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Faculty of Nursing Universitas Padjadjaran, Building Academic 2 Floor 1
Jl Ir. Soekarno KM. 21, Hegarmanah, Jatinangor District, Sumedang Regency,
West Java Province, Indonesia, 45363
Mobile: 085317736810; Phone: 022-7796647; Fax: 022-7796647

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Technology and mental healthcare: Benefits and challenges for future directions in mental health nursing

Muhammad Arsyad Subu[1,2*], Nabeel Al-Yateem[1,2], Fatma Refaat Ahmed[1,2], Heba Khalil[1], Sawsan Abuhammad[1], Syed Azizur Rahman[2,3]

[1] Nursing program, College of Health Sciences, University of Sharjah, United Arab Emirates
[2] Faculty of Nursing and Midwifery, Universitas Binawan, Jakarta, Indonesia
[3] Health Care Management program, College of Health Sciences, University of Sharjah, United Arab Emirates

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Corresponding author

Muhammad Arsyad Subu*
Nursing program, College of Health Sciences, University of Sharjah, United Arab Emirates; Faculty of Nursing and Midwifery, Universitas Binawan, Jakarta, Indonesia; Address: University City - Sharjah - United Arab Emirates; Jl. Dewi Sartika No.25-30, Kalibata, Kec. Kramat jati, Kota Jakarta Timur, Daerah Khusus Ibukota Jakarta; Telp/fax : (021) 80880882; Postal Code: 13630, Phone: (021) 80880882; Email: msubu@sharjah.ac.ae

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Abstract

In mental healthcare, significant advances have been made in technologies that assess, diagnose, treat, monitor, promote, and enhance mental health and well-being. These innovations offer flexible, personalized support, lower access barriers, and provide valuable insights into individual and population mental health. Technology has significantly transformed the delivery of psychiatric nursing services, making them more accessible, efficient, and personalized. Nurses should know that individuals with mental health issues may not have access to these technologies. They should have the choice to use these solutions, which should complement—not replace—existing services and not divert resources from other essential care. Significant challenges include data privacy, leaks, and misuse. Regulatory issues arise from a lack of clear, specific rules to safeguard data and promote ethical use of technology. It is also important to create suitable regulatory frameworks for users, professionals, and developers, and involve potential users, families, and caregivers in development and regulation.

Keywords: benefits; challenges; future directions mental health; nursing; technology

Technology is advancing quickly, with many expecting it to offer innovative solutions to mental health challenges. Research indicates a worldwide rise in mental distress. Reports show an increase in mental health issues among children and young people, including more cases of self-harm and suicidal thoughts. Anxiety, stress, and social isolation have impacted many people's mental health. The demand for technological mental health support has grown in recent years, with a significant increase in searches for mental health apps (ITC & Health, 2025). As the use of digital technology increases, research in this area remains somewhat limited (Löchner et al., 2025). A key benefit and possible risk of digital technologies is the vast amount of patient data they generate. This information supports diagnosis, therapy planning, and clinical decision-making. These datasets can forecast behavioral changes and help minimize biases like memory errors and social desirability bias (Seizer et al., 2024).

The future of mental health technology envisions broader access through teletherapy and virtual platforms, enhanced care with AI and machine learning for personalized diagnostics and chatbots, and continuous tracking via wearables and biometrics. It also employs immersive tools like VR and AR to support, not replace, human care, while tackling challenges related to validation, data privacy, and equitable access. In today's hyper-connected world, technology influences not just work and communication but also mental health management. Although often seen as a stressor, technology offers innovative, accessible ways to support emotional well-being. This article discusses how technology can improve mental health, with real-life

examples (Sari, 2024). Its purpose is also to provide insights into the role of technology in mental health and nursing services, barriers, facilitators, and prospects.

Some Technological Advancements in Mental Healthcare

Telemedicine or telenursing

As telemedicine becomes more embedded in clinical practice, including mental health services, a study by Wilcock et al. (2023) suggests it may be even more vital for preventive and follow-up care than previously thought. Telemedicine impacts the quality of mental health care by analyzing changes in mental health visits, medication adherence, hospitalizations, post-discharge follow-up appointments, and patient mortality rates among patients treated by practices with higher telemedicine use during the first year of the pandemic, compared to those relying mainly on in-person care. Examples include Talkspace, which offers therapy via video or text messaging, and ReGain, which focuses on couples therapy to strengthen relationships without in-person visits. Benefits of teletherapy include greater privacy, especially for those who are uncomfortable visiting clinics, and the provision of a safer emotional space. Overall, telemedicine or telenursing could be an effective way to boost patient-clinician engagement and maintain continuity of care for mental health populations (Wilcock et al., 2023).

Smartphone Apps

Providing sufficient access to mental health services remains a global challenge. Almuqrin et al. (2025) indicate that smartphone apps can present an affordable, accessible, and convenient way to monitor, support, and treat mental health issues. Though many target mild depression and anxiety, some are designed for more severe mental health problems (Löchner et al., 2025). These apps often incorporate therapeutic principles such as cognitive-behavioral therapy (CBT) and relaxation techniques. Smartphone apps are revolutionizing mental health nursing by offering tools for patient self-management (such as mood tracking and coping strategies), enhancing nurse support through communication and data analysis, and increasing access to care for conditions such as depression, anxiety, and psychosis (Almuqrin et al., 2025).

Artificial intelligence

Artificial intelligence (AI) is increasingly integrated into global mental healthcare, transforming and challenging traditional roles of mental health nurses with new AI-powered tools in practice (Milasan & Scott-Purdy, 2025). AI's presence is now widespread in everyday digital activities, including healthcare. The growing interest among AI developers has resulted in a variety of mental health solutions, such as chatbot applications and virtual therapists for depression and anxiety (Anmella et al., 2023), AI-powered VR therapies for phobias (Gomes et al., 2023), AI-assisted diagnoses and treatments, and personalized care plans created by AI (Koutsouleris et al., 2022). These innovations in AI aim to advance mental health nursing practices. Collaboration among mental health nurses, patients, and AI developers is essential to develop AI tools that foster person-centered care, empowerment, and active engagement (Milasan & Scott-Purdy, 2025). These AI chatbots are designed for emotional assistance: Woebot, grounded in cognitive-behavioral therapy (CBT), helps users manage stress, anxiety, and depression through engaging dialogues (Milasan & Scott-Purdy, 2025).

Immersive Technologies

Virtual Reality (VR) and Augmented Reality (AR) are immersive technologies that are especially effective for exposure therapy, enabling patients to face their fears in a safe, controlled, and immersive environment (Rosebrock et al., 2024). Augmented reality (AR) enhances mindfulness and relaxation exercises by overlaying calming visuals onto the real world. VR and AR—computer-generated 3D environments or enhancements of real settings—are increasingly employed in mental health treatment. This technology enhances both accessibility and cost-efficiency in psychotherapy, often preferred by users over traditional approaches. VR setups usually involve head-mounted displays that deliver visual and auditory stimuli, complemented by tactile and olfactory cues, creating realistic, interactive environments that simulate real-life situations through specialized electronic devices (Emmelkamp & Meyerbröker, 2021).

Wearable Devices/Technology: Monitoring mental health in real-time

Wearable devices such as smartwatches and health bracelets now include tools to monitor mental health indicators. Examples, Fitbit and Apple Watch track heart rate, sleep patterns, and physical activity—key factors influencing mental well-being. These devices collect extensive long-term data on behavior, environment, and physiology. Smartwatches and fitness trackers track indicators such as heart rate, sleep, and activity levels, acting as digital biomarkers for stress, anxiety, and depression. This real-time data enables users and clinicians to monitor progress and take proactive measures (Löchner et al., 2025).

Digital Therapeutics and Neurotechnology

Many software programs that often require a prescription offer evidence-based treatments for specific health conditions. Devices for brain recording and stimulation, once limited to clinicians and researchers, are now accessible to consumers. These devices aim to improve well-being, reduce stress and anxiety, and elevate mood. Furthermore, other neurotechnology tools claim to address

psychiatric and psychological concerns (Borrione et al., 2020).

Ethical Considerations in Technology Mental Health

Many countries have established regulations for mental health technologies. To be considered a medical device, software, tools, and instruments must serve a 'medical purpose'. The same product might not be classified as a medical device in different contexts. The use of technology in mental health nursing raises various ethical issues. These issues emerge with the use of health information systems (HIS), telehealth, and electronic medical records.

Rapport, trust & acceptability

Certain mental health technologies employ intensive monitoring, which can sometimes be perceived as overly invasive. This perception may erode trust in mental health services and the organizations that offer digital tools, leading to reduced utilization. Additionally, if misused, remote monitoring might increase distress and anxiety among individuals with mental health issues, harm the patient-clinician relationship, and infringe on the fundamental human right to privacy. There are ongoing concerns about whether individuals can genuinely provide informed consent for mental health monitoring and support tools, particularly with direct-to-consumer devices. To foster public trust and acceptance, it is essential to involve service users, their families, and care professionals in the research and development of mental health technologies, as well as in the establishment of future regulations and research priorities.

Human connections: Effectiveness and safety

Technology plays a crucial role in connecting people, especially those who are geographically separated but share similar needs and experiences. This is particularly important for individuals with rare conditions, who may have limited opportunities to meet others. As mental health services increasingly adopt contactless, automated approaches, it is vital to consider how reduced human interaction could impact those seeking support. Digital interventions tend to be highly effective because individuals with phobias might prefer addressing their fears virtually rather than in person. This makes VR treatments a convenient and attractive option for many. Although millions use these tools, most commercial applications lack rigorous scientific validation, and existing studies typically involve small samples and lack follow-up data (Woodward et al., 2020).

Aspects concerning data privacy and data security

Data privacy and security are vital concerns in mental health technology. These apps often gather sensitive information such as sleep patterns, moods, and personal notes. If this data is mishandled or hacked, it can cause serious harm. Developers are required to comply with privacy laws such as GDPR in the EU and HIPAA in the US, but many apps lack transparency about their data use, raising user concerns. Data leaks may also occur due to insufficient security measures, as demonstrated by recent hacks targeting online therapy apps, underscoring the importance of digital security. Clear privacy policies are essential when handling personal data in mental healthcare. The rising adoption of mental health tech in various settings raises concerns about misuse, discrimination, coercion, or commercial exploitation without consent (Burr et al., 2020). There is a growing demand for stronger security measures to safeguard users and victims, as well as increased research into the effects of mental health data breaches.

Challenges and Future Directions

Implementing and utilizing technology in mental healthcare and psychiatric nursing faces several challenges. For example, data security and privacy are primary concerns, as sensitive health data is at risk of cyberattacks, leaks, and misuse. Regulatory issues arise from a lack of clear, specific rules to safeguard data and promote ethical use of technology. Infrastructure and connectivity gaps, especially in rural areas, pose additional challenges. The costs of adopting new technology can be substantial. Resistance from staff and community, along with low digital literacy, requires training and adaptation efforts. Lastly, system integration remains difficult because the mental health sector is still fragmented and lacks proper cohesion. Mental health nurses need ongoing education and skill development in health informatics to ensure that technology serves as a helpful tool rather than an obstacle to delivering high-quality care.

Solutions and adaptations involve competency enhancement, requiring psychiatric nurses to engage in continuous education and training in health technology and informatics. Additionally, psychiatric nurses serve as patient advocates, translating data into meaningful insights and educating patients in the digital age. Robust regulations are crucial for establishing policies that ensure data security and uphold the ethical application of technology in psychiatric nursing. Enhancing health data protection regulations and policies is essential for future solutions. Users should select health apps that have transparent privacy policies. Developers are responsible for implementing strong encryption and performing regular security audits. Digital literacy plays a key role in enabling safe and effective technology use, helping users navigate apps, platforms, and devices with confidence, while also identifying trustworthy sources and avoiding misinformation online. Managing and reducing

screen time can help decrease stress and improve well-being. Devices like apps and wearables offer valuable opportunities for mental health support, and when used responsibly, they can significantly enhance emotional well-being. The future of more inclusive and accessible mental health support depends on technological advancements (Sari, 2024).

Conclusions

Technology does not replace nurses' roles; rather, it enhances them through various digital innovations. Emerging technologies in mental health assessment, monitoring, and treatment are rapidly advancing. They aim to expand treatment options and enhance well-being for individuals and communities. To serve everyone effectively, efforts should focus on building evidence for safety and effectiveness, establishing regulatory frameworks for users, clinicians, and developers, and involving users, families, and care professionals in the development process. Technology must address existing disparities in access to care and prevent them from worsening. It should also ensure resources are not diverted from other critical mental health interventions, such as promoting social interactions and addressing social determinants of mental health issues. The role of technology in mental health nursing involves improving quality and accuracy. Tools like EEG, brain imaging, and CT scans enable earlier and more precise diagnoses. Accessibility is vital; for example, tele-nursing can deliver mental health services to remote areas. Operational efficiency can be enhanced with Electronic Health Records (EHRs), which streamline administrative tasks and data management. Patient engagement is increasingly important, with digital apps and platforms allowing individuals to manage their mental health independently. Decision-making is supported by real-time data and information, helping stakeholders develop effective mental health policies. Moreover, ongoing training for mental health professionals and increasing public digital literacy are vital. Building an integrated digital ecosystem and fostering collaboration among government, private sector, and academia are also key strategies. Finally, technological innovation should be adapted to local needs and emphasize a more humane approach.

Declaration of Interest

The author declares that he has no conflict of interest.

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Data Availability

De-identified data and the study instruments will be made available by the corresponding author upon reasonable request for research purposes, subject to institutional approvals.

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Advancing emergency care: A 20-year bibliometric analysis of prehospital airway suction research

Ardian Jafar A. Hukum*, **Sidik Awaludin**

Departement of Nursing, Faculty of Health Science, Jenderal Soedirman University, Indonesia

Abstract

Background: Prehospital airway suction is a critical intervention for maintaining airway patency in emergencies, especially in trauma, cardiac arrest, or airway obstruction. Despite its clinical significance, research on its effectiveness, device innovation, and procedural outcomes remains underrepresented compared to other airway management practices.
Purpose: This study systematically maps the scientific landscape, research trends, and thematic structures of prehospital airway suction, identifying clusters, gaps, and future directions.
Methods: A bibliometric analysis was conducted using Publish or Perish to retrieve articles from Scopus and PubMed (2005–2025) with the keyword "prehospital airway suction." Data were analysed using VOSviewer for co-occurrence of terms in titles and abstracts, producing network, overlay, and density visualisations.
Results: From 90 relevant publications, 71 (78.89%) directly addressed prehospital airway suction. Five thematic clusters emerged: (1) airway devices and preparation, (2) healthcare providers and prehospital procedures, (3) suction effectiveness and safety, (4) advanced techniques such as Suction-Assisted Laryngoscopy and Airway Decontamination (SALAD), and (5) clinical outcomes and evaluations. Overlay visualisation revealed a recent research shift (2020–2025) toward portable device innovation, advanced suction methods, and simulation-based training. The most cited work was Prekker et al. (2014), cited 79 times.
Conclusion: This first bibliometric study on prehospital airway suction highlights priorities in procedural standardisation, portable and efficient device development, effective suction techniques, and enhanced simulation-based training. The findings offer a reference for future research targeting specific populations, extreme emergencies, and the integration of emerging technologies.

Keywords: airway suction; bibliometric analysis; portable suction; prehospital; SALAD technique

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Corresponding author

Ardian Jafar A. Hukum*
Departement of Nursing, Faculty of Health Science, Jenderal Soedirman University, Indonesia; Address: Jl. Dr. Soeparno, Karangwangkal, Karang Bawang, Grendeng, Kec. Purwokerto Utara, Purwokerto, Jawa Tengah, 53122. Indonesia ; Phone:+6282248047075; E-mail:ardianjafar.a.hukum@gmail.com

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Introduction

In the management of emergency patients, suction plays a vital role in maintaining a clear airway free from secretions and obstructions that may compromise oxygenation and ventilation (Carney et al., 2021). Given that airway compromise can rapidly lead to hypoxia, respiratory arrest, or even death, ensuring airway patency and function is a critical factor in supporting patient survival (Berkenbush et al., 2023; Jarvis et al., 2024). International guidelines and systematic research evidence underscore that prompt airway intervention significantly contributes to clinical outcomes, particularly in cases of severe trauma, out-of-hospital cardiac arrest, and other critical conditions (Gage, Powell, Bosson, et al., 2023; Jacobs & Grabinsky, 2014). One of the major challenges in the field is airway obstruction caused by blood, vomitus, or excessive secretions. In such situations, the use of suction devices becomes crucial to ensure airway patency and to prevent potentially life-threatening aspiration (Sontakke et al., 2023). Consequently, the demand for portable, efficient, and rapidly deployable suction equipment

has become a primary concern in the development of emergency medical technologies (Dunne et al., 2020; Gage, Powell, Nassal, et al., 2023; Kibblewhite et al., 2023).

Although airway suctioning has been incorporated into basic paramedic training, scientific literature that explores its effectiveness, associated risks, and technological advancements remains limited. Improper suctioning procedures may lead to complications such as hypoxia, mucosal injury, or exacerbation of aspiration (Brainard & Gerecht, 2015; Kibblewhite et al., 2023). Previous studies have largely focused on endotracheal intubation or advanced airway management, while basic suctioning as a fundamental intervention is often overlooked in systematic reviews (Warnock & Gates, 2023).

Given the increasing complexity of emergency cases and ongoing advancements in portable suction technology, it is imperative to conduct a comprehensive mapping of research trends and the scientific knowledge structure in this field. A bibliometric approach can reveal the relationships between topics, key researchers, institutions, and shifts in research focus over time (van Eck & Waltman, 2010; Zupic & Čater, 2014). Therefore, this study uses a bibliometric approach with the aim of identifying trends, main themes, and directions of research development regarding the use of airway suction in prehospital situation, so as to provide a comprehensive overview of scientific progress and opportunities for innovation in the future.

Materials and Methods

Design

This study adopts a quantitative bibliometric methodology to systematically examine prevailing research trends and thematic patterns, with the objective of identifying underrepresented areas that present potential for novelty in subsequent scholarly investigations (Donthu et al., 2021; Kumar et al., 2024; Öztürk et al., 2024).

Data Collection

The article search was conducted in July 2025 using two research databases: Scopus and PubMed. Two researchers independently performed the search using the Publish or Perish application. Differences of opinion between the two researchers were resolved through discussion. Discussions were conducted based on the inclusion and exclusion criteria agreed upon at the outset and their relevance to the study. The keyword used was prehospital airway suction. The keywords are applied to the title, abstract, and keywords. This is done to ensure that all publications discussing prehospital airway suction can be properly identified. Articles collected were limited to those published between 2005 and 2025. The inclusion criteria for this study were studies discussing prehospital airway suction. Meanwhile, the exclusion criteria were editorial articles, intrahospital suction, and surgical suction. The article collection process can be seen in the prisma diagram in Figure 1.

Data Analysis

The collected articles were subsequently analysed using the VOSviewer application. The process of entering data into the VOSviewer application is carried out by one researcher. VOSviewer is a software tool designed for analysing and visualising bibliometric data (van Eck & Waltman, 2010). Bibliometric visualisation was carried out using co-occurrence of terms in titles and abstracts (Donthu et al., 2021; Kumar et al., 2024) resulting in three distinct types of visualisation: network visualisation, overlay visualisation, and density visualisation (Donthu et al., 2021; Kumar et al., 2024; Öztürk et al., 2024; van Eck & Waltman, 2010). Density visualisation to illustrate term frequency, network visualisation to depict the interconnections between terms, and overlay visualisation to show temporal distribution (van Eck & Waltman, 2010). The minimum number of occurrences was set at five in order to capture significant terms (Zupic & Čater, 2014). Subsequently, all of the resulting visualisations were verified, interpreted and discussed by both researchers.

Ethical Consideration

This study is a bibliometric analysis that does not involve human participants; therefore, ethical approval was not required.

Results

Volume and Type of Publication

Based on the article search conducted using the Publish or Perish application, a total of 90 research articles related to prehospital airway suction published over the past 20 years were identified. Of these, 47 articles were sourced from Scopus and 43 from PubMed. All collected articles were screened for duplication using Mendeley Desktop. Among the 90 articles, 71 (78.89%) addressed themes related to prehospital airway suction. These comprised 85.92% original research articles (n=61), 7.04% review articles (n=5), 2.82% case reports (n=2), 1.41% evaluation study (n=1), 1.41% abstract (n=1), and 1.41% book chapter (n=1).

Following classification by type, the temporal distribution of these publications was examined to identify patterns in research growth.

Growth Research Analysis

Over the past two decades (2005–2025), the number of research publications on prehospital airway suction has fluctuated. During this period, there were three years—2005, 2008, and 2013—in which no publications on the topic were found. The highest number of publications occurred in 2022, with a total of 12 articles. Nevertheless, as shown in Figure 2, the publication trend on prehospital airway

Table 1. Top 10 Most Cited Publications about prehospital airway suction over the last two decades (from 2005 to 2025)

Rangking	Author (year)	Source	Cited by
1st	Prekker et al. (2014)	Critical Care Medicine	79
2nd	Schalk et al. (2010)	Resuscitation	70
3rd	Bernhard et al. (2015)	Anasthesiologie und Intensivmedizin	29
4th	Hossfeld et al. (2021)	European Journal of Anaesthesiology	28
5th	Barker et al. (2010)	Wilderness and Environmental Medicine	25
6th	Schalk et al. (2011)	Prehospital Emergency Care	22
7th	Black, (2007)	Emergency Medicine Journal	22
8th	Bernhard et al. (2015)	Notfall und Rettungsmedizin	20
9th	Schalk et al., (2012)	Anaesthesist	20
10th	Dengler et al. (2011)	Anaesthesist	19

Table 2. Publications related to portable suction (2005–2025) retrieved from Scopus and PubMed databases

Author (year)	Source
Schalk et al. (2011)	Prehospital Emergency Care
Dengler et al. (2011)	Anaesthesist
Suzuki et al. (2019)	PloS one
Peri et al. (2025)	Annals of Biomedical Engineering

Table 3. Publications related to the SALAD technique (2005–2025) retrieved from Scopus and PubMed databases

Author (year)	Source
Bernhard et al. (2015)	Anasthesiologie und Intensivmedizin
Otten et al. (2017)	Journal of special operations medicine : a peer reviewed journal for SOF medical professionals
Jensen et al. (2019)	Air medical journal
Jain et al. (2020)	Prehospital and Disaster Medicine
Guillote et al. (2024)	Prehospital emergency care

suction has demonstrated a steady increase from 2023 to 2025.

Most Cited Publications

As shown in Table 1, the ten most frequently cited publications can be identified. Ranked first is an article authored by Prekker et al., (2014), published in Critical Care Medicine, which has been cited 79 times. Furthermore, Table 2 presents articles related to prehospital airway suction over the past 20 years. According to this table, four articles specifically discuss portable suction devices, namely those by Schalk et al., 2011, Dengler et al., (2011), Suzuki et al., (2019), and Peri et al., (2025).

Co-occurrence Terms and Topic Analysis

Based on the network visualisation, the bibliometric structure revealed five main clusters, each represented by a different colour, indicating the relationships among terms within the literature (van Eck & Waltman, 2010). Each cluster represents a distinct research focus (Donthu et al., 2021). The red cluster consists of 25 terms focusing on airway devices and preparation. Advanced airway management is critically required in the prehospital setting to improve patient outcomes (Carney et al., 2021; Nah et al., 2024). The green cluster comprises 24 terms related to healthcare personnel and the management of prehospital airways. The

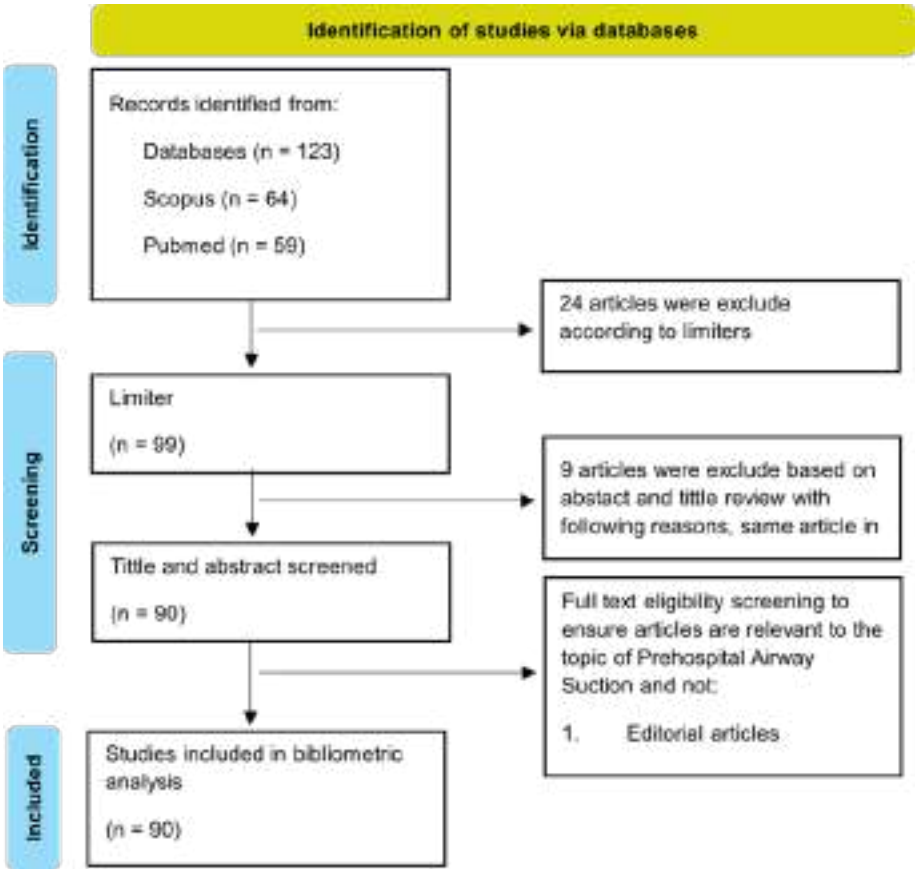

Figure 1. Prisma 2020 Flow Diagram Adapted for Bibliometric Analysis

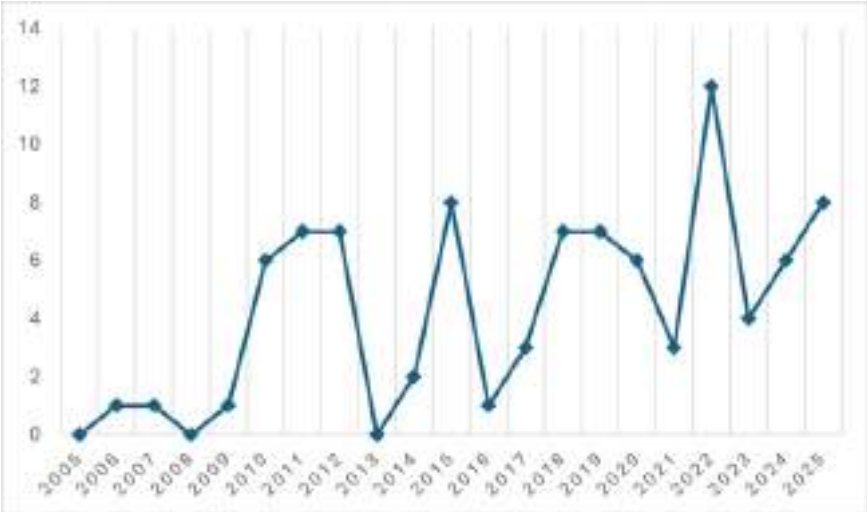

Figure 2. Graph illustrating the growth of research outputs on prehospital airway suction from 2005

blue cluster includes 23 terms concerning the use of suction and evidence-based clinical efficacy. Current systematic reviews on the use of portable suction devices have identified a lack of standardisation and high-quality evidence regarding their safety, effectiveness, and potential adverse effects in prehospital settings, particularly in the management of combat casualties (Jain et al., 2020). The yellow cluster is composed of 23 terms that centre on intubation procedures and field-related challenges. The final cluster, represented in purple, consists of 21 terms highlighting a focus on clinical outcomes

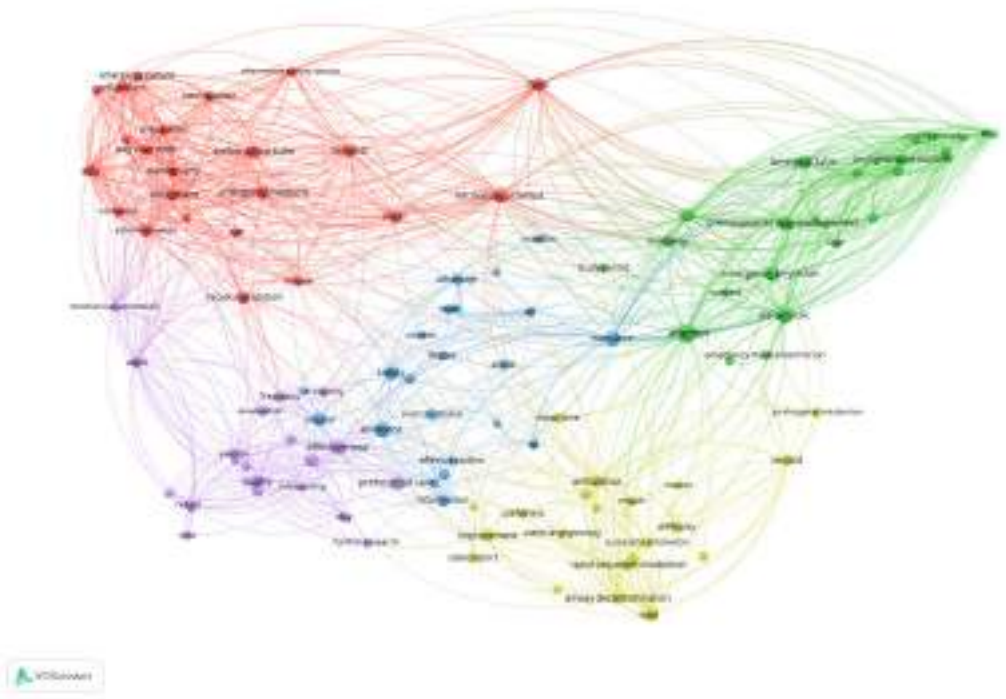

Figure 3. Co-occurrence network visualisation of title and abstract terms in prehospital airway suction research between 2005 and 2025

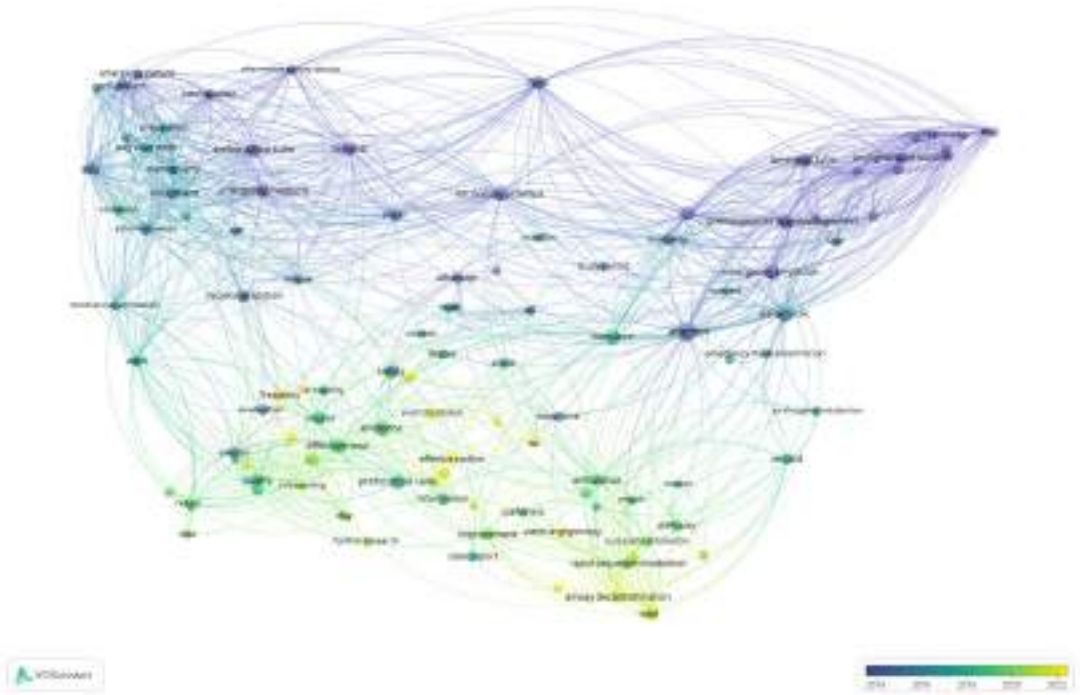

Figure 4. Overlay visualisation of co-occurring terms in the title and abstract of prehospital airway suction publications (2005–2025)

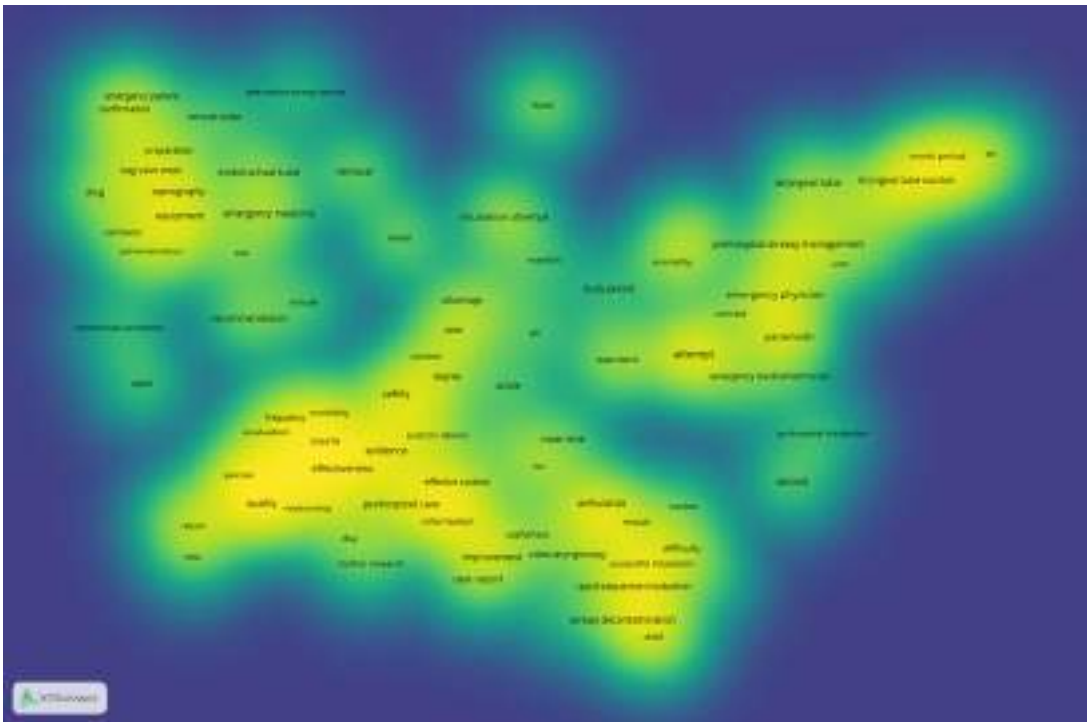

Figure 5. Density visualisation of co-occurring terms in the title and abstract of prehospital airway suction publications (2005–2025)

and the evaluation of prehospital care.

The overlay visualisation (Figure 4) indicates that terms such as bag-valve mask, preparation, and emergency medicine were dominant in earlier years, particularly between 2014 and 2016, as represented by bluish-purple colouring. In contrast, more recent years have seen the emergence of terms such as airway decontamination, SALAD, and suction device, which are highlighted in bright yellow. This trend reflects a shift in focus from basic airway adjuncts to more advanced tools such as portable suction devices (Peri et al., 2025) and innovative suction techniques like SALAD (Guillote et al., 2024), as well as increasingly complex procedures in airway management.

To explore this trend further, the researchers conducted an in-depth review of the 90 articles retrieved from Scopus and PubMed using the Publish or Perish application. The aim was to identify articles discussing portable suction devices and advanced suction techniques. As a result, five articles addressing portable suction were identified (Table 2), along with six articles focusing on the SALAD technique (Table 3).

The density visualisation (Figure 5) highlights the most frequent and densely occurring terms, such as effectiveness, safety, prehospital care, suction device, attempt, emergency physician, and paramedic. These terms represent the most extensively discussed areas in global research on prehospital airway suction. Their bright yellow colouring indicates both high frequency and strong connectivity within the bibliometric network (Donthu et al., 2021; van Eck & Waltman, 2010).

Discussion

The analysis using VOSviewer revealed that all articles discussing prehospital airway suction formed five main clusters. The red cluster consists of 25 terms focusing on Airway Devices & Preparation, including terms such as bag-valve mask, endotracheal tube, emergency medicine, preparation, capnography, confirmation, cervical collar, and alternative airway device. This cluster conceptually represents a paradigm shift in pre-hospital airway management, from a device-based approach to a holistic approach that emphasises clinical readiness and physiological confirmation prior to intervention. Current trends indicate that successful airway management is determined not only by technical skills, but also by systematic preparation, pre-intubation assessment, and real-time capnography monitoring, which have been shown to improve first-pass success and the chances of return of spontaneous circulation (ROSC) (Berkenbush et al., 2023; Jarvis et al., 2024; Liaqat et al., 2025; Panchal et al., 2020).

The green cluster focuses on healthcare professionals and the management of prehospital airways. Key terms within this cluster include paramedic, emergency physician, prehospital airway management, laryngeal tube, laryngeal tube suction, attempt, and emergency medical technician. This cluster highlights studies that emphasise the

role of medical professionals, the effectiveness of airway manoeuvres, and the implementation of airway procedures. A study on out-of-hospital cardiac arrest patients demonstrated that the success rate of advanced airway placement by paramedics increased significantly when operators had high case exposure and participated in regular simulation-based training (Tuttle & Hubble, 2018). Moreover, paramedics with experience in using laryngeal tubes and laryngeal tube suction achieved higher first-pass success rates (Dyson et al., 2017).

The blue cluster is related to the use of suction and evidence-based clinical efficacy. Key terms appearing in this cluster include suction device, effective suction, safety, effectiveness, evidence, information, improvement, ISO, and mean time. This cluster reflects scientific interest in the safety and efficiency of portable suction devices in a pre-hospital setting, while highlighting the technical challenges that remain in the field. Recent research shows that many portable suction devices still have limited suction power, are heavy, and have slow emptying times, thereby reducing their effectiveness in emergency situations that require a rapid response (Jain et al., 2020; Peri et al., 2025). In line with this, several studies emphasise the importance of standardising device performance based on ISO regulations and evidence-based evaluation, so that suction devices can guarantee patient safety and consistency of clinical results in various pre-hospital settings (Dudziński et al., 2023). This trend indicates a shift in research focus from simply testing device functionality towards developing suction technology that is ergonomic, energy efficient, and integrated with clinical safety protocols.

