis from a distinct sample pool. The inclusion criteria were established: 1) must have used the platform more than 10 times, and 2) must voluntarily participate in the research. The researchers likely ensured that data collection was adequate to answer the research question. This approach ensured that the sample size was not arbitrarily set but determined by the data's depth and completeness.

Data Collection

The researcher selected a sample of professional and expert nurses to participate in the study, focusing on using a platform for assessing the occurrence of phlebitis. The researcher directly contacted the selected nurses, providing comprehensive details regarding the study's objectives, procedures, and expectations. Voluntary consent was obtained from the participants, ensuring they were informed of their rights and the nature of their involvement.

The participants were divided into two groups at the beginning of the group discussion (Professional nurses = 8, expert nurses = 4). The researcher introduced themselves, clarified the purpose of the study, explained the discussion's structure, and outlined the anticipated duration of approximately 2 hours. Before starting, permission was sought to record audio and take notes during the debate. Explicit consent was also obtained for participants' involvement in the research project. The researchers, qualified in nursing and qualitative research, maintained a professional relationship with participants, which included potential power imbalances due to their roles in the institution. To mitigate biases, they ensured voluntary participation, emphasized confidentiality, and clarified the purpose and structure of the study. Explicit consent was obtained for involvement, audio recording, and note-taking to maintain transparency.

The group discussion allowed the nurses to express their opinions freely, responding to specific questions posed by the researcher. Group discussions were chosen over individual interviews to promote shared perspectives and collaboration. The researcher fostered an open, equal environment to address power imbalances between professional and expert nurses, ensuring all voices were respected. Participants were assured of confidentiality to reduce any pressure to conform to authority. Throughout the session, the researcher actively revisited key points to ensure clarity and consistency of understanding among the participants. Examples of questions used include: Can the platform accurately assess the occurrence of phlebitis? Will the platform for determining the occurrence of phlebitis be implemented in clinical practice? The researcher might ask participants to describe their experiences and thoughts on the platform’s effectiveness. The session was carefully structured to provide a comfortable space for all participants to share their views, while ensuring that all perspectives were captured for subsequent analysis.

Data collection through group discussions can introduce bias due to group dynamics, where some participants may dominate the conversation while others remain passive. To minimize this bias, researchers employed strategies such as using a skilled facilitator to ensure equal participation, setting clear ground rules, incorporating anonymous feedback, ensuring balanced group composition, and conducting post-discussion

interviews. These approaches helped ensure that all participants had an equal opportunity to express their opinions, thereby reducing the risk of dominant voices overshadowing quieter ones and providing a more balanced and comprehensive data collection process.

The researcher also took the initiative to revisit crucial information and key points, ensuring consistent understanding within the sample group. The entire group discussion spanned approximately 2 hours. To reduce participant fatigue in qualitative studies, researchers employed strategies such as providing scheduled breaks to allow participants to rest and recharge, thereby improving focus. Additionally, creating a comfortable physical and psychological environment helped participants feel at ease, further reducing the likelihood of fatigue and ensuring more effective participation.

Data analysis

The researcher meticulously analyzed the data acquired from the focus groups. The interviews in Thai were transcribed verbatim, ensuring that every word, pause, and non-verbal expression was accurately captured. The content extracted from the interview transcripts was carefully documented using Microsoft Word software. The data was then analyzed using content analysis techniques, following the guidelines Miles and Huberman (1994), which involved three sequential steps, with the data analysis conducted by two researchers. First, data condensation was performed, which included writing summaries, indexing, coding, developing themes, categorizing, and generating interim analysis results through analytic memos. Second, data display was employed, which involved systematically organizing and presenting the data in a clear and easily comprehensible format. Finally, conclusions were drawn, and results were verified by using the data in a clear and visible form to assess the reliability of the findings, ensuring trustworthiness in the results.