The yellow cluster focuses on intubation procedures and field-related challenges. Key terms in this cluster include rapid sequence intubation, video laryngoscopy, airway decontamination, difficulty, successful intubation, SALAD technique, ambulance, median, and mouth. Several previous studies have shown that training in the Suction-Assisted Laryngoscopy and Airway Decontamination (SALAD) technique significantly reduces intubation failure rates, decreases aspiration volume, and achieves first-pass success rates comparable to conventional methods (Berkenbush et al., 2023; Guillote et al., 2024; Jensen et al., 2020). Scientifically, this trend indicates a shift in research focus towards improving operator safety and mitigating aspiration risks through simulation-based techniques and visualisation technologies such as video laryngoscopy, which is now the standard of modern training in ambulance and emergency services environments. Thus, this cluster emphasises the importance of integrating technical skills, visual aids, and airway decontamination strategies to optimise the success of intubation in challenging field conditions.

The purple cluster highlights a focus on clinical outcomes and the evaluation of prehospital care. Key terms in this cluster include prehospital care, morbidity, frequency, evaluation, return of spontaneous circulation (ROSC), quality, further research, and relationship. This cluster conceptually represents a shift in research orientation from technical procedures towards assessing the effectiveness and quality of services, reflecting global efforts to assess the extent to which pre-hospital interventions contribute to patient safety and outcomes. Evaluations of prehospital care systems have identified variations in outcome quality, highlighting the need for ongoing performance monitoring, benchmarking, and targeted training to reduce morbidity and mortality (Amaleh et al., 2024). In addition, recent research emphasises the importance of integrating clinical outcome indicators such as ROSC and resuscitation quality as key parameters in evaluating the quality of emergency services (Takayama et al., 2025; Wang et al., 2022). This cluster underscores an emphasis on patient outcomes, the effectiveness of interventions, and research areas that warrant further exploration.

Data analysis reveals that the primary focus of global literature centres around three key aspects: the efficacy of suction procedures, technical challenges in the field, and the role of healthcare providers. Terms such as effectiveness and safety indicate a strong emphasis on evidence-based procedural validation (Berkenbush et al., 2023). Meanwhile, the emergence of terms like “airway decontamination” and “SALAD” reflects the adoption of novel techniques to address complex airway challenges (Guillote et al., 2024; Jensen et al., 2019). Several studies have demonstrated that video laryngoscopy and SALAD (Suction-Assisted Laryngoscopy and Airway Decontamination) enhance airway visibility and improve first-pass intubation success rates (Berkenbush et al., 2023; Eberlein et al., 2019; Maissan et al., 2022). Additionally, prior research has emphasised that the effectiveness of suction is highly dependent on both the equipment used and the skill level of the operator (Dudziński et al., 2023; Peri et al., 2022).

The correlation between terms indicates a strong association between prehospital care and terms such as evidence, morbidity, and evaluation. Prehospital airway suction is a critical intervention in cases of trauma, cardiac arrest, or respiratory arrest due to airway obstruction (Jain et al., 2020; Lorenzen et al., 2024). The success of suction procedures has a direct impact on Return of Spontaneous Circulation (ROSC) and contributes to reducing both morbidity and mortality (Carney et al., 2021; Takayama et al., 2025; Wang et al., 2022). This highlights the importance of outcome measurement in the context of airway interventions in out-of-hospital settings (Nishimura et al., 2022).

The terms paramedic, emergency physician, and emergency medical technician underscore the critical importance of operator skill in the success of suction procedures. Previous studies have shown that paramedic competence in airway suctioning is directly correlated with patient outcomes (Carney et

al., 2021; Panchal et al., 2020). Therefore, regular simulation-based training and protocol updates are strongly recommended. Earlier research has highlighted the significance of simulation-based training in enhancing airway suction skills (Jensen et al., 2019).

The overlay visualisation indicates that terms such as SALAD, airway decontamination, and improvement have emerged more recently (2020–2022), signalling current research directions. Additionally, the appearance of the term further research highlights existing gaps in the literature, particularly regarding new devices (Johnson et al., 2022), extreme emergency environments (Jain et al., 2020), and longitudinal evaluation of suction procedures (Jarvis et al., 2024). This presents an opportunity for larger clinical studies with prospective designs.

Limitation of the study

This is the first bibliometric study to specifically explore the topic of prehospital airway suction. As such, the findings of this research may serve as a valuable reference for future researchers in selecting themes for further investigation within the domain of prehospital airway suction. Nevertheless, this study has several limitations that should be acknowledged. First, it relied solely on two publication databases (Scopus and PubMed). Second, the analysis was limited to the keyword prehospital airway suction, thereby excluding relevant studies that may have used alternative terms such as prehospital airway management. It is hoped that these limitations can be addressed in future bibliometric research.

Implication of the study

Implication for nursing research

This bibliometric analysis shows that research discussing prehospital airway suction is still limited in number. More specifically, there is a lack of research discussing the effectiveness of portable suction devices, suction techniques such as SALAD, and the effect of suction on patient outcomes in emergency conditions. This gap indicates a need for further research on these topics. Furthermore, this bibliometric analysis also shows a shift in trends towards innovation in advanced devices and simulations. These results open up great opportunities for nursing researchers to collaborate with experts in the field of electromedicine to design advanced portable suction technology that is effective in improving patient outcomes and, at the same time, is easy to move and robust (can be used in all types of terrain outside the hospital area, especially on extreme emergency scenarios).

Implication for nursing education

The results of this bibliometric analysis confirm that the skills of personnel (including nurses) greatly influence the success of airway suction outside of hospitals, especially when dealing with airway contamination (such as blood, vomit, or thick secretions). Therefore, nursing education institutions must strengthen their curriculum on airway management. This can be achieved through simulation-based training with scenarios involving severe contamination. The improvement of these skills must go beyond technical aspects to include clinical decision making, risk assessment, and critical situation management. Furthermore, continuing education for emergency nurses and ambulance nurses must be conducted regularly to maintain and improve their skills.

Implication for nursing practice

The results of this study emphasise the need for standardization of suction procedures. This is to ensure that suction techniques are safe, effective, and produce consistent results, including in situations outside of hospitals. Emergency nurses must perform suction procedures in accordance with evidence-based practices, which include decontamination techniques, safe suction duration, selection of appropriate suction devices, and management of challenging emergency environments. Furthermore, nurses must continuously improve their suction skills in accordance with standardized procedures. With improved nursing skills, suction equipment readiness, and compliance with procedures, nursing practice will directly contribute to successful airway management and improved patient safety.

Conclusion

This bibliometric study indicates that prehospital airway suction is an evolving topic, with research focusing on effectiveness, technical challenges, and the role of medical personnel. The emergence of terms such as further research, improvement, and evaluation suggests that although substantial evidence on prehospital airway suction is available, many variables remain unstandardized. There is a clear need for procedural standardization (Peri et al., 2025), the development of portable and efficient devices (Jain et al., 2020), advancement of effective suction techniques (Patterson et al., 2021), and the enhancement of simulation-based clinical training for paramedics and medical personnel (Halabi et al., 2022; Zucca et al., 2024). Future research should target specific populations, extreme emergency scenarios, and the integration of emerging technologies due to the lack of research on these themes. Even though these themes are real conditions that occur in prehospital emergency services.

Declaration of Interest

The authors affirm that there are no conflicts of interest associated with this study.

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Data Availability

The dataset generated during this study is available from the corresponding author on reasonable request.

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Self-efficacy, drug side effects, and nurse communication: Factors related in chemotherapy adherence for breast cancer patients

Muhammad Ashraf[1], Hema Malini[2*], Randy Refnandez[3], Intan Yullya Kardila[4]

[1] Bachelor of Nursing Student, Faculty of Nursing, Universitas Andalas, Padang, West Sumatera, Indonesia
[2] Department Medical Surgical Nursing, Faculty of Nursing, Universitas Andalas, Padang, West Sumatera, Indonesia
[3] Department Mental and Community Nursing, Faculty of Nursing, Universitas Andalas, Padang, West Sumatera, Indonesia
[4] Stikes Garuda Putih, Jambi city, Jambi, Indonesia

Abstract

Background: Chemotherapy is a crucial therapy for breast cancer patients, and its success heavily depends on patient compliance. However, despite extensive in the impact of Non-compliance, there is still limited understanding of the specific factors influencing chemotherapy adherence among breast cancer patients, highlighting the need to re identify these contributing factors.
Purpose: This study aims to identify the determinant factors related to chemotherapy adherence among breast cancer patients at the West Sumatera Provincial Hospital.
Methods: This study is a quantitative research with a cross-sectional design. An accidental sampling technique was used, with a total of 81 patients. Bivariate analysis was conducted using the chi-square test ($p < 0.05$), and multivariate analysis was performed using Multiple Logistic Regression.
Results: The results showed that 61.7% of patients had good compliance. Factors associated with compliance included good self-efficacy, low knowledge, feeling bothered by the side effects of chemotherapy drugs, and effective nurse interpersonal communication. Multivariate analysis revealed that self-efficacy and drug side effects had a significant relationship with compliance ($p < 0.05$). Drug side effects were the most significant factor (OR = 12.223, 95% CI: 1.371 to 109.015, $p < 0.05$).
Conclusion: The findings of this study highlight the importance of managing drug side effects and enhancing self-efficacy through patient education and improved nurse interpersonal communication. These measures are expected to improve the quality of nursing care and patient outcomes.

Keywords: adverse reactions; breast cancer; chemotherapy; drug-related side effect; patient compliance

Introduction

Cancer is the leading cause of death worldwide, causing nearly 10 million deaths in 2020. Breast cancer is the highest case in 157 out of 185 countries in the world (Ferlay et al., 2020). According to the Global Burden of Cancer Study data, breast cancer ranks first in the world (11.7%) and the mortality rate (6.9%) in the age range of 40-50 years (GLOBOCAN, 2020). Based on data, Indonesia is included in the top 10 highest rates of breast cancer sufferers and the fourth highest death rate caused by breast cancer. The prevalence of breast cancer in Indonesia is in first place with 65,850 cases with the second leading cause of death after lung disease (Indra, 2020). Deaths from breast cancer are expected to continue to increase to more than 14.1 million in 2023. The prevalence of breast cancer is spread across all provinces, based on data stating that breast cancer is in first place which every year there is an increase (Basic Health Research, 2018).

Primary treatment to improve healing and reduce the risk of breast cancer recurrence through surgery and radiation. Chemotherapy is the

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Corresponding author

Hema Malini*
Department Medical Surgical Nursing, Faculty of Nursing, Universitas Andalas, Padang, West Sumatera, Indonesia; Limau Manis, Pauh, Padang City, West Sumatra 25163; Phone: +62 812-6104-5860; E-mail: hemamalini@nrs.unand.ac.id

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most used cancer modality therapy option and can break down 30% of recurrences (Harun et al., 2022; Sordo-Bahamonde et al., 2023; Wang & Wu, 2023).

Chemotherapy as the first choice of treatment in advanced cancers with palliative goals, is expected to increase the patient's "survival rate", lower the risk of recurrence, prevent complications and kill cancer cells. With a variety of cancer treatment options, the proportion of cancer patients' compliance in undergoing chemotherapy is still low (Bekalu et al., 2023; Hastuty et al., 2020).

Adherence in therapy is urgently needed because non-compliance of patients, especially breast cancer patients undergoing chemotherapy, can reduce the success of therapy, reduce the chance of survival, increase the incidence of hospital admissions, health care costs, recurrence events, and mortality rates (Indah et al., 2020). In addition, non-compliance can result in the spread of cancer cells to other organs of the body so that it will cause complaints due to the process of spreading cancer cells to other organs of the body. If cancer cells are left untreated, their spread can reach entire healthy parts of the organ, affect organ function, or metastasize to more distant parts of the body, which can ultimately lead to death. Data shows that of the 19,241 breast cancer patients, 3,158 (16%) died within 10 years of diagnosis. One of the causes of death is due to further complications resulting from failure to complete treatment (Ho et al., 2020; Lestari & Lestari, 2019).

Chemotherapy compliance requires collaborative efforts and understanding between healthcare professionals and patients. Patients must adhere to daily medications such as dosage, frequency, duration of therapy, and discontinuation. In addition, the chemotherapy schedule for breast cancer patients set by the doctor is something that must be adhered to by patients (Ho et al., 2020). Adherence to treatment is one of the factors in the effectiveness of a treatment so that it can reduce the mortality and mortality rate of a disease (Indah et al., 2020).

Compliance is a picture for patients in following instructions from health workers. Every patient must adhere to both long-term and short-term treatment to help the patient recover properly and quickly. Factors that affect compliance in undergoing chemotherapy are knowledge, self-efficacy, distance from the location of residence, side effects of chemotherapy, quality of service of health workers, family social support, age, education, economy Patients who do chemotherapy not according to the schedule provided by health workers will have an impact on the patient's survival. Non-compliance is associated with poor survival will lead to death. Although previous studies have examined factors influencing chemotherapy compliance, aspects such as medication side effect, patient accommodation, inadequate knowledge, self-confidence, and the impact of psychosocial support from nurses' interpersonal communication remain underexplored. Investigating these factors is important because they can significantly affect patient adherence, self-confidence and overall treatment outcomes. Thus, the purpose of this study is to further investigate factors related to chemotherapy adherence in breast cancer patients (Fitriana et al., 2023; Lestari & Lestari, 2019).

Materials and Methods

Design

The type of research used in this study is quantitative research with a cross-sectional approach.

Population and sampling

The population of this study is all breast cancer patients in the National General Hospital. The population in April 2023 undergoing outpatient treatment at the West Sumatera provincial National General Hospital is 102 people. The sample was carried out through an accidental sampling technique of 81 respondents. The sampling technique used in this study was accidental sampling, which is a method of determine samples based on chance. In this approach, all respondents who happened to meet the researcher and met the inclusion and exclusion criteria were selected as data sources, the participants were breast cancer patients undergoing chemotherapy. The inclusion criteria in this study were breast cancer patients who had completed-5 chemotherapy cycles. The exclusion criteria were patients with decreased consciousness, patients with comorbid diseases, and patients with intellectual disabilities.

Instruments

The instruments in this study included data on the characteristics of respondents consisting of age, education, occupation, monthly income, distance and time to health services, and stadium. Furthermore, the researcher used five questionnaires and one observation sheet. The knowledge questionnaire was adopted from Yulia (2012) and consisted of 15 questions, a Cronbach's alpha = 0.896. The self-efficacy questionnaire was adopted from Hia (2019) consisting of 10 questions, with a validity coefficient of 0.399 and a reliability coefficient (Cronbach's alpha) of 0.83. The chemotherapy drug side effect questionnaire was adapted from Makoul et al., (2007), with validity values ranging from 0.370-0.934 and a reliability coefficient (Cronbach's alpha) of 0.942. in addition, the Interpersonal Communication of Nurses or Communication Assessment Tool (CAT) was used, with Cronbach's alpha reliability of 0.96. Meanwhile, the observation sheet on chemotherapy compliance was based on the control card of breast cancer patients.

Data collection procedures

The study was conducted from September 8, 2023, to March 6, 2024. All respondents were selected according to the inclusion and exclusion criteria.

Table 1. Characteristics of Respondents (Age, Education Level, Occupation, Income, Distance, Time, Stage, Cycle (n=81)

Characteristics of Respondents	Mean /SD	Min-Max
Age	49.14/ 8.452	26-71
	f	%
Education		
Primary Education	11	13.6
Secondary Education	41	50.6
Higher education	29	35.8
Work		
Not Working	51	63.0
Work	30	37.0
Income		
Low	34	42.0
Keep	38	46.9
Tall	9	11.1
Distance and Time		
Close≤ 5km/<30 minutes	20	24.7
> 5 km/>30 minutes away	61	75.3
Stadium		
Stadium 2	57	70.4
Stadium 3	23	28.4
Stadium 4	1	1.2
Cycle		
5-6 Cycles	43	53.1
7-8 Cycles	38	46.9

Table 2. Distribution of Category Frequency Based on Knowledge, Side Effects of Chemotherapy Drugs, Self-Efficacy, Interpersonal Communication of Nurses, Compliance (n=81)

Category	F	%
Knowledge		
Tall	35	43,2
Low	46	56,8
Side Effects of Chemotherapy Drugs		
Disturb	64	79,0
Non-Intrusive	17	21,0
Self-Efficacy		
Good	66	81,5
Enough	15	18,5
Nurse Interpersonal Communication		
Good	42	51,9
Bad	39	48,1
Compliance		
Obedient	50	61,7
Non-Compliance	31	38,3

Table 3. Relationship of Knowledge, Self-efficacy, Side Effects of Drugs, and Interpersonal Communication of Nurses with Chemotherapy Compliance (n=81)

	Compliance				Total		P value
	Obedient		Non-Compliance				
	f	%	f	%	f	%	
Knowledge							
Tall	27	77.1	8	22.9	35	100.0	0.024
Low	23	50.0	23	50.0	46	100.0	
Self-efficacy							
Good	45	68.2	21	31.8	66	100.0	0.027
Enough	5	33.3	10	66.7	15	100.0	
Side Effects of the Drug							
Non-Intrusive	17	94.4	1	5.6	18	100.0	0.003
Disturb	33	52.4	30	47.6	63	100.0	
Nurse Interpersonal Communication							
Good	31	73.8	11	26.2	42	100.0	0.036
Bad	19	48.7	20	51.3	39	100.0	

Table 4. Models of Logistic regression of Knowledge, self-efficacy, side effects of medications, and interpersonal communication of nurses with Chemotherapy Compliance

Variables	Model 1		Model 2	
	OR (ICR 95%)	p	OR (IC95%)	p
Knowledge	3.044 (0.976-9.497)	0.055	2.649 (0.884 – 7.943)	0.82
Self-Efficacy	3.152 (0.748 – 13.278)	0.25	4.666 (1.220 – 17.847)	0.024
Perception of Drug Side	12.223 (1.371-109.015)	0.118	12.262 (1.411 – 106.531)	0.023
Perceptions related to nurse interpersonal communication	2.276 (0.725 – 7.145)	0.159		

The data collection process began with obtaining research ethics approval, followed by recruiting respondents using the accidental sampling technique, in which all individuals who happened to meet the researcher and met the inclusion and exclusion criteria were included as participants.

Afterward, the researcher introduced themselves and explained the purpose and objectives of the study to the respondents. Informed consent was then obtained, and each respondent was asked to sign the consent form. Subsequently, data were collected through guided interviews using questionnaires, assisted by enumerators.

Data Analysis

The results of the study were analyzed using statistical software. Univariate analysis was carried out on each variable from the results of the study, namely independent variables (knowledge, self-efficacy, side effects of chemotherapy drugs, interpersonal communication of nurses) and dependent variables (adherence in undergoing chemotherapy in breast cancer patients) which were analyzed using statistics in the form of mean and frequency distribution.

Bivariate analysis was carried out to determine whether there was a relationship between independent variables (knowledge, self-efficacy, side effects of chemotherapy drugs, interpersonal communication of nurses) and dependent variables (adherence in undergoing chemotherapy in breast cancer patients) using the Chi Square test with a significance degree of 0.05, since based on the results of the normality test (Shapiro–Wilk), the data were not normally distributed. Furthermore, a multivariate analysis was carried out with a multiple logistic regression test to see the most dominant factor with a significance degree of 0.05.

Ethical considerations

The ethical license has been confirmed by the Ethical Standards Committee of the Faculty of Nursing on January 02, 2024, Number: DP.04.03/D.XVI.XI/06/2024 Participants give consent before conducting the survey and have the option to refuse to answer any questions or stop the survey at any stage. All information collected is completely anonymous. Each respondent took about 25-30 minutes to complete the questionnaires. No major complaints were reported, although some noted that

the number of questions was many. Short breaks were allowed to minimize fatigue.

Results

This study aims to investigate adherence and factors related to chemotherapy adherence in breast cancer patients in national general hospitals. The study involved 81 breast cancer patients undergoing chemotherapy. The results of the study presented data related to demographic characteristics, univariate, bivariate and multivariate analysis results.

Table 1 presents the demographic characteristics of respondents undergoing chemotherapy. The average age was 41.14 years. Most respondents had completed education at the level of 29 people (35.8%) and were unemployed, total 51 people (63.0%). The majority lived more than 5 km from the hospital and took over 30 minutes to reach it (75.3%). Most respondents were in stage 2 of cancer (70.4%) and had undergone 5-6 chemotherapy cycles (53.1%).

Based on table 2, 43,2% of respondents had high knowledge about chemotherapy. Most respondents (79.0%) experienced side effect during chemotherapy. Regarding self-efficacy, 81.5% were in the good category. Nurse interpersonal communication was rate god by 51.9% of respondents. More than half (61.7%) of the respondents complied with the chemotherapy regimen.

Table 3 shows the correlation between various factor and chemotherapy adherence. Among respondents with high knowledge, 77.1% adhered to chemotherapy, wile 50.0% of those with low knowledge were no compliant. In terms of themes of self-efficacy, 68.2% of respondents in the good category adhered to chemotherapy, compared to 66.7% non-compliance in the sufficient category. Regarding drug side effects, 94.4% of respondents without interfering side effects were non-compliant. For nurse interpersonal communication, 73.8% of respondents with good communication adhered to chemotherapy, while 51.3% with poor communication were non-compliant. Statistical analysis revealed significant correlations between knowledge, self-efficacy, drug side effects, and nurse interpersonal communication with chemotherapy adherence ($p< 0.05$), indicating these factors are significantly associated with patient compliance during chemotherapy.

Table 4 shows the factors associated with chemotherapy adherence, after a multiple logistical analysis. Of the four variables included in the multivariate model, (Model 1) there was one factor that remained significant ($p <0.05$), related to chemotherapy adherence in the last model (Model 2): self-efficacy and drug side effects. Side effects showed a stronger association with chemotherapy adherence of cancer patients with (OR = 12,223, 95% CI 1,371 to 109,015, $p <0.05$).

Discussion

This study found that 61.7% of respondents adhered to their chemotherapy schedule, while 38.3% were unable to follow the prescribed cycles. The reasons for non-adherence included low hemoglobin levels, thrombocytopenia, poor physical condition, forgetfulness, and work commitments. Previous studies indicate that adherence is influenced by environmental motivation and strong nurse support (Siska, 2017). More than half of respondents (56.8%) demonstrated low knowledge regarding breast cancer, its prevention, chemotherapy procedures, and potential drug side effects.

Moreover, this study found that 30.9% of participants had poor knowledge, reflecting persistent gaps in understanding breast cancer and its risk factors. Evidence from previous research supports this finding, showing that over half of patients had inadequate knowledge of chemotherapy, its side effects, and self-care strategies (Rizka et al., 2023; Abu El-Kass et al., 2021; Suhail et al., 2024). Lack of knowledge often increases anxiety about chemotherapy, but this can be alleviated through adequate education on its benefits, risks, and management.

Chemotherapy knowledge encompasses understanding the purpose, duration, side effects, and necessary lifestyle adjustments during therapy. Adequate knowledge helps patients anticipate potential side effects, take preventive measures, and adhere to treatment (Mathur et al., 2015; Parker et al., 2020; Berger et al., 2018). However, many patients remain uninformed, with 54.6% unaware of their chemotherapy regimen and 56.9% unable to identify the medications they were receiving (Suhail et al., 2024). Factors contributing to poor knowledge include limited exposure to health information, cognitive constraints, low educational background, and negative perceptions about chemotherapy (Arunachalam et al., 2021). Thus, health workers need to provide clear, accessible, and continuous education to ensure patients understand the treatment and its potential side effects.

This study also showed that most respondents (81.5%) had good self-efficacy. Self-efficacy is essential in motivating individuals to believe in their capacity to undergo chemotherapy, manage side effects, and maintain treatment continuity. High self-efficacy enhances readiness to face treatment challenges, while low self-efficacy may result in lack of motivation, hopelessness, and fear (Ester & Wardah, 2020). When self-efficacy is low, patients need emotional, social, and informational support from families and healthcare providers to strengthen their confidence and resilience.

Most respondents (79%) reported experiencing chemotherapy side effects, primarily physiological complaints such as nausea, vomiting, loss of appetite, fatigue, and mucositis. These findings are consistent with previous studies documenting similar side effects (Rusmalina, 2019; Koshy et al.,

2023). Chemotherapy side effects vary depending on drug type, dosage, treatment duration, and patient characteristics (Nurseta et al., 2022). Preventive measures—such as premedication with antiemetics, erythropoietin, and supportive drugs—can reduce the severity of side effects and improve patient comfort (Wardani, 2014).

This study found that 51.9% of respondents rated nurse interpersonal communication as good, indicating that nurses generally treated patients respectfully, provided comfort, and showed empathy. Effective communication is crucial in cancer care, as poor communication contributes to misunderstandings, delays in reporting side effects, and reduced trust (Keutchafo, W. et al., 2022). However, 48.1% rated nurse communication as poor, particularly regarding opportunities for asking questions, shared decision-making, and receiving adequate explanations. These gaps highlight the need for nurses to strengthen patient engagement, clarify information about chemotherapy, and provide consistent feedback.

The multivariate analysis showed that self-efficacy and side effects significantly influenced chemotherapy adherence. Higher self-efficacy was associated with better compliance, consistent with evidence that confidence improves persistence during treatment despite physical and emotional challenges (Bandiyah et al., 2017; Wu et al., 2020). Interestingly, the side effect factor was identified as the strongest predictor of adherence, supporting findings that patients who recognize and anticipate side effects tend to be more compliant (Fitriana et al., 2023). This emphasizes the importance of providing early, clear, and comprehensive information about potential side effects and management strategies.

Strengths and Limitations

This study has several strengths. First, it provides comprehensive data on multiple determinants of chemotherapy adherence among breast cancer patients, including knowledge, self-efficacy, side effects, and nurse interpersonal communication. Second, the use of validated questionnaires enhances measurement reliability and validity. Third, the study involved an adequate sample size, allowing for meaningful statistical analysis, including multivariate modelling.

However, the study has limitations. The cross-sectional design restricts the ability to infer causal relationships. The use of accidental sampling limits the generalizability of the findings to all breast cancer patients. Additionally, adherence and other variables were measured through self-report, introducing the possibility of recall and social desirability bias. Future research using longitudinal designs, random sampling, and objective adherence measures is recommended to strengthen evidence.

Implications of the Study

The findings have several practical and clinical implications. First, identifying factors such as knowledge, self-efficacy, side effects, and communication provides direction for developing targeted interventions to improve adherence. Second, the study underscores the pivotal role of nurses in providing education, emotional support, and effective communication to enhance patient understanding and treatment continuity. Third, routine assessment of patient knowledge, self-efficacy, and treatment side effects is necessary to guide individualized counselling and timely support. These insights can inform nursing practice, patient education programs, and policy development aimed at optimizing adherence to chemotherapy among breast cancer patients.

Conclusion

This study found that chemotherapy adherence among breast cancer patients is significantly influenced by self-efficacy and drug side effects, with side effects emerging as the strongest predictor. Enhancing patient self-efficacy and providing structured information about chemotherapy and its side effects are essential to improving adherence.

Based on the findings, healthcare providers—especially nurses—should prioritize interventions that strengthen patient self-efficacy, increase knowledge about treatment, and offer strategies for managing side effects. Continuous health education, counseling, and the use of educational materials such as booklets can help patients better understand their treatment and improve their compliance with chemotherapy.

Declaration of Interest

The authors state that they have no competing financial interests or personal relationships that could seem to affect the work reported in this paper.

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Data Availability

All data generated or analyzed during this study are included in this published article.

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Lived experiences of domestic violence among Minangkabau women: A phenomenological study

Yanti Puspita Sari[1*], Khatijah Lim Abdullah[2], Hermalinda Herman[1]

[1] Universitas Andalas, Padang, West Sumatera, Indonesia
[2] Department of Nursing, Sunway University, Malaysia

Abstract

Background: Very few studies try to explore women's experiences with violence in the Minangkabau cultural sphere. Thus, a phenomenological inquiry is timely to illuminate how Minangkabau women themselves experience, interpret, and respond to violence within these evolving cultural dynamics.
Purpose: This study aimed to explore the lived experiences of women who have faced domestic violence, focusing on the causes of the violence, its impact on their health, and the decision-making processes they undertook in response.
Methods: This study used a phenomenological study approach. The inclusion criteria were women from the Minangkabau tribe, aged 18-40, married or previously married, and with children. Participant recruitment was conducted through the Pusat Pelayanan Terpadu Pemberdayaan Perempuan dan Anak/ Integrated Service Center for the Empowerment of Women and Children) and the Women's Crisis Center (WCC) "Nurani Perempuan", based on predetermined inclusion criteria. Data collection continued until thematic saturation was reached. Nine women were involved. In-depth interviews and field notes were transcribed verbatim, and theme analysis was performed using the seven-step Collaizzi technique.
Results: Four themes emerged from the data: (1) failure to resolve family conflict; (2) physical and psychological despair; (3) inability to make decisions; (4) need for external support. Participants' experiences reflect the erosion of traditional protective systems due to cultural shifts, economic dependence, and societal pressures.
Conclusions: The study highlights that unresolved family conflict, poor health outcomes, and limited decision-making power shape women's vulnerability to domestic violence. Strengthening community-based support and culturally sensitive interventions is recommended to empower women and reduce the risk of domestic violence.

Keywords: cultural norms; domestic violence; gender-based violence; phenomenology

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Corresponding author

Yanti Puspita Sari*
Assistant Professor, Faculty of Nursing, Universitas Andalas, Indonesia; Jl. Dr. Mohammad Hatta, Limau Manis, Pauh, Padang City, West Sumatra 25175, Phone: (+62 812 1354 9479), E-mail: yantipsari@nrs.unand.ac.id

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Introduction

Domestic violence remains a global health issue among women worldwide, including Indonesia (WHO, 2020). The World Health Organization reported that approximately 35% of women worldwide and in more than 80 nations had experienced violence by their partners, including physical, psychological, sexual, or a combination of all types of violence. Moreover, 30% homicide of women in the world is caused by partner violence (WHO, 2018). It is a severe problem threatening women's health, well-being, and quality of life.

These statistics from around the world are in line with the situation in Indonesia, where rates of domestic violence are still rising dramatically, indicating that the problem is not only widespread but also ingrained in local culture. In 2018, the prevalence of violence against women 41% of physical violence, 31% of sexual violence, and 15% of economic and psychological violence are reported in Indonesia Currently, the prevalence of domestic

violence by partners in Indonesia in 2024 shows that activity restrictions and financial restrictions are the two most common forms of violence, at 30.3% and 15%, respectively; followed by emotional violence at 11.3% and a combination of physical and sexual violence at 10.4% (BPS & UNFPA, 2024).

Several factors contribute to women's violence, namely, destructive husband behaviors like alcohol consumption (Crane et al., 2019; Cunradi et al., 2018), lack of self-control (Omar Elsaltani & Foster, 2025), the social culture that makes a woman lower than men (Patriarchy culture) (Ruiz-Perez et al., 2017), and the men superior paradigm (Clark et al., 2018). Besides that, low education levels of women and few job opportunities increase the risk of women experiencing violence (Zhao et al., 2025)

The Minangkabau are the only ethnic group in Indonesia that adheres to a matrilineal system, a tradition in which women inherit family property, pass on lineage to their children (Revita et al., 2019), and are culturally respected as central figures in the household Kusniarti (2018). According to Hafizah (2019) Minangkabau women, they are safeguarded by their maternal uncles, or "mamak", and even marriage proposals need their consent. Despite these cultural ideals, recent years have seen a rise in violence against Minangkabau women, exposing a sharp contrast between tradition and reality (Ike, 2019).

Modernization, meanwhile, has brought significant consequences, altering cultural practices, including those of the Minangkabau. Previously, married Minangkabau women remained in their family homes, and husbands were considered outsiders to their wives' families, allowing wives to stay close to their parents and 'mamak'. This situation could act as a control and a barrier for husbands to prevent them from being abusive within the family (Nofiardi, 2018). Another phenomenon is that some Minangkabau women are now choosing to marry men outside the Minangkabau ethnic group and to live separately from their parents and extended family by migrating to other areas, as a form of domestic independence (Pangulu et al., 2022). These choices mean that Minangkabau women no longer receive direct protection from 'mamak' due to their distant domiciles, highlighting the significant and concerning impact of modernization on the protective function of 'mamak' and the gravity of the cultural shift (Widihastuti et al., 2019).

On the other hand, in accordance with Minangkabau custom, women inherit their family's wealth, which should grant them a strong economic standing. However, in reality, this does not always translate into complete financial independence (Andra et al., 2025). The economic landscape for Minangkabau women is significantly shaped by two dominant forces: cultural customs and religious norms. These norms, which still uphold the husband as the family's primary breadwinner, play a crucial role in shaping Minangkabau women's economic independence (Valentina & Safitri, 2022). This tension between cultural ideals and modern realities is reflected in the lived conditions of Minangkabau women.

The results of a preliminary study in a coastal village in Padang City, West Sumatra, found that women who experience violence, are neglected by their husbands, tend to lose their grip on life, become a disgrace and a burden to large families, do not have regular income and live below the poverty line (Hafizah, 2019) They also do not take good care of themselves and tend to be passive about their health conditions; physically, they appear older than their age. The condition of these women has an impact on the poor fulfillment of the basic needs of their children; where children grow and develop with incomplete families, lose their father figure, are malnourished, and do not get a proper formal education, even as some of them drop out of school and do menial jobs that they should not experience (Fatmariza & Febriani, 2019).

To interpret these complex experiences of Minangkabau women, it is essential to draw upon theoretical perspectives that capture both overlapping vulnerabilities and shifting cultural contexts. It is necessary to consider both the various intersecting identities that influence vulnerability using intersectionality theory, a concept that recognizes that people's experiences of disadvantage are shaped by multiple factors such as gender, race, class, and sexuality, and the cultural shifts that modify social norms and support systems (cultural erosion) to comprehend women's experiences of domestic abuse. As previously explained, the cultural shifts may have influenced the roles and positions of Minangkabau women within their families.

Very few studies try to explore women's experiences with violence in the Minangkabau cultural sphere. Thus, a phenomenological inquiry is timely to illuminate how Minangkabau women themselves experience, interpret, and respond to violence within these evolving cultural dynamics. Research on women's experiences of violence is essential to reduce its prevalence and mitigate the associated health consequences. A deeper understanding of these lived experiences can serve as the foundation for developing nursing care interventions that are more targeted, efficient, and effective for women affected by violence.

Objectives

The study aimed to explore the lived experiences of women who have faced domestic violence, with a focus on how personal identity and shifting cultural norms affect vulnerability, health consequences, and decision-making about their experiences of violence. It particularly examines how women contribute to the family economy and how Minangkabau cultural traditions are employed and have evolved. These elements have the potential to alter power dynamics in marriages and influence support-seeking behaviors, providing valuable insights for

understanding and addressing domestic violence.

Materials and Methods

Study Design

This study used a phenomenological approach to explore Minangkabau women's experiences in domestic violence perpetrated by their husbands, whether those who experienced verbal violence, physical violence, or sexual violence, or a combination of all types of violence.

Participants and setting

This study was conducted in Padang City, West Sumatra, Indonesia, and involved Minangkabau women who had experienced domestic violence. Participants were recruited purposively from two protection agencies: the P2TP2A *(Pusat Pelayanan Terpadu Pemberdayaan Perempuan dan Anak/ Integrated Service Center for the Empowerment of Women and Children)* and the Women's Crisis Center (WCC) *"Nurani Perempuan"*, both located in Padang City. These organizations provide essential services such as counseling, legal support, and temporary shelter to women survivors of domestic violence, making them appropriate and ethical recruitment sites for accessing participants with relevant lived experiences.

Staff at these institutions identified potential participants and contacted them. The inclusion criteria were: (1) women of Minangkabau ethnicity from Minangkabau indigenous tribes, (2) aged between 18 and 40 years, (3) currently married or previously married, (4) having at least one child, and (5) having experienced domestic violence.

Initial contact was made via telephone to provide an overview of the study, including its purpose, ethical considerations, and participants' rights (e.g., voluntary participation, confidentiality, and the right to withdraw at any time). For those who agreed to participate, an in-person meeting was arranged at a location they identified as safe and convenient. These meetings were coordinated by staff from the respective protection agencies. Informed consent was obtained before the interviews.

Participants were given the full right to pause or discontinue the interview at any point if they felt uncomfortable or unsafe due to the sensitive nature of the discussion.

A total of nine participants were included in this study. The sample size was not predetermined but guided by the principle of data saturation; interviews continued until no new themes or significant information emerged.

Ethical Consideration

Ethical approval was obtained from the Research Ethics Committee of M Djamil Hospital, West Sumatra (LB.02.02/5.7/299/2022). Pseudonyms were used to maintain secrecy and conduct interviews. To ensure consistency and empathy, interviewers were trained in trauma-informed techniques. Referrals for counselling were available if needed, and participants were free to withdraw at any time.

Data Collection

After an agreement was made on the time and place for the interview, an in-depth interview was conducted with the participants using an interview guide developed by the researchers based on a literature review and reviewed by a panel of experts. This in-depth semi-structured interview guide consisted of open-ended questions with probes to explore the women's experiences. Some open-ended questions used were *"What are your family life experiences?"* Can you describe in more detail your experience of domestic violence? How did that experience affect your life? The interview lasted approximately 45 to 60 minutes. The interview was audio-recorded using a digital voice recorder, and field notes were taken to document non-verbal responses. Recruitment was terminated when the data were saturated, meaning no new ideas or relevant insights emerged from the data being collected.

Data Analysis

After the interview session took place with each participant, the researchers constructed verbatim transcripts. Researchers analyzed verbatim transcripts and found keywords in each participant's statement. These keywords are then analyzed and grouped into several categories to ultimately shape the research theme. In general, data processing in research uses Colaizzi's approach. Colaizzi is particularly well-suited for capturing the richness of participants' lived experiences while providing a straightforward, step-by-step method for extracting themes, ensuring credibility and transparency (Morrow, 2015).

Trustworthiness

Meetings with the research team to review the interview guide, sampling, and analysis were part of the audit trail, which also included audio recordings of the interviews, transcriptions, and accuracy checks of the transcripts (Birt et al., 2016). To better understand the substance of each interview, the researchers reviewed the tapes and listened to them several times. Independent theme formation was carried out, and the researchers debated the theme or themes they couldn't agree on until they reached consensus. Discussions were held to settle any disagreements until an agreement was reached. Reflexivity was ensured through reflective journals and team discussions, allowing researchers to bracket their personal assumptions and minimize bias, thereby ensuring that the findings authentically represented participants' lived experiences (Berger, 2013).

Field notes were used to document participants' nonverbal cues and contextual details during the interviews. To verify the accuracy and resonance of emerging themes, co-checking between researchers

and participants strengthened the credibility and authenticity of the findings. Collectively, these procedures contributed to the study's overall trustworthiness.

Results

At the time of the interviews, the reported mean age of the women was 31.3 years; seven women were divorced or separated, and the number of children ranged from 1 to 4. The mean length of marriage was 7.6 years. The majority of the women reported having completed senior high school. Seven participants reported being unemployed.

This study identified four main themes: failure to resolve family conflict, physical and psychological despair, inability to make decisions, and a need for external support. It reflects the participants' experiences of domestic violence and its impact on their physical and psychological health and decision-making strategies.

Failure to resolve family conflicts

Through data analysis, it is known that family problems and conflicts were triggers for violence against women. We divided this theme into economic and non-economic conflicts.

Economic Conflicts: Financial difficulties, such as debt, business losses, or job instability, often lead to tension. As stated by the following participants:

"We're fine until he stops working. He is a car salesman whose incentives depend on the number of successful sales. We have even been crediting the house. However, he decided to stop because the sale was difficult, and he began searching for a new job. We have pursued debt. He started getting angry. Everything I did was wrong. He said I was just a burden; he said I was a useless wife. Once, he slapped me when I did not cook, because there were no ingredients to cook; while maybe he was hungry "... (P2)

"Our business is selling clothes, but in the last few years, it has not worked. I asked him to find a new job. He is angry, does not want to, and survives. Until we are finally stuck in debt. If you're going to be a useful wife, he told me to help him solve the problem, rather than just praying. Since then, he often yelled at me. Almost every day, he cried, even cursed me. (P7)

Non-Economic Conflicts: Issues like infidelity and communication breakdown also escalated violence. As stated by the following participants:

"I found him having a video call with a woman, who I know is a widow. I suspect this is what causes him never to touch me again. He has always brushed me aside if I tried to get closer. Once I slept beside him, he pulled away. He said, Do not pretend to feel that our relationship is all right. It is better to separate "..... (P4).

"He still gives me my sexual needs. I feel it probably means that he has improved; in fact, it is not. He said that he used his right and was lazy if I asked him why he did not touch me... it's excruciating for me "... (P6)

The conflicts that arise are prolonged because the husband and wife are unable to resolve them. Communication efforts could be better. Even husband-and-wife communication often centers on children. If it touches on economic problems, the wife's suspicion ends in anger, harsh words, and beatings. As expressed by the following participants:

"I tried to talk to my husband, suppressing the pain of his treatment. But, every time I ask, he sometimes answers casually, not at all. He mediated me and avoided; I was not considered at all "(P5)

"Every time I ask, he says" enough, "there's nothing we need to talk about, I'm already dizzy with all this, you just add to my mind getting heavier" ... (P8)

"When I asked, What is your relationship with that woman? ' he answered, It's up to you with your perception; I will not respond. It was harrowing for me "…. (P3).

These unresolved conflicts became the root of tension that often escalated into violence, laying the groundwork for women's emotional suffering and sense of despair.

Physical and Psychological Despair

In this study, it was found that Minangkabau women who experienced violence by their husbands suffered physical and psychological harm.

Psychological Impact: Women hid their suffering to preserve family honor, experiencing anxiety, fear, and shame. Some participant statements:

"Sometimes, he doesn't come home when we fight; it keeps happening when he's angry. Then the neighbors began to ask me, Why does my husband often not come home? I am confused and feel pressured to answer. I could not possibly tell the truth and embarrass my husband. I said he had work outside the city. "… (P3)

"I am afraid to tell what happened to my family because he is the husband I chose of my own accord. I was worried, my family blamed me back "… (P5)

"I often cry over my fate. Why did things turn out like this? What was my fault? I've tried to be a good wife according to her wishes; I even stopped working to comply with her will."

Physical Impact: Stress led to weight loss, fatigue, and general deterioration of health.

"I lost so much weight. I even felt that my face looked much older. I couldn't sleep, my heart hurt every time I thought about my husband's treatment, I wanted to scream, but I couldn't "…. (P9)

This deep physical and psychological distress

weakened women's confidence and gradually diminished their capacity to make decisions about their lives and relationships.

Inability to make decisions

The study found that the participants were unable to make decisions. They endure for long periods in these violent conditions. Participants often felt trapped, unable to act due to economic dependence, cultural expectations, and concern for children.

Economic Dependence. As explained by the following participants:

"At the beginning of my marriage, I worked. Nevertheless, he asked me to stop. Because of obedience, I stopped working. I did not expect this to happen. I want to get out of my marriage, but I am confused. Where do I have the money to support myself and the children? ... (P4)

"I really can't do it anymore. But where will I go? There's no way I'm going to my parents; they're too hard on their economy. I need a lot of money for the kids. I'm willing to be hurt as long as the children can go to school and eat "… (P6)

Social Pressure. As disclosed as follows:

"I think I have to survive. I feel we have long lived together, even if later divorced, which man would want to be a husband to a widow like me? "… (P4)

"I want to go. But what about the kids? They still need a father figure. I cannot imagine they will lose the father figure. Although I know he is not a good father "… (P5)

"From the beginning, I reminded the family always to keep the family together. Because we are from a good family, as a wife, I was asked to serve my husband well, because if I am right, then my husband would be good. But that does not apply to me. But I do not dare to complain to the family. I'm afraid they're disappointed "…. (P5).

Cultural Pressure. As disclosed as follows:

Also, Minangkabau women are obligated to maintain the family's proper name. Divorce is not viewed favorably in Minangkabau society. It tends to be regarded as a disgrace to women because women cannot maintain their marriages. Their hesitation to act was further reinforced by sociocultural expectations that discourage divorce, leaving women feeling trapped until external help became accessible.

"I was born and raised in the Minangkabau culture. None of my family's descendants ever divorced her husband, whatever the reason. I do not want to give bad things to our big family. Divorce of husband and wife still bad for us "… (P1)

Need For External Supports

Women who experience violence need external support. They often feel helpless and worry about getting out of the problems that bind them. A sound support system will help women become more vital and motivated to save themselves from further violent dangers. The presence of legal, familial, or community support was often the turning point that enabled women to regain strength and consider safer options.

Legal Aid and Mediation. As disclosed as follows:

"I am looking for legal aid agencies in this area. I'm coming. I tell them everything. I was given advice, coaching, and mediation. I ended up divorcing well. "… (P2)

"Legal aid agencies contacted my extended family; they mediated between my family and me, because I could not afford to be alone. Families understand it, and they even apologize for not knowing my condition "… (P9)

Family and Peer Support. As disclosed as follows:

"When I was in a very bad state economically, I contacted my friend, and I told him about what I was going through. He raises funds to help me become a venture capitalist. I felt very fortunate at the time "… (P4).

These four themes illustrate a cycle of vulnerability that Minangkabau women face when experiencing domestic violence. Unresolved family conflicts (Theme 1) often escalate into psychological despair (Theme 2), which in turn weakens women's confidence and capacity to make independent decisions (Theme 3). This inability to act is further reinforced by cultural expectations that discourage divorce and emphasize women's responsibility for preserving family honor. As a result, many women remain trapped in violent relationships until external support (Theme 4) becomes accessible, enabling them to break the cycle and consider safer options.

Discussion

This study found that domestic violence against women is a combination of issues, including unresolved marital conflict, economic pressures, cultural expectations, and a lack of effective support systems for women.

Participants in this study shared their stories of how their initially tranquil marriages progressively deteriorated into conflict, neglect, and distance, as evidenced by a decline in communication between spouses. Couples reported spending little time together, discussing personal feelings infrequently, and having intimate moments only when necessary. Moreover, marital tensions escalated due to changes in the husband's behavior or suspicions of infidelity. When their wives tried to speak, some husbands even reacted angrily, cursing, or physically, kicking, slapping, or pulling their hair. These findings resonate with research showing that poor marital communication strongly predicts violence. Our study results align with research conducted in several other countries with diverse

cultures, including the Minangkabau. A survey on multicultural families found a robust negative relationship between functional communication and violence in multicultural couples (Clark et al., 2018; Krob & Steffen, 2015; Namy et al., 2017). It is said that husbands often exhibit a distracting communication style towards their wives, exert pressure, and display a sense of superiority.

This study also highlighted the role of cultural and institutional factors in contributing to their vulnerability, alongside interpersonal conflict. In Minangkabau society, women are expected to be quiet and patient, and to discuss family matters with their children or other relatives rarely. Women hid their pain to preserve family honor and their husbands' pride, demonstrating a strong sense of shame (Irawaty, 2019). This emotional suppression contributes directly to psychological despair, as women internalize their suffering and develop feelings of isolation, helplessness, and anxiety.

Minangkabau women should have been safeguarded by their maternal uncles, or *"mamak"* (Eva & Afri, 2023). However, different living locations do not provide *"mamak"* opportunities to fulfill their mediation roles to the fullest. Thus, women are increasingly powerless to face problems and resolve family conflicts. This lack of familial mediation reinforces the participants' inability to make decisions, as they lack both guidance and support from traditional protective structures.

The current study also found that economic problems trigger violence against women. Research in Kenya reveals a trend like that found in Minangkabau's study, indicating that violence is also triggered by financial problems (Chiang et al., 2018). Although matrilineal property rights under Minangkabau inheritance laws theoretically provide women with economic stability, many participants lacked autonomous access to or control over these assets (Hanani, 2013), especially if they are not the only daughter in the family (Fatmariza & Febriani, 2019; Hanani, 2013).

Thus, Minangkabau women depend entirely on their husbands' income, especially if they do not work, either because they did not have a job from the beginning of the marriage or because they stopped working at their husbands' request after marriage. For many women in Minangkabau, it is challenging for them to refuse a husband's request, so some reluctantly leave their jobs (Irawaty, 2019).

Similar to our study findings, some previous studies found that husbands started to abuse them when they had financial problems due to a backward business, reduced income, and job loss (Ozcan et al., 2016; Vyas et al., 2015). This will affect the tense relationship between husband and wife (Choi & Hyun, 2016). Ultimately, this sparks a conflict between spouses that can end in the presence of violence as a form of emotional overflow (Kisa et al., 2019). These economic pressures also exacerbate psychological despair, as women feel trapped and responsible for family survival.

Husbands often begin to think and claim that their wives are a burden, unable to provide any support. At the same time, their families continue to have urgent economic needs for clothing, food, shelter, and children's education. The stress experienced by husbands results in violence against wives as a form of outlet for their failure to function as the primary breadwinner (Kusniarti, 2018).

Mellar et al. (2024) reported that women who often experience domestic violence are economically dependent on their husbands and have low levels of education. Similarly, Mabena et al. (2025) also noted that the predictors of violence against women are those from low-income or unemployed households.

The weak position of Minangkabau women today is no different from that of women from other cultures and countries (Ozcan et al., 2016). They researched rural women in Turkey who have a patriarchal system, and found that women, socially and economically, are very dependent on their husbands, and even in the patriarchal culture, there are gender-based differences in treatment. Men can physically reprimand their wives as an excuse to discipline family members.

Minangkabau women who experience violence from their husbands have a significant psychological burden. Not infrequently, they have to face the questions their closest neighbors sometimes ask. The life of a husband and wife in Minangkabau is bound by unwritten rules that require them to live in the same house, sleep in the same room, and interact with neighbors. Husbands who rarely return home or return home late at night are taboo and considered negative things for the Minangkabau people. These social pressures heighten feelings of helplessness and isolation, reinforcing psychological despair.

The Minangkabau community's social life is quite open, allowing them to communicate with each other through interactions with neighbors. Questions will arise when a family or certain individuals *"break"* society's rules, even if it is an internal family issue. Any questions from others were inner pressure for women victims of violence by their husbands. They usually answer with a smile only or respond with other answers that do not raise suspicion among their neighbors about their husbands; women will hide their suffering as much as possible. Minangkabau women are always taught to maintain their husbands' good name because "husbands are clothes for them, and they are clothes for their husbands" (Irawaty, 2019). The meaning is that when the husband's disgrace spreads to the broader community, they also share their shame. This illustrates how cultural norms contribute to women's inability to make decisions and seek help independently.

This study also found that women who experience violence by their husbands try to reduce social interaction between themselves and their surroundings; they avoid talking about their husbands and their family activities. These women

will cry alone over their situation, holding back their emotional turmoil and sadness in front of their children. They even lied when the children asked, *"Why didn't you come home, Mom?"*, *"Where did you sleep tonight, Mom?"* "*Why is Daddy mean to Mom? Why did he hit Mom?"* Usually, they choose not to tell their children the truth because they do not want them to hate their father. Such behaviors reflect both psychological despair and constrained decision-making.

The mental pressures experienced by women often make it difficult for them to sleep, feel inferior in the social environment, and avoid intense social interactions. The woman cannot feel happiness and is confused about how to face life, so she forces herself to stay healthy for her children's sake.

In the Minangkabau culture, women are continually educated to be good wives. They possess minimal household skills, are patient, and love their husbands and children. They always prioritize the interests of their husbands and children and can perform daily domestic tasks, such as washing clothes and cooking meals for the family (Kusniarti, 2018). Women are taught that, regardless of their level of education or the quality of their work, they are still expected to be wives who serve their husbands, as the husband is the family leader. These cultural norms further contribute to both the inability to make decisions and dependence on external support.

Minangkabau women are taught the norm that, once married, they must obey their husbands' words above all. Parents and other family members should not interfere in their household affairs unless specifically asked to do so. Minangkabau women have, over generations, indirectly absorbed their parents' teachings, namely that any conflicts between husband and wife should not be disclosed to other family members, let alone the wider community.

In this study, the few participants who accessed legal aid or community support illustrate how external interventions can interrupt cycles of violence reinforced by cultural and economic constraints. Support systems provided both financial relief and legitimacy to challenge cultural stigma around divorce. The community and maternal health nurses can adopt a trauma-informed and empowerment-based approach, identifying early signs of abuse, offering confidential support, and connecting women with legal or community-based services.

Assistance is provided by several counselors in these private institutions, where, on average, the counselors are also people who have previously been victims of violence and have found ways to rise and build a better life. It can be concluded that counselors are *"former victims,"* and their quality of protection and assistance is not yet professional. They put forward their previous personal experiences. However, the investigation results show that they have also received training on protecting women victims of violence. This highlights the critical role of external support in enabling women to regain decision-making power and overcome psychological despair.

With all the limitations of the existing system of protection for victims of violence, women victims of violence feel hope that they can get out of the complex problems of their lives. They feel that others understand their condition and are willing to help them. It encourages women to realize they are not alone in the face of conflict. These examples illustrate how external support can mitigate both economic vulnerability and psychological distress.

A sound system supports and breaks the chain of the suffering of women who experience domestic violence (Sparrow et al., 2023). When they have the right view and the people around who empathize and care, this woman usually dares to end the violence they experienced immediately. Women victims of violence also need to be supported to be economically independent, so they will no longer depend on others (Bergvall, 2024). Health assistance is an important thing that women need to be detached from the physical and mental disturbance due to the violence they experience. Therefore, the support system is essential in improving women's lives with violence (Aktaş Özkafacı & Eren, 2020; Jeremiah et al., 2018).

However, none of the women in this study sought help from healthcare facilities. It may indicate that women experiencing violence are unaware that nurses and other health professionals can provide support for them. Many perceive health services only as places for health care, not as safe spaces to discuss domestic problems. Others may doubt whether nurses can maintain confidentiality or provide psychosocial assistance.

As part of the national health service system in Indonesia, nurses need to develop various efforts to reduce violence against women, including developing appropriate interventions for assisting and recovering physical and psychological trauma experienced by women with violence. Multiple programs can be created and expanded to screen women at risk of experiencing violence and then break the cycle. Community and public health nurses can collaborate with women's and child protection units, such as Women's Crisis Centers and local organizations, to provide integrated health and psychosocial care, ensuring a continuum of support for survivors of violence.

Strengths and Limitations

This study gives unique insight into the lived experiences of women facing domestic violence in the Minangkabau cultural context. The phenomenological technique captures participants' emotions and coping strategies. Using rigorous approaches, such as verbatim transcription and theme coding, increased the credibility of the results. The findings have practical implications for nursing practice, community support, and the development of culturally appropriate interventions.

However, this study also has several limitations.

First, the findings are based on victims' self-reported sensitive experiences, which may be impacted by memory or emotion, leading to some recall bias. In addition, each woman's story is essential in its own right; however, self-reported data can be influenced by how participants remember and choose to share their experiences. Second, men's viewpoints were not addressed, making it impossible to grasp how they perceive cultural changes within their relationships. Finally, because the participants came from a particular cultural and social context, the findings may not reflect experiences in other settings. Despite these limitations, the study offers valuable insight into how women experience and make sense of cultural change in their intimate relationships.

Practical Implications

The findings underscore the need for nursing-led interventions that target the four primary areas identified in this study. By providing family counselling and health education that encourage constructive communication and nonviolent coping mechanisms, community health nurses can significantly improve family mediation and conflict resolution. To help women manage the emotional anguish, anxiety, and depression brought on by violence, psychiatric and mental health nurses play a critical role in providing trauma-informed counselling and mental health services. By including empowerment, education, and economic skill-building activities into standard maternal and reproductive health programs, maternal and women's health nurses can support women's autonomy. Finally, cooperation between nurses and legal and social support systems, such as protective services and Women's Crisis Centers, can ensure that survivors receive comprehensive, culturally sensitive, and home-based support, including family counselling and health education that promote constructive communication and nonviolent coping mechanisms.

Additionally, training husbands on polite domestic behavior and educating women about their rights might help lessen violence triggers by relating cultural norms to real-world situations. When combined, these strategies provide an evidence-based, culturally sensitive method of safeguarding Minangkabau women and enabling them to confront and overcome domestic abuse.

Future Research

Further inquiry should expand the sample to include women engaged with official support services and incorporate men's perspectives on domestic violence within Minangkabau society. Intervention studies testing the effectiveness of culturally and economically based empowerment programs are also warranted.

Conclusions

This study shows that cultural shifts in the Minangkabau matrilineal system, such as women migrating after marriage, reduced inheritance-based economic control, and diminished oversight from "mamak", have weakened women's positions, making them more vulnerable to domestic violence. The findings highlight the need for strategies that empower women, provide external support, and strengthen culturally sensitive protective systems to reduce the risk of violence.

Declaration of Interest

All authors declare that they have no conflict of interest.

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Data Availability

The datasets generated and analyzed during the current study are not publicly available due to the sensitive and confidential nature of the participants' experiences. However, they are available from the corresponding author upon reasonable request, provided permission is obtained from the institutional ethics committee.

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Self-care education based on local wisdom to improve glycemic control and self-efficacy in type 2 diabetes

I Dewa Putu Gede Putra Yasa[1]*, I Wayan Surasta[1], Iga Ari Rasdini[1], Abdulkareem S. Iblasi[2], Rapin Polsook[3], I Gede Juanamasta[4]

[1] Nursing Program, Poltekkes Kemenkes Denpasar, Denpasar, Indonesia
[2] Assistant Professor, Nursing Program, College of Health Sciences, University of Buraimi, Oman
[3] Faculty of Nursing, Chulalongkorn University Bangkok, Thailand.
[4] Nursing Program, STIKes Wira Medika Bali, Denpasar, Indonesia

Abstract

Background: Effective management of type 2 diabetes mellitus (T2DM) requires structured self-care education supported by family and cultural context. In Bali, health-related decisions are often influenced by patrilineal households where male family members act as primary decision-makers.
Purpose: This study evaluated a self-care education program based on Balinese local wisdom to improve glycemic control and self-efficacy among T2DM patients.
Methods: A quasi-experimental design with pre- and post-tests and a control group was conducted at Community Health Center in Bali, Indonesia from June to September 2024. .Seventy patients with T2DM living in patrilineal households were purposively recruited and randomly allocated into intervention (n=35) and control (n=35) groups.. The intervention consisted of twelve weekly sessions of culturally tailored self-care education covering diet, physical activity, monitoring, medication, and foot care, with active involvement of male household decision-makers. Outcome measures included self-efficacy (Diabetes Management Self-Efficacy Scale), HbA1C, and systolic/diastolic blood pressure, analyzed using t-tests.
Results: After 12 weeks, the intervention group demonstrated significant improvements compared to controls: self-efficacy (mean difference: 8.37, p<0.001), systolic blood pressure (-4.51 mmHg, p<0.001), diastolic blood pressure (-2.74 mmHg, p<0.001), and HbA1C (-0.61%, p<0.001). Although the HbA1C reduction was modest, it indicates a meaningful step toward better glycemic control.
Conclusion: A 12-week culturally tailored self-care education program involving patrilineal family members improved self-efficacy and glycemic control in T2DM patients. These findings highlight the importance of integrating local wisdom and family involvement into diabetes education to enhance patient empowerment and adherence.

Keywords: decision-making; diabetes mellitus type 2; family support; hemoglobin; glycemic control; self-management

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Corresponding author

I Dewa Putu Gede Putra Yasa*
Nursing Program, Poltekkes Kemenkes Denpasar, Denpasar, Indonesia; Pulau Moyo No.33 A, Pedungan, Denpasar Selatan, Kota Denpasar, Bali; Postal code: 80222: Mobile phone: 081339528086, E-mail: Putrayasa718@gmail.com

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Introduction

Type 2 diabetes mellitus (T2DM) is a chronic disease caused by impaired insulin production or utilization, leading to long-term health, social, and economic consequences. (IDF, 2021). Globally, over 500 million people are affected, with prevalence projected to increase, especially in low- and middle-income countries. (IDF, 2021). In Indonesia, T2DM affects 13.4% of the population, with Bali showing an average prevalence of 1.7%. Poor glycemic control increases the risk of complications such as neuropathy, cardiovascular disease, and premature mortality, making effective self-management essential(Kaiser, Zhang, 2018) (Kemenkes, 2024).

Self-care education is a cornerstone of diabetes management. It typically emphasizes dietary regulation, physical activity, medication adherence, monitoring, and psychosocial support (ADA, 2017). However, conventional

approaches often overlook cultural and familial dynamics that shape patient behavior (Namusisi H., 2025). Evidence shows that education is more effective when it engages family members and adapts to the local context (Yasa et al., 2023), as families often play a key role in caregiving and decision-making (Suyadnya, 2009; Tiwery et al., 2024).

Educational models and media significantly impact patients' and families' knowledge and understanding of DM care (Beck et al., 2018). Educating families enables them to provide proper care during the management process (Pesantes et al., 2018a). Essential components of family education include understanding DM, adjusting family routines, and addressing emotional challenges associated with the illness (Bennich et al., 2017a). Furthermore, the choice of educational media affects how well information is retained. Studies have shown that audiovisual tools like DVDs are more effective than written materials such as leaflets or booklets for educating patients and their families (Estacio et al., 2015; Pamungkas et al., 2017).

Balinese society is structured around a patrilineal system in which male household members—fathers or eldest sons—act as primary decision-makers, including in health-related matters (Lansing, 2012). Their authority influences dietary practices, healthcare access, and treatment adherence. This cultural feature presents both a barrier and an opportunity: without male involvement, patient adherence may falter, but with it, families can reinforce lifestyle changes and support sustainable self-care practices. Thus, self-care education that actively involves male decision-makers reflects local wisdom and is more likely to succeed.

Bali is an appropriate setting for this research because of its unique sociocultural context, the growing prevalence of T2DM, and the community's reliance on familial and village-level (desa pakraman) support systems. Integrating these cultural structures into diabetes education could enhance patient empowerment and glycemic control while addressing gaps in standard care models.

Therefore, this study aimed to evaluate the effectiveness of a culturally tailored, local wisdom-based self-care education program in improving glycemic control and self-efficacy among patients with T2DM in Bali.

Materials and Methods

Study design

This study employed a quasi-experimental design with pre- and post-tests and a control group (Em, 2024)The design was chosen to assess the impact of a culturally tailored, local wisdom-based self-care education program on glycemic control and self-efficacy in patients with type 2 diabetes mellitus (T2DM).

Participants and eligibility criteria

The study was carried out at Community Health Center in Bali, Indonesia , over a three-month period from June 15 to September 14, 2024. Community Health Center in Bali, Indonesia was chosen as the study site because it represents the core characteristics of Balinese patrilineal culture, where male family members—fathers or eldest sons—act as primary decision-makers in household and health-related matters. This cultural context was essential for evaluating a self-care education model based on local wisdom that actively involved family authority in diabetes management. Mengwi also has a well-established community health infrastructure with a large population of type 2 diabetes patients, making it feasible for structured interventions and follow-ups. Its strong desa pakraman (customary village) system supports family and community participation, aligning perfectly with the study's aim to integrate cultural and familial dynamics into self-care education. Compared to other community health centres in Bali, Mengwi offers a balanced environment that maintains traditional values while providing adequate healthcare facilities and research collaboration, ensuring both cultural relevance and practical feasibility for the intervention.

A total of seventy patients with type 2 diabetes mellitus (T2DM) were recruited. All participants lived in patrilineal households, where male family member —typically fathers or eldest sons—held the primary role in decision-making, including health-related matters.

Eligible participants were men and women between 30 and 60 years of age who were actively receiving treatment at the Community Health Center in Bali, Indonesia . To ensure meaningful engagement in the education program, participants were required to have at least a senior high school (SMA) education and the ability to communicate effectively. Individuals were excluded if they had a diagnosed mental illness that could interfere with participation or if they had stroke-related complications that might limit their ability to engage in the intervention sessions.

Sample size

The average self-efficacy score on The Diabetes Management Self-Efficacy Scale was 26.6, with

$$n = \frac{2\sigma^2}{(\mu 2 - \mu 1)^2} x\, f(\alpha, \beta)$$

n = sample size
σ= standard deviation
f(α,β) = constant based on statistical tables
μ1 = mean empowerment score
μ2 = estimated mean empowerment score

Table 1. Outcome variables before and after intervention (n=70)

Variable	Group			
	Intervention		Control	
	Pre-test	Post-Test	Pre-test	Post-Test
Self-efficacy				
Min-max	13-30	20-40	16-30	16-40
Mean	23.11	31.49	24.03	25.34
SD	4.65	4.90	4.61	5.94
CI (95%)	21.52-24.71	29.80-33.17	22.45-25.61	23.30-27.38
Systolic				
Min-max	133-162	129-158	134-160	130-160
Mean	147.74	143.23	151.11	149.20
SD	8.62	8.48	8.18	7.68
CI (95%)	144.78-150.70	140.32-146.14	140.30-153.92	146.56-151.84
Diastolic				
Min-max	84-100	80-100	83-98	82-95
Mean	89.63	86.89	90.51	89.54
SD	3.61	4.17	3.29	3.15
CI (95%)	88.39-90.87	85.45-88.32	89.38-91.65	88.46-90.62
HbA1C				
Min-max	6.6-11	6.0-10.0	6.8-11	7-10
Mean	8.69	8.09	8.74	8.60
SD	1.09	1.05	1.08	1.00
CI (95%)	8.32-9.07	7.72-8.45	8.37-9.11	8.26-8.94

Table 2. Differences in Self-Efficacy and Glycemic Control Pre- and Post-Test for Both Groups

Variable	Mean difference within group (pre-post)	p-value	Mean difference between group (post-Post)	p-value
Intervention				
Self-efficacy	8.37±4.26	<0.001	7.06	<0.001
Systolic	-4.51±3.29	<0.001	2.60	<0.001
Diastolic	-2.74±2.48	<0.001	1.77	<0.001
HbA1C	-0.61±0.42	<0.001	0.47	<0.001
Control				
Self-efficacy	1.31±2.63	0.01		
Systolic	-1.91±2.90	<0.001		
Diastolic	-0.97±2.54	0.03		
HbA1C	-0.14±0.33	0.02		

a standard deviation of 9.19, in a preliminary study of 30 Type 2 Diabetes Mellitus patients. The intervention is expected to increase the self-efficacy score by 30% to 34.58, with $\alpha = 0.05$ and $\beta = 0.10$. Based on the above formula, a sample size of 34.48 was rounded to 35 for each group, resulting in 70 participants (35 in the control group and 35 in the treatment group). A participant drops out after missing two educational sessions (Arası et al., 2023; Rani et al., 2020).

Intervention

The intervention was developed as a culturally tailored diabetes self-care education program designed specifically for individuals with type 2 diabetes mellitus (T2DM) living within Bali's unique patrilineal family structure. Recognizing that household decision-making in Balinese culture is often dominated by male figures—such as fathers or eldest sons—the research team designed a 12-week program that not only provided patients with

knowledge and skills for diabetes management but also actively engaged male family members as supporters and motivators in the self-care process. This integration of family authority and cultural context formed the foundation of the intervention's structure and delivery.

The intervention was designed as a 12-week program of culturally tailored self-care education, delivered in weekly sessions lasting approximately one hour each. The sessions were facilitated by trained healthcare educators and held at times agreed upon with patients and their families to encourage active participation. A distinctive feature of the program was the involvement of male household decision-makers—fathers or eldest sons—whose authority in Balinese patrilineal families plays a critical role in shaping health behaviors, including dietary choices, access to medical care, and treatment adherence.

The program began with an introductory session that built rapport with participants and provided foundational knowledge about type 2 diabetes mellitus. This included the definition of the disease, its causes, symptoms, possible complications, and general management strategies. Half of the session was dedicated to open discussion, allowing patients and family members to share experiences and ask questions, while the remainder took the form of a structured lecture.

Subsequent sessions addressed specific aspects of diabetes management. Nutrition was a central focus, with discussions on calculating daily caloric needs, the 3J diet method (quantity, type, timing), and the "My Plate" approach. Because male decision-makers often guide food choices, their engagement in these discussions was critical to supporting healthier dietary practices. Practical demonstrations and audiovisual media reinforced the content. Another session emphasized the role of physical activity, introducing safe exercises, strategies for setting target heart rates, and the benefits of regular movement.

Further sessions guided participants in health monitoring, teaching techniques for checking blood glucose levels, blood pressure, and body weight. Foot care was also highlighted, with demonstrations on proper hygiene, nail trimming, and footwear selection, along with simple daily exercises to prevent complications. Medication management formed another important component, where patients and families were introduced to oral therapies and insulin administration. Hands-on demonstrations and video materials ensured that both patients and their supporting family members, especially male household heads, felt confident in managing medications.

Toward the later stages, sessions reinforced previously taught self-care skills and encouraged participants to apply them in daily life. The program culminated in advocacy and evaluation, where patients and their families reviewed their progress, discussed challenges, and built confidence in sustaining long-term diabetes management practices. Throughout these concluding sessions, the participation of male family members was emphasized to strengthen commitment and support for ongoing self-care behaviors.

By combining structured education with active family involvement, the program sought not only to increase knowledge and skills but also to embed diabetes self-management within the cultural framework of Balinese households. The program culminates with advocacy and evaluation during the eleventh and twelfth sessions. The sessions emphasize progress review, challenge identification, and fostering patient and family confidence in self-care maintenance. Given the influential role of male family members in decision-making, their involvement in these concluding sessions helps reinforce long-term commitment to diabetes management. Facilitators deliver feedback, assess outcomes, and provide guidance for ongoing health management.

Instruments

The Diabetes Management Self-Efficacy Scale was used to measure self-efficacy. A previous study found that a CVI of 1.00 was produced by the content validity evaluation, correlation scores exceeded the critical r table value of 0.388 (r = 0.550-0.867), and Cronbach's alpha of 0.934, indicating that all items exhibited valid and reliable (Hertuida Clara et al., 2025).

Data analysis

Data were analyzed using computer statistical software. Descriptive statistics (mean, SD, frequency, proportion) summarized participant characteristics. Data were normally distributed ($p>0.05$). Paired t-tests assessed within-group differences, and independent t-test assessed between-group differences. Statistical significance was set at $p<0.05$.

Ethical considerations

This study received ethical approval from the Ethics Committee of Poltekkes Kemenkes Denpasar with approval number No: Ref. LB.02.03/EA/KEPK/0367/2023. All participants were provided with comprehensive information about the study's purpose, procedures, benefits, and potential risks, and written informed consent was obtained before participation. Participant confidentiality and data privacy were strictly maintained, and participants had the right to withdraw from the study at any time without negative consequences. The study was designed to minimize risk, with all findings transparently reported and used to enhance knowledge about self-management diabetes mellitus.

Results

Characteristics of Respondents

There were 70 respondents divided into two groups: the control group and the intervention group. The respondents' characteristics, based on gender, age, and duration of illness. The majority of females were found on the intervention (51.40%) and control 20 (57.40%). The ages of respondents in the intervention and control groups were not significantly different. The average age of respondents in the intervention group was 53.51±5.00, and in the control group, it was 52.97±. The average duration of T2DM in both groups is similar, ranging from 6 to 12 years, with an average of 9,23±1.56 and 8,77±1.35, respectively, intervention and control.

Before the intervention, there was little difference in respondents' self-efficacy between the intervention and control groups. The minimum self-efficacy score in the intervention group was lower than in the control group, at 13 and 16, respectively, with a maximum score of 30 for both groups in the pre-test. After the intervention, there were differences between the groups in minimum score, mean, and standard deviation. The post-test variation in self-efficacy scores was smaller in the intervention group than in the control group, as shown by a min-max range of 20-40 and mean 31.49±4.90 in the intervention group, compared to a min-max of 16-40 and mean of 25.34±5.94 in the control group (Table 1).

In the pre-test, respondents' systolic blood pressure levels showed similar minimum and maximum values, with a range of 133-162 mmHg in the intervention group and 134-160 mmHg in the control group. The control group had a higher mean systolic blood pressure than the intervention group, with 151.11 mmHg compared to 147.74 mmHg. The standard deviation of systolic blood pressure in both groups was similar, at 8.62 mmHg and 8.18 mmHg, respectively. Following the intervention, changes in systolic blood pressure occurred in both groups, with both experiencing a general decrease. The intervention group's mean systolic blood pressure decreased from 147.74 to 143.23 mmHg, while the control group's decreased from 151.11 to 149.20 mmHg. Respondents' pre-test diastolic blood pressure was nearly identical between groups, with a mean of 89.63±3.29 in the intervention group and 90.51±3.29 in the control group. After the intervention, the difference widened, with the intervention group mean decreasing to 86.89 and the control group to 89.54.

Pre-test HbA1C levels in both groups were similar, with a range of 6.6-11 in the intervention group and 6.8-11 in the control group. The mean HbA1C was also comparable between groups, at 8.69 and 8.74, respectively. After the intervention, the intervention group showed a reduction in HbA1C to 8.09, while the control group saw a slight increase to 8.60.

The self-care education model was implemented over 12 weeks, and this intervention resulted in significant differences in all four dependent variables. The mean difference in self-efficacy was 8.37 (p-value: <0.001). For systolic blood pressure, the mean difference was -4.51 mmHg (p-value: <0.001), and for diastolic blood pressure, it was -2.74 mmHg (p-value: <0.001). The HbA1C difference was -0.61 (p-value: <0.001). Negative values indicate reductions in average scores from pre- to post-intervention. All p-values indicate significant differences in self-efficacy scores, systolic and diastolic blood pressure, and HbA1C before and after the intervention in the treatment group.

In the control group, the mean differences for self-efficacy, systolic blood pressure, diastolic blood pressure, and HbA1C were smaller than those in the treatment group, with varying p-values. The mean difference for self-efficacy was 1.31 (p-value: 0.01). For systolic blood pressure, it was -1.91 mmHg (p-value: <0.001), and for diastolic blood pressure, it was -0.97 mmHg (p-value: 0.03). The HbA1C difference was 0.14 (p-value: 0.02). These p-values indicate significant differences in self-efficacy, systolic and diastolic blood pressure, and HbA1C over three months of observation in the control group.

The mean differences In self-efficacy, systolic blood pressure, diastolic blood pressure, and HbA1C between the treatment and control groups varied. Self-efficacy showed a mean difference of 7.06 (p-value: <0.001). The mean difference in systolic blood pressure was 2.60 mmHg (p-value: <0.001), for diastolic blood pressure, it was 1.77 mmHg (p-value: <0.001), and for HbA1C, it was 0.47 (p-value: <0.001). The p-values indicate significant differences in self-efficacy, systolic blood pressure, diastolic blood pressure, and HbA1C between the treatment and control groups. Based on Table 2, the mean differences for all four dependent variables were greater in the treatment group compared to the control group. These data suggest that the self-care education model had an impact on self-efficacy and glycemic control (systolic and diastolic blood pressure and HbA1C) in patients with type 2 diabetes.

Discussion

This study demonstrated that a 12-week self-care education program grounded in Balinese local wisdom significantly improved self-efficacy, reduced blood pressure, and modestly lowered HbA1C levels among patients with type 2 diabetes mellitus. These findings indicate that involving patrilineal family structures, particularly male decision-makers, can strengthen adherence to self-care behaviors and contribute to better diabetes outcomes.

The most notable improvement was seen in self-efficacy. Patients in the intervention group reported greater confidence in managing diet, physical activity, medication, and health monitoring. This suggests that education tailored to cultural norms

does more than transfer knowledge—it fosters empowerment through social reinforcement. In Balinese households, male family members often determine food purchasing and preparation decisions (Dongoran, 2024). By engaging them directly in the educational process, the intervention ensured that patients' self-care efforts were supported rather than hindered by household dynamics. This mechanism explains why self-efficacy increased significantly in the intervention group compared with controls. A good understanding of T2DM and its management positively impacts patients' self-efficacy (Sheila D'souza et al., 2017).

Blood pressure reductions, while statistically significant, remained within the hypertensive range. This finding underscores both the potential and the limitations of short-term educational interventions. Improved dietary regulation and increased physical activity, reinforced by family support, likely contributed to the modest reductions observed. However, the persistence of elevated blood pressure suggests that longer interventions or integration with pharmacological adjustments may be necessary to achieve clinically optimal outcomes (Reis et al., 2018).

HbA1C reduction in the intervention group (−0.61%) was statistically significant but clinically modest, as most participants remained above the target threshold of 7%. This reflects a common challenge in diabetes research, where short-term behavioral interventions improve glycemic trends but may not achieve full clinical targets without extended follow-up or more intensive support. Importantly, the results highlight that even small reductions in HbA1C are meaningful, as they contribute to lowering the risk of long-term complications (Wang et al., 2022).