Trustworthiness

The researcher meticulously assessed the reliability of the data, guided by the criteria outlined by Lincoln and Guba (1985). First, credibility was ensured through carefully selecting a sample group comprising professional and expert nurses who had actively utilized the platform to assess the occurrence of peripheral venous inflammation. This sample included individuals with firsthand experience, making them authentic representatives capable of accurately understanding the phenomenon. Second, dependability was achieved by employing various data collection methods, including group interviews and observations, which were interconnected to mitigate bias in the collection process. Third, confirmability was ensured by reviewing the gathered data to assess the consistency of understanding between the researcher and the sample. This review occurred before concluding the group discussion to confirm the research results' accuracy and ensure they align with the information obtained. Audit trails were also maintained, ensuring detailed records of all research processes, including data collection, analysis, and decision-making, thereby providing transparency and verifying the findings' consistency and reliability.

Triangulation was also employed by using multiple data sources and researchers to cross-check results. The data analysis was conducted in three sequential steps, with two researchers independently analyzing the data. To ensure accuracy and consistency, the researchers cross-checked their results by comparing their findings and discussing any discrepancies until consensus was reached, further enhancing credibility and confirmability. Triangulation was also employed by using multiple data sources and researchers to cross-check results. The data analysis was conducted in three sequential steps, with two researchers independently analyzing the data. To ensure accuracy and consistency, the researchers cross-checked their results by comparing their findings and discussing any discrepancies until consensus was reached, further enhancing credibility and confirmability.

This study used the Consolidated Criteria for Reporting Qualitative Research (COREQ) guidelines (Tong *et al.*, 2007), a standardized reporting framework designed to enhance qualitative research studies' transparency, rigor, and completeness. The guidelines provide a structured approach for reporting key methodological aspects, ensuring that studies are comprehensive, replicable, and critically appraised effectively. By adhering to the COREQ guidelines, the study ensures that essential details about the research process from the research team and study design to data analysis and reporting are documented and transparent.

Ethical consideration

The study received ethical approval from the Institutional Review Board of the Faculty of Medicine, Chulalongkorn University (COA No.575/2020, IRB No.719/62) on May 12, 2020. All participants willingly provided written informed consent, ensuring their voluntary participation in the study. The researcher took several measures to preserve confidentiality and anonymity, particularly during the focus group discussions. First, before the commencement of the session, the researcher introduced themselves and provided a clear explanation of the study's purpose, the steps involved, and the expected duration of the group discussion. The researcher also explicitly sought consent for audio recording and note-taking during the conversations, assuring participants that the tapes would be used solely for research purposes and that their identities would be kept confidential. To protect

Table 1: Detailed characteristics of the 12 participants.

No	Age (years)	Gender	Positions	Work experience (years)	The number of platform uses
NS-001	32	Male	Proficient	10	20
NS-002	32	Female	Proficient	10	35
NS-003	30	Female	Proficient	8	38
NS-004	28	Female	Proficient	6	30
NS-005	30	Female	Proficient	8	35
NS-006	44	Female	Expert	22	33
NS-007	32	Female	Proficient	10	30
NS-008	48	Female	Expert	28	35
EX-001	42	Male	Expert	20	120
EX-002	55	Female	Expert	32	122
EX-003	45	Female	Expert	23	120
EX-004	40	Female	Expert	18	125

Note: Competent (2–3 years of experience), Proficient (3–10 years of experience), Expert (10+ years of experience)

participants' anonymity, identifying information was removed from the recorded data, and pseudonyms were used in any subsequent analysis or reporting.

Additionally, the researcher emphasized the importance of confidentiality to all group members, requesting that they refrain from sharing details of the discussion outside of the session to maintain the privacy of other participants. All notes and recordings were securely stored, accessible only to the research team, and destroyed after the study's completion. These precautions ensured that participants' personal information remained confidential and their contributions were anonymized, thereby preserving the integrity and ethical standards of the research.