These findings are consistent with prior studies showing that culturally tailored interventions are more effective than generic education (Abu & Llahana, 2025). Research in South Asian, Middle Eastern, and Latin American populations has similarly demonstrated that involving family members in diabetes education improves dietary adherence, medication use, and glycemic outcomes (Bennich et al., 2017b; Pamungkas & Chamroonsawasdi, 2020; Pesantes et al., 2018b; M. Sohal et al., 2022). However, this study adds novelty by addressing a patrilineal cultural context, where male authority is particularly influential in household health behaviors. Unlike individual-centered approaches, this model situates self-care within family decision-making structures, demonstrating how cultural adaptation can improve adherence.

Despite these strengths, several limitations must be acknowledged. First, the sample size was relatively small and drawn from a single health center, which may limit generalizability. Second, while the intervention achieved significant improvements, clinical outcomes such as HbA1C and blood pressure remained above recommended targets, underscoring the need for longer interventions and integration with medical management. Finally, the study relied on self-reported adherence and may be influenced by reporting bias.

Overall, the study suggests that self-care education grounded in local wisdom and reinforced through family engagement is a promising approach to diabetes management. Future research should explore long-term follow-up, larger and more diverse samples, and comparisons with similar culturally tailored models in other regions to strengthen the evidence base and refine intervention strategies.(T. Sohal et al., 2015)[NO_PRINTED_FORM]

Implications for Practice

This study emphasizes the need for culturally tailored type 2 diabetes self-care education models. In cultures with strong family-based decision-making, like Bali's patrilineal system, involving family members in education can improve self-care and patient outcomes. Healthcare providers treating type 2 diabetes patients may include family support systems to reinforce self-management. Culturally sensitive education models that fit patients' social structures improve engagement and may lead to lasting lifestyle changes.

The study emphasizes the importance of structured educational interventions for diabetes care, improving self-efficacy and glycemic control. This implies that healthcare institutions should routinely develop and implement similar educational programs for diabetes management. Regular follow-up and reinforcement sessions may improve long-term outcomes, as this study's duration suggests ongoing support. Finally, applying these models to other cultures can broaden diabetes education by allowing healthcare providers to tailor interventions to cultural dynamics and family involvement, improving patient empowerment and health outcomes across diverse populations.

Conclusion

This study showed that a 12-week self-care education program based on Balinese local wisdom significantly improved self-efficacy, reduced blood pressure, and modestly lowered HbA1C levels in patients with type 2 diabetes mellitus. By actively involving male household decision-makers in the educational process, the program aligned diabetes management strategies with cultural norms and family structures, thereby enhancing patient empowerment and adherence to self-care practices.

While the improvements in glycemic control and blood pressure were statistically significant, they did not fully achieve clinical targets. The HbA1C reduction of 0.61% represents progress toward better glycemic control but remains above the recommended threshold of <7%, and blood pressure values continued to fall within the hypertensive range. These outcomes highlight both the promise and the limitations of short-term, culturally tailored educational interventions.

The findings suggest that embedding self-care

education within the cultural framework of patrilineal households can strengthen diabetes management in settings where family decision-making plays a central role. At the same time, the modest clinical improvements underscore the need for longer-term interventions, integration with medical therapy, and larger-scale studies to confirm and extend these results.

In conclusion, self-care education that respects and leverages local wisdom is a valuable strategy for improving diabetes management. It should be considered as a complementary approach to standard clinical care, particularly in culturally distinct communities where family involvement strongly influences health behaviors.

Declaration of Interest

We declare that there is no conflict of interest

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Author contribution

The author confirm contribution to the paper as follows: study conception and design, Author, data collection, analysis and interpretation of results, draft manuscript preparation, reviewed the results of the manuscript

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Challenges in clinical training for professional nurse students: A qualitative study

Naryati Naryati[1,3], Muhammad Hadi[1], Rizki Nugraha Agung[2], Melati Fajarini[1*]

[1] Departemen Manajemen Keperawatan, Fakultas Ilmu Keperawatan, Universitas Muhammadiyah Jakarta
[2] Prodi Spesialis Keperawatan Medikal Bedah, Universitas Muhammadiyah Jakarta
[3] Prodi Sarjana Keperawatan, Fakultas Ilmu Keperawatan, Universitas Indonesia

Abstract

Background: Clinical training is a cornerstone of nursing education, equipping students with the practical competencies required for professional practice. However, professional nursing students often face significant obstacles, including limited supervision, communication barriers, emotional strain, and resource constraints that hinder their clinical learning. Despite these concerns, few studies in Indonesia have systematically explored these challenges, creating a gap in understanding the specific contextual factors shaping clinical training experiences.
Purpose: This study aimed to explore the challenges experienced by professional nursing students during clinical training in Indonesia.
Methods: A qualitative descriptive study was conducted using semi-structured interviews with 25 professional nursing students from accredited nursing programs in Indonesia. Data collection occurred between March and June 2025 to provide temporal context. Participants were purposively sampled to ensure diverse experiences. Thematic analysis followed Braun and Clarke's six-step framework, and NVivo software supported data management. Trustworthiness was ensured through credibility, dependability, confirmability, and transferability strategies.
Results: Analysis revealed five central themes: (1) Inadequate clinical supervision, characterized by limited instructor availability and insufficient feedback; (2) Communication barriers, including hierarchical dynamics, medical jargon, and language differences; (3) Emotional and psychological strain, stemming from high workloads and performance anxiety; (4) Resource constraints, such as limited access to modern tools and simulation facilities; and (5) Interpersonal challenges, involving peer competition and difficulties in collaborative learning. These issues were further influenced by Indonesia's cultural and institutional context.
Conclusion: Overcoming these barriers requires a holistic strategy encompassing improved student-to-instructor ratios, enhanced communication training, stress management initiatives, investment in educational resources, and fostering positive peer relationships. Institutional dedication to these interventions is critical to advancing clinical training outcomes and cultivating competent nursing professionals.

Keywords: communication barriers; clinical training; emotional strain; nursing education; qualitative study

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Corresponding author

Melati Fajarini*
Departemen Manajemen Keperawatan, Fakultas Ilmu Keperawatan, Universitas Muhammadiyah Jakarta Indonesia; Jl. Cemp. Putih Tengah I No.1, RT.11/RW.5, Cemp. Putih Tim., Kec. Cemp. Putih, Kota Jakarta Pusat, Daerah Khusus Ibukota Jakarta 10510, Phone: +62 811-8865-236, E-mail: melati@fikumj.ac.id

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Introduction

Clinical education serves as the cornerstone of nursing programs, equipping students with critical hands-on experiences essential for building competencies required in professional practice. However, nursing students worldwide face significant challenges during clinical training, including limited clinical placement opportunities, inadequate supervision, emotional demands of patient care, and communication barriers (Chan et al., 2020; Labrague et al., 2021; Storaker et al., 2022). Overcoming these challenges is crucial to ensuring that clinical education effectively fosters skilled and

competent nursing professionals.

A primary challenge is the scarcity of clinical placements, which often limits students' exposure to diverse clinical scenarios and hampers the development of practical skills (Aghamohammadi-Kalkhoran et al., 2022). In Indonesia, this issue is compounded by a growing number of nursing students, insufficient collaboration between educational institutions and healthcare facilities, and inadequate infrastructure (Yusuf et al., 2020; Smith et al., 2020). Variations in clinical training quality across institutions, driven by disparities in resources and faculty expertise, further exacerbate the problem (Utami et al., 2021).

Communication barriers also hinder the learning experience, particularly in culturally complex settings. Indonesian nursing students often struggle to bridge the gap between theoretical knowledge and real-world application, which can lead to reduced confidence and increased stress (Nursester, 2023). Factors such as hierarchical relationships and cultural norms emphasizing respect for authority often discourage students from expressing concerns or seeking assistance, limiting open communication and critical thinking opportunities (Wong et al., 2020; Raharjo et al., 2022). A supportive supervisory relationship and a positive pedagogical environment are essential to addressing these issues (Wati et al., 2024).

Emotional demands present another significant challenge. Managing critical patients, dealing with end-of-life care, and navigating ethical dilemmas can cause stress and emotional exhaustion, adversely affecting students' well-being and academic performance (Labrague et al., 2021). During the COVID-19 pandemic, Indonesian nursing students reported heightened anxiety and fear during clinical rotations, highlighting the need for robust psychological support systems (Achmad et al., 2021).

To address these barriers, innovative strategies such as simulated learning environments, interprofessional education, and mentorship programs have shown promise. Simulated environments allow students to practice clinical skills in a controlled setting, fostering critical thinking and decision-making without the pressure of real-life scenarios (Kim et al., 2020). Interprofessional education enhances teamwork and communication skills, while mentorship programs provide guidance, emotional support, and role modeling, improving students' confidence and competence (Henderson et al., 2022; Oates et al., 2021). However, the success of these strategies depends on institutional commitment, resource allocation, and stakeholder engagement.

Despite these advancements, few studies had comprehensively examined the multifaceted challenges of clinical education in Indonesia, particularly the influence of cultural communication patterns, emotional preparedness, and institutional policies on students' learning experiences. Cultural attributes such as collectivism and high-context communication significantly influence student-supervisor interactions, often hindering assertiveness and open communication (Mulyanah & Krisnawati, 2023). Institutional policies, including accreditation and quality assurance measures, also play a pivotal role in shaping the quality of clinical education (World Bank, 2012; BAN-PT, 2019). However, these aspects remain underexplored in the Indonesian context.

This study aimed to investigate the challenges faced by professional nursing students in clinical education in Indonesia and to develop integrated strategies for improvement. By examining factors such as emotional preparedness, communication dynamics, and cultural influences, this research sought to provide a comprehensive understanding of these challenges and offered practical recommendations to enhance clinical training outcomes.

Materials and Methods

Study design

This research utilized a qualitative descriptive approach to investigate the challenges encountered by professional nursing students during their clinical training in Indonesia. Data collection was conducted between March and June 2025, allowing researchers to capture recent and contextually relevant experiences of students within the current clinical education environment. This method facilitated an in-depth exploration of the participants' experiences and perceptions, offering critical insights into the multifaceted nature of clinical education in nursing (Creswell, 2018). By emphasizing participants' first-hand accounts, this design ensured a comprehensive understanding of the obstacles faced and their potential impact on learning outcomes and professional development.

Sample

Participants were recruited from four accredited universities across three major regions of Indonesia (Java, Sumatra, and Sulawesi) to ensure broad geographic and institutional representation. A purposive sampling approach was employed to recruit participants, ensuring the inclusion of students with significant clinical training experience. Operationally, students were considered to have significant clinical training experience if they had completed a minimum of one full clinical rotation (equivalent to 6–8 weeks) in a hospital or community health setting and had direct involvement in patient care under supervision. This criterion ensured that participants had substantial exposure to real clinical environments and could articulate meaningful insights regarding the challenges encountered.

To enhance contextual richness and representativeness, participants were recruited from both public and private institutions located across different geographic regions, including Java,

Table 1.Interview guideline

Opening questions:
"Can you tell me about your overall experience as a professional nurse student?" *"What motivated you to pursue nursing as a profession?"*
Main questions:
"What challenges have you encountered during your clinical training?" *"Can you describe a specific instance where you felt unsupported or unprepared during clinical training?"* *"What factors do you think contribute to these challenges?"*
Probing questions:
"Can you elaborate on how that experience impacted your learning?" *"What kind of support do you think could have helped in that situation?"*
Closing questions:
"What advice would you give to other nursing students facing similar challenges?" *"Is there anything else you would like to share about your clinical training experience?"*

Sumatra, and Sulawesi. This diversity allowed the study to capture variations in clinical training structure, institutional resources, and cultural dynamics across Indonesian nursing programs.

Participants eligible for inclusion were professional nursing students who had completed at least one clinical training rotation, demonstrated proficiency in the Indonesian language for effective communication during interviews, and expressed a willingness to participate by providing informed consent. Conversely, students who were on academic leave, had discontinued their clinical training, or possessed incomplete clinical training records were excluded from the study. The sample size was guided by the principle of data saturation, a widely recognized standard in qualitative research (Patton, 2002). Data collection continued until no new themes or insights were identified during the interviews, ensuring the depth and reliability of the findings. The final sample consisted of 25 participants, reflecting the point at which thematic saturation was achieved.

Interview Guideline

The interview guideline was developed through a literature review and consultations with experts in nursing education. The initial draft was reviewed by three nursing educators and two qualitative research methodologists to ensure clarity, relevance, and comprehensiveness. A pilot interview was conducted with two professional nurse students to refine the questions and probes. Table 1 shows an example of interview guideline.

Procedure

Participants were recruited through nursing faculty coordinators and student networks to ensure access to students with relevant clinical training experiences. To minimize potential gatekeeper influence or selection bias, faculty coordinators were instructed to distribute a standardized recruitment invitation to all eligible students rather than selectively approaching individuals. Similarly, announcements shared through student networks used identical wording and were disseminated through multiple channels (e.g., official class groups, student forums) to maximize reach and reduce selection skew. Interested students contacted the research team directly, ensuring voluntary participation without faculty involvement in the final selection.

Prior to participation, all individuals received an information sheet explaining the study's objectives, procedures, and ethical considerations. Written informed consent was obtained from each participant before commencing the interviews, adhering to ethical research standards. Data collection involved semi-structured interviews conducted either in person or virtually, depending on participants' preferences and logistical accessibility. Both formats followed the same interview guide, and interviewers received standardized training to ensure consistency in questioning style, probing techniques, and rapport-building strategies.

The research team also reflected on potential differences between in-person and virtual interviews. While in-person interviews allowed for richer observation of nonverbal cues, virtual interviews were not perceived to substantially reduce the depth or quality of responses, as participants appeared equally comfortable sharing experiences in both settings. Many students reported that virtual interviews provided a sense of convenience and privacy, which facilitated open discussion.

Each interview lasted 45–60 minutes and was audio-recorded with explicit consent to ensure accurate documentation of responses. The recordings were transcribed verbatim to maintain data integrity. To enhance the credibility of the findings, participants were invited to review their transcripts through a member-checking process, enabling them to verify or clarify their statements as necessary.

Data analysis

The data analysis was conducted using thematic analysis, adhering to the six-step framework developed by Braun and Clarke. This analytical approach encompassed a systematic process

Table 2. Demographic Characteristics of Participants

Characteristics	n	Percentage (%)
Gender		
Male	7	28.0
Female	18	72.0
Age (years)		
20–22	14	56.0
23–25	11	44.0
Clinical Training Completion		
One rotation	10	40.0
Two or more rotations	15	60.0
University Accreditation		
A-grade	18	72.0
B-grade	7	28.0

Note: A-grade and B-grade refer to the national university accreditation ratings issued by the National Accreditation Board for Higher Education (BAN-PT) in Indonesia. An A-grade indicates that the university meets excellent standards in academic quality, resources, governance, and educational outcomes, while a B-grade reflects good but not yet excellent overall performance according to BAN-PT evaluation criteria.

that began with an in-depth familiarization with the data to gain a comprehensive understanding. Following this, initial codes were generated to identify significant features of the data. The analysis progressed with the identification and exploration of overarching themes, which were then rigorously reviewed to ensure coherence and relevance. Subsequently, these themes were refined, defined, and clearly named to encapsulate their essence accurately. The final stage involved synthesizing the findings into a comprehensive and cohesive report, as outlined by Braun and Clarke (2006). To enhance the efficiency and organization of the coding process, NVivo software (version 15) was utilized as a supportive tool, enabling systematic data management and analysis.

Trustworthiness

Ensuring trustworthiness in qualitative research is essential for establishing the credibility, dependability, confirmability, and transferability of findings (Lincoln & Guba, 1985; Korstjens & Moser, 2018). In this study, multiple rigorous strategies were applied throughout the research process to maintain the integrity and validity of the data and analysis. Credibility was supported through prolonged engagement and careful, systematic interaction with participants. Prolonged engagement in this study involved multiple points of contact with each participant, including initial rapport-building conversations and one full semi-structured interview, resulting in approximately 60–90 minutes of total contact time per participant. This extended interaction created a comfortable interview environment and allowed participants to discuss their experiences more openly. While the study did not employ direct observational methods, "persistent observation" was adapted conceptually to refer to the interviewer's sustained focus on emerging patterns, emotional nuances, and contextual cues throughout the interviews, ensuring that key issues related to clinical training challenges were explored in depth. This usage aligns with its application in interview-based qualitative studies rather than ethnographic field observations.

Dependability was enhanced through a detailed and transparent audit trail documenting each phase of the study, including sampling decisions, interview procedures, coding steps, and theme development. This clear documentation enables independent scrutiny and supports the replicability of the research under comparable conditions. Reflexive journaling was also used throughout data collection and analysis, allowing the researchers to critically examine how their assumptions and professional backgrounds might shape data interpretation. Confirmability was strengthened through systematic documentation of analytic decisions and the inclusion of external peer debriefing. The debriefing process involved a qualitative research expert with no direct involvement in the study, holding a graduate specialization in qualitative health research and experience supervising multiple qualitative nursing studies. The debriefer reviewed preliminary codes, emerging themes, and representative quotations to assess whether interpretations were grounded in the data. Feedback from the debriefer was integrated into theme refinement, particularly in clarifying theme boundaries and ensuring that thematic labels accurately reflected participant narratives. Transferability was supported by providing a thick description of the study context, including participant demographics, institutional characteristics, and the sociocultural environment of clinical nursing

Table 3. Theme, category, and code

Theme	Category	Code
Inadequate Clinical Supervision	Limited Presence of Instructors	Infrequent Instructor Availability, Overburdened Instructors, Lack of Real-Time Support
	Irregular Supervision	Unscheduled Supervision Visits, Insufficient Supervision Frequency, Missed Learning Opportunities
	Insufficient Feedback	Lack of Constructive Feedback, One-Way Communication, Infrequent Feedback
Communication Barriers	Language Barriers	Use of Local Dialects, Translation Dependence, Limited Exposure to Diverse Languages
	Misunderstanding Medical Jargon	Unfamiliar Medical Terms, Insufficient Training on Technical Language, Misinterpretation of Instructions
	Hierarchical Communication Patterns	Fear of Supervisors, Fear of Reprimands, Lack of Mentorship Culture
	Nonverbal Communication Challenges	Misinterpretation of Body Language, Inconsistent Tone of Voice, Lack of Training in Nonverbal Cues
	Time Constraints	Rushed Clinical Rounds, Overworked Supervisors, Competing Demands
Emotional and Psychological Strain During Clinical Training	Overwhelming Workload	Physical Exhaustion, Mental Fatigue, Imbalance Between Practice and Learning
	High-Pressure Environment	Fear of Errors, Pressure to Perform Perfectly, Performance Anxiety in High-Stakes Scenarios
	Internal Psychological Challenges	Self-Doubt, Comparison with Peers, Imposter Syndrome
Resource Constraints	Insufficient Supplies	Shortage of Materials for Practice, Overcrowded Practice Sessions, Limited Access to Essential Resources
	Outdated Tools	Use of Outdated Equipment, Inability to Learn Modern Techniques, Lack of Alignment with Industry Standards
	Limited Simulation Opportunities	Rare Access to Simulation Labs, Lack of Practical Exposure, Insufficient Practice of Clinical Scenarios
	Faculty and Staff Constraints	Inadequate Faculty-to-Student Ratio, Lack of Specialized Expertise, Limited Interaction Time with Instructors
Interpersonal Dynamics in Collaborative Learning	Challenges in Collaborative Dynamics	Unequal Workload Distribution, Interpersonal Conflicts, Lack of Communication Skills
	Impact of Competition Among Peers	Unhealthy Rivalry, Fear of Judgment, Stress and Anxiety
	Benefits of Positive Peer Interactions	Emotional Support, Knowledge Sharing, Building Trust and Cooperation

education in Indonesia. This detail enables readers to determine the applicability of the findings to similar settings or populations.

Ethical consideration

The study obtained ethical approval from the Institutional Review Board (IRB) of Universitas Muhammadiyah Jakarta (Approval No. E078). All procedures adhered to the ethical principles outlined in the Declaration of Helsinki and its subsequent amendments. Prior to data collection, participants were informed about the study's purpose, procedures, potential risks, and their rights as research participants. Written informed consent was obtained from all students who agreed to participate. Confidentiality was strictly maintained by anonymizing all identifying information and securely storing interview data. Participation was entirely voluntary, and students were free to decline or withdraw from the study at any point without penalty or academic consequences.

Results

Participant Demographics

Table 2 shows that the majority of participants were female (72%), which aligns with the predominantly female demographic typically observed in nursing

student populations. Most participants were between 20 and 22 years old (56%), suggesting that many were in the early stages of their clinical education. In terms of clinical exposure, 60% had completed two or more clinical rotations, indicating that most participants possessed a relatively higher level of hands-on clinical experience. Additionally, a substantial proportion of participants (72%) were enrolled in universities with A-grade accreditation, reflecting that the sample largely came from institutions with higher academic standing.

Note: A-grade and B-grade refer to the national university accreditation ratings issued by the National Accreditation Board for Higher Education (BAN-PT) in Indonesia. An A-grade indicates that the university meets excellent standards in academic quality, resources, governance, and educational outcomes, while a B-grade reflects good but not yet excellent overall performance according to BAN-PT evaluation criteria.

The themes identified during clinical training highlight various challenges. Inadequate clinical supervision arises from the limited presence of instructors, irregular oversight, and insufficient feedback. Communication barriers are evident due to language differences, misunderstandings of medical jargon, hierarchical communication patterns, nonverbal challenges, and time constraints. Emotional and psychological strain is fueled by overwhelming workloads, high-pressure environments, and internal psychological challenges. Resource constraints include insufficient supplies, outdated tools, limited simulation opportunities, and faculty shortages. Interpersonal dynamics in collaborative learning reflect challenges in teamwork, the impact of peer competition, and the advantages of positive peer interactions. The details are presented in Table 3.

Theme 1: Inadequate Clinical Supervision

Clinical supervision is a critical component of healthcare education. However, students highlighted deficiencies in supervision, which negatively impacted their learning, confidence, and preparedness for clinical decision-making. The issues ranged from a lack of presence by instructors to insufficient feedback and irregular schedules. This theme encapsulates the barriers students face in achieving optimal clinical training.

Category 1: Limited Presence of Instructors

Students consistently expressed frustration over the absence of instructors during clinical practice. Their physical unavailability often left students feeling unsupported and underprepared. Limited instructor presence creates a gap in real-time learning and mentorship. Students rely on timely guidance to navigate clinical challenges, and its absence leads to reduced confidence and an increased risk of errors.

Infrequent Instructor Availability

"We rarely see our instructors during clinical practice because they are often assigned to other responsibilities." (PW11)

"Sometimes, we are left to figure out things on our own due to the lack of instructors." (PG2)

Overburdened Instructors

"Our instructors are responsible for so many things that they can't focus on guiding us." (PW4)

"They have administrative duties that take them away from clinical teaching." (PG5)

Lack of Real-Time Support

"During emergencies, we don't always have someone to guide us, which is really stressful." (PW6)

"Without immediate help, we often make decisions based on guesswork, which feels unsafe." (PW15)

Category 2: Irregular Supervision

Unpredictable supervision schedules added to the stress and uncertainty students experienced during clinical training. Irregular supervision disrupts the learning continuum. A predictable schedule fosters a structured environment where students feel secure and confident in seeking help.

Unscheduled Supervision Visits

"The schedule for supervision is irregular, making it hard for us to know when to expect help." (PW3)

"Sometimes, instructors visit without prior notice, which makes us feel unprepared." (PG6)

Insufficient Supervision Frequency

"Some instructors show up once a week, which is not enough for us to learn effectively." (PW17)

"We need regular interaction, but the current supervision pattern doesn't allow that." (PW8)

Missed Learning Opportunities

"When instructors are irregular, we miss the chance to learn important skills in real time." (PW17)

"Supervision gaps mean we might overlook critical steps in patient care." (PW8)

Category 3: Insufficient Feedback

Students highlighted that the quality and frequency of feedback from instructors were inadequate, leaving them uncertain about their progress and areas for improvement. Constructive feedback is essential for skill refinement and confidence-building. The absence of detailed, actionable feedback leaves students feeling disconnected and inadequately prepared for real-world clinical situations.

Lack of Constructive Feedback

"We rarely receive constructive feedback, which leaves us unsure about our progress." (PW5)

"When feedback is given, it's usually very brief and not detailed enough to help us improve." (PW14)

One-Way Communication

"Feedback sessions feel like lectures rather than discussions." (PW16)

"We are told what we did wrong but not how to fix it or do better next time." (PG3)

Infrequent Feedback

"Sometimes, we go through weeks without any feedback at all." (PW11)

*"I feel disconnected from my learning outcomes because feedback is so rare."(*PG3)

Theme 2: Communication Barriers

Communication barriers hinder effective interaction and the learning process in clinical settings. These barriers range from language differences and technical jargon to hierarchical relationships and other situational challenges that affect students' confidence and understanding.

Category 1: Language Barriers

Language difficulties create obstacles in establishing rapport with patients and understanding their needs, particularly in diverse linguistic environments.

Use of local dialects

"Some patients speak in dialects that we don't understand, making communication very difficult." (PW12)

"We have to guess the meaning when patients use unfamiliar local terms, which is risky." (PG7)

Translation dependence

"I often rely on my peers to translate, which takes extra time and effort." (PW1)

"Asking staff for help with translation slows down the workflow." (PW18)

Limited exposure to diverse languages

"Our training didn't prepare us for handling patients who speak multiple dialects." (PW9)

"I wish we had language training specific to the regions where we're placed." (PW7)

Category 2: Misunderstanding Medical Jargon

The use of complex or unfamiliar medical terminology impedes students' ability to follow clinical instructions accurately. The lack of familiarity with medical jargon creates confusion and anxiety for students, leading to potential errors and a sense of inadequacy in clinical tasks. Focused training on medical language is essential to bridge this gap.

Unfamiliar medical terms

"Sometimes, medical terms used by doctors are unfamiliar to us, causing confusion." (PG2)

"We are expected to understand terms we've never encountered before." (PW3)

Insufficient training on technical language

"We need more training on how to interpret technical language during rounds." (PW13)

"I struggle to remember terms that are only briefly explained." (PW6)

Misinterpretation of instructions

"Once, I misunderstood an instruction because I didn't know what a specific term meant." (PW8)

"Misinterpreting a single term can lead to errors in patient care." (PW15)

Category 3: Hierarchical Communication Patterns

Power dynamics in clinical settings often make students hesitant to seek clarification, impacting their confidence and learning. Hierarchical communication patterns create an environment where students fear judgment and reprimands, limiting their ability to clarify doubts or learn effectively. Promoting a culture of mentorship and open dialogue can alleviate these barriers.

Fear of supervisors

"I feel intimidated when speaking with supervisors, so I avoid asking questions." (PW2)

"Some supervisors are unapproachable, which discourages communication." (PW5)

Fear of reprimands

"The fear of being scolded makes me hesitant to clarify doubts." (PG10)

"One negative interaction can deter me from asking questions again." (PG17)

Lack of mentorship culture

"We need more supportive mentors who encourage open communication." (WG17)

"A culture of constructive feedback is missing in some teams." (PW4)

Category 4: Nonverbal Communication Challenges

Nonverbal communication plays a crucial role in healthcare, yet it is often overlooked in training. Misinterpretations of tone or body language can create unnecessary tension or misunderstandings, emphasizing the need for training in this area. Nonverbal cues, such as body language and tone, often lead to misunderstandings or discomfort in interactions.

Misinterpretation of body language

"Sometimes, I feel that a supervisor's expression is disapproving, even if it's not intentional." (PW11)

"Patients' nonverbal cues are hard to interpret, especially when they're anxious." (PG3)

Inconsistent tone of voice

"A supervisor's tone can feel harsh even when they're just giving instructions." (PW9)

"It's hard to gauge intent when someone speaks

quickly or sharply." (PW7)

Lack of training in nonverbal cues

"We haven't been taught how to interpret nonverbal communication effectively." (PW1)

"Reading patients' body language feels like guesswork most of the time." (PG6)

Category 5: Time Constraints

Time constraints in clinical settings exacerbate existing communication challenges. The pressure to complete tasks efficiently often overrides the importance of clear and meaningful communication between students, supervisors, and patients.

Limited time in clinical settings exacerbates communication barriers, leaving students with little opportunity to clarify doubts or interact meaningfully.

Rushed clinical rounds

"Rounds are so fast-paced that there's no time to ask questions." (PW12)

"I struggle to keep up during rounds, so I miss important details." (PW3)

Overworked supervisors

"Supervisors are often too busy to provide detailed explanations." (PG5)

"Their workload makes it hard for them to address our queries patiently." (PG6)

Competing demands

"Balancing documentation and patient care leaves little time for communication." (PW6)

"We're expected to multitask, which reduces the focus on effective communication." (PW14)

Theme 3: Emotional and Psychological Strain During Clinical Training

This theme highlights the multifaceted emotional and psychological challenges faced by nursing students during clinical training. The strain stems from excessive workloads, high expectations, and internal struggles with self-perception. These stressors not only affect students' mental well-being but also hinder their ability to learn and perform effectively in clinical settings.

Category 1: Overwhelming Workload

The clinical training workload is reported to be excessively demanding, leading to both physical and mental exhaustion. This affects students' energy levels and their capacity to focus on academic learning and patient care.

Physical Exhaustion

"The workload is too much to handle, leaving us physically and mentally exhausted." (PW16)

"Sometimes, I can't even get out of bed the next day because of how drained I feel." (PW8)

Mental Fatigue

"After long shifts, I find it hard to focus on academic tasks." (PW10)

"Even during my time off, I feel mentally stuck and unable to process what I've learned." (PW2)

Imbalance Between Practice and Learning

"We spend so much time working that there's no time left to study or reflect." (PW4)

"It feels like the focus is more on surviving the shift rather than learning something new." (PG7)

Category 2: High-Pressure Environment

Fear of Errors

"I am constantly afraid of making errors that could harm patients." (PW15)

"The fear of doing something wrong paralyzes me during critical tasks." (PW9)

Pressure to Perform Perfectly

"The pressure to be perfect is overwhelming and affects my confidence." (PW11)

"We're expected to act like seasoned professionals, but we're still learning." (PW18)

Performance Anxiety

"Every decision feels like it could have life-or-death consequences." (PW5)

"Knowing that someone's health depends on me creates immense anxiety." (PG4)

Category 3: Internal Psychological Challenges

Self-Doubt

"I often feel like I'm not good enough to be a professional nurse." (PW7)

"Sometimes I wonder if I made the right career choice because of how incompetent I feel." (PW14)

Comparison with Peers

"The comparison with others makes me question my abilities." (PW3)

"Seeing my peers excel while I struggle makes me feel like a failure." (PW6)

Imposter Syndrome

"I feel like I don't deserve to be here and that I'm just pretending to be competent." (PW1)

"It's hard to celebrate my successes because I always think I just got lucky." (PG2)

Theme 4: Resource Constraints

Category 1: Insufficient Supplies

Shortage of Materials

"Sometimes, there aren't enough supplies for everyone to practice on." (PW5)

"We often run out of basic items like gloves and masks during training." (PW17)

Overcrowded Practice Sessions

"We had to wait for hours to get a turn with the equipment." (PW12)

"Too many students in one session make it

impossible to get meaningful practice." (PW9)

Limited Access

"We only get access to the main equipment during exams, not for regular practice." (PW4)

"There's just one machine for the whole class, and we barely get time to use it." (PG3)

Category 2: Outdated Tools

Use of Outdated Equipment

"The equipment we use is outdated and not what we'll encounter in real settings." (PW10)

"We're using tools from years ago, which don't reflect the current standards." (PG6)

Inability to Learn Modern Techniques

"It's challenging to learn modern techniques with old machines." (PW13)

"We're missing out on critical skills because the tools we have are obsolete." (PW2)

Lack of Alignment with Industry Standards

"Our training isn't aligned with what hospitals require nowadays." (PW15)

"Employers expect us to know advanced tools, but we've never seen them here." (PW18)

Category 3: Limited Simulation Opportunities

Rare Access to Labs

"Simulation labs are rarely available, limiting our ability to practice." (PW6)

"We don't get enough time in the labs to feel confident in our skills." (PG5)

Lack of Practical Exposure

"Without simulations, it's hard to apply theoretical knowledge to practice." (PW3)

"I feel underprepared because I've never had the chance to practice real-life scenarios." (PW7)

Insufficient Practice of Clinical Scenarios

"We're not exposed to enough clinical situations to develop confidence." (PW16)

"Practicing on mannequins once or twice isn't enough to prepare for real patients." (PW11)

Theme 5: Interpersonal Dynamics in Collaborative Learning

Category 1: Challenges in Collaborative Dynamics

Unequal Workload Distribution

"Group tasks often end up with unequal workload distribution." (PW10)

"Some members just don't contribute, leaving others to do all the work." (PW1)

Interpersonal Conflicts

"Disagreements in groups sometimes make it hard to focus on learning." (PW14)

"Arguments over small things derail the entire discussion." (PW8)

Lack of Communication Skills

"Some group members struggle to explain their ideas, so discussions are unproductive." (PW13)

"Miscommunication happens a lot, and it slows us down." (PW17)

Category 2: Impact of Competition Among Peers

Unhealthy Rivalry

"There's a lot of competition, which sometimes feels unhealthy." (PW6)

"I feel like I have to compete even in group projects." (PG2)

Fear of Judgment

"I'm always afraid my ideas will be criticized harshly." (PW12)

"People hold back because they don't want to be wrong in front of others." (PW9)

Stress and Anxiety

"The pressure to perform better than others is overwhelming." (PW18)

"It feels like I'm competing against my own friends." (PW3)

Category 3: Benefits of Positive Peer Interactions

Emotional Support

"Having supportive friends helps me get through tough times." (PW5)

"When I'm stressed, my friends are always there to encourage me." (PW7)

Knowledge Sharing

"We often share tips and encourage each other, which makes a difference." (PW4)

"Learning is easier when we exchange ideas and help each other out." (PG1)

Building Trust and Cooperation

"Working with people I trust makes group projects more enjoyable." (PW11)

"When we cooperate well, everything feels smoother and more productive." (PW16)

Discussion

Inadequate clinical supervision emerged as a critical theme. Although international studies, such as Labrague et al. (2020), similarly report insufficient supervision as a barrier to skill development and confidence-building, the Indonesian context introduces distinct systemic mechanisms. Chronic shortages of clinical educators, uneven distribution of qualified preceptors, and the absence of standardized supervision models create inconsistent learning experiences across institutions. From a Social Learning Theory perspective, limited role modeling reduces opportunities for observational

learning and feedback, hindering the internalization of clinical competencies. This divergence suggests that improving supervision in Indonesia requires not only increasing instructor numbers but also strengthening institutional policies that regulate workload distribution and supervisory expectations.

Communication barriers, including hierarchical interactions and medical terminology challenges, are widely acknowledged globally (Ali et al., 2019). However, these issues manifest differently in Indonesia due to cultural tendencies toward power distance, indirect communication, and linguistic diversity across regions. These cultural norms shape how students interpret authority and engage in professional dialogue. A Cultural Competence framework helps explain how misalignment between communication expectations (e.g., students hesitant to question senior staff) and clinical demands (e.g., assertive communication) can impede clarity and clinical decision-making. These findings extend the global literature by elucidating how cultural hierarchies not only individual skill deficits structure communication challenges.

Emotional and psychological strain, consistent with prior findings by Brown et al. (2021), was strongly reported by participants. However, the sources of stress in this study were closely tied to Indonesia's educational structure, in which many nursing students simultaneously undertake academic responsibilities and part-time clinical work. This dual burden increases role conflict and depletes coping capacity. Drawing on Stress–Coping theory, these pressures may overwhelm students' adaptive resources, leading to heightened vulnerability to anxiety and burnout. This mechanism highlights how structural factors not solely clinical experiences intensify psychological strain in the Indonesian context.

Resource constraints, including limited equipment and outdated simulation tools, have been described globally (Mansour et al., 2020), yet in Indonesia they are amplified by disparities across institutions and regions. Students in resource-limited settings may experience constrained opportunities for skills practice, affecting competence and readiness for independent work. This theme contributes to international literature by emphasizing how geographic and economic factors intersect with pedagogical quality. Interpersonal challenges, particularly peer competition and teamwork difficulties, reflect findings by Lee and Kim (2021), but they also reveal a nuanced interplay within Indonesia's collectivist culture. Although collectivism typically supports cooperation, it can also heighten sensitivity to social comparison, fear of negative evaluation, and avoidance of conflict. These dynamics suggest that peer relationships are shaped by cultural expectations of harmony and respect, which can both support and hinder collaborative learning. Understanding these dynamics through a cultural lens provides a richer interpretation of interpersonal challenges in Indonesian nursing education.

Implications for Practice and Policy

Addressing these challenges requires strategies tailored to Indonesia's institutional and cultural landscape. Enhancing supervision is essential, but feasibility must be considered: instructor shortages and heavy clinical workloads may limit immediate implementation. Policy-level initiatives, such as incentivizing clinical educators, creating joint academic–hospital appointments, and establishing national supervision standards may offer more sustainable solutions. Improving communication training should incorporate culturally informed approaches, such as role-play scenarios addressing hierarchical interactions or structured communication tools (e.g., SBAR) adapted to local linguistic norms. Stress management initiatives must be accompanied by workload adjustments, accessible counseling services, and organizational support systems. Bridging resource gaps will require targeted investment, but implementation may vary across institutions. Partnerships with hospitals, academic consortia, or government agencies could support access to shared simulation facilities. Interpersonal challenges may be addressed through structured team-based learning, peer mentoring models, and faculty development in conflict management.

Strengths and Study Limitations

Strengths

Despite its limitations, this study offers several notable strengths. The use of qualitative inquiry allowed for a rich and nuanced understanding of students' experiences, capturing contextual factors and personal perspectives that would be difficult to obtain through quantitative methods alone. The inclusion of participants from multiple accredited nursing programs contributes to data diversity and enhances the credibility of the findings. Additionally, employing established techniques for ensuring trustworthiness, such as maintaining an audit trail, investigator triangulation, and member checking strengthened the rigor, credibility, and dependability of the study.

Study Limitations

This study has several limitations. First, although qualitative methods provide depth, the findings are not statistically generalizable beyond the study population. Second, interviews conducted virtually may have influenced the openness or depth of participant disclosure due to privacy constraints or technological challenges. Third, the reliance on self-reported data may introduce recall bias or social desirability bias. Lastly, participants were drawn from accredited programs, which may not reflect the experiences of students in less-resourced or non-accredited institutions, potentially limiting transferability.

Recommendations for Future Research

Future research could adopt mixed-methods designs to deepen and validate insights. An explanatory sequential design could quantify the prevalence of specific challenges, followed by qualitative exploration to explain underlying mechanisms. An embedded mixed-methods design may allow integration of observation data within qualitative interviews to elucidate behavioral patterns. Longitudinal studies could examine how students' coping strategies, communication skills, and supervisory relationships evolve across semesters. Including perspectives from clinical instructors, hospital administrators, and policymakers would provide a multi-level understanding of clinical training challenges.

Conclusion

This study suggests that nursing students in Indonesia face key challenges during clinical training, including inadequate supervision, communication barriers, emotional strain, resource limitations, and interpersonal difficulties. These findings highlight how cultural and institutional contexts shape students' learning experiences. To address these issues, institutions might prioritize two feasible actions: implementing structured mentorship programs to strengthen supervision and expanding access to simulation-based learning to compensate for limited clinical resources. Future research should evaluate the effectiveness of such interventions, particularly mentorship, communication training, and stress-management initiatives using longitudinal or mixed-methods designs to assess their impact on students' competence and well-being.

Declaration of Interest

All author declare no conflict of interest.

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Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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Direct and indirect effects of stress, health literacy, social media use, and self-efficacy on diabetes prevention behaviors in youth: A path analysis

Nina Nina[1*], Achmad Lukman Hakim[1], Hidayani Hindayani[1], Tukimin Bin Sansuwito[2]

[1] Universitas Indonesia Maju, Jakarta, Indonesia
[2] Lincoln University College, Selangor Darul Ehsan, Malaysia

Abstract

Background: Type 2 diabetes mellitus (T2DM) is increasingly affecting youth, particularly in low- and middle-income countries like Indonesia. Psychosocial and informational factors such as stress, health literacy, self-efficacy, and social media exposure may influence diabetes prevention behaviour. However, the interrelationships among these variables remain understudied.
Purpose: This study aimed to assess the direct and indirect effects of stress, T2DM knowledge, health literacy, self-efficacy, social media exposure, and nutritional status on diabetes prevention behaviour among Indonesian university students using path analysis.
Methods: A cross-sectional study was conducted among 380 undergraduate students aged 18–25 years at Universitas Indonesia Maju, Jakarta. Diabetes prevention behavior was measured using the Diabetes Prevention Behavior Questionnaire (DPBQ). Validated instruments assessed perceived stress (PSS-10), diabetes knowledge (modified DKQ-24), social media exposure to health information, health literacy (HLQ subscales 1, 2, 3, 5), and general self-efficacy (GSES). Body Mass Index (BMI) was calculated from self-reported height and weight. Path analysis evaluated direct and indirect effects and indirect effects were tested via bootstrapping (5,000 resamples).
Results: Participants reported moderately high engagement in T2DM prevention behaviors (M = 3.72, SD = 0.46). The final model showed good fit to the data. T2DM prevention behavior was positively predicted by self-efficacy (β = 0.31, p < 0.001), health literacy (β = 0.25, p = 0.001), social media exposure (β = 0.21, p = 0.008), and diabetes knowledge (β = 0.18, p = 0.015), and negatively predicted by perceived stress (β = −0.23, p = 0.002) and BMI (β = −0.12, p = 0.031). Self-efficacy mediated the relationship between stress and prevention behavior (indirect β = −0.08, p = 0.012), while health literacy mediated the effects of diabetes knowledge (indirect β = 0.10, p = 0.046) and social media exposure (indirect β = 0.07, p = 0.046) on prevention behavior.
Conclusion: Diabetes prevention behaviors in Indonesian youth are shaped by an interrelated network of psychosocial and digital factors. Self-efficacy and health literacy play central mediating roles, suggesting that future interventions should combine psychological empowerment, health literacy enhancement, and strategic use of social media to strengthen T2DM prevention in young populations. Longitudinal research is needed to confirm causal pathways.

Keywords: Health literacy; prevention behavior; self-efficacy; social media; stress type 2 diabetes mellitus; youth

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Corresponding author

Nina Nina*
Universitas Indonesia Maju Jakarta, Indonesia; Address: Jl. Harapan No.50, RT.2/RW.7, Lenteng Agung, Kec. Jagakarsa, Kota Jakarta Selatan, Daerah Khusus Ibukota Jakarta 12610; Phone: +62821-2267-8042,

E-mail: naninna62@gmail.com

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Introduction

Type 2 diabetes mellitus (T2DM) remains a major global public health concern, and its growing presence among younger people has become especially

alarming. Once viewed primarily as a condition affecting older adults, T2DM is now appearing more often in adolescents and young adults. This shift reflects broader changes in daily life, rising psychosocial stress, increasingly sedentary routines, and the powerful influence of digital platforms that shape how young people understand and engage in health behaviors (Pulungan et al., 2021; Chan et al., 2020). The problem is further intensified by higher rates of obesity, declining physical activity, and unhealthy dietary habits among youth (Zhang et al., 2022). This epidemiological shift is highly concerning because early-onset T2DM progresses more aggressively, is associated with earlier development of complications, and imposes a longer lifetime burden on individuals and healthcare systems (Zheng et al., 2018). Early diagnosis and prevention are therefore critical to reducing long-term morbidity and economic strain.

Globally, an estimated 537 million people were living with diabetes in 2021, with projections showing a rise to 783 million by 2045 (Saeedi et al., 2020). Importantly, more than 90% of these cases are attributed to T2DM (Zheng et al., 2018). Recent data further demonstrate a significant rise in T2DM among adolescents and young adults, a trend that was once rare but is now rapidly increasing in many low- and middle-income countries (Saeedi et al., 2020). This shift reflects an interplay of modifiable lifestyle factors, such as unhealthy diets, physical inactivity, increased screen time, stress exposure and limited health literacy among the younger generation.

In 2021, an estimated 19.5 million Indonesians were living with diabetes, placing the country among the top ten nations worldwide with the highest disease burden (IDF Diabetes Atlas, 2021). Alarming increases in T2DM among younger age groups mirror broader national trends, where physical inactivity, unhealthy dietary patterns, and chronic psychological stress have become increasingly common risk factors (Ministry of Health of the Republic of Indonesia, 2022). Because lifestyle habits are largely established during late adolescence and early adulthood, university students represent a critical population for early intervention, making this developmental stage a strategic window for promoting healthy behaviors and preventing the progression of diabetes.

Despite these efforts to raise awareness at the national level, a significant number of Indonesian young adults have insufficient knowledge of T2DM risk factors and have not yet adopted preventive actions (Widayanti et al., 2020). Previous studies found that health behavior has been determined by nutritional status, stress, and health literacy. Nutritional status as indicated by body mass index (BMI) and dietary habit can be a predictor and a consequence of eating behavior (Asril et al., 2020). High stress in university students has been associated with maladaptive coping and low motivation to perform health-promoting activities (Leblalta et al., 2022). However, previous literature has predominantly focused on these factors individually and explore how they interact within the context of a broader behavior model is lacking.

Knowledge about T2DM is a prerequisite for altering behaviour, but it needs to be underpinned by functional health literacy, defined as the ability to access, understand, and use health information (Nutbeam, 2000). Self-efficacy, or confidence in one's ability to perform targeted health behaviors, is equally important for translating awareness into sustained action (Bandura, 1997). In recent years, social media has become a major channel through which young people obtain health information and form health-related attitudes (Sun et al., 2022; Yeh et al., 2018). Platforms such as Instagram, TikTok, and YouTube can both support health promotion and spread misinformation, thereby influencing beliefs, norms, and decisions related to diet, physical activity, and other lifestyle behaviors among youth (Bozzola et al., 2022; Yonker et al., 2015; Zhang et al., 2022).

While the importance of psychosocial and digital factors in shaping health behavior continues to grow, relatively few studies have examined their combined influence on diabetes-prevention behaviors using multivariable analytical approaches. In particular, path analysis studies that simultaneously assess both direct and mediated effects of stress, knowledge, social media exposure, self-efficacy, health literacy, and nutritional status among university students are scarce. To address this gap, the present study investigates the pathways through which these interrelated factors affect T2DM prevention behaviors among Indonesian university students. By applying path analysis, this study seeks to clarify how psychosocial attributes and digital information exposure interact to shape preventive health actions. The findings are expected to inform the design of future interventions that aim to strengthen health-promoting behaviors and reduce diabetes risk among adolescents and young adults, particularly in low-resource settings. Specifically, this research examines the direct and indirect effects of stress, diabetes knowledge, social media exposure, self-efficacy, nutritional status, and health literacy on T2DM prevention behaviors within a comprehensive behavioral model.

Materials and Methods

Study Design

This was a cross-sectional study that used path analysis to understand the associations between the variables such as stress, diabetes-related knowledge, exposure to health information through social media, health literacy, self - efficacy, nutrition status, and behaviors of Type 2 diabetes prevention.

Setting and participants

The research was conducted at Universitas Indonesia Maju (UIM) in Jakarta between November 2024 and

January 2025. UIM was selected as the study site for several reasons. First, it is a large private university with diverse academic programs, providing access to a broad cross-section of young adults as a population known to be in a critical developmental stage for establishing long-term health behaviors. Second, the university has previously collaborated in public health initiatives, offering a supportive environment for behavioral research and efficient participant recruitment. Third, Indonesian university students represent an important demographic for global diabetes prevention efforts, as rising rates of early-onset T2DM have been observed across low- and middle-income countries.

The study focused exclusively on undergraduate students aged 18–25 years, as this age group is at the transition between adolescence and adulthood, when lifestyle patterns such as diet, physical activity, and stress management become more independent and stable. University staff were not included because the study specifically targeted youth and emerging adults as a population with distinct psychosocial characteristics, digital media consumption patterns, and health literacy profiles compared with older adults in the same setting. Limiting the sample to students ensures that findings speak directly to this globally relevant risk group.

Based on G*Power 3.1 calculations, a minimum of 204 participants was required for medium effect size ($f^2 = 0.15$), six predictors, 0.95 power, and $\alpha = 0.05$ (Faul et al., 2009). To reduce variance, improve generalizability, and anticipate incomplete responses, the sample size was expanded to 384 participants. A stratified random sampling approach was used to capture representation across the university's major faculties. Each faculty served as a stratum, and the number of sampled students from each faculty was proportional to its enrollment size. Within each stratum, participants were selected through simple random sampling using student identification numbers as the sampling frame.

Instruments

The study variables were measured using several validated instruments. Diabetes prevention behavior was assessed using the 20-item Diabetes Prevention Behavior Questionnaire (DPBQ), which evaluates engagement in physical activity, dietary practices, and lifestyle modifications on a 5-point Likert scale, with higher scores indicating stronger adherence to recommended preventive behaviors. The structure and behavioral domains measured by the DPBQ are consistent with validated lifestyle and diabetes-prevention behavior tools used in prior research (Toobert et al., 2000), supporting its conceptual and psychometric foundations. In the current study, the Bahasa Indonesia version demonstrated good internal consistency (Cronbach's $\alpha = 0.85$).

Stress levels were assessed using the Perceived Stress Scale (PSS-10) developed by Cohen et al. (1983), which consists of 10 items rated on a 5-point scale (0–4). PSS-10 is a globally validated psychological assessment tool with well-established content, convergent, and discriminant validity. The Indonesian version has demonstrated good reliability (Cronbach's $\alpha = 0.84$) in previous validation studies (Dwi et al., 2024).

Diabetes knowledge was measured using a modified youth-adapted version of the Diabetes Knowledge Questionnaire (DKQ-24), originally developed by García et al. (2001). The adapted 15-item instrument uses three response options ("True," "False," "I don't know"). The DKQ family of tools has previously demonstrated good criterion validity and sensitivity for detecting gaps in diabetes-related understanding.In the current study, internal consistency demonstrated acceptable (Cronbach's $\alpha = 0.78$).

Perceptions of social media exposure to health information were assessed using an 8-item scale adapted from Powell et al. (2024), which evaluates frequency and perceived credibility of diabetes-related content viewed on Instagram, TikTok, and YouTube. Prior work has demonstrated strong face and construct validity for this measure when assessing online health information exposure.In The current study, the adapted Indonesian version showed satisfactory reliability (Cronbach's $\alpha = 0.81$).

Health literacy was measured using four subscales (1, 2, 3, and 5) of the Health Literacy Questionnaire (HLQ) developed by Osborne et al. (2013), comprising 16 items. The HLQ is a widely used instrument with extensive evidence supporting its content validity, factorial validity, and cross-cultural measurement invariance across diverse populations.In the current study, the Indonesian version has demonstrated high internal reliability (Cronbach's $\alpha = 0.87$).

Self-efficacy was assessed using the General Self-Efficacy Scale (GSES) designed by Schwarzer and Jerusalem (1995), a 10-item instrument rated on a 4-point Likert scale. The GSES has demonstrated excellent convergent validity with behavior change and coping-related constructs, as well as strong reliability across global samples.The Indonesian adaptation has shown good psychometric properties (Cronbach's $\alpha = 0.86$) (Wardani et al., 2025).

Nutritional status was assessed using Body Mass Index (BMI) calculated from self-reported weight and height, classified according to WHO Asia–Pacific cutoffs for underweight, normal weight, overweight, and obesity (WHO Expert Consultation, 2004). BMI was also modeled as a continuous variable in path analysis.

A demographic questionnaire collected information on age, sex, academic year, faculty of study, parental history of diabetes, and previous exposure to diabetes-related education.

Data Collection Procedure

Data collection was carried out following ethical approval from the Universitas Indonesia Maju Research Ethics Committee (Ref: 1650/Sket/Ka-Dept/RE/UimA/XI/2024). Participants were

Table 1. Demographic Characteristics of Participants (N = 380)

Variable	Category	n	%
Age (years), Mean (SD)		20.8 (1.9)	
Gender	Male	140	36.8
	Female	240	63.2
Academic Year	First Year	90	23.7
	Second Year	100	26.3
	Third Year	110	28.9
	Fourth Year	80	21.1
Faculty	Medicine	120	31.6
	Nursing	90	23.7
	Public Health	100	26.3
	Pharmacy	70	18.4
Parental History of Diabetes	Yes	160	42.1
	No	220	57.9
Prior Exposure to Diabetes Education	Yes	200	52.6
	No	180	47.4

Table 2. Descriptive Statistics of Key Study Variables (N = 380)

Variable	Number of Items	Scale Range	Mean (SD)	Cronbach's α
T2DM Prevention Behavior (DPBQ)	20	1 – 5	3.72 (0.46)	0.85
Perceived Stress (PSS-10)	10	0 – 4	2.14 (0.68)	0.84
T2DM Knowledge (Modified DKQ-24)	15	0 – 15	10.28 (2.31)	0.78
Social Media Exposure to Health Information	8	1 – 5	3.49 (0.57)	0.81
Health Literacy (HLQ subscales 1, 2, 3, 5)	16	1 – 5	3.68 (0.53)	0.87
General Self-Efficacy (GSES)	10	1 – 4	2.91 (0.51)	0.86
Body Mass Index (BMI)	–	kg/m²	22.7 (3.9)	–

Table 3. Pearson Correlation Coefficients Among Study Variables (N = 380)

Variable	1	2	3	4	5	6	7
1. T2DM Prevention Behavior	1						
2. Perceived Stress	–0.32**	1					
3. T2DM Knowledge	0.28**	–0.14**	1				
4. Social Media Exposure	0.35**	–0.12*	0.21**	1			
5. Health Literacy	0.40**	–0.29**	0.25**	0.38**	1		
6. Self-Efficacy	0.44**	–0.34**	0.22**	0.30**	0.47**	1	
7. BMI	–0.11*	0.18**	–0.09	–0.05	–0.12*	–0.14**	1

Note: *p < .05, **p < .01

recruited through digital media channels, including online university announcements, institutional social media platforms, and electronic bulletin boards. These platforms were selected to ensure broad and accessible outreach to university students. Electronic informed consent was obtained through Google Forms, the same platform used to administer the survey. All submitted questionnaires were carefully reviewed to ensure completeness. When inconsistencies or missing responses were identified, participants were contacted via follow-up email for clarification. Data collection took place over a three-week period, resulting in a validated final dataset of 384 respondents..

Data Analysis

Demographic characteristics and key study variables were summarized using descriptive statistics, including means, standard deviations, and frequency distributions. Pearson correlation coefficients were calculated to assess associations among continuous variables prior to model testing.

Table 4. Model Fit Indices for the Path Analysis Model

Fit Index	Recommended Threshold	Observed Value	Model Fit Interpretation
Chi-Square (χ^2)	Non-significant preferred	98.52 (df = 72, p = 0.018)	Acceptable (slightly significant)
RMSEA (Root Mean Square Error of Approximation)	≤ 0.08	0.042	Good Fit
CFI (Comparative Fit Index)	≥ 0.90	0.964	Excellent Fit
TLI (Tucker-Lewis Index)	≥ 0.90	0.952	Excellent Fit
SRMR (Standardized Root Mean Square Residual)	≤ 0.08	0.034	Good Fit

Table 5. Path analysis results

Path	Standardized Coefficient (β)	p-value	95% CI (Lower)	95% CI (Upper)
Stress → T2DM Prevention Behavior	-0.23	0.002	-367	-93
T2DM Knowledge → T2DM Prevention Behavior	0.18	0.015	43	317
Social Media Exposure → T2DM Prevention Behavior	0.21	0.008	53	367
Health Literacy → T2DM Prevention Behavior	0.25	0.001	132	368
Self-Efficacy → T2DM Prevention Behavior	0.31	0.043	212	408
BMI → T2DM Prevention Behavior	-0.12	0.031	-238	-2
Stress → Self-Efficacy → T2DM Prevention Behavior (Indirect)	-0.08	0.012	-158	-2
T2DM Knowledge → Health Literacy → T2DM Prevention Behavior (Indirect)	0.10	0.046	22	178
Social Media Exposure → Health Literacy → T2DM Prevention Behavior (Indirect)	0.07	46	11	129

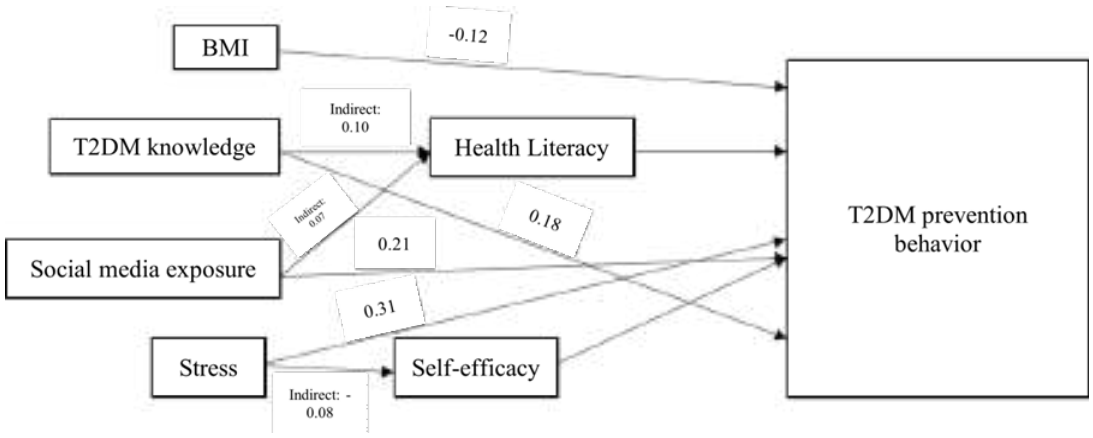

Figure 1. Path analysis of T2DM prevention behavior

To evaluate the hypothesized relationships among the study variables, path analysis was conducted using AMOS version 26. Path analysis is a form of structural equation modeling (SEM) that allows simultaneous examination of direct and indirect effects among variables based on a theoretically driven model. This approach was selected because it enables testing of complex causal pathways and mediation effects within a single analytical framework, offering deeper insight into the mechanisms linking the variables of interest.

Model fit was assessed using multiple goodness-of-fit indices. A non-significant chi-square (χ^2) statistic suggested adequate model fit, although χ^2 is known

to be sensitive to large sample sizes. Additional indices were therefore consulted, including the Root Mean Square Error of Approximation (RMSEA), where values ≤ 0.08 indicate acceptable fit; the Comparative Fit Index (CFI) and Tucker–Lewis Index (TLI), with recommended thresholds above 0.90; and the Standardized Root Mean Square Residual (SRMR), with values < 0.08 reflecting good fit.

To evaluate mediation pathways and estimate indirect effects, a bootstrapping procedure with 5,000 resamples and bias-corrected 95% confidence intervals was applied. Bootstrapping is a robust, non-parametric method that improves the accuracy of indirect effect estimation and is widely recommended for mediation analysis.

Results

Table 1 shows that participants had a mean age of 20.8 years (SD = 1.9), with more females (63.2%) than males (36.8%). Academic years were fairly balanced, with the highest proportion in the third year (28.9%). Most students were from Medicine (31.6%), followed by Public Health (26.3%), Nursing (23.7%), and Pharmacy (18.4%). A parental history of diabetes was reported by 42.1% of participants, and 52.6% had prior exposure to diabetes education.

Table 2 shows that participants had a moderately high engagement in diabetes prevention behaviors, with a mean DPBQ score of 3.72 (SD = 0.46). Perceived stress levels were moderate, averaging 2.14 (SD = 0.68). Knowledge of type 2 diabetes was fair, with a mean score of 10.28 out of 15 (SD = 2.31). Social media exposure to health information was also moderate at 3.49 (SD = 0.57). Participants demonstrated relatively good health literacy (M = 3.68, SD = 0.53) and self-efficacy (M = 2.91, SD = 0.51). The average BMI was 22.7 kg/m² (SD = 3.9), indicating that most participants were within the normal range based on WHO Asia-Pacific classifications.

Table 3 shows that T2DM prevention behavior was positively and significantly correlated with self-efficacy (r = 0.44), health literacy (r = 0.40), social media exposure (r = 0.35), diabetes knowledge (r = 0.28), and negatively correlated with perceived stress (r = –0.32). BMI showed a weak but statistically significant negative correlation with T2DM prevention behavior (r = –0.11). This correlation is considered weak because, in behavioral and health sciences, correlation coefficients closer to zero (typically |r| < 0.20) represent small or minimal associations. In practical terms, a weak negative correlation means that as BMI increases, T2DM prevention behaviors tend to decrease slightly, but the strength of this relationship is modest. These findings suggest that higher self-efficacy, better health literacy, greater exposure to health information on social media, and higher diabetes knowledge are associated with stronger engagement in preventive behaviors, while higher stress and BMI are associated with lower engagement.

This model indicates a good overall fit between the hypothesized structure and the observed data, with all key indices (RMSEA, CFI, TLI, SRMR) meeting recommended thresholds. Although the chi-square test is statistically significant, this is common in large samples and does not by itself indicate poor fit. The combination of low RMSEA, high CFI/TLI, and low SRMR supports the adequacy of the model for explaining T2DM prevention behavior among the participants (Table 4).

The path analysis results indicate that stress has a significant negative effect on T2DM prevention behavior (β = -0.23, 95% CI: -0.367 to -0.093, p = 0.002), while knowledge, social media exposure, health literacy, and self-efficacy show significant positive effects. Among these, self-efficacy has the strongest direct effect (β = 0.31, 95% CI: 0.212 to 0.408, p < 0.001). The indirect effects also support the mediating role of self-efficacy between stress and prevention behavior (β = -0.08), and of health literacy between both knowledge (β = 0.10) and social media exposure (β = 0.07) and T2DM prevention behavior, all statistically significant (Table 5). Visualization of indirect and direct effect also provided in Figure 1.

Discussion

The aim of this study was to understand both the direct and indirect effects of psychosocial measures (e.g., self-efficacy, health literacy, knowledge, stress, and perceived effects of social media exposure) and informational measures on prevention behaviors associated with type 2 diabetes mellitus (T2DM) among young individuals. The findings showed that these predictors have a significantly predictive role on the preventive behavior alone or through the mediatory process.

Self-efficacy emerged as the most powerful predictor of all, consistent with Bandura's (2004) Social Cognitive Theory concept of self-belief as a crucial factor in behaviour change. Self-efficacy not only had a significant direct effect on T2DM prevention behavior, but also mediated the association between stress and behavior. This concept is indicative of the fact that those who have the strongest belief about their capability to engage in healthy behaviors, would be more resilient in the face of stress and be more likely to sustain long-term preventive actions. Previous studies have highlighted that self-efficacy is important for overcoming barriers, maintaining a change in lifestyle, and managing chronic diseases (Chen et al., 2022; Hagger et al., 2018; Schunk & DiBenedetto, 2020).

Health literacy was also another important predictor affecting directly and indirectly T2DM prevention. It was a mediator of the effects of diabetes knowledge and social media exposure, highlighting the role of the ability to understand and utilize health information in promoting behavior

change. Health literacy allows people to make choices, access and use health information, and engage in prevention of health (Nutbeam, 2000; Sørensen et al., 2012). Increased health literacy is associated with better diet behavioural and greater physical activity levels among young adults (Bae & Yoon, 2021; Osborne et al., 2013), thus attesting to the importance of this factor in this population.

Both direct and indirect effect of stress on preventive behavior were negative, which was mediated by self-efficacy. These results are consistent with the previous literature that described the relationship between higher stress and lower motivation (Baumeister et al., 2018), reduced self-regulation (Laurence & Kim, 2021), and more maladaptive strategy use such as emotional eating and more sedentary activities (Jafaru et al., 2022). In college students, academic and social stressors frequently interfere with their ability to execute long-term preventive strategis (Kim et al., 2022; Lee & Lim, 2022)

Of the media exposure, when mediated by high health literacy, media exposure had the moderate positive effect on T2DM prevention behavior. This indicates that, though digital media platforms are effective tools for health promotion, the potential effects of these tools are contingent at the level of user ability to critically evaluate information in the media. Social media has become one of the most popular channels that has influenced health attitudes and behaviors among youth (Salciccia et al., 2021; Sun et al., 2022). While such platforms can help increase awareness and change behaviors, the potential for misinformation is always present. Thus, health literacy is necessary to ensure young people interpret information correctly and use it properly (Bode & Vraga, 2021).

Notably, preventive behavior had a weak negative association with BMI. Although BMI is commonly used as an indicator of nutritional and health status, our results suggest that psychosocial and cognitive determinants exert a much stronger influence on preventive behaviors than BMI alone, particularly among young adults. This aligns with studies showing that BMI is often a poor standalone predictor of health behavior, as young individuals may not perceive elevated BMI as an immediate health threat (Friedman et al., 2025). Other studies similarly report that the relationship between BMI and preventive practices, including diet modification, exercise, and glucose monitoring tends to be weak or inconsistent in younger populations, partly because health behaviors are driven more by social norms, motivation, and digital influence than by clinical risk indicators (Bodega et al., 2023; Rounsefell et al., 2020). However, some individuals may use their awareness of weight and its long-term consequences as a motivator for behavior change (Asril et al., 2020). These findings support the interpretation that while nutritional status is relevant, behavioral intentions and psychological factors remain the dominant drivers of T2DM preventive behavior among youth.

T2DM knowledge was positively associated with preventive behavior in this study. Although knowledge alone does not automatically lead to behavioral change, it provides the essential cognitive foundation for recognizing personal susceptibility, evaluating the seriousness of diabetes, and understanding the rationale behind lifestyle modification (Liu et al., 2022; Tietjen et al., 2021; Widayanti et al., 2020). Individuals with higher diabetes-related knowledge are better equipped to identify early warning signs, interpret risk information, and appreciate the long-term benefits of preventive actions (Chu et al., 2023). However, knowledge must be accompanied by the skills to access, appraise, and apply health information in daily decision-making. When supported by stronger health literacy, diabetes knowledge is more likely to be translated into meaningful and sustained preventive behaviors, such as healthier dietary choices, regular physical activity, and proactive health monitoring (Banerjee et al., 2020). This interaction is consistent with evidence showing that knowledge becomes behaviourally impactful only when individuals possess adequate functional and critical health literacy, enabling them to convert understanding into actionable strategies for risk reduction.

These findings have important implications for public health strategies aimed at strengthening diabetes prevention among young people. The prominent role of self-efficacy highlights the need for interventions that actively build confidence through skill-development activities, personalized feedback, and realistic goal-setting. Such approaches can empower youth to adopt and sustain healthier lifestyle behaviors over time. Health literacy also emerged as a critical determinant and should be integrated into health education programs and community-based initiatives. Enhancing young people's ability to locate, interpret, and apply health information is essential, particularly in an era where digital content is abundant but varies widely in quality. Strengthening health literacy can help ensure that youth make informed choices based on credible information rather than misinformation commonly encountered online. The negative influence of stress underscores the importance of incorporating emotional well-being into preventive health efforts. Embedding stress-management strategies, mindfulness practices, and improved access to mental health support within educational settings may improve students' capacity to engage in health-promoting behaviors. Finally, social media, when paired with adequate health literacy, can serve as a valuable channel for health promotion. Curated, culturally relevant, and youth-friendly content delivered through platforms such as TikTok and Instagram has the potential to reach large audiences and positively shape health beliefs and behaviors. Leveraging these platforms thoughtfully could enhance the effectiveness of diabetes

prevention initiatives targeting young populations.

Limitations

This study is not without its own limitations. The cross-sectional design of this study precluded drawing conclusions about causality. Longitudinal or intervention studies are required to establish the directionality of these associations. Secondly, information was self-reported, which may have led to recall and social desirability biases. Objective behavior-based or biometric measures would fortify future work.

Furthermore, the sample was largely comprised of health-related department students, and could be narrow in ecological validity to non-health major students or other subgroups. Additional exploration is needed with more heterogeneous and community-based samples. Finally, although indirect effects were statistically significant, confidence intervals were not bootstrapped, which may inflate those values. On this, findings would be more conclusive using structural equation modelling at a larger sample with more sophisticated estimation strategies.

Conclusions

This research adds to an expanding literature on psychosocial and information predictors of type 2 diabetes prevention behavior in young people. Self-efficacy, health literacy, and stress were important; they had a direct and indirect impact on behavior. Intervention focus on psychological empowerment, health education and digital intervention, and developing a pathway to success while addressing the health literacy gap. The findings related to mediation roles of self-efficacy and health literacy suggest the need for multifactorial interventions to be developed in the direction of psychological empowerment in conjunction with health education and use of a digital screening tool. With lifestyle-related diseases increasing in younger age groups, this drives home the urgency of giving young people the tools, abilities, and confidence to make healthy decisions that stick.

Declaration of Interest

No authors have declared a conflict of interest.

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Author Contributions

Nina was responsible for coming up with the idea for the study, creating its layout, coordinating its data collecting, and penning its initial paper. Data analysis and interpretation were both done by Achmad Lukman Hakim. Hidayani helped write the discussion part and added to the literature review. Methodological advice and text critiques were offered by Tukimin bin Sansuwito. The final version was reviewed and approved by all writers.

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Comparison of the accuracy of two wound classification systems for diabetic foot ulcer healing

Kharisma Pratama[1], Suyanto Suyanto[2], Wida Kuswida Bhakti[1], Suriadi Jais[1*]

[1] Institut Teknologi dan Kesehatan Muhammadiyah Kalimantan Barat, Indonesia
[2] Politeknik Kesehatan Kemenkes Surakarta, Indonesia

Abstract

Background: Diabetic foot ulcers (DFUs) remain a significant clinical challenge, requiring precise classification systems to aid prognosis and treatment planning. The Wagner classification is widely used but offers limited detail on specific wound characteristics, while the SHID (Suriadi, Haryanto, Imran, Defa) system provides a more comprehensive evaluation but lacks validation.
Purpose: This study was designed to evaluate and compare the predictive validity of the Wagner and SHID classification systems in forecasting DFU healing outcomes.
Methods: A prospective cohort study was conducted at Kitamura Clinic and Doctor Soedarso Pontianak Hospital between August 2021 and July 2022, involving 89 DFU patients. Both systems were evaluated based on sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and likelihood ratios. Predictive validity was determined using receiver operating characteristic (ROC) curve analysis and the Youden index.
Results: A cut-off grade of >2 provided optimal predictive value for both systems. The SHID classification demonstrated a sensitivity of 92%, specificity of 62%, PPV of 27.5%, and NPV of 98%, while the Wagner classification showed a sensitivity of 58%, specificity of 77%, PPV of 28%, and NPV of 92.2%. Positive likelihood ratios were 2.4 for SHID and 2.5 for Wagner. ROC analysis yielded an area under the curve (AUC) of 0.786 (95% CI: 0.69–0.87) for SHID and 0.703 (95% CI: 0.60–0.80) for Wagner. The Youden index was higher for SHID (0.540) compared to Wagner (0.349).
Conclusion: Although both systems are effective for predicting DFU healing within 12 weeks, SHID's superior AUC and Youden index suggest greater clinical utility in screening and managing DFUs.

Keywords: diabetic foot ulcer; sensitivity, specificity, wound classification, wound healing prediction

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Corresponding author

Suriadi Jais*
Professor, Department of Medical and Surgical Nursing, Magister Nursing Program, Institut Teknologi dan Kesehatan Muhammadiyah Kalimantan Barat, Indonesia; Address: Kampus ITEKES Muhammadiyah Kalimantan Barat, Jalan Sungai Raya Dalam, Gg. Ceria V, No. 10, Kubu Raya, Kalimantan Barat, Indonesia, 78391; Phone: +62 812-1949-9500, E-mail: suriadif@yahoo.com.au

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Introduction

In a number of nations, including Indonesia, diabetes is one of the diseases with the highest prevalence. According to the International Diabetes Federation (IDF), Indonesia ranks fifth in terms of the number of diabetes patients. There are 19.5 million Indonesians between the ages of 20 and 79 who suffer from this ilness (Magliano et al., 2021). The IDF also predicts that Indonesia will maintain its fifth-place ranking in 2045. In fact, diabetes cases in Indonesia will reach 28.6 million or increase by 46.6% (Magliano et al., 2021). DFU is one of the complications associated with diabetes.

In Indonesia, the incidence of DFU is quite high at 48.6%, while the incidence of wound recurrence is 51.4% (Jais et al., 2022). DFU are a common and highly abnormal complication of long-term and inadequately treated diabetes. Approximately 19% to 34% of the estimated 537 million diabetics worldwide will develop DFU in their lifetime. 20% of individuals with DFU require a lower extremity amputation, either minor (below the ankle), major (above the ankle), or both and 10% will die within one year of

their initial DFU diagnosis (McDermott et al., 2023). Therefore, the implementation of DFU prevention strategies that can develop even worse is very important, and will likely contribute to reducing the burden on national health services.

Diabetes-related foot ulcers are non-healing wounds on the epidermis of the feet of diabetics. There are a number of factors that can affect the outcome of a DFU, including healing time and the danger of lower extremity amputation (Kaminski et al., 2022; Kawuryan, 2018). Wound classification systems are useful tools to support clinical judgement, aid effective communication between healthcare professionals, assist triage of referrals to timely specialist services and to guide clinical decision-making and prognosis in certain situations, and support clinical auditing and benchmarking (Kaminski et al., 2022). A number of review articles on DFU classification systems, including Wagner and SHID, have been published. A DFU classification system intended to provide a risk assessment or prognosis for an individual patient will require more detailed information and evaluation compared with a DFU classification system designed for the comparison of outcomes between populations, the latter which would ideally be simple, quick and require no specialised equipment (Kaminski et al., 2022).

Wagner is a commonly used classification (Oyibo et al., 2001), while SHID is a new Indonesian classification. Unfortunately, in Indonesia, the reliability assessment of the Wagner scale is fair to substantial, with inter-rater reliability study demonstrating a kappa coefficient (κ=0.43 - 0.77) in comparison to the SHID scale, which exhibits a higher kappa coefficient of [κ]=0.81 -1.00 (Suriadi et al., 2016). Other (Suriadi et al., 2016) studies have also reported that the classification of Wagner wounds demonstrates moderate reliability in the inter-observer agreement between the initial evaluation and the reevaluation for the Wagner classification (Kappa = 0.55; 95% CI: 0.507–0.593) (Bravo-Molina et al., 2018), as well as Krippendorff's α agreement between observers α of Wagner = 0.374 (Alahakoon et al., 2023). Subsequently, in the validity assessments reported in various studies, sensitivity values were observed to fluctuate between 0.75 and 0.88, whereas specificity values ranged from 0.71 to 0.94 (Chuan et al., 2015; Gunawan et al., 2024; Jais et al., 2022; Jeon et al., 2017).

The sensitivity and specificity values for the Wagner classification of wounds are generally favorable. However, due to the comparatively low reliability observed when assessed against the SHID in previous studies, there is a critical need to conduct validity studies on both classification systems. Despite the existence of various wound classification systems, none has been recognized as a definitive gold standard. Empirical studies have demonstrated that the sensitivity and specificity of these assessments can be reliably determined to an adequate level, even in the absence of an established gold-standard reference test (Habibzadeh, 2023; Lim, 2021). The aim of this study was to evaluate the predictive validity of the Wagner and Shid classifications in relation to wound healing outcomes in patients with diabetic wounds.

Materials and Methods

Design

The present study employed a prospective cohort design. This method facilitates the longitudinal examination of diabetic foot ulcers by tracking patients from the initial assessment. It facilitates the implementation of the Wagner and SHID classifications at baseline and the subsequent comparison of these scores with wound-healing outcomes obtained throughout the 12-week follow-up period. This methodology guarantees immediate data acquisition, diminishes recollection bias, and offers a more precise evaluation of the predictive validity of competing categorization systems.

Setting and sample

This study conducted at Kitamura Clinic and Wound Clinic Doctor Soedarso Pontianak Hospital from August 2021 to July 2022. A purposive sampling technique was used in this study. This study involved the participation of two nurses who have certifications in wound care. They were graduates of a nursing degree and had more than one year of experience in wound care. Each of them, one nurse was an employee at the wound clinic of the hospital, and one nurse was an employee at Kitamura Clinic.

The inclusion criteria for the samples consist of individuals diagnosed with DFUs, encompassing both new and recurrent ulcers. There is no age restriction for the participants, and the selection is not limited to badly infected wounds or DFU with complications, patients without complications such as kidney or heart failure, stroke, and others or those who are unable to perform activities. Additionally, the study includes patients who are receiving outpatient treatment. Respondents were recruited through a simple stepwise process. All patients presenting with diabetic foot ulcers at both clinical settings were initially screened by research assistants. Those meeting the inclusion criteria were identified through medical records and initial clinical assessment. Eligible patients were then approached during their visit, informed about the study, and invited to participate. Individuals who agreed provided written consent, after which baseline assessments were completed, and participants were followed weekly for 12 weeks.