Results

Table 1 presents the demographic information of the sample group. The participants were female, constituting 83.33 percent, with males accounting for 16.67 percent. The average age is 39, with a standard deviation of 9.13 years. The majority falls within the age range of 41-50 years, representing 41.67 percent, followed by those aged 20-30 and 31-40, each accounting for 25.00 percent. Regarding professional positions, the majority are expert professional nurses, making up 75.00 percent, followed by those working as professional nurses with special expertise, accounting for 16.67 percent. The average work experience is 18.08 years with a standard deviation of 9.54 years. Predominantly, participants have 1-10 years of work experience, accounting for 41.67 percent, followed by those with 21-30 years of experience, constituting 33.33 percent. Regarding the number of platforms uses by nurses providing information, expert nurses averaged 32.50 times with a standard deviation of 3.30 times, while professional nurses with special expertise averaged 123.00 times with a standard deviation of 2.45 times.

The qualitative data analysis results on the platform's quality for assessing phlebitis using the telemedicine consultation system can be summarized in four themes (Table 2).

Theme 1: Accuracy: Most of the sample group expressed the opinion that the platform can accurately assess the occurrence of phlebitis because it provides information that aids in diagnosis and evaluation based on images alone. However, they noted an issue that needs to be considered: Differences in photographs, camera angles, lighting, and skin color may affect the diagnosis of peripheral venous infarction from images. The opinions of the sample group are as follows:

"I believe the assessment is accurate because the platform provides additional information about the patient's symptoms. For example, there is red swelling, a burning pain, and constant complaints of pain, along with dark skin color. This additional information helps make accurate and realistic diagnoses possible."(NS-001)

"I can evaluate correctly because there are experts directly assessing Mechanical Phlebitis. However, I've noticed that some theories require palpation of the blood vessels to assess their characteristics. Sending images with color alone may impact the evaluation." (NS-004)

"Diagnosing peripheral phlebitis based on images and clinical signs or symptoms allows for accurate decision-making." (EX-001)

Table 2: The emerging themes of nurses' experiences using a platform for phlebitis assessment based on a telemedicine consultation system.

Themes	Selective Codes
Accuracy	- The assessment is accurate
	- Can evaluate correctly
Feasibility	- I believe there is a possibility
	- Guidance in nursing practice
Propriety	- Help align nursing practices and provide clear
	- It is believed to be a valuable tool for monitoring and preventing.
Utility	- This platform is a valuable tool to assist nurses in evaluating and providing guidance on nursing practices
	- It can intervene in the early stages to prevent its spread and severity

However, the authors highlight a concern raised by participants regarding the impact of factors such as differences in photographs, camera angles, lighting, and skin color on the diagnosis of peripheral venous infarction. The authors suggest that these variables should be standardized to improve the platform's diagnostic accuracy.

Theme 2: Feasibility: Most sample groups believed that the phlebitis assessment platform can be implemented in clinical practice because digital technology is increasingly used to deliver healthcare services. The opinions of the sample group are as follows:

"I believe there is a possibility. If the precision of the tools is the same, the images used for diagnosis will be clear. It is agreed that the patient's symptoms need to be further explained or specified, especially regarding redness and the swollen area. Providing more details will assist in making diagnostic decisions more clearly." (NS-002)

"Utilizing such a platform will contribute to promoting the nursing profession by enabling systematic work. Expert nurses can remotely offer consultation and guidance in nursing practice through digital technology. This allows us to establish a clear plan, implement it, document the outcomes in the patient's history file, and put it into practice. This should have a positive impact on the patient's well-being and lead to improved treatment results." (NS-003)

"It is highly likely, as digital communication is now widely implemented in the medical field." (EX-001)

This finding indicates growing acceptance and readiness for digital solutions in healthcare settings. They suggest that this aligns with the broader trend of integrating technology into clinical practice, making the platform feasible for adoption in various healthcare environments.

Theme 3: Propriety: The majority of the sample group expressed the opinion that the phlebitis assessment platform is an innovation that can be appropriately used in nursing practice for remote patient care through digital technology. The views of the sample group are as follows:

"Advice from expert nurses who provide remote consultations and guidance on nursing practice through digital technology will help align nursing practices and provide clear, systematic guidelines." (NS-001)

"If there were a system or platform for evaluating the occurrence of phlebitis, it would be a valuable tool for monitoring and preventing severe phlebitis in patients. This would ensure the safety of both patients and healthcare providers, reducing the risk of lawsuits." (NS-008)

"It serves as an alert and provides guidance for nurses on whether the intravenous infusion site is inflamed. This benefits patients by preventing peripheral phlebitis, eliminating risks, and reducing hospital length of stay." (EX-003)

This finding strongly endorses the platform's relevance and suitability for modern nursing practice. They suggest that the platform is seen as a valuable and appropriate innovation, enabling nurses to provide adequate care remotely, thus aligning with the growing shift toward digital healthcare solutions.