Instruments

This study utilized several instruments for data collection, including the Wagner (Shah et al., 2022) and SHID (Jais et al., 2022) wound classification systems. Additionally, vascular Doppler, blood pressure measurement, and a monofilament test were employed. Demographic information was

Table 1. Characteristic of participants

Variables	
Gender n (%)	
Male	42 (47.2)
Female	47 (52.8)
Age, mean (SD)	56.6 (9.7)
Education	
Elementary school	13 (14.6)
Yunior high school	5 (5.6)
Senior high school	50 (56.2)
Higher education	21 (23.6)
Smoking n (%)	
Smoke	12 (13.5)
No smoke	77 (86.5)
Healing time n (%)	
≤ 12 weeks	77 (86.5)
> 12 weeks	12 (13.5)
Mean DMIST score, mean (SD)	6.7 (2.4)
Blood pressure , mean (SD)	
Systole	136.5 (17.4)
Diastole	86 (6.9)
HbA1c, median (min-max)	8.5 (6.1 – 15.2)
Neuropathic n (%)	
Positive	20 (22.5)
Negative	67 (77.5)
Ankle Brachial Index, median (min-max)	1 (0.7 – 1.6)
Wound site	
Forefoot	43 (48.3)
Midfoot	26 (29.2)
Hindfoot	6 (6.8)
Malleolus	1 (1.1)
Above malleolus	13 (14.6)

Note : SD, standard deviation, min-max (minimum – maximum)

Table 2.The sensitivity and specificity for score of the SHID

Criterion	Sensitivity	Specificity	+LR	-LR	+PV	-PV
≥1	100	0	1		13.5	
>1	100	31	1.5	0	18.5	100
>2	92	62	2.4	0.1	27.5	98
>3	33	88	2.9	0.8	30.8	89.5
>4	8	94	1.3	1	16.7	86.7
>5	0	99	0	1	0	86.4
>6	0	100		1		86.5

gathered using a questionnaire form and DMIST tool.

DMIST is a diabetic foot ulcer assessment scale was created based on seven distinct domains: depth, maceration, inflammation/infection, size, the type of tissue present in the wound bed, characteristics of the wound edge, and tunneling/undermining (Oe et al., 2020). This assessment tool is referred to as DMIST, which is an acronym representing the seven domains. The DMIST scale functions as a

Table 3.The sensitivity and specificity for score of the Wagner

Criterion	Sensitivity	Specificity	+LR	-LR	+PV	-PV
≥1	100	0	1		13.5	
>1	100	21	1.3	0	16.4	100
>2	58	77	2.5	0.5	28	92.2
>3	0	95	0	1	0	85.9
>4	0	100		1		86.5

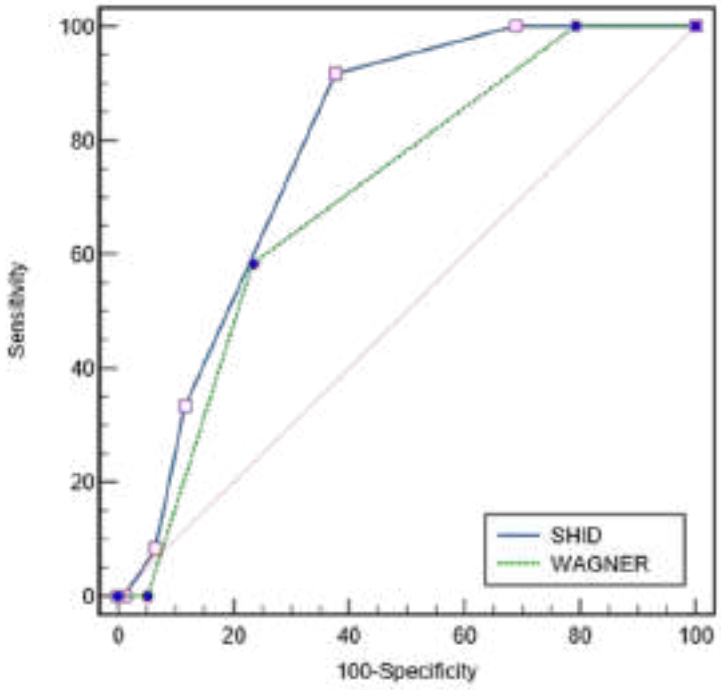

Figure 1. The receiver operator characteristic curve of the SHID and Wagner for wound healing within ≤ 12 and > 12 weeks follow-up (n 89). SHID : AUCs were 0.786 (95% CI: 0.69 – 0.87) and Wagner, the AUCs were 0.703 (95% CI: 0.60–0.80). Youden index was 0.540 for SHID and 0.349 for Wagner.

summative rating scale comprising seven subscale scores that range from 0 to 9 (with only one subscale reaching a score of 9). The overall scores can vary from 0 to 34, with higher scores indicating a poorer prognosis for wound healing.

Data collection

The data collection process was carried out by two research assistants who conducted wound assessments utilizing classification systems upon the patients' admission to the clinic and the polyclinic. In addition, they measured the ankle-brachial index (ABI) with a handheld vascular Doppler, assessed blood pressure, evaluated HbA1c levels, and determined neuropathy status through the monofilament test, while also collecting demographic information from the patients. The research assistants performed weekly follow-ups throughout the recovery process, assessing wound progress using the DMIST tool. Patients were observed for a duration of up to 12 weeks or until clinical assessment confirmed wound healing.

Data analysis

Descriptive statistics described patient characteristics. In order to assess the precision of the two wound classification systems, diagnostic probabilities (specifically sensitivity and specificity) were computed over the spectrum of scores generated by the respective instruments. To assess predictive validity, we analyzed the accuracy of the Wagner and SHID wound classifications. The diagnostic probabilities, including sensitivity, specificity, PPV, NPV, PLR, and negative predictive value (NLR), were computed across the spectrum of Wagner and SHID classification scores (Lim, 2021; Šimundić, 2009; Trevethan, 2017).

Sensitivity is defined as the proportion of individuals diagnosed with the target condition who yield a positive test result, specifically, the percentage

of patients exhibiting wound healing within a 12-week timeframe whose scores fall below or equal to the established cut-off. In contrast, specificity refers to the proportion of individuals without the target condition who present a negative test result, denoting the percentage of patients whose scores are equal to or exceed the cut-off threshold. Positive Predictive Value is the proportion of patients who test positive and indeed have the target condition, represented as the percentage of patients with scores below or equal to the cut-off who experience wound healing within 12 weeks. Conversely, NPV indicates the proportion of patients with a negative test result who do not possess the target condition, quantified as the percentage of those with scores above the cut-off who do not achieve wound healing within the same 12-week period.

According to Suriadi et al., (2008), the likelihood ratio is calculated as the sensitivity divided by 1 - specificity, indicating the ratio of probabilities that a positive test result occurs in a patient with wound healing within 12 weeks compared to a patient without such healing in that timeframe. For both patients with and without wound healing occurring within 12 weeks, the Wagner and SHID wound classification scores were ascertained during the initial assessment.

The Receiver Operating Characteristic curve serves as a graphical depiction of sensitivity (true positives) plotted on the y-axis against one minus specificity (false positives) on the x-axis across all potential cut-off scores for a given test. Consequently, the ROC curve illustrates the balance between the true positive rate and the false positive rate for every possible dichotomous cut-off score pertaining to the test. The Area Under the Curve of the ROC is computed to evaluate the overall validity of the wound classification system. AUC is recognized as a summary statistic of the ROC, with higher AUC values indicative of more precise tests. An AUC of 0.5 denotes a lack of diagnostic capability in predicting outcomes. The ROC method represents one approach to validating diagnostic tools and is extensively used for the standardization of medical diagnoses, decision-making criteria, as well as the development and calibration of questionnaires or evaluation tools (Lim, 2021; Šimundić, 2009). Tests without diagnostic competence predict outcomes with an AUC of 0.50. MedCalc 15.8 (Ostend, Belgium) was used for all statistical analyses.

Ethical consideration

This study was conducted after the approval of the Ethics Committee at the Institute of Technology and Health Muhammadiyah Ponianak, with the assigned number: 99A//KEP/II).I/AU/D/2021. Prior to commencing the study, the researchers provided a comprehensive elucidation of the study's objectives, the methodologies employed for data acquisition, and the advantages associated with subject involvement. The participants were provided with the chance to pose inquiries and were given the assurance that they had the option to discontinue their involvement in the study at any given point. The confidentiality of their personal information was maintained.

Results

Characteristic of participants

There were 89 DFU patients that enrolled. Table 1 depicts the characteristics of the patients. The mean (SD) age was 56.6 (9.7) years, with 47.2% of patients male and 52.8% female. Elementary school had 14.6%, junior high had 5.6%, senior high had 56.2%, and higher education had 23.6%. 86.5% of patients did not smoke, whereas 13.5% did. The wound healing time at 12 weeks was 86.5%, with 13.5% taking longer. The mean (SD) DMIST score was 6.7 (2.4), systolic blood pressure was 136.5 (17.4), and the diastolic blood pressure was 86 (6.9). The median of HbA1c was 8.5 (6.1 - 15.2), while ABI was 1 (0.7 - 1.6). Neuropathy affected 22.5% of patients, whereas 77.5% did not. The wound regions were 48.3% in the forefoot, 29.2% in the midfoot, 6.8 in the hindfoot, 1.1% in the malleolus, and 14.6% above the malleolus.

Predictive validity

The sensitivities, specificities, PPV, NPV, and LR were calculated for the SHID and Wagner scores and ranged from 1- 6 and 1- 5 respectively. The predictive validity test indicated that a SHID and Wagner cutoff score of >2 produced the best sensitivity, specificity, PPV, and NPV (92%, 62%, 27.5%, and 98%) and (58%, 77%, 28% and 92.2% respectively). Then The SHID was found to be a small to moderate diagnostic tool with a PLR of 2.4 and Wagner 2.5 . In Figure 1, sensitivity was plotted vs. 1-specificity for each possible score of the SHID to generate the ROC; the AUC was 0.786 (95% CI: 0.69 – 0.87) and for Wagner, the AUCs were 0.703 (95% CI: 0.60–0.80, respectively. Then youden index was 0.540 for SHID and 0.349 for Wagner.

Discussion

The SHID and Wagner were found to be a viable instrument for assessing DFUs in this study, and it can predict wound healing time of 12 and > 12 weeks. The comparison of SHID and Wagner revealed that SHID produced high sensitivity and specificity. The SHID is the new assessment tool developed specifically to assess DFU classification and developed in 2021 (Suriadi, 2021). According to a research conducted by Jais et al. (2022), the predictive validity test revealed that the cut-off score of ≤ grade 2 for SHID shown a sensitivity and specificity of 74% and 97% respectively. Similarly, the cut-off score of ≤ grade IB for TU showed a sensitivity and specificity of 77% and 92% respectively. Furthermore, the cut-off score of ≤ grade 2 for Wagner exhibited a sensitivity of 84% and a specificity of 71%. Our analysis remains

consistent with the prior study on SHID wound categorization, as described, however it contradicts the findings of the Wagner study (Jais et al., 2022).

The SHID was highly sensitive for a cutoff score of > 2 in our investigation, but it had low specificity and positive predictive value, implying a significant false-positive rate. This finding suggests people who are not at risk of developing infection complications may benefit from preventative care. For Wagner results demonstrate that a cutoff score of > 2, with a sensitivity of 0.58 and specificity of 0.77. This means that 58% of the clinical sample was correctly identified as having wound healing time ≤ 12 weeks, even across a diverse clinical sample, while 42% were missed and not identified as belonging to the clinical group when they should have been. Almost all typically developing individuals (77 %) were correctly identified as not having wound healing time ≤ 12 weeks, and only 23 % were identified as having wound healing time ≤ 12 weeks when they actually did not because their score fell below the cutoff of > 2.

In a comparison of various scoring systems conducted at Cheonan Hospital in Korea involving 137 patients, the Wagner score demonstrated a sensitivity of 75% and specificity of 66%. Among the scoring systems evaluated, the Wagner scoring system yielded the most predictive results (Jeon et al., 2017). Its simplicity is one of its key advantages when compared to other scoring systems; however, it does not provide specific assessments related to infection, vascularization, and neuropathy in diabetic foot ulcers. Additionally, another study found that the Wagner score had a sensitivity of 77.2% and a specificity of 80% (Gunawan et al., 2024). Although both studies mentioned above demonstrate reasonable sensitivity and specificity values, their study cannot be directly compared to our study, as both utilized a retrospective design and employed wound assessment through photographs without obtaining direct data from patients during the evaluation process. There are significant limitations when assessing the actual condition of wounds using photography, as factors such as wound depth, the presence of tunneling and undermining, and other signs may not be clearly observed (Mohafez et al., 2016).

Upon examination of the Area Under the Curve (AUC) values for both the Wagner and SHID wound classifications, which fall within the range of 0.70 to 0.80, it can be concluded that both classifications are considered acceptable (Mandrekar, 2010; White et al., 2023). Similarly, the positive likelihood ratios for both the Wagner and SHID classifications are identical, further supporting their comparability.

Nevertheless, an analysis of the Youden index indicates that SHID presents a superior value of 0.540, compared to Wagner's value of 0.349. This finding suggests that SHID demonstrates an acceptable and balanced performance in terms of both sensitivity and specificity (Xu et al., 2014). The Youden Index assigns equal importance to sensitivity and specificity (Schisterman et al., 2008). Additionally, our study found that the AUC of the SHID was greater than 0.75, suggesting it is effective in predicting wound healing times of 12 weeks or less and more than 12 weeks (Cho et al., 2020; Jais et al., 2024).

Limitation of the study

One primary limitation of the research conducted in this study is to the very limited size of the sample. Furthermore, it is imperative to conduct a multicenter studies in order to establish the generalizability of the findings.

Implication of study

The results of this study have immediate implications for nursing practice. The SHID classification, noted for its superior predictive accuracy, gives nurses with a practical instrument for evaluating diabetic foot ulcers, prioritizing at-risk patients, and directing appropriate therapies to prevent complications. Its application can improve the quality of nurse assessments, facilitate clinical decision-making, and improve communication among multidisciplinary teams. These findings underscore the necessity for ongoing nursing education and future research to assess the wider implementation of SHID in enhancing patient outcomes.

Conclusions

The results of this study corroborate the hypothesis that both the SHID and Wagner wound classification systems can be effective for assessing DFU grades in clinical environments. Specifically, our analysis of the AUC and Youden index indicates that the SHID demonstrates moderate accuracy in differentiating between wound healing times of 12 weeks or less and those exceeding 12 weeks. By accurately identifying wound healing durations in patients with DFU using the SHID, there is potential to reduce the risk of underdiagnosis, thereby facilitating timely interventions to prevent complications and ultimately enhance patient outcomes.

Declaration of Interest

The authors report no competing interests.

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Data Availability

The datasets generated and analyzed during this study are available from the corresponding author upon reasonable request.

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Factors associated with stage of behavior change and willingness to quit smoking among people living with HIV In Taiwan

Linlin Lindayani[1*], Yiin-Lai, MS[2], Wen-Chien Ko[3], Jung-Der Wang[4], Nai-Ying Ko[2,5]

[1] Department of Nursing, Sekolah Tinggi Ilmu Keperawatan PPNI Jawa Barat, West Java, Indonesia.
[2] Department of Nursing, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Tainan, Taiwan
[3] Departement of Internal Medicine, College of Medicine, National Cheng Kung University, National Cheng Kung University Hospital Tainan, Taiwan.
[4] Department of Public Health, College of Medicine, National Cheng Kung University, Tainan, Taiwan.
[5] Department of Nursing, College of Medicine, National Cheng Kung University, Tainan, Taiwan

Abstract

Background: The prevalence of smoking among people living with HIV is double than general population. There is no specific guideline for smoking cessation in this population thus many of HIV-smoker receive unproven treatment that led to low adherence and high relapse.
Purpose: The aim of this study was to identify the stage of behavior change and willingness to quit smoking, and to determine their associated factors among people living with HIV.
Methods: A cross-sectional design was conducted at an HIV/AIDS hospital in southern Taiwan. of 423 people living with HIV, the mean age was 37.43 (SD=10.99) years and 97.9% were male.
Results: About 33.9% were a current smoker, 22.9% were in pre-contemplation stage, and 33.3% willing to quit smoking. Age, education, CD4 cell counts, viral load, having diabetic and hepatitis B, and exposure to smoking cessation information were associated with stage of behavior change. Smoking 2-3 times a month (aOR=9.33, 95%CI= 1.45-60.2) and having heard about smoking cessation were significant predictors for willingness to quit smoking (aOR= 3.67, 95 CI= 3.67-9.06).
Conclusion: Our findings suggest to design an intervention according to HIV-smoker stage of behavior change for successful smoking cessation. Additionally, it is important to address patients' clinical conditions including smoking frequency and exposure to information related to smoking cessation.

Keywords: HIV; readiness; smoking; smoking cessation; stage of change; willingness

Introduction

Smoking remains a major public health concern worldwide and represents an even more significant burden among people living with HIV (PLWH). A systematic review and meta-analysis demonstrated that the prevalence of smoking among PLWH is substantially higher than in the general population, driven by biological, behavioral, and structural determinants (Hoang et al., 2024). This elevated prevalence has been consistently reported across regions. A global analysis of PLWH receiving antiretroviral therapy (ART) found persistently high rates of active smoking, highlighting a widespread unmet need for cessation support (Ale et al., 2021). Consistent with global findings, earlier meta-analytic evidence also confirmed high smoking prevalence among HIV-positive populations (Lindayani et al., 2019).

International cohort studies further corroborate these observations.

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Corresponding author

Linlin Lindayani*
Department of Nursing, Sekolah Tinggi Ilmu Keperawatan PPNI Jawa Barat, Indonesia; Address: Jln Muhammad No.34 Bandung, West Java, Indonesia; Phone: (022) 6121914; E-mail: linlinlin-dayani@gmail.com

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PLWH continue to smoke at higher rates than the general population, as demonstrated in large Italian cohorts and African population studies, where nicotine dependence was common and cessation uptake remained low (De Socio et al., 2020; Egbe et al., 2019). In the United States, national data from 1999–2016 similarly showed persistently higher smoking prevalence among PLWH, suggesting entrenched behavioral patterns and insufficient cessation infrastructure (Asfar et al., 2021).

The health consequences of smoking among PLWH are profound. Recent longitudinal evidence from the STOPSHIV cohort demonstrated that smoking significantly increases the risk of cardiovascular disease, cancer, and all-cause mortality in this population (De Socio et al., 2025). These findings reinforce earlier reports indicating amplified morbidity and mortality risks among PLWH who continue to smoke. Despite these risks, cessation outcomes remain suboptimal. Even structured programs often yield limited success, with studies from Italy and the United States showing low adherence, frequent relapse, and minimal long-term abstinence following cessation interventions among PLWH (De Socio et al., 2020; Triant et al., 2020).

The Transtheoretical Model (TTM) is a widely used framework for guiding smoking cessation interventions. However, PLWH often face unique psychosocial and structural barriers that impede progression through the stages of change. A recent systematic review highlighted that stress, stigma, depression, socioeconomic instability, and substance use frequently limit readiness to quit among PLWH (Hoang et al., 2024). Other regional studies echo these findings, suggesting that many PLWH remain in early stages such as precontemplation or contemplation (Egbe et al., 2019; Mdege et al., 2021). Factors such as low socioeconomic status, limited access to cessation resources, mental health challenges, and lack of awareness of cessation services have also been linked to lower willingness to quit smoking among PLWH (Mdege et al., 2021).

Despite a growing body of literature, very few studies have examined the stage of behavior change and willingness to quit smoking specifically among HIV populations in Asia, and almost none have explored this issue in Taiwan. Smoking patterns, cultural norms, healthcare accessibility, and the structure of HIV care in Taiwan differ substantially from those in Western countries where most prior studies have been conducted. Consequently, existing evidence may not accurately capture the behavioral readiness, motivational dynamics, or sociocultural barriers experienced by Taiwanese people living with HIV. To date, no study in Taiwan has simultaneously assessed both the stage of behavior change and willingness to quit smoking, and the factors associated with these two critical outcomes remain largely unknown. The absence of such context-specific data limits the ability to design culturally adapted and readiness-based smoking cessation interventions that are responsive to the needs of HIV smokers in Taiwan. Given these gaps, the present study is necessary to identify the stage of behavior change and willingness to quit smoking and to determine their associated factors among people living with HIV in Taiwan. Such evidence is essential for informing targeted, stage-appropriate cessation strategies that can be effectively integrated into the Taiwanese HIV care system.

Materials and Methods

Study design and sample

This study was conducted using a cross-sectional design at outpatient clinic of an AIDS hospital, a university-affiliated hospital in southern Taiwan. This hospital has over 20 years of experience in caring for more than 2,281 people living with HIV. In 2018, the proportion of transmission routes, gender ratio, and age is similar to the 30,625 HIV diagnosed cases reported to the Taiwan Centers for Disease Control. The inclusion criteria for eligibility were an HIV-positive person and aged ≥ 18 years old. Pregnant women with HIV were excluded from this study. A convenience sampling was used to select a participant.

Measures

Smoking Status

Smoking status was assessed using self-reported items regarding current smoking behavior. Participants were asked whether they currently smoked, whether they had smoked previously, the number of cigarettes consumed per day, and the frequency of smoking. The frequency of smoking was operationally defined based on participants' self-reported smoking behavior and categorized into six levels to reflect the regularity of cigarette consumption. "Never" indicated that the individual did not smoke at any time during the assessment period. "More than once" referred to smoking that occurred on more than one occasion but not frequently enough to be classified under monthly or weekly patterns. "Once a month or less" described individuals who smoked once per month or less. "Two to four times a month" represented intermittent but more regular smoking within the monthly range. "Two to three times a week" referred to smoking that occurred on a weekly basis, and "four times or more a week" indicated smoking behavior occurring at least four times per week, reflecting the highest frequency category. This classification provides a standardized framework for describing smoking behavior and aligns with commonly used epidemiological measures in tobacco research.

Although smoking status was self-reported, prior research has demonstrated that self-reported smoking behavior is generally reliable and shows substantial agreement with biochemical verification in both general and HIV populations, with reported sensitivity ranging from 85% to 93% and specificity

from 85% to 97% (Gorber et al., 2009). Because single-item measures of smoking status do not form a multi-item construct, internal consistency reliability (e.g., Cronbach's alpha) is not applicable. However, self-reported smoking status has been shown to possess strong criterion validity when compared to cotinine assays (Benowitz et al., 2009).

Stage of Behavior Change (TTM Staging Algorithm)

The stage of behavior change was assessed using a structured set of items developed based on the Transtheoretical Model (TTM) of smoking cessation (Prochaska, 2002). The staging algorithm categorizes current and former smokers into five stages: precontemplation, contemplation, preparation, action, and maintenance. The algorithm used in this study was adapted from the validated staging questions by Etter and Perneger (1999), which have been widely applied in international smoking cessation research. Participants were asked: "Do you smoke right now?"; "Do you want to quit smoking within the next six months?"; "Do you want to quit smoking in the next 30 days?"; "Do you want to quit smoking now?"; "Did you smoke in the past six months?"; "Have you smoked any cigarettes in the past six months?"

The TTM staging algorithm has demonstrated strong construct validity, with stage classification correlating significantly with quit attempts, nicotine dependence, and cessation outcomes (Herzog et al., 1999; Prochaska & Velicer, 1997). Previous studies have also reported test–retest reliability coefficients ranging from 0.78 to 0.85, indicating stable classification across time (Etter & Perneger, 1999; de Vries et al., 2013). Because the staging algorithm assigns participants to mutually exclusive categories, internal consistency reliability is not applicable. The algorithm has shown good predictive validity in multiple studies, with higher-stage participants more likely to make quit attempts and achieve cessation (Spencer et al., 2002).

Willingness to Quit Smoking

Willingness to quit smoking was measured using closed-ended questions assessing prior exposure to cessation programs and readiness for referral. The items included: "Have you ever joined a smoking cessation program?"; "Have you ever heard about smoking cessation programs?"; "Are you willing to quit smoking?"; "Are you willing to be referred to a smoking cessation program now?"

These willingness items were developed based on behavioral intention principles within TTM and smoking cessation research. Although these questions are single-item or categorical indicators, which means internal consistency reliability cannot be calculated, previous research has demonstrated that single-item measures of willingness or intention to quit smoking possess good predictive validity, correlating strongly with future quit attempts and treatment engagement (Hyland et al., 2006; Borland et al., 2010). Prior studies have also reported acceptable test–retest reliability (κ = 0.72–0.84) for similar willingness items in smoking cessation trials (Etter & Sutton, 2002). Content validity is supported by their widespread use in smoking cessation research and their alignment with established constructs of readiness and referral intention.

Demographic and Clinical information

The demographic data and medical history were collected using an online standard form. Demographic data collected included date of birth, sex, education level, employment and marital status. Medical history included self-reported smoking status (current and former smoking), injecting drug use, HIV risk factors, family CVD history, diabetes status, under lowering blood pressure medication, and HIV co-infection (Hepatitis B & C).

The medical record review was performed by the researcher to extract data on ART and HIV-related information and the lipid profile including lipid-lowering agents. HIV-information included the date of HIV diagnosis, HIV risk factors, current CD4 cell count and a viral load including date of the test. ART-related information included current regimen, the used of Lopinavir/Abacavir, date of start for consuming those ART.

Procedure

This study was approved by the Institutional Review Board of the study hospital (ER-98-090). Written informed consent was obtained from respondent prior data collection. HIV-positive patients were identified by a case manager at the outpatient clinic and referred to the researcher. The researcher collected information on demographic and the self-reported medical history using an online standard form and the results of a physical examination for measured blood pressure, body weight, and height. A review of the medical records was done by the researcher to collect information on laboratory data, HIV, and ART-related information after the clinical consultation and the information was recorded in the online form.

Data Analysis

Mean and standard deviation (SD) were calculated for continuous data, and frequency was computed for categorical data. The demographic and clinical information were compared among different smoking status (never smoker, current smoker, and previous smoker), among different TTM stage of change (pre-contemplation, preparation, and action stage), and between those who were willingness vs. unwillingness toward referral to smoking cessation. Univariate and multivariate logistic regression were used to evaluate factors associated with stage of change and willingness toward referred to smoking cessation. A 5% significant level was used to be significant. IBM SPSS 23.0 (IBM Corporation, Armonk, New York, USA) was used to performed using statistical analyses.

Table 1. Bivariate association: stage of behavior changes by demographic, clinical, and smoking-related information among people living with HIV (N=423)

Variable	Pre-contemplation (n=97), %	Preparation (n=47), %	Action (n=84), %	Maintenance (n=195), %	p-value
Age (year) [mean ±SD]	31.91±9.37	31.95±7.95	41.17±11.26	39.90±10.99	<.001
Male	95 (97.9)	46 (97.9)	79 (94.0)	185 (94.9)	.453
Single	38 (82.6)	20 (83.3)	36 (94.7)	70 (87.5)	.371
High school above	46 (57.5)	21 (53.8)	41 (50.6)	75 (41.9)	.098
Employed	22 (73.3)	11 (50.0)	14 (60.9)	38 (67.8)	.420
Risk factor					
Heterosexual	11 (23.9)	4 (16.0)	5 (13.2)	13 (16.0)	.820
IDU	11 (23.9)	5 (20.0)	7 (18.4)	15 (18.5)	
MSM	24 (52.2)	15 (60.0)	25 (65.8)	49 (60.5)	
Unknown/others	24 (52.2)	1 (4.0)	1 (2.6)	4 (4.9)	
HIV exposure duration (year)	6.57±4.09	8.43±5.50	6.56±4.31	5.54±4.89	.073
Current CD4 cell counts (cells/mm3)	518.3±215.35	521.5±242.43	644.6±248.31	620.2±293.74	.001
Log current viral load (copies/ml)	4.50±3.03	4.23±3.00	3.23±0.94	3.83±2.29	.010
ART-used	71 (22.0)	41 (12.7)	64 (19.8)	147 (45.5)	.389
Duration receiving ART (year)	5.10±3.89	5.24±4.91	4.62±4.20	4.70±4.31	.923
BMI (kg/m2)	21.53±3.76	23.42±4.23	23.23±3.41	23.07±3.46	.002
HBV	3 (3.7)	5 (13.9)	11 (15.5)	27 (16.7)	.038
HCV	1 (1.4)	1 (3.0)	3 (4.4)	15 (9.7)	.063
Diabetic	0	2 (4.3)	9 (10.7)	10 (5.1)	.012
Current smoker	95 (66.4)	47 (32.9)	1 (0.7)	0	<.001
Frequency of smoking					
Once a month or less	0	5 (5.2)	3 (3.1)	70 (72.2)	<.001
2-3 times a month	0	6 (12.8)	6 (12.8)	30 (63.8)	
2-3 times a week	4 (4.8)	1 (1.2)	0	3 (3.6)	
Cigarette per day	7.09±7.06	8.41±10.58	10.68±9.91	10.97±8.30	.321
Previous attempts to quit	63 (35.4)	35 (19.7)	74 (41.6)	6 (3.2)	<.001
Ever hear about smoking cessation	56 (57.7)	41 (20.1)	55 (14.7)	127 (19.7)	.006
Total cholesterol	145.2±54.62	153.8±44.48	165.28±34.99	157.86±45.820	.035
Triglyceride	101.5±76.82	120.6±86.78	159.4±116.5	136.4±90.92	<.001

Results

Smoking status

A total of 423 people living with HIV agree to join this study. The mean age was 37.43 (SD=10.99) years, and 97.9% were male. The majority of them were single (87.3), employee (65.2%), and 59.7% of men who have sex with men (MSM). Above 33.9% of people living with HIV were current smoker, 20.1% former smoker, and 45.9% never smoke. Above 54.7% of current smoker had smoking cessation in the past 6 months. Current smoker more likely to having high education level, lower CD4 count, higher viral load.

Stage of behavior change and its associated factors

The overall distribution of the stages of behavior change was 22.9 % in pre-contemplation, 0.2 % in contemplation, 11.1 % in preparation, 19.8 % in action stages, and 46% in maintenance stage. The stage of behavior change was significantly associated with age, CD4 cell counts, viral load, hepatitis B co-infection, diabetic, and anthropometry

Table 2. Bivariate association: willingness status to smoking cessation by demographic, clinical, and smoking-related information among HIV-smoker (N=144)

Variable	Willing (n=48)	Unwilling (n=96)	p-value
Age (year) [mean ±SD]	31.75±8.00	31.24±8.15	.726
Male	47 (97.9)	89 (97.8)	.726
Single	20 (83.3)	35 (81.4)	.561
Above High school	22 (55.0)	42 (56.8)	.506
Employed	11 (50.0)	21 (75.0)	.188
Risk factor			
Heterosexual	4 (16.0)	10 (23.3)	.536
IDU	5 (20.0)	9 (20.9)	
MSM	15 (60.0)	24 (55.8)	
Unknown/others	1 (4.0)	0 (0)	
HIV-exposure duration (year)	8.43±5.50	6.5±3.89	.108
Current CD4 cell counts (cells/mm3)	520.4±239.9	527.6±218.01	.861
Log current viral load (copies/ml)	4.23±3.00	4.39±2.98	.778
HBV	5 (13.5)	3 (3.9)	.074
HCV	1 (1.5)	1 (2.9)	.558
ART-used	42 (97/7)	65 (97.0)	.662
Duration receiving ART (year)	5.24±4.91	4.89±3.54	.757
Frequency of smoking			
Once a month or less	2 (4.2)	1 (1.1)	.040
2-3 times a month	6 (12.5)	5 (5.5)	
2-3 times a week	6 (12.5)	3 (3.3)	
> 4 times a week	31 (64.6)	68 (74.7)	
Cigarette per day	8.41±2.56	7.13±7.23	.657
Previous attempts to quit	36 (75.0)	60 (65.9)	.183
Ever hear about smoking cessation	41 (85.4)	56 (61.5)	.004

measurements including BMI, total cholesterol and triglyceride (Table 1). In addition, stage of behavior change was associated with frequency of smoking, previous attempts quit, and ever hear about smoking cessation.

In the multivariable regression results (Table 3), age, higher education level, CD4 counts more than 500 cell/mm3, undetectable viral load, higher BMI, hepatitis B co-infection, higher numbers of quitting attempts, ever hear about smoking cessation, and hypertriglyceridemia were associated with the likelihood of being at a more advanced stage of behavior change ($p < 0.05$). The odds of being at the preparation stage and action stage versus the pre-contemplation stage for having diabetic (OR = 9.17, 95 % CI = 0.19-14.33 and OR=3.34, 95%CI=1.32-8.69, respectively). The same path of the odds ratio (OR) was examined by comparing respondents in the stage of action versus the stage of pre - contemplation: the odds of undetectable viral load were three times of those with detectable viral (OR = 3.11, 95 % CI = 1.35-7.15). Subject who had higher education and previous attempts to quit were more likely to be in a maintenance stage.

Willingness to quit smoking cessation and its associated factors

Among 144 of HIV- smoker, one third were willing to quit and refer to smoking cessation program and 66.7% were unwilling. We further compared demographic characteristic and clinical information between those who willing and unwilling (Table 2). Subjects who smoked more than 4 times a week and ever heard about smoking cessation were tend to be unwilling to smoking cessation. The results of the logistic regression showed that smoking 2-3 times a month (aOR=9.33, 95%CI= 1.45-60.2) and having heard about smoking cessation were significant predictors for willingness toward referred to smoking cessation (aOR= 3.67, 95 CI= 3.67-9.06) (Table 4).

Discussion

Our findings regarding the stage of change and willingness toward smoking cessation among people living with HIV (PLWH) in Taiwan showed that 22.9% of HIV-smokers were in the precontemplation stage and 66.7% were unwilling to be referred for smoking cessation. This pattern indicates relatively

Table 3. Ordered logistic regression for factors contributing to the stages of behavior change (n = 423)

Variables	Preparation (n=47) Odds Ratio (95%CI)	Action (n=84) Odds Ratio (95%CI)	Maintenance (n=195) Odds Ratio (95%CI)
Age ≥ 45 years old	.97 (.28-3.39)	.15 (.07-.36)	.21 (.09-.47)
Male	1.03 (.09-11.68)	3.01 (.57-15.92)	2.57 (.56-11.95)
High school above	1.16 (.54-2.50)	1.32 (.71-2.46)	1.88 (1.10-3.19)
CD4≥500	.75 (.37-1.53)	.40 (.21-.74)	0.41 (.25-.68)
Undetected Viral load	1.13 (.52-2.49)	3.11 (1.35-7.15)	1.16 (.91-2.87)
BMI (kg/m2) ≥25	.42 (0.17-1.05)	.32 (.15-.70)	.44 (.21-.89)
HBV	.24 (.05-1.06)	.21 (.06-.78)	.19 (.06-.66)
Diabetic	9.17 (.19-14.33)	3.34 (1.32-8.69)	7.54 (7.54-9.67)
Frequency of smoking			
2-3 times a month	2.80 (.79-9.87)	4.67 (.47-5.34)	.75 (.21-1.65)
2-3 times a week	4.67 (1.09-19.9)	5.72 (1.29-8.08)	.99 (.12-1.93)
Previous attempts to quit	.67 (.31-1.47)	.27 (.12-.58)	60.4 (24.1-51.1)
Ever hear about smoking cessation	.20 (.07-.51)	.72 (.39-1.31)	.73 (0.44-1.20)
Hypercholesterolemia	.71 (.24-2.14)	.73 (.28-1.89)	.81 (.36-1.84)
Hypertriglyceridemia	.79 (.34-1.85)	.27 (.14-.52)	.42 (.23-.74)

Note: precontemplation is reference, bold: significant with p<.05.

Table 4. Logistic regression for factors contributing willingness to quit smoking among HIV-smoker (n=143)

Variable	aOR (95% CI)	p-value
Age ≥ 45 years	1.6 (.5-6.1)	
Male	1.1 (.1-12)	.965
CD4 (Cell/mm3) ≥500	1.2 (.6-2.4)	.649
Frequency of smoking		
2-3 times a month	9.3 (1. 5-60)	.019
2-3 times a week	2.1 (.6-7.9)	.261
Ever hear about smoking cessation	3.7 (1.5-9.1)	.005

Note: Bold: p<.005

low readiness and motivation to quit compared with more recent evidence from other settings. Studies from Europe, Africa, and Latin America have reported high smoking prevalence among PLWH but generally higher levels of interest in quitting and greater proportions in more advanced motivational stages than observed in our sample (Egbe et al., 2019; Mdege et al., 2021; Teixeira et al., 2020). In addition, a recent global review highlighted that, although smoking is highly prevalent among PLWH worldwide, many express at least some interest in cessation when systematically assessed, suggesting that our findings reflect particularly low willingness to quit in this Taiwanese context (Ale et al., 2021; Hoang et al., 2024; Lindayani et al., 2020). Differences in readiness to change and willingness to quit across studies may be related to variations in tobacco control policies, cultural norms, cessation service availability, and how readiness is measured.

In Taiwan, national tobacco control policies and subsidized cessation services have been implemented for the general population through thousands of healthcare facilities and community pharmacies, but they are not specifically tailored to the needs of PLWH (De Socio et al., 2020; Triant et al., 2020). Our findings suggest that generic approaches may not sufficiently address the psychosocial and clinical complexity of smoking behavior in PLWH, as also highlighted in recent global analyses showing that male gender, substance use, mental health problems, and social marginalization strongly shape both smoking and cessation outcomes in this population (Hoang et al., 2024; Edwards et al., 2019). This underscores the need to design and implement smoking cessation strategies that are individualized according to the stage of behavior change and integrated into routine HIV care.

We also found that more than half of those who had attempted smoking cessation in the previous

six months were still smoking at the time of data collection, indicating a high relapse rate. Similar difficulties in sustaining abstinence have been reported in cohort and intervention studies, where PLWH often show high initial interest in quitting but low long-term quit rates despite receiving pharmacological or behavioral support (De Socio et al., 2020; Triant et al., 2020). Recent cohort data from Italy further demonstrate that persistent smoking in PLWH is associated with a higher risk of cardiovascular and neoplastic events and increased all-cause mortality, emphasizing the clinical consequences of failed or incomplete cessation efforts (De Socio et al., 2025). Together, these studies and our findings point to the need for more intensive, long-term, and HIV-specific cessation support, including relapse-prevention components.