Theme 4: Utility: Most sample groups believed the phlebitis assessment platform benefits nursing practice and patient care. The views of the sample group are as follows:

"This platform is a valuable tool to assist nurses in evaluating and providing guidance on nursing practices, which are essential aspects of the nursing profession. It enhances the independence and safety of nurses' work and reduces the risk of legal disputes arising from nursing practices. Furthermore, it helps prevent patients from developing phlebitis due to inadequate care. The guidelines can serve as a foundation for initial care management before consulting with a doctor." (NS-004)

"In the future, the platform may evolve into an intelligent system, an innovative invention capable of receiving images, assessing the degree of phlebitis, and providing clinical guidelines for nursing practices. This advancement will align nursing practices and benefit patients by preventing the development of severe phlebitis. It can intervene in the early stages to prevent its spread and severity." (NS-007)

"It is beneficial because, at times, the presentation of phlebitis is unclear, leading to confusion." (EX-001)

This is a positive reflection of the platform's potential impact on healthcare. They suggest that its use could enhance nursing efficiency and improve patient outcomes by providing a valuable tool for assessing phlebitis, ultimately supporting higher-quality care delivery.

Discussions

The quality of the platform for assessing the occurrence of phlebitis using a telemedicine consultation system was evaluated. This evaluation was based on information obtained from two groups**.** A focus group of professional nurses applied to participate in the research project and used the platform to assess the occurrence of phlebitis. These individuals had more than 1 year of work experience and had used the platform more than 10 times, totaling eight people. Expert nurses were selected through a specific sample selection process to evaluate the occurrence of phlebitis utilizing the platform. Four nurses with over 5 years of work experience had used the platform more than 10 times. The results of qualitative data analysis on the quality of the platform for assessing phlebitis using the telemedicine consultation system.

The majority of the sample group believed that the platform can accurately assess the occurrence of phlebitis or be accurate. This aligns with previous studies that have found digital diagnostic tools to evaluate images or photographs accurately (Nianios *et al.*, 2009, Wang *et al.*, 2017, Aarts *et al.*, 2023). This may be attributed to the advancements in photography and digital equipment available today. These advancements result in highly detailed, sharp, and true-to-life images, enabling

evaluators to assess symptoms. Consequently, symptoms can be displayed and diagnosed correctly.

Furthermore, additional information aids in further diagnosis beyond the evaluation based on images alone. This includes signs and symptoms related to the location of fluid administration. Such information is crucial for accurately assessing the occurrence of phlebitis (Mihala *et al.*, 2018). However, issues that may lead to inaccurate diagnoses must be considered. These issues include differences in photograph resolution, camera angles, lighting, and variations in patient skin color. These factors are essential considerations requiring further study to address these confounding variables.

The majority of the sample group believed that the platform for phlebitis assessment based on a telemedicine consultation system can be integrated into clinical practice. This aligns with previous studies showing telemedicine consultation systems are clinically feasible and widely adopted today (D'Haeseleer *et al.*, 2020, Raj *et al.*, 2022). Digital technology is increasingly used to deliver healthcare services, offering convenience and accessibility. With the prevalence of individuals' digital devices, healthcare services can be accessed anytime and anywhere. Furthermore, easy access to high-speed internet networks with stable signals contributes to this accessibility. Dealing with technology barriers in areas with limited internet access requires offline functionality. Developing platforms and tools that can function offline or with intermittent internet access ensures that healthcare professionals can still use the technology, even in low-connectivity areas. Advancements in telecommunications and computer science have progressed alongside the availability of digital technology, making services more affordable. It has been successfully employed to provide healthcare services in community health centers (Mougiakakou *et al.*, 2011).