In our study, older age, higher CD4 cell counts, undetectable viral load, higher body mass index, diabetes, and hypertriglyceridemia were associated with more advanced stages of behavior change. Recent epidemiological studies among PLWH have similarly shown that clinical status and comorbid conditions are closely linked to smoking patterns and cessation behavior (Ale et al., 2021; Teixeira et al., 2020). For example, PLWH with cardiovascular or metabolic comorbidities may be more strongly advised to quit and therefore more motivated to consider cessation (De Socio et al., 2025). At the same time, high levels of nicotine dependence and psychosocial stressors remain major barriers, particularly in those with heavy alcohol use or other substance use (Egbe et al., 2019; Mdege et al., 2021). Our finding that having heard about smoking cessation was associated with both more advanced stages of change and greater willingness toward cessation is consistent with recent work showing that awareness of support options and tailored provider advice are key facilitators of quitting among PLWH (Edwards et al., 2019; Triant et al., 2020).

Limitation of the study

There are some limitations of our study should be acknowledged in our study. First, smoking information relies on self-reported information that could lead to bias. Future studies need to measure nicotine dependency level for an objective measure of smoking status. Second, overrepresentation of male participants that could be affected to the less generalizability of this study. Third, we did not collect information regarding other behavioral factors, such as diet, exercise, and psychological stress, that would affect to stage of behavior change and their willingness to quit smoking.

Implication of the study

This study highlights the importance of integrating stage-based smoking cessation interventions into routine HIV care. The high prevalence of smoking and low readiness to quit among people living with HIV indicate that uniform cessation approaches are insufficient. Applying the Transtheoretical Model (TTM) enables healthcare providers to assess readiness to quit and tailor interventions according to individuals' stages of behavior change, which may improve adherence and reduce relapse. The findings also emphasize the critical role of nurses and case managers in delivering smoking cessation support. Targeted training in TTM-based counseling is needed to strengthen their capacity to assist and motivate HIV-positive smokers. At the policy level, limited reimbursement for smoking cessation services under current NHI regulations may restrict access for many individuals who need early support. Expanding coverage and implementing targeted tobacco control strategies for people living with HIV are essential to ensure equitable and effective smoking cessation support.

Conclusion

In conclusion, we applied the TTM to identify the stages of behavior change in people living with HIV. The study findings showed a higher prevalence of current smoking and a lower rate of readiness and willingness to quit smoking. We demonstrated that stage of change was highly associated with age, education level, clinical information, including CD4 cell count, viral load, and comorbidity (diabetic and hepatitis B), experience with smoking cessation, and exposure to smoking cessation information. findings suggest to design an intervention according to HIV-smoker stage of behavior change for successful smoking cessation by improving the adherence and reduce relapse rate. Considering high prevalent of smoking among people living with HIV, it's important to integrate smoking cessation program into HIV care and to assess smoking status including their willingness to quit smoking routinely in every clinical visit using the TTM "stage of change" model. Aggressive campaign of smoking cessation is warranted to spread out information widely. Furthermore, training for nurses who take care HIV-positive persons or case manager regarding smoking cessation also needed in order to be able to help, assist, and support HIV-smoker to quit. However, according to NHI policy, reimbursement of smoking cessation only provides for those with serious stage. It's underscored the needs for equality to support smokers to stop and a structured intervention at the population level, with tobacco control efforts targeted to HIV population.

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Conflicts of interest

All authors declar no conflict of interest

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Interprofessional clinical simulation in enhancing patient centered care competency among Indonesian nursing students: A mixed methods design

Galih Jatnika[1*], **Jordan Tovera Salvador**[2]

[1] Faculty of Health and Technology Sciences, Jenderal Achmad Yani University, Cimahi, Indonesia
[2] Department of Nursing Education, College of Nursing, Imam Abdulrahman Bin Faisal University, Dammam, Saudi Arabia

Abstract

Background: Nursing clinical simulations to improve patient centered care (PCC) competency are currently often limited to nursing students. Interprofessional clinical simulations are designed to improve PCC competency by involving students from various health professions, including medicine, physiotherapy, nutrition, and medical laboratory technology.
Purpose: This study aimed to identify the effect of interprofessional clinical simulation on patient centered care competency.
Methods: This research used a convergent parallel mixed methods design. The quantitative study involved 50 respondents, and the qualitative study involved 9 participants. Two case scenarios were given in the simulation. The instrument was used patient centered care competency scale. Quantitative data were analyzed using the Wilcoxon test, qualitative data using thematic analysis, and the two data sets were integrated using a joint display table.
Results: Quantitative results showed a significant effect of the interprofessional clinical simulation in enhancing PCC competency ($p<0.001$). Qualitative findings identified four themes and fourteen subthemes. The themes are valuing and honoring the patient's viewpoint, ensuring patients are fully engaged in their treatment plan, addressing the patient's discomfort for peace and well being and protecting the patient's rights and needs. The integration of the two data showed that the quantitative research results converged with the qualitative research results.
Conclusion: The results of the increase in PCC competency scores converged with most themes and subthemes from nursing student's experiences.

Keywords: competency; interprofessional clinical simulation; mixed-methods; nursing student; patient centered care

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Corresponding author

Galih Jatnika*
Faculty of Health and Technology Sciences, Jenderal Achmad Yani University, Cimahi, Indonesia; Address: Jl. Terusan Jenderal Sudirman, Cimahi, Jawa Barat, Kota Cimahi, Jawa Barat 40525; Mobile Phone: 08121468631, Email: galih_ikd@yahoo.com

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Introduction

Currently, many nursing services and their management have applied the principle of patient centered care (PCC). Patient centered care is defined as respected patient's preference, needs, values, and ensures that patient's value is guided in all clinical decision making. PCC Implementation can improve patient adherence, encourage patients to be more responsible for their health and can guide the direction for achieving health outcomes (Araki, 2019). Patient centered care is a crucial component of modern healthcare, but its implementation still faces several barriers, including staff shortages and time constraints, inadequate communication training, environmental issues, and resistance to change (Alqahtani et al., 2023). Several barriers to PCC implementation have been identified from a multidisciplinary perspective (patients, nurses, doctors, and managers): organizational barriers, including staff shortages, high workloads, and lack of guidelines; and barriers from the service provider perspective, including a lack of a holistic perspective and the dominance of a medical perspective (Charosaei et al., 2023). Currently, many healthcare services are still oriented toward

disease centered care or medical centered care. Most healthcare organizations worldwide focus solely on medical centered care rather than patient needs (Edgman-Levitan & Schoenbaum, 2021). The implementation of PCC by nurses in hospitals in Indonesia shows that it is still ineffective and it is recommended that in its implementation, training and introduction regarding patient centered care be provided to health workers so that they can implement it well and thus improve the quality of service (Putra et al., 2021).

PCC can improve the quality of healthcare services, enhance patient satisfaction, and reduce the length of hospital stays, but PCC implementation by healthcare members is still not as expected. PCC implementation by nurses still requires improvement so that services provided can be more oriented to patient's needs. As nurse educators, PCC models must be trained since these nurses are taking their nursing education. To address this problem, academia must collaborate with clinical settings to bridge the gap and achieve quality services (McKeon et al., 2009). PCC is one of six skills including healthcare competencies that must be mastered by nursing students. Competency is a measurable performance that is expected to integrate knowledge, attitudes and skills that must have by someone. Actually, the gold of competence is to provide quality service. This competency must be given and trained from an early age as an effort to bridge the problems in the nursing service order. Increased competence to bridge the gap in this problem can be done by increasing PCC competency since this nurse take their nursing education.

One of the learning methods in enhancing competency among nursing students is by giving clinical simulation. Interprofessional clinical simulation is a technique that creates situations and experiences such as in real healthcare event situations and environments with the aim of learning, practicing, testing and evaluating experiences or increasing understanding of a healthcare event. Based on this description, the objectives of this study are to identify the effects of interprofessional clinical simulation in improving PCC competency among Indonesian nursing students, to explore the learning experience of using interprofessional clinical simulation as an effort to improve PCC competency among Indonesian nursing students, to integrate both data using a convergent parallel mixed methods study and to gain more comprehensive insight from both research results.

Material and Methods

Design

This study used a convergent parallel mixed methods design. A convergent parallel mixed method design is research that collects and analyzes quantitative data and qualitative data independently and continues by comparing and combining the two data at the interpretation stage (Creswell & Clark, 2018). Quantitative data in the form of changes in PCC competency score was collected simultaneously with qualitative data in the form of nursing student's experiences in carrying out interprofessional clinical simulations. The two data were then integrated to obtain more comprehensive research results.

Participants/sample

The results of calculating the number of quantitative phase was used G power analysis for one group sample t test by looking at the difference between two dependent means with actual power of 95% with an alpha level of 0.05 showed a total sample size were 50 respondents. The sampling method was used proportional stratified random sampling. The proportion of respondents from each level/year are: first year of 16 nursing students, the second year of 10 nursing students, the third year of 13 nursing students and the fourth year of 11 nursing students. Participants in qualitative research come from respondents in the quantitative research phase. The number of participants in qualitative research was 9 participants, which was determined based on data saturation. The nursing students who participated in this research were nursing students from the Faculty of Health and Technology Sciences, Jenderal Achmad Yani University.

Data collection

The research was conducted in three phases, namely the quantitative phase, the qualitative phase and the data integration phase. In the quantitative phase, respondents were given two cases about patients with cultural backgrounds who use alternative medicine to treat chronic diseases and a case about a patient who still wants to perform religious duties despite being sick. Then, they conducted a simulation on the application of patient centered care according to the cases by involving medical students, physiotherapy, nutrition, medical laboratory technology students in the simulation activities with a simulation implementation time of 30 minutes for each case. Before and after the simulation, PCC competency measurements were carried out using a patient centered care competency scale. In the qualitative phase, semi structured interviews were conducted with participants to explore their experience of conducting interprofessional clinical simulation. Interviews used semi structured guide questions based on the PCC competency scale dimensions. The interview process with participants was recorded using a voice recorder. In the third phase, data integration was carried out between data on improving PCC competencies and data on participants' experiences in participating in interprofessional clinical simulation using a joint display table. Data integration was carried out to compare whether quantitative data and qualitative data were converging or diverging.

Validity and reliability/Trustworthiness

The patient centered care competency scale

instrument can numerically assess the level of PCC competency among nursing students. Patient centered care competency scales instrument consists of four domains, seventeen items in PCC competency including Respecting Patients' Perspectives (6 items), Promoting Patient Involvement in Care Processes (5 items), Providing for Patients' Comfort (3 items) Advocating for Patients (3 items). This instrument used a five-point Likert scale (1) minimum, (2) below average, (3) average, (4) good, (5) excellent, which the participants chose to rate their competencies. (subjective, self-assessment). The Patient Centered Care Competency Scale was validated in two general hospitals in Seoul, Korea (Hwang, 2015). The Cronbach's alpha coefficient was 0.95 for the total PCC competency scales and 0.83, 0.91, 0.86, 0.83, and 0.85 for the subscales of PCC competency. Validity and reliability of the PCC competency scale were also tested on registered nurses in Finland, with Cronbach's alpha coefficients for the seventeen items instrument being 0.92 and for the subscales, 0.80–0.85 (Suhonen et al., 2021). The English version of the patient centered care competency scale has been translated into Indonesian and the results of the validity and reliability test show a Pearson correlation showing a significant correlation with the total score at the $p \leq 0.05$ level ($r = 0.632$ to $r = 0.930$) and a Cronbach's alpha coefficient value was 0.961 for all items of the patient centered care competency scale so that the patient centered care competency scale can be adapted to measure PCC competency among Indonesian nursing students. In the qualitative phase, semi structured interviews were conducted using an interview guide based on 4 domains in the patient centered competency scale by asking about participants' experiences in the implementation of the PCC domain in the simulation process, including respecting patients' perspectives, promoting patient involvement in the care process, providing for patient comfort, and advocating for patients. In qualitative research, data triangulation was carried out by comparing interview data and observation results by two facilitators to ensure consistency between answers and participant experiences. All interview data were

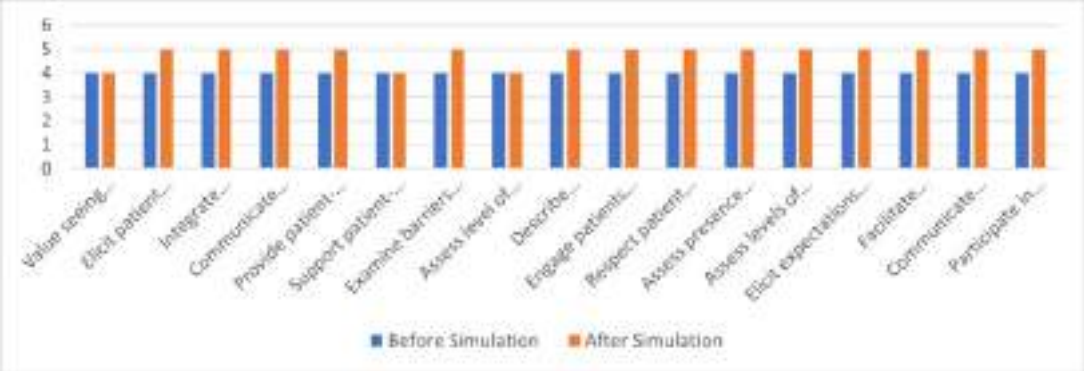

Figure 1. Changes in PCC competencies between before and after conducting interprofessional clinical simulation.

Table 1. Characteristics of Respondents (N=50)

Demoghraphical Characteristics	Frequency	Percentage	Mean	Standart Deviation
Age				
< 20	24	48 %	20.6	(SD ± 0.99)
> 20	26	52 %		
Gender				
Male	7	14 %		
Female	43	86 %		
Civil Status				
Single	50	100 %		
Year Level				
First Year	16	32 %		
Second Year	10	20 %		
Third Year	13	26 %		
Fourth Year	11	22%		

Table 2. The Effect of Utilizing the Interprofessional Clinical Simulation in Improving Patient Centered Care Competency Among Indonesian Nursing Students

Dimensions and Items	PCC Scores Pre (Median ± min - max)	PCC Scores Post (Median ± min - max)	P value
PCC total	4.0 (range 3.0 -5.0)	5.0 (range 4.0-5.0)	0.001
PCC Dimensions			
I. Respecting for Patients Perspective	4.0 (3.0-5.0)	5.0 (3.0-5.0)	0.001
1. Value seeing health care situations through patient's eyes.	4.0 (2.0-5.0)	4.0 (3.0-5.0)	0.001
2. Elicit patient values, preferences and needs as part of clinical interview, implementation of care plan, and evaluation of care.	4.0 (3.0-5.0)	5.0 (3.0-5.0)	0.001
3. Integrate understanding of multiple dimensions of patient centred care such as patient and family preferences.	4.0 (2.0-5.0)	5.0 (3.0-5.0)	0.001
4. Communicate patient values, preferences and need to other health care team members.	4.0 (2.0-5.0)	5.0 (3.0-5.0)	0.001
5. Provide patient centered care with sensitivity and respect for the diversity of human experience.	4.0 (2.0-5.0)	5.0 (3.0-5.0)	0.035
6. Support patient centred care for individuals and groups whose values differ from own	4.0 (3.0-5.0)	4.0 (3.0-5.0)	0.004
II. Promoting Patient Involvement in the Care Process	4.0 (3.0-5.0)	5.0 (4.0-5.0)	0.001
7. Examine barriers to active involvement of patients in the care processes.	4.0 (2.0-5.0)	5.0 (4.0-5.0)	0.001
8. Assess level of patient's decisional conflict and provide access to resources.	4.0 (2.0-5.0)	4.0 (3.0-5.0)	0.001
9. Describe strategies to empower patients or families in all aspects of care process.	4.0 (2.0-5.0)	5.0 (4.0-5.0)	0.001
10. Engage patients or designated surrogates in active partnerships that promote health, safety and well being, and self care management.	4.0 (3.0-5.0)	5.0 (3.0-5.0)	0.001
11. Respect patient preferences for degree of active engagement in care process	4.0 (3.0-5.0)	5.0 (4.0-5.0)	0.002
III. Providing for patients Comfort	4.0 (3.0-5.0)	5.0 (4.0-5.0)	0.001
12. Assess presence and extent of pain and suffering.	4.0 (3.0-5.0)	5.0 (4.0-5.0)	0.007
13. Assess levels of physical and emotional comfort.	4.0 (3.0-5.0)	5.0 (4.0-5.0)	0.001
14. Elicit expectations of patient and family for relief of pain, discomfort and suffering.	4.0 (3.0-5.0)	5.0 (4.0-5.0)	0.001
IV. Advocating for Patients	4.0 (3.0-5.0)	5.0 (3.0-5.0)	0.001
15. Facilitate informed patient consent for care.	4.0 (3.0-5.0)	5.0 (4.0-5.0)	0.001
16. Communicate care provided and needed at each transition in care.	4.0 (2.0-5.0)	5.0 (3.0-5.0)	0.001
17. Participate in building consensus or resolving conflict in the context of patient care	4.0 (3.0-5.0)	5.0 (3.0-5.0)	0.001

returned to participants for confirmability checks to ensure consistency of answers and credible data. Considering that this study used a self-assessment tool whose results can be subjective, the researcher emphasizes data confidentiality and anonymity and there are no right or wrong answers in the interview activities but focuses on the perception of each participant's experience is a valuable point in this study.

Data analysis

Before analyzing the quantitative data, a data

Table 3. Factor loading of individual items in CRAFTT

Participants	Age	Gender	Year/Level	Civil status
#1	20	Male	Year 3	Single
#2	23	Female	Year 4	Single
#3	22	Female	Year 4	Single
#4	21	Female	Year 4	Single
#5	21	Female	Year 3	Single
#6	21	Female	Year 3	Single
#7	21	Female	Year 2	Single
#8	20	Female	Year 1	Single
#9	22	Female	Year 4	Single

normality test was conducted and it was found that the PCC competency score data was not normally distributed, so the PCC competency score data was presented using the median value and added the minimum and maximum scores. The difference test between PCC scores before and after the interprofessional clinical simulation used the Wilcoxon test. In the qualitative study, analysis was carried out using the Colaizzi technique. The audio recordings were converted into interview transcripts for further coding to determine themes and subthemes using Nvivo 12 software. The two datasets from the quantitative study and qualitative study were merged using a joint display table for comparison to see whether the experience of conducting interprofessional clinical simulation converged or diverged with the PCC competency improvement score.

Ethical consideration

We strictly uphold and adhere to the ethical principles of the Declaration of Helsinki (World Medical Association [WMA], 1964) throughout the conducting of this study. We uphold the ethical principles of human research to ensure that no ethical violations occur in the research process. This study upholds ethical principles including, autonomy, confidentiality, informed consent, justice, beneficence, and nonmaleficence. This research was already approved by Health Research Ethics Committee, Faculty of Health and Sciences, Jenderal Achmad Yani University, ethical clearance letter number 088/KEPK/Fitkes-Unjani/VII/2024. This research was conducted in July 2024 in the laboratory of the Faculty of Health and Technology Sciences, Jenderal Achmad Yani University.

Result

The research results consist of three phases, namely the quantitative phase, the qualitative phase and the data integration phase.

Quantitative Phase

The Demographic profile in Table 1 shows respondents in the quantitative study were fifty nursing students with an average age of 20.6 (SD ± 0.99) years. Eighty six percent (n = 43) of respondents were female and seven percent (n = 7) were male. All respondents (n = 50) were unmarried. The number of nursing students based on year/level consisted of 16 (32%) respondents from first year, 10 (20%) respondents from second year, 13 (26%) respondents from third year and 11 (22%) respondents from fourth year.

Based on Table 2 there was a significant increase in the PCC total score from score 4.0 (range 3-5) to 5.0 (range 4-5) with a p value of 0.001 (p value < 0.05). There was a significant effect in enhancing PCC competency after utilizing interprofessional clinical simulation among Indonesian nursing students. In the PCC dimension 'Respecting for Patient's Perspective', there was a significant increase in the PCC score from 4.0 (3-5) to 5 (3-5) with a p value of 0.001 (p value < 0.05). In the PCC dimension 'Promoting for Patient's Involvement in the Care Process', there was a significant increase in the PCC score from 4.0 (3-5) to 5 (4-5) with a p value of 0.001 (p value < 0.05). In the PCC dimension 'Providing for Patient's Comfort', there was a significant increase in the PCC score from 4.0 (3-5) to 5 (4-5) with a p value of 0.001 (p value < 0.05). In the PCC dimension of 'Advocating for Patients', there was a significant increase in the PCC competency score from 4.0 (3-5) to 5 (3-5) with a p value of 0.001 (p value < 0.05). There were significant effects in all PCC dimensions after utilizing interprofessional clinical simulation in enhancing PCC competency among Indonesian nursing students. There was a significant increase in 17 PCC items after utilizing interprofessional clinical simulation in enhancing PCC competency among Indonesian nursing students (P value < 0.05).

Based on Figure 1 shows that all 17 PCC items score before simulation was rated between moderate and good level, while after simulation shows 14 PCC items were at good level and only 3 PCC items stayed between moderate and good level.

Qualitative Phase

Based on Table 3 shows nine nursing students as

Table 4. Empirical Data Correlation Matrix of CRAFFT (n=80)

Overall Pcc and Dimensions	Change in Pcc Scores (Quantitative Result)	Nursing Students Experiences (Qualitative Subthemes)	Quantitative and Qualitative Integrated
Respecting Patients Perspective	4.0 to 5 □1.0 Between moderate and good level to a good level (Significant)	• Learned new knowledge.“There are many lessons that can be learned from this regarding….” # 1 “This is my first experience, sir, appreciating the values of patients, so I learned a lot.”#3 “Well, we can do this by respecting opinions and as previously learned...” #7 • Shared decisions making. “In my experience, I respect the patient’s decision,sir.”#2. “we have to respect the patient’s decision...”#3 “Because everything was decided by the client…#4 • Communicating patients value, preferences, needs to other nurses and other health professionals. “… the method is by communicating to the doctor that the patient does not want to use conventional medicine.” #3 “I try to communicate with other professions ….”#4. “I will explain in as much detail as possible regarding what the patient has, how the patient’s values and beliefs are so that colleagues ...” #6. “I will first explain to my team members or other nurses ....” #9	Converge
Promoting Patient Involvement in The Care Process	4.0 to 5 □1.0 Between moderate and good level to a good level (Significant)	• Good communication between nurses and patients. “The communication factor itself...”#6. “then also the approach and communication ...” #7 • Striving to get patients actively involved in the care process. “… I ask little by little so that I can provoke the patient to talk, like how are you?, ...” #2 “… start to explore slowly with the client, this family we might play with questions sir so that the client can answer by for example we give open questions not closed questions.” #4 • Getting trust form patients and family. “… so the most important factor is the trust factor first sir.”#4. “… sometimes the patient also does not fully trust the medical staff so that is what must be attempted.”#6 “The factors can be the patient’s trust in nursing actions...” #7 • Involving family in care process “Maybe next e with the support of your family like having family beside you ...” #1. “.., yes so from the family.” #2 “In terms of family support. That’s it sir.”#3. “… you can ask the family if the patient is less willing to chat with us.” #8	Converge
Providing for Patient Comfort	4.0 to 5 □1.0 Between moderate and good level to a good level (Significant)	• Reducing pain and patient discomfort. “by asking whether the patient feels any pain or the patient feels discomfort...”#6 “Well, maybe we can do it by relaxing the pain that is felt and also distraction.” #7 • Sensitivity to the patients verbal and nonverbal response. “I have done the first from the expression of the face...” #1. “seen like that we have to see the expression on his face ...”#2 “… from the facial expression, emotional from a small sad tone of voice.”#3. “… we can assess and assess the level of physical and emotional comfort of the patient.”#7 “Uh, maybe for comfort, sir, if it is not comfortable, it can be seen from the expression,...” #8 “by examining their facial expressions when talking, ...” #9 • Feeling closeness with patients. “… I felt closer to the client.” #4. “yes, as previously reviewed, get closer to the patient, ….” #9	Converge

participants in the qualitative phase who conducted interprofessional clinical simulation. The average age of the participants was 21.2 years old (SD ± 0.97). There were eight female participants and one male participant. The nursing student’s participants consisted of four students from the fourth year, three students from the third year, one student from the second year and one student from the first year. All participants were unmarried.

This study identified several themes and subthemes about the experiences of nursing students utilizing interprofessional clinical simulation.The

Cont. Table 4. Empirical Data Correlation Matrix of CRAFFT (n=80)

Overall Pcc and Dimensions	Change in Pcc Scores (Quantitative Result)	Nursing Students Experiences (Qualitative Subthemes)	Quantitative and Qualitative Integrated
Advocating for Patients	4.0 to 5 □1.0 Between moderate and good level to a good level (Significant)	• Providing informed consent for patients. "so I do informed consent first before taking action."#2 "By telling them, explaining the positives and negatives, telling them slowly… giving information to patients about alternative medicine."#3 "Communicating patients' values, preferences, needs to other nurses and other health professionals "…we are open to patient care."#1 "The strategy is…by communicating to the doctor …."#3. "I try to communicate with other professions..."#4 "I will explain in… that colleagues will also understand..."#6 "I will first explain to my team members or other nurses so … so that they have the same perception when dealing with the patient." #9 • Provide complete, clear information, using language that patients can understand. "… explain in detail and use easy-to-understand language." #7. "by providing information as clearly as possible ...." #8 • Ensuring patients get the best care and good medication. "… consult more with the doctor, ensure patients get the right and good medicine."#3 "… not only from us but from other health workers so that they can support good client care."#4. "… we inform you first so that there are no mistakes." #7 • Communicate about patient condition in every shift change. "… provide the information they have received and tell it to the next shift." #1. "… writing and reading it to be communicated to the next shift nurse." #2. "I explain to the next shift regarding the client's general condition, ..." #4. "to the next nurse it is explained that we have conducted an assessment, ..."#5. "by maybe discussing sir so all the nurses from the previous shift and the next shift …."#8. "during the handover carried out by the next shift, I will explain again what the characteristics of the patient are...."#9	Converge
Overall PCC	4.0 to 5 □1.0 Between moderate and good level to a good level (Significant)	Observation score 3.75 (range 3.25 – 4.0) by facilitators was rated as competent.	Converge

results of qualitative research regarding participants experiences after participating in interprofessional clinical simulation based on PCC dimensions revealed 4 themes and 14 subthemes. The theme of Valuing and Honoring the Patient's Viewpoint was obtained by 3 subthemes including learning the ability to respect patient's values, preferences, needs, norms, religion and culture, shared decisions making, and communicating patient's values, preferences, needs to other nurses and other health professionals. The theme of Ensuring Patients are Fully Engaged in their Treatment Plan found 4 subthemes including good communication between nurses and patients, striving to get patients actively involved in the care process, getting trust from patients and family and Involving family in the care process. The theme of Addressing the Patient's Discomfort for Peace and Well Being obtained three subthemes including reducing pain and patient discomfort, sensitivity to the patients verbal and nonverbal responses and feeling closeness with the patient. Next, Protect the Patient's Rights and Needs has 4 sub themes including providing informed consent for patients, providing complete, clear information, using language that patients can understand, ensuring patients get the best care and good medication, communicating about patient condition in every shift change.

Data Integration Phase

Based on Table 4, the integration between quantitative results and qualitative findings shows that the results of the PCC competency score for the Respecting Patients' Perspective dimension converge with participants describing learned new knowledge after participating in the interprofessional clinical simulation. The results of integration in the PCC dimension of Promoting Patient's Involvement

in the Care Process between the results of increasing the PCC competency score converge with participants describing having tried to involve patients as active participants in their care by having good communication between nurses and patients and families and frequently greeting clients. The results of integration on the PCC dimension Providing for Patients' Comfort between the results of increasing PCC scores from between moderate and good level to a good level is converge with participants describe providing patient comfort can be done by being sensitive to the patient's verbal and nonverbal responses, reducing complaints and eliminating pain to provide for patient comfort and also expressing a feeling of being closer to the patient. The results of the integration of the PCC dimension of Advocating for Patients between the results of increasing the PCC scores from 4.0 to 5.0 or become a good level is converge with participants describe advocating for patients can be done by providing informed consent for patient, providing the clearest possible information to patients, ensuring that patients receive good care and treatment and always communicating with other nursing teams at every nursing transition. The integration results between the quantitative research results in the form of PCC competency scores converge with qualitative findings in the form of nursing students' experiences after utilizing interprofessional clinical simulation.

Discussion

Quantitative Phase

PCC competency total score before being given the interprofessional clinical simulation was rated between moderate and good level at 4.0 (range 3-5) and the PCC competency total score after used the interprofessional clinical simulation at a good level at 5.0 (4-5). The results of this study indicate that there is a conformity with the results of previous research by Kim (2022) on factors influencing patient centered care in nursing students at 3 universities in Korea after undergoing at least 6 months of clinical training, the PCC competency score was 3.69 + 0.46 (range 1-5) and nursing professional values were factors influencing patient centered care competency among nursing students.

The results of this research are also in line with previous research by Pakkonen et al. (2023) which stated that PCC competency total score among nurses working in long term care was found at 3.80 (SD ± 0.45) or was rated between moderate and good level. The results of this study are also similar to other studies by Hwang et al., 2019 who conducted a study on nurses in a hospital environment and found that the patient centered care competency total score was 3.61 (SD ± 0.46) or was rated between moderate and good level. The results of this study are also in accordance with the results of previous studies (Katja et al., 2023) that examined PCC competence in registered nurses who provide individualized care for older hospitalized patients, which found PCC competence was at a good level.

In the PCC dimension 'Respecting for Patients' Perspective', there was a significant increase in the PCC score from 4.0 (3-5) to 5 (3-5) with a p value of 0.001 (p value < 0.05). In the PCC dimension 'Promoting for Patients' Involvement in the Care Process', there was a significant increase in the PCC score from 4.0 (3-5) to 5 (4-5) with a p value of 0.001 (p value < 0.05). In the PCC dimension 'Providing for Patients' Comfort', there was a significant increase in the PCC score from 4.0 (3-5) to 5 (4-5) with a p value of 0.001 (p value < 0.05). In the PCC dimension of 'Advocating for Patients', there was a significant increase in the PCC competency score from 4.0 (3-5) to 5 (3-5) with a p value of 0.001 (p value < 0.05). The researcher argued that there was a significant increase in PCC competence because simulations involving interprofessionals such as doctors, lab analysts, can further improve the ability to master patient centered care. This is supported by previous research by Kari et al. (2022) who studied developing a patient centered care team model for home living older adults with multimorbidity in primary health care centers stated that an interprofessional patient centered care model will further improve holistic and more people centered care because interprofessionals benefit more from the skill mix.

At the PCC items level before being given the interprofessional clinical simulation, 17 PCC items with a score of 4.0 were rated between moderate and good levels. The researcher argued that the PCC score before intervention was already high, which could be caused by the nursing students having been exposed to clinical practicum so that they already had previous experience in providing patient care. The lack of PCC competency mastered by nursing students can also be caused by obstacles such as in previous research by Kim dan Kim (2023) which examined the experiences and perceptions of nursing students regarding barriers when implementing patient centered care in clinical settings including busyness, educational challenges, lack of awareness, lack of relationship building and lack of a policy approach. After these nursing students were given a patient centered care simulation packaged under the name interprofessional clinical simulation, an increase in PCC scores was found on 14 PCC items to a score of 5.0 or were at a good level and only 3 PCC items included value seeing health care situations through patients eyes, supporting patient centered care for individuals and groups whose values differ from own and assessing the level of patient's decisional conflict and providing access to resources got a median score of 4.0 or at between moderate and good level.

Nurse advocates provide support and empower patients and collaborate with interprofessional and also recommend support from other health care professionals to patients based on patient need and preference to ensure patients receive

the best care, examination and therapy from other health care workers. This is supported by previous research (Heier et al., 2024) which examined the effect of providing interprofessional communication skills training involving medical trainees and nurse trainees, which found a significant effect on improving interprofessional error communication skills, teamwork, roles, responsibilities and increasing patient centeredness in medical trainees and nurse trainees. Through the interprofessional clinical simulation, nursing student's PCC skills will be better trained. Researchers recommend a PCC competency learning simulation that also involves other health students such as medical students, analyst students, pharmacy students so that later these nursing students can provide holistic care and more patient centered care.

Qualitative Phase

The results of qualitative research regarding participant's experiences after participating in interprofessional clinical simulation based on PCC dimensions revealed 4 themes and 14 subthemes. The results of this study are consistent with previous research (Carlsson et al., 2022), who conducted an evaluation of registered nurses experiences of patient centered care competency after being given a digital competence in care (DCC) intervention was obtained the category of being open to change and new ways of working and the subcategories of feeling strengthened by new knowledge, being inspired by others and meeting demand with an open mind for seamless care.

Patient centered care is a care that encourages patients to be more active participants in their care. This result is in line with previous research (Lateef & Mhlongo, 2022) which examined the perceptions of 30 nurses in primary healthcare facilities in Nigeria towards patient centered care, which found 4 categories, namely poor approach by nurses, lack of enforcement agency, outcome driven healthcare, valued care provider, communication to sharpen care and driven healthcare service.

Ensuring patients are fully engaged in their treatment plan is one of the themes in PCC competency that further encourages patient engagement in their care process. This is also supported by the results of previous studies (Clavel et al., 2021) which state that there are 3 important components in patient engagement in care, namely empowerment, patient centeredness and shared decision making. More active involvement of patients and families in their care can better adjust care that fits the patients' needs, patients' preferences and increase patients' satisfaction.

Addressing the patient's discomfort for peace and well being is a theme in the principle of patient centered care. The results of this research are in accordance with previous research (Carlsson et al., 2022) which examined the experience of patient centered care competence in the register nurses after participating in digital competence in care (DCC). The category of focusing on patients despite the distance was obtained with 2 subcategories, namely initiating individually tailored meetings and creating closeness and a sense of security despite the distance.

Protect the patient's rights and needs is one of the themes in patient centered care that seeks to ensure that patients receive the best care and treatment according to their needs. The results of this study are in line with previous studies (Lateef & Mhlongo, 2022) that examined the experiences of registered nurses about patient centered care competence working in primary healthcare facilities in Nigeria, which found 4 categories including poor approach by nurses and lack of enforcement agency, outcome driven healthcare, valued care provider, communication to sharpen care and driven healthcare service.

Participants describe that through efforts to provide informed consent and communicate between other health teams is an effort to advocate for patients. It was found that there was conformity with the patient centered care competency scale measuring instrument used, namely items in the patient advocacy dimension including facilitating informed patient consent for care and communicating care provided and needed at each transition in care (Suhonen et al., 2021). Nursing students describe that advocating for patients is done by communicating the condition, results of studies and actions that have been given to patients to other health workers and also to other professionals such as physicians and laboratory analysts to ensure that patients will receive the best care, the best lab tests and the best treatment.

Data Integration Phase

Interpretation of the combined result between the respect for patient's perspective dimension using an increase in PCC competency score from 4.0 to 5.0 is consistent with the results of qualitative research in the form of 3 subthemes, including learned new knowledge, shared decision making, and communicating patient's values, preferences, and needs to other nurses and other health professionals. Gaining new knowledge can help them to become a basis for learning a skill. This is supported by the results of a study (Carlsson et al., 2022) that examined the evaluation of registered nurses experiences of PCC competence after being given digital competence in care, it was found that there was one subtheme of feeling strengthened by new knowledge which means gaining knowledge helped them articulate the practical work that they regularly perform, which strengthened their professional role. Interpretation of the combined result for the dimension of promoting patient involvement in the care process between the results of quantitative research in the form of an increase in the PCC competency score from 4.0 to 5.0 is consistent with the results of qualitative findings in the form of 4 subthemes, including good communication between nurses and

patients, striving to get patients actively involved in the care process, getting trust from patients and family, and involving family in the care process. The research analysis saw that good communication between patients and nurses can increase patient involvement in their care. This is in line with previous research (Holm et al., 2024) on integrating patient involvement interventions in clinical practice, which found that communication and interaction are the main aspects of patient involvement in the care process. Interpretation of the combine result for the dimension of providing for patient comfort between the results of quantitative research in the form of an increase in the PCC competency score from 4.0 to 5.0 or from moderate to a good level is consistent with the results of qualitative findings in the form of 3 sub themes including reducing pain and patient discomfort; sensitivity to the patients verbal and nonverbal responses; feeling closeness with patients. The researcher's analyzes that closeness with patients can be felt by participants, considering that this simulation used simulated patients. Nursing students felt more closeness to patients and families when doing simulations using simulated patients. This is also supported by previous research (Gorski et al., 2022) examining the effectiveness of simulated patients, stating that simulated patients are more effective than student role playing and fostering a patient centered. Interpretation of the combine result for the dimension of advocating for patients between the results of quantitative research in the form of an increase in the PCC competency score from 4.0 to 5.0 is consistent with the results of qualitative findings in the form of 4 subthemes including providing informed consent for patient, provide complete, clear information, using language that patients can understand; ensuring patients get the best care and good medication, communicate about patient condition in every shift change. Researchers analyzed that patient advocacy can be done by nurses by providing informed consent for patients, providing empathy, understanding and better understanding of patients, ensuring patient rights to receive good and quality care. This is supported by the results of previous studies (Davoodvand et al., 2016) examining the Iranian nursing perspective on patient advocacy which stated that there are 2 themes, namely empathy for patients (including giving sympathy, understanding, being closer to patients) and protecting the patient (including patient care, patient health, complete care and defending patient rights). The increase in the PCC competency score is confirmed by 4 subthemes of qualitative findings that are indeed in line including provide informed consent for patient; provide complete, clear information, using language that patients can understand; ensuring patients get the best care and good medication; and communicate about patient condition in every shift change It can be concluded that the interpretation of the combination for all PCC dimensions between quantitative results converges with most themes and subthemes from the qualitative findings. The author is aware of limitations by not using a control group in this study as a comparison group for the results of this study. The author also sees the possibility of previous differences in the knowledge or skills possessed by nursing students about patient centered care because in the simulation session there was no lecture session on patient centered care. The author suggests the intervention development program in the PCC competency by providing a Comprehensive patient centered care education program of 4 sessions over 2 weeks which includes an added lecture session on the application of patient centered care for nursing students which of course involves other health students before taking clinical practicum.

Conclusion

Result of quantitative analysis was obtained there was a significant effect of interprofessional clinical simulation on PCC total competency among Indonesian nursing students (p value: 0.001). Results of qualitative research regarding participant's experiences after using interprofessional clinical simulation based on PCC dimensions revealed 4 themes and 14 subthemes. The results of an increase in PCC competency scores in nursing students converge with most of the expressions of experience from nursing students who have participated in the interprofessional clinical simulation. Quantitative result data converge with most of the qualitative findings. The author suggests the development of further research with a comprehensive interprofessional simulation model of patient centered competency program which includes lecture sessions on PCC and involves all other health science fields through a multicenter study containing representatives from all health science fields that play a role in patient centered care so that nursing student graduates can be competent in implementing patient centered care to improve patient's outcomes and satisfaction.

Declaration of Interest

In the publication of the results of this research there is no conflict of interest.