Most of the sample group expressed that the platform for phlebitis assessment based on a telemedicine consultation system is an innovative tool that can be effectively employed in nursing practices for remote patient care through digital technology. According to their opinions, using this platform does not harm patients and does not result in an increased workload for nurses. This finding aligns with prior studies that observed advantages such as accessing expert advice anywhere and anytime, reduced costs, elimination of travel expenses, and decreased working time, resulting in enhanced patient care and overall healthcare improvements (Colbert *et al.*, 2020). Notably, most patients consented to platform usage, ensuring the absence of privacy violations and eliminating procedures that could pose risks to the patient's health condition.

The majority of the sample group believed that the platform for phlebitis assessment based on a telemedicine consultation system is advantageous for both nursing practice and the quality of patient healthcare. This sentiment aligns with previous studies, which indicate that telemedicine consultation systems are likely to be increasingly accepted and utilized by healthcare professionals presently and in the future (Mansoor *et al.*, 2021). This teleconsultation platform for evaluating phlebitis can reduce the incidence of venous inflammation, leading to positive health outcomes for patients and increased patient satisfaction. The future development of this platform is exciting, especially with the possibility of increasing automation and the use of AI. The feasibility of applying AI within a phlebitis teleconsultation model is worth exploring.

However, some participants expressed concerns regarding the platform's effectiveness and usability. These negative perceptions were primarily related to technical difficulties, lack of familiarity with digital tools, and concerns over the accuracy of remote assessments compared to in-person evaluations. Some participants felt the platform could not fully replicate the hands-on experience required in specific clinical situations. Additionally, a few respondents pointed out that reliance on technology might create barriers for older nurses or those with limited digital literacy, potentially affecting the platform's overall accessibility and effectiveness. These concerns highlight the importance of addressing technical and user-related factors when implementing telemedicine-based tools in clinical practice.

One limitation is the potential lack of depth in the qualitative study, which may result in a limited understanding of participants' experiences and perspectives. Without in-depth exploration, the findings might not fully capture the complexities and nuances of the studied topic. Group dynamics, susceptible to the influence of dominant personalities or groupthink, can impact the quality of participant responses. Additionally, social desirability bias may prompt participants to articulate socially acceptable views, potentially overshadowing genuine opinions. This comprehensive understanding is intended to equip nurses with the necessary knowledge and confidence to deliver nursing care to patients efficiently. By familiarizing themselves with the functionalities and nuances of the system, nurses can enhance their proficiency in using this innovative tool, thereby ensuring effective and informed patient care within the realm of telemedicine consultations.

Conclusion

The platform for assessing phlebitis could enhance nursing workflows by streamlining the diagnostic process, saving time, and allowing nurses to focus on direct patient care. Standardizing assessments reduces subjective variability, leading to more consistent evaluations and faster decision-making. Regarding patient outcomes, the platform may enable earlier

detection of phlebitis, allowing timely intervention and reducing the risk of complications. The platform could also improve overall patient satisfaction and health outcomes by ensuring consistent and accurate care across healthcare settings.

Acknowledgments

We sincerely thank all participants for their valuable time and generous cooperation. Your support and dedication have played a crucial role in the successful completion of this study.

Funding source

None

Availability of data and materials

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Authors' contributions

Study conception and design: P.T., K.P., and J.S.; data collection: P.T.; literature review and analysis: P.T.; study supervision, manuscript writing, and referencing: P.T. and K.P. All authors have read and approved the final version of the manuscript and contributed to critical revisions for important intellectual content.

Declaration of Interest

The authors declare no conflicts of interest.

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How to cite this article: Thangkratok, P., Pongpirul, K., and Sriratanaban, J. (2025) 'Nurses' experience of using platform for phlebitis assessment based on telemedicine consultation system: a qualitative descriptive study', *Jurnal Ners*, 20(2), pp. 108-116. doi: http://dx.doi.org/10.20473/jn.v20i2.60596