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Data Availability

The data obtained and published are entirely the result of direct data collection by researchers from respondents and participants. All data from this study has been presented in this article.

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Understanding sleep quality among postoperative patients in Intensive Care Unit: A conceptual analysis approach

Nunung Nurhayati[1]*, Agung Waluyo[2], I Made Kariasa[3], Sali Rahadi Asih[4], Hening Pujasari[5], Bahrul Hayat[6]

[1] Faculty of Nursing, Universitas Indonesia, Depok, Indonesia and Department of Critical and Emergency Nursing, PPNI College of Nursing West Java, Bandung, Indonesia
[2] Department of Medical Surgical Nursing, Faculty of Nursing, Universitas Indonesia, Depok, Indonesia
[3] Department of Medical Surgical Nursing, Faculty of Nursing, Universitas Indonesia, Depok, Indonesia
[4] Department of Psychology, Faculty of Psychology, Universitas Indonesia, Depok, Indonesia
[5] Basic Science and Fundamental of Nursing Department, Faculty of Nursing, Universitas Indonesia, Depok, Indonesia
[6] Department of Psychology, Faculty of Psychology, State Islamic University, Jakarta, Indonesia

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Corresponding author

Nunung Nurhayati*
Faculty of Nursing, Universitas Indonesia, Depok, Indonesia and Lecturer at Department of Critical and Emergency Nursing, PPNI College of Nursing West Java, Bandung, Indonesia; Address: Jl. Prof. DR. Sudjono D. Pusponegoro, Pondok Cina, Kecamatan Beji, Kota Depok, Jawa Barat 16424and Jl. Mahmud No.34, Pamoyanan, Kec. Cicendo, Kota Bandung, Jawa Barat 40173; Phone: (022) 6121914; E-mail: nung.nunung.nurhayati.2007@gmail.com

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Abstract

Background: Sleep quality is an important yet understudied element influencing postoperative recovery in intensive care units. Considering that there is a lack of consistent knowledge of the quality of sleep, it is difficult to establish appropriate tests and therapies.
Purpose: To do a conceptual analysis of sleep quality in postoperative intensive care units patients utilizing the Walker and Avant framework, delineating its qualities, antecedents, consequences, and empirical referents.
Methods: This study used the Walker and Avant eight-step process for idea analysis, which included a systematic literature evaluation of papers published between 2020 and 2024 in databases such as PubMed, Scopus, ScienceDirect, and ProQuest. Data was evaluated to determine important defining qualities, causes, outcomes, and measurable indicators of sleep quality.
Results: The analysis identified four defining attributes of sleep quality: sleep architecture, sleep disturbances, subjective experience, and physiological indicators. Antecedents included environmental noise, lighting, pain, anxiety, and frequent medical interventions. Poor sleep quality was associated with adverse outcomes such as increased delirium risk, delayed wound healing, and prolonged intensive care units stays. Empirical referents included patient-reported tools like the Pittsburgh Sleep Quality Index, polysomnography, and actigraphy.
Conclusion: Sleep quality is a multidimensional concept central to postoperative care in intensive care unit. Addressing environmental and psychological factors through targeted interventions can improve sleep quality and enhance recovery outcomes.

Keywords: concept analysis; intensive care unit; postoperative recovery; sleep quality

Introduction

Sleep quality is a complex and multidimensional concept without a universally accepted definition, often assessed subjectively based on factors such as sleep duration, depth, and continuity (Nelson et al., 2022). Poor sleep quality is linked to adverse health outcomes, including delayed recovery and reduced health-related quality of life, particularly in Intensive Care Unit (ICU) settings (Jespersen et al., 2023). Postoperative sleep disturbances are prevalent, affecting 59–72% of ICU patients, with 57% still experiencing poor sleep six months after discharge (Sert et al., 2024; Yildiz et al., 2021). These

disturbances are characterized by fragmented sleep, reduced time in deep restorative stages, and sleep efficiency (44-78%) (Lee & Wilcox, 2022).

Despite known environmental, psychological, and demographic contributors to postoperative sleep disturbances, comprehensive studies integrating these factors remain limited (Tegegne & Alemnew, 2022; Yu et al., 2023). Interventions such as noise reduction, pain management, and behavioural therapies show potential but lack standarized evaluation frameworks, restricting their application across clinical settings (Berezin et al., 2023; Darnall et al., 2023). Additionally, the absence of a universally accepted definition of sleep quality hinders the development of effective assessment tools and interventions, particularly in nursing care, where sleep promotion is crucial (Nelson et al., 2022). More research is needed to clarify the factors affecting sleep quality in ICU patients' post-surgery and its implications for clinical practice.

This study adopts a conceptual analysis approach to elucidate the definition, attributes, and clinical implications of sleep quality, contributing to a more robust framework for postoperative care. This conceptual analysis specifically addresses sleep quality among adult postoperative patients admitted to the ICU, with emphasis on sleep experiences occurring during ICU hospitalization. Post-discharge sleep disturbances and long-term recovery trajectories are considered consequences rather than defining elements of the concept, ensuring a clear distinction between conceptual attributes and contextual factors.

Materials and Methods

Study Design

This study employed a concept analysis using Walker and Avant's eight-step framework, complemented by a systematic literature evaluation conducted in accordance with the PRISMA 2020 guidelines to ensure transparency, reproducibility, and methodological rigor.

Concept Analysis Framework

The Walker and Avant approach guided the conceptual phases, including: (1) concept selection, (2) determination of the analysis purpose, (3) identification of all uses of the concept, (4) determination of defining attributes, (5) construction of model and related cases, (6) identification of antecedents and consequences, and (7) definition of empirical referents.

Information Sources and Search Strategy

A systematic literature search was conducted across four electronic databases: PubMed, Scopus, ScienceDirect, and ProQuest. These databases were selected to capture multidisciplinary evidence spanning nursing, critical care, and perioperative medicine.

Search strategies were developed iteratively with Boolean operators and Medical Subject Headings (MeSH) where applicable. An example of the PubMed search string is provided below: ("sleep quality" OR "sleep disturbance" OR "deep sleep") AND

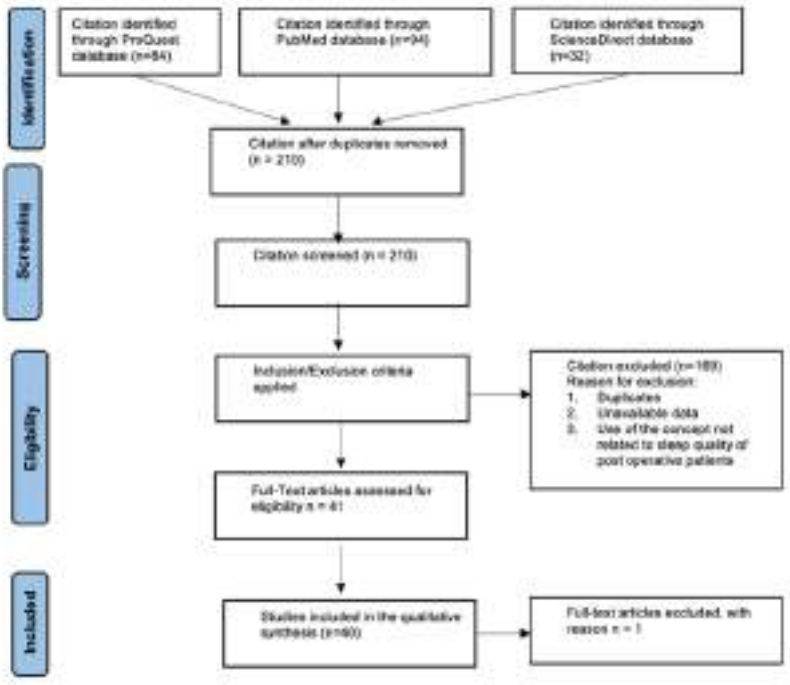

Figure 1. Searching flow chart

("postoperative" OR "post-surgery" OR surgical) AND ("intensive care unit" OR ICU OR "critically ill"). Equivalent adaptations were applied to other databases. The full search strings for all databases are provided in Supplementary Table 1.

Eligibility Criteria

Eligible studies were primary empirical investigations published between 2020 and 2024 and available as full-text articles in the English language. Studies were required to include a sample size of at least 25 participants and to focus on adult postoperative patients admitted to intensive care units. In addition, included studies had to assess sleep quality using at least one recognized objective method, such as polysomnography or actigraphy, or a validated subjective instrument, such as the Pittsburgh Sleep Quality Index.

Studies were excluded if they were review articles, editorials, study protocols, or case reports. Investigations involving pediatric populations were not considered. Studies that did not evaluate sleep quality as an outcome or that were conducted in non–intensive care unit settings or among non-postoperative populations were also excluded.

Study Selection Process

All identified records were imported into reference management software and duplicates removed. Two reviewers independently screened titles and abstracts, followed by full-text assessment. Discrepancies were resolved through discussion or consultation with a third reviewer. Inter-rater agreement during full-text screening demonstrated substantial reliability (Cohen's $\kappa = 0.82$). A total of 185 articles were excluded at the full-text stage, primarily due to non-ICU populations, lack of sleep quality measurement, or inappropriate study design. The study selection process is illustrated in Figure 1 (PRISMA Flow Diagram).

Data Extraction

A standardized data extraction form was used to collect information on study design, sample characteristics, ICU setting, sleep assessment methods, and key findings related to sleep quality attributes, antecedents, and outcomes.

Risk of Bias and Quality Appraisal

Methodological quality and risk of bias were assessed independently by two reviewers using appropriate tools based on study design (e.g., observational or experimental). Domains evaluated included selection bias, measurement bias, and confounding. Studies were not excluded based on quality alone; instead, appraisal results informed the interpretation of conceptual attributes and empirical referents.

Synthesis Approach

Findings from the 40 conceptually relevant studies were synthesized narratively and mapped to Walker and Avant's analytical components, ensuring that defining attributes, antecedents, consequences, and empirical referents were grounded in systematically evaluated evidence.

Results

Select a concept

Sleep quality is crucial for ICU patients' recovery post-surgery, encompassing rest, depth, and satisfaction. It encompasses duration, latency, continuity, and disturbances, often disrupted by environmental and physiological factors and indicators.

Purpose of the analysis

This study explores sleep quality in critical care unit patient post-surgery, identifying factors affecting it, quantifying it, and using it to inform clinical evaluations and treatment plans while also identifying gaps in the literature.

Uses of the concept

This review of Walker and Avant's process aims to identify the key aspects of the concept and explore its various applications, establishing an evidence base that supports the analysis's findings (Khalili et al., 2024).

Common definition — Sleep quality is an individual's satisfaction with their sleep, encompassing factors like time spent, consistency, depth, and calmness upon awakening. It reflects the sleep process's effectiveness in maintaining physical and mental health and is crucial for overall well-being (WHO, 2024).

Objective definition — Sleep quality refers to the measurable aspects of sleep, including duration, time spent asleep, percentage of time spent in bed, and nightly awakenings. PSG and actigraphy are instruments used to evaluate these characteristics by measuring data on sleep patterns and disturbances (Oren et al., 2020). Polysomnography (PSG) is the gold-standard method for objectively assessing sleep. It involves continuous, overnight monitoring of multiple physiological parameters such as brain activity (electroencephalography), eye movements, muscle tone, heart rhythm, and respiratory patterns. PSG provides detailed information on sleep architecture, sleep stages, and sleep disturbances, making it highly accurate but resource-intensive and less feasible for routine use in intensive care units. Actigraphy is a non-invasive, wearable method that estimates sleep–wake patterns based on body movement, typically using a wrist-worn device. It allows for continuous, long-term monitoring in natural clinical settings and is more practical in intensive care units. Although less precise than PSG in identifying sleep stages, actigraphy is useful for evaluating sleep duration, fragmentation, and circadian rhythm trends (Oren et al., 2020).

Subjective definition — Subjective sleep quality is an individual's assessment of their sleep experience, contrasting with objective sleep quality.

Table 1. Attribute of sleep quality among postoperative patients in ICU

Attribute Domain	Operational definition (what defines the concept)	Common indicators & thresholds (when available)	ICU feasibility notes
Sleep architecture & continuity	Objective characteristics describing the structure and consolidation of sleep during the ICU stay	• Sleep latency (prolonged if >30–45 min) • Total sleep time (often <5 h/night in ICU) • Sleep efficiency (poor if <85%) • Wake after sleep onset (WASO: frequent/prolonged awakenings)	PSG provides detailed architecture but is rarely feasible; actigraphy and ECG-derived metrics are more practical for continuity and fragmentation
Sleep disruption pattern	Frequency and pattern of within-sleep interruptions reflecting fragmented or non-restorative sleep	• Number/duration of nocturnal awakenings • Day–night sleep inversion • Increased arousal frequency	Routinely inferred from actigraphy, nursing observations, and sleep logs; aligns well with ICU workflow
Subjective sleep experience	Patient-reported perception of sleep adequacy, restfulness, and satisfaction	• Richards–Campbell Sleep Questionnaire (RCSQ): poor sleep commonly defined as <50/100 • Perceived unrefreshing or insufficient sleep	Highly feasible when patients are awake and communicative; limited in delirium or deep sedation
Physiological correlates	Autonomic and neuroendocrine responses associated with sleep quality	• Heart rate variability (reduced nocturnal parasympathetic activity) • Cortisol rhythm disruption (elevated nocturnal levels)	HRV is increasingly feasible via ECG monitoring; cortisol useful for research but limited for routine bedside use

Table 2. Summaries antecedent, consequence, and empirical referents

Category	Description
Antecedents	- Noise from medical equipment, staff activities, and other patients disrupts circadian rhythms and hinders sleep (Foster, 2020). - Exposure to constant lighting suppresses melatonin secretion, further disrupting sleep patterns (Telias & Wilcox, 2019). - Pain, sedation, and frequent medical procedures interfere with uninterrupted sleep (Knauert et al., 2019). - Anxiety, fear, and disorientation contribute to poor sleep quality (Telias & Wilcox, 2019).
Consequences	- Prolonged ICU stays and increased risk of delirium (Devlin et al., 2018) - Impaired immune function, delayed wound healing, and reduced recovery (Jakowski et al., 2023). - Long-term health issues like cardiovascular disease and metabolic syndrome (Medic et al., 2017). - Persistent sleep disturbances lead to fatigue and compromised mental health post-discharge (Agyapong et al., 2025).
Empirical Referents	- Patients self-report using tools like the Richards-Campbell Sleep Questionnaire (Naik et al., 2018). - PSG for objective sleep architecture measurements (Tiruvoipati et al., 2020). - Actigraphy to monitor rest-activity cycles (Iyengar et al., 2020). - Nurses' observations of restlessness and sedative use (Macdowell et al., 2024). - Environmental assessments of noise, lighting, and interventions (Aparício & Panin, 2020).

Supplementary Table 1. Full Electronic Search Strategies

Database	Full Search String
PubMed	(“sleep quality” OR “sleep disturbance” OR “sleep pattern” OR “deep sleep”) AND (“postoperative” OR “post-surgery” OR surgical) AND (“intensive care unit” OR ICU OR “critically ill”)
Scopus	TITLE-ABS-KEY (“sleep quality” OR “sleep disturbance” OR “sleep pattern” OR “deep sleep”) AND TITLE-ABS-KEY (“postoperative” OR “post-surgery” OR surgical) AND TITLE-ABS-KEY (“intensive care unit” OR ICU OR “critically ill”)
ScienceDirect	(“sleep quality” OR “sleep disturbance” OR “sleep pattern” OR “deep sleep”) AND (“postoperative” OR “post-surgery” OR surgical) AND (“intensive care unit” OR ICU OR “critically ill”)
ProQuest	(“sleep quality” OR “sleep disturbance” OR “sleep pattern” OR “deep sleep”) AND (“postoperative” OR “post-surgery” OR surgical) AND (“intensive care unit” OR ICU OR “critically ill”)

It includes day function, sleep duration, depth, and restfulness, often evaluated using self-reporting tools like the Pittsburgh Sleep Quality Index (Knutson et al., 2017).

Conceptual definition — Multiple factors influence the quality of sleep among postoperative patients in the ICU, including subjective sleep quality, sleep latency, sleep length, pre-sleep activities, sleep disturbances, daytime functional impairments, and the use of sleeping aids (Oren et al., 2020).

Attribute

Four defining attributes of sleep quality among postoperative ICU patients were identified: sleep architecture and continuity, sleep disruption patterns, subjective sleep experience, and physiological correlates. Each attribute is operationalized using measurable indicators that are feasible within ICU settings. Where available, clinically relevant thresholds (e.g., RCSQ <50, sleep efficiency <85%) are provided to enhance bedside applicability. Environmental and care-related factors (e.g., noise, lighting, staff activities) are treated as antecedents, not defining attributes, to maintain conceptual clarity (Table 1).

Sleep architecture

Sleep latency — The amount of time it takes to fall asleep is referred to as sleep latency, and it is a significant predictor of both the quality of sleep and the level of drowsiness that occurs during the daytime. The multiple sleep latency test is a standard that is extensively used for a variety of objectives, including the evaluation of drowsiness and the identification of sleep disorders within the population. In addition, sleep latency is influenced by genetic factors and polymorphisms in the RBFOX3 gene have been associated with this characteristic, which is predominantly expressed in the brain and makes a significant contribution to the neurotransmitter release cycles that are necessary for the initiation of sleep (Oxlund et al., 2023).

Total duration of sleep-in bed — Sleep patterns vary significantly across populations due to factors like race, sex, and socioeconomic status (Lollies et al., 2022). For example, individuals with intellectual disabilities spend about 10 hours in bed but have lower sleep efficiency (Arık et al., 2020). Sleep duration decreases with age, from 14.2 hours at six months to 8.1 hours by 16 years (Ghani et al., 2020). Furthermore, generational shifts show later bedtimes and consistent wake times, leading to reduced total sleep duration. Longer preoperative sleep durations may increase the risk of postoperative psychosis in heart surgery patients (Shanmugasundaram & Dhanasekaran, 2022). Actigraphy studies confirm significant reductions in actual sleep time after surgery (Phansila et al., 2022). Extended sleep duration (≥9 hours) and prolonged time in bed are associated with a greater decline in physical function in older adults (Lin et al., 2022).

Sleep depth — Sleep depth is a complex concept that differs from traditional sleep stages. Those experiencing sleep misperception perceive rapid eye movement (REM) sleep as lighter. In previous studies, the conventional belief challenged that major surgical procedures can disrupt sleep patterns, resulting in a drop in overall sleep time, a decrease in slow-wave sleep, and an increase in non-REM stage 2 sleep. Therefore, both subjective and objective measurements are crucial when assessing sleep depth.

Back to sleep — The time taken to fall back asleep after waking follows a U-shaped pattern throughout the night and can be significantly reduced with medications like pentobarbital and flurazepam (Wolff et al., 2024). Brief awakenings may lead to longer subsequent episodes of slow-wave sleep (SWS) and REM sleep, influencing sleep stage progression (Campbell, 1987). In older adults, sleep disturbances are primarily linked to increased awakenings from non-rapid eye movement sleep, making it harder to return to sleep (van Wyk et al., 2019). REM sleep plays a critical role in distinguishing fear-related and neutral stimuli, consolidating fear-associated memories, and facilitating their extinction. However, remaining awake after extinction enhances the differentiation between neutral and extinguished stimuli, a process linked to activity in the ventromedial prefrontal cortex and amygdala.

Sleep efficiency — Sleep efficiency is a crucial

measure of sleep quality and overall health. Factors like pain, nocturia, and sleep medication use are commonly associated with poor sleep efficiency in older adults, who often experience inefficiencies in their sleep (Desjardins et al., 2019). Research also indicates that sleep efficiency plays a role in determining the quality of life in individuals with heart failure and preserved ejection fraction (Ahmed & Zargaran, 2020). Additionally, low sleep efficiency (below 85%) is linked to reduced nocturnal dips in systolic blood pressure and heart rate in normotensive young individuals, potentially increasing cardiovascular disease risk.

Sleep disturbances

Noise — Environmental noise, particularly from transportation, significantly disrupts sleep and poses health risks. Nighttime noise levels above 55 dB are associated with insomnia symptoms and can lead to endocrine and metabolic perturbations, as well as cardiometabolic, psychiatric, and social issues in both adults and children (Yao et al., 2023). The effects of noise on sleep are not limited to nighttime disturbances but can also result in daytime sleepiness, decreased cognitive performance, and long-term adverse health outcomes (Basner & McGuire, 2018).

Lighting — Light exposure significantly influences sleep patterns and quality. Bright morning light can advance sleep timing, while evening light exposure can delay it and negatively impact sleep outcomes (Delaney et al., 2021). Later circadian phases are associated with lower light intensity and later light exposure, leading to more awakenings during sleep. Light affects sleep in two ways: first, it causes shifts in circadian rhythms, which in turn affects sleep in nocturnal animals and alertness in humans (Santhi & Ball, 2020). The impact of light on slumber can be described in two ways. Research has shown that both objective and subjective sleep outcomes are improved by exposure to bright light (more than 1000 lux) as opposed to dim light (less than 100 lux) or moderate light (100-1000 lux) (Dautovich et al., 2019).

Bedtime activities — Consistent bedtime routines established early in life can lead to better sleep outcomes, including longer sleep duration and fewer sleep problems (Fiese et al., 2021). Early postoperative mobilization within 24 hours of caesarean section can reduce hospital stay, pain scores, and complications like ileus and infection. Pain levels associated with postoperative activities, such as coughing and moving in bed, tend to be higher in the early days following cardiac surgery (Christodoulidis et al., 2023).

Frequency of waking up at night — Nocturnal awakenings are a prevalent sleep disturbance affecting approximately one-third of the general population. Patients typically wake up more often during the first postoperative night compared to preoperatively (48%), along with other contributing factors, including noise from staff and other patients and bathroom use (Yao et al., 2023). A higher risk of postoperative delirium may be linked to sleep disruption, especially increasing wake time after sleep initiation. Postoperative sleep alterations include an increase in stage 2 sleep and a decrease in slow-wave sleep since the magnitude of surgery and opioid administration may influence the extent of sleep disturbances (Ding et al., 2016).

Frequency of sleep disturbances during the day — Postoperative results can be severely affected by sleep disorders, which affect a large percentage of surgical patients. These disruptions typically linger and become worse following surgery, especially in the initial week (Ding et al., 2016). The likelihood of postoperative delirium is higher in patients who have a history of sleep disorders, with odds ratios reported in meta-analyses ranging from 3.73 to 5.24 (Díaz-Alonso et al., 2018). According to Díaz-Alonso et al. (2018), this heightened risk is caused by both sleep disruptions before and after the operation.

Use of sleeping pills — The use of sleeping pills is a significant clinical issue due to the high prevalence of insomnia, affecting approximately 35% of adults (Culver et al., 2020). The rational use of sleeping pills demands individual patient evaluation, specific treatment goals, and careful consideration of the chosen medication (Culver et al., 2020). There is a higher probability of negative postoperative outcomes when benzodiazepines and Z-drugs are used before surgery, especially when opioids are also recommended (Garland et al., 2023). Improving postoperative sleep through both pharmaceutical and non-pharmacological therapies has the potential to enhance patient recovery (Zhang et al., 2023). However, there are concerns about opioid overprescription for postoperative pain management. Studies show that patients typically use fewer opioids than prescribed after discharge, with most consuming 15 pills or less (Seixas, 2021). Despite this, many patients retain excess medication, raising concerns about improper disposal and potential misuse (Seixas, 2021).

Subjective sleep

Patient-reported measures of sleep satisfaction and restfulness are critical components of assessing sleep quality.

Sleep satisfaction — Sleep pleasure is a concept in sleep research that emphasizes the positive emotions experienced during sleep (Díaz-Alonso et al., 2018). Factors affecting sleep satisfaction include the amount of sleep, depth of sleep, frequency of awakenings, and number of awakenings per night. Moreover, older individuals with depression may report less satisfaction with their sleep (Soeding et al., 2024). Sleep quality is influenced by how you feel before, during, and after sleep, and environmental factors like bedding quality, bedroom temperature, and noise levels influence the following day. Sleep satisfaction indices include ease of falling asleep, ability to return to sleep after waking up, and sleep duration on both weekdays and weekends (Ohayon

et al., 2017).

Physiological indicators

Postoperative patients in the ICU require good sleep quality for recovery. HRV and cortisol levels are crucial indicators. HRV indicates the autonomic nervous system's balance, with reduced variability often linked to stress and poor sleep. On the other side, elevated cortisol disrupts sleep patterns, reducing sleep quality.

HRV is a non-invasive measure of autonomic nervous system function that is monitored in ICU settings to enhance the understanding of patients' sleep architecture and autonomic function (Ganglberger et al., 2023; Ho et al., 2024). Increased HRV during sleep is associated with restorative sleep and heightened parasympathetic activity, whereas lower HRV may indicate sympathetic dominance, stress, and poor sleep quality. HRV derived from electrocardiogram signals has been shown to assess sleep stages and fragmentation in critically ill patients, offering a practical alternative to traditional PSG, which is often impractical in ICU settings (Ganglberger et al., 2023). The use of deep learning models to classify sleep stages in ICU patients based on HRV and respiratory variability reveals the potential of these biosignals to provide insights into sleep phases, quality, and fragmentation (Ganglberger et al., 2023). Additionally, HRV has been investigated for its potential role in predicting perioperative neurocognitive outcomes, with findings suggesting its relevance in evaluating neurocognitive risk in non-cardiac surgical patients (Liu et al., 2024).

Cortisol levels — Cortisol, a glucocorticoid hormone secreted by the adrenal glands, follows a diurnal pattern, peaking in the early morning and gradually declining throughout the day (Lightman, 2010). Sleep disruptions can alter this rhythm, leading to elevated nocturnal cortisol levels, which are associated with stress and poor sleep quality. In postoperative ICU patients, increased cortisol levels may result from surgical stress, pain, and environmental disturbances. A study by Hu et al. (2015) found that interventions such as earplugs, eye masks, and soothing music improved perceived sleep quality among ICU patients. However, despite these improvements, no significant differences were observed in urinary cortisol levels between the intervention and control groups. This suggests that while these interventions enhance subjective sleep experiences, their impact on physiological stress markers like cortisol may vary based on factors such as surgery timing and individual differences.

Identification of Cases

Model Case — After undergoing abdominal surgery, a 55-year-old patient was admitted to the ICU for postoperative care. Her sleep quality was monitored over 48 hours, revealing an extended sleep latency of 45 minutes and a total sleep duration of 4.5 hours. Her sleep was fragmented, with a 60% sleep efficiency. She struggled to transition into deep sleep stages, but could return to light sleep after brief awakenings. Frequent nighttime awakenings were influenced by noise from medical equipment and staff conversations, and daytime rest periods were interrupted by nursing care. A low-dose sedative was given to aid her sleep, but only slightly improved sleep continuity. Mrs A described her sleep as "unrefreshing" and "disrupted," expressing frustration over her inability to achieve restorative sleep. Her HRV analysis showed reduced parasympathetic activity at night, indicating poor autonomic recovery. Elevated morning cortisol levels suggested increased stress, likely due to sleep deprivation.

Borderline case — A 68-year-old postoperative patient recovering from abdominal surgery in the ICU is experiencing inconsistent sleep quality. The patient falls asleep slightly longer than average, with only about 5 hours of actual sleep. The sleep monitoring system shows a predominance of light sleep with minimal deep sleep phases, resulting in a low sleep efficiency of 50%. Despite frequent awakenings, the patient can return to sleep within 15-20 minutes. Nursing interventions and routine vital sign monitoring also contribute to delayed sleep onset. The patient wakes 3-4 times at night due to discomfort from surgical drains and alarm sounds. Frequent daytime naps also interfere with nighttime sleep patterns. Although feeling somewhat rested, the patient's sleep is fragmented and shallow, leading to dissatisfaction with the overall sleep experience. HRV data indicates mild stress levels, and slightly elevated morning cortisol levels suggest increased stress or inadequate nighttime rest.

Contrary case — Mrs A, a 45-year-old postoperative patient in the ICU following abdominal surgery, experiences severely impaired sleep quality. Her sleep is characterized by prolonged latency exceeding an hour, fragmented periods totaling less than three hours, and an absence of restorative deep sleep. Even daytime rest is compromised by the busy ICU setting. Despite being offered prescribed sleep aids, she refuses them due to concerns about side effects, leaving her without effective interventions. Subjectively, Mrs A describes her sleep as "non-existent," expressing frustration and exhaustion, with physical discomfort, environmental stressors, and emotional strain exacerbating her perception of poor sleep. Objective assessments indicate significant physiological stress, including reduced HRV and persistently high cortisol levels, markers of sleep deprivation and stress. These findings highlight the profound impact of her disrupted sleep on both her physical and psychological well-being.

Table 2 presents summaries of the antecedent, consequence, and empirical reference, and detailed explanations are below:

Antecedents

Understanding the factors that impact the quality of

sleep experienced by postoperative patients in the ICU is crucial for encouraging patient recovery and well-being. The events or circumstances that take place prior to the manifestation of an idea are referred to as antecedents (Yuan et al., 2021). The analysis identified the following antecedents contributing to sleep quality: Noise from medical equipment, staff activities, and other patients, as well as constant lighting, disrupt circadian rhythms and hinder sleep. High noise levels from equipment alarms and conversations have been reported to disturb sleep in ICU patients (Sathvik et al., 2023). Additionally, exposure to light during nighttime can suppress melatonin secretion, further disrupting sleep patterns (Telias & Wilcox, 2019). Pain, sedation, and frequent medical procedures interfere with uninterrupted sleep. Moreover, the use of mechanical ventilation and other medical interventions can contribute to sleep fragmentation (Telias & Wilcox, 2019). Anxiety, fear, and disorientation in ICU settings contribute to poor sleep. Patients may feel unsafe or anxious, leading to difficulty falling asleep or maintaining sleep (Sathvik et al., 2023).

Consequences

Poor sleep quality in postoperative ICU patients is associated with several adverse outcomes, including prolonged ICU stays, increased delirium risk, impaired immune function, delayed wound healing, and diminished overall recovery and quality of life. Sleep disturbances contribute to extended hospitalizations due to their impact on physiological recovery and healing processes (Devlin et al., 2018). Additionally, sleep disruptions are linked to delirium, characterized by cognitive deficits, hallucinations, and disorientation, affecting nearly half of ICU patients and potentially leading to long-term cognitive impairments. Poor sleep quality is also associated with reduced quality of life, increased stress, emotional distress, and cognitive impairments (Medic et al., 2017).

Moreover, inadequate sleep in ICU patients increases susceptibility to infections and sepsis due to impaired cytokine production and cellular immunity (Lollies et al., 2022). Sleep deprivation is also correlated with delayed tissue repair and wound healing, complicating postoperative outcomes. Furthermore, chronic sleep disturbances can lead to long-term health risks such as cardiovascular disease, metabolic syndrome, and type 2 diabetes, conditions often associated with stress (Medic et al., 2017). Daily psychosocial stressors, including lack of leisure time and work-family conflicts, can further affect sleep latency and quality (Lee et al., 2017). The long-term ramifications of recurrent sleep disturbances during ICU stays include persistent fatigue, reduced physical function, and impaired mental health, negatively affecting patients' quality of life even after hospital discharge (Naik et al., 2018).

Empirical referents

Empirical referents are observable and measurable indicators used to assess the presence of a concept (Naik et al., 2018). In the context of postoperative ICU patients, sleep quality is a key empirical referent, evaluated through multiple approaches. Self-reports, such as the Richards–Campbell Sleep Questionnaire (RCSQ) is a simple, patient-reported tool used to assess perceived sleep quality, particularly in intensive care unit (ICU) settings. It consists of five items that evaluate key aspects of sleep: sleep depth, sleep latency, number of awakenings, ability to return to sleep, and overall sleep quality. Each item is rated using a visual analog scale (0–100), with higher scores indicating better sleep (Naik et al., 2018). PSG is the gold standard for sleep assessment, objectively measuring sleep architecture and stages, but its use in ICU settings is limited due to technical complexity and patient care constraints (Tiruvoipati et al., 2020). Actigraphy, a non-invasive method using wristwatch-like devices, helps track rest-activity cycles and sleep patterns in ICU patients (Iyengar et al., 2020). Nurses' observations of restlessness, sedative use, and sleep periods serve as practical indicators, highlighting sleep disturbances as a major concern (Macdowell et al., 2024). These empirical referents enable systematic evaluation and intervention to enhance postoperative ICU patients' sleep quality and recovery outcomes.

Discussion

The findings of this conceptual analysis highlight sleep quality as a clinically relevant yet under-integrated component of postoperative care in the ICU. Rather than implying direct causality, the present analysis demonstrates that sleep quality is consistently associated with key recovery-related outcomes in postoperative ICU patients, including delirium risk, physiological stress responses, and prolonged ICU stay. By applying the Walker and Avant framework, this study clarifies sleep quality as a multidimensional concept shaped by definable attributes and influenced by modifiable antecedents within the ICU environment, thereby supporting its relevance for nursing assessment and care planning.

The findings of this study underscore the critical importance of addressing sleep quality as a fundamental component of postoperative care for patients in ICUs. Despite its significant impact on recovery, sleep quality is often overlooked in these high-stress environments. ICU patients frequently encounter sleep disturbances due to environmental factors, pain, and psychological distress. Utilizing Walker and Avant's (2011) conceptual framework provides a structured approach to understanding sleep quality by identifying key antecedents, attributes, and consequences, leading to actionable interventions that enhance patient care.

Environmental factors such as noise and light exposure are repeatedly identified in postoperative ICU literature as antecedents that disrupt sleep continuity and circadian regulation, rather than direct causes of adverse outcomes (Ho et al., 2024). Excessive alarm noise, staff communication, and continuous illumination may increase arousal frequency and reduce restorative sleep phases, which in turn are associated with fatigue, stress responses, and impaired cognitive recovery (Stewart et al., 2017). Interventions including noise reduction strategies, dimming lights during nighttime hours, earplugs, and eye masks have been shown to improve subjective sleep outcomes in ICU populations, although evidence for downstream clinical effects remains variable (Delaney et al., 2019). Framing these interventions as sleep-protective strategies rather than curative measures aligns more closely with the current postoperative ICU evidence base.

Postoperative pain and anxiety represent critical clinical antecedents that may interfere with sleep initiation and maintenance in ICU patients. Inadequately controlled pain can prolong sleep latency and increase nocturnal awakenings, while anxiety and hyperarousal may limit progression into restorative sleep stages (Delaney et al., 2019). Multimodal analgesia and individualized anxiolysis may therefore support sleep quality indirectly by reducing physiological and psychological arousal. Importantly, this analysis does not suggest that analgesic or anxiolytic interventions directly improve sleep outcomes; rather, their timing, dosing, and selection may influence sleep–wake stability and delirium risk (Sadler et al., 2020). Aligning analgesia and anxiolysis schedules to minimize nighttime arousal represents a feasible, nursing-sensitive strategy within postoperative ICU care.

Sleep disruption has been repeatedly linked to delirium in critically ill populations, including postoperative ICU patients, although causal pathways remain complex and bidirectiona (Zhang et al., 2021). Fragmented sleep and circadian misalignment may exacerbate neuroinflammatory responses and impair cognitive resilience, thereby increasing vulnerability to delirium. Within this context, nursing-led interventions such as care clustering, reduction of non-urgent nighttime procedures, and alignment of monitoring activities with patients' sleep–wake cycles may reduce unnecessary sleep interruptions. These strategies target mechanistic contributors to sleep disruption and align with delirium prevention bundles commonly used in ICU practice (Lee et al., 2017). Research in the future should look at how sleep-focused therapies affect recovery trajectories over the long run and what factors particular to individual patients affect the quality of their sleep-in different types of ICU.

Clinical implication

As a conceptual analysis, this study does not establish causal relationships but instead provides a structured framework for understanding how sleep quality operates within the postoperative ICU context. Incorporating sleep assessment into routine ICU nursing practice using feasible tools such as patient-reported measures, actigraphy, or HRV-derived indicators may enhance early identification of patients at risk for poor recovery trajectories. Future ICU-focused longitudinal and interventional studies are needed to clarify the extent to which sleep-targeted interventions influence postoperative outcomes and to determine which patient subgroups derive the greatest benefit. Such research should prioritize postoperative ICU-specific populations, standardized sleep measures, and clearly defined intervention mechanisms.

Limitations

The concept analysis method proposed by Aparício and Panin (2020) offers a structured framework for defining and analyzing concepts, but it has limitations. It relies on existing literature and theoretical constructs, which may not fully capture the complexities of clinical practice. Sleep quality assessment often relies on subjective self-reported data, which can introduce bias and affect study validity. Sleep in ICUs is often disrupted by environmental factors, making it difficult to isolate their specific impact on sleep quality. Variability in postoperative patients' medical histories and recovery trajectories complicates generalizability. Measurement tools for sleep quality may also have inherent biases or limitations, affecting data accuracy and reliability. Small sample sizes can reduce statistical power, and findings may not be generalizable. The dynamic nature of ICU environments further complicates sleep assessment, necessitating longitudinal research. Ethical and practical challenges, such as obtaining informed consent from critically ill patients, can also impact study design and execution.

Conclusions

Sleep quality is a critical but complex component of recovery among postoperative patients in intensive care units. The findings of this concept analysis suggest that sleep quality is influenced by a combination of environmental, physiological, and care-related factors; however, causal relationships cannot be definitively inferred due to heterogeneity in study designs and measurement approaches. While biomarkers such as cortisol levels and heart rate variability offer valuable insights into stress and autonomic regulation, their clinical interpretation in ICU settings is constrained by confounding factors including critical illness severity, pharmacological interventions, and circadian disruption. Therefore, these indicators should be considered complementary rather than standalone measures of sleep quality. Based on the synthesized evidence, a tiered sleep quality assessment approach is proposed, integrating (1) routine subjective screening using

validated tools, (2) targeted objective monitoring when clinically feasible, and (3) contextual clinical judgment that accounts for ICU-specific constraints. Implementation should occur in a stepwise manner, beginning with low-burden environmental and scheduling modifications, followed by individualized pain and anxiety management strategies, and progressing to selective use of physiological indicators where appropriate. This pragmatic, layered approach supports clinical decision-making while acknowledging measurement limitations and resource variability, and it provides a feasible pathway for integrating sleep quality assessment into routine postoperative ICU care.

Declaration of Conflicting Interest

No conflict of interest to declare.

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Author's Contribution

JG contributed to the study's conception and design, data acquisition, and data analysis, wrote the first draft of the manuscript, revised the final draft, and gave final approval of the version to be published.

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Comprehensive approaches to suicide prevention in undergraduate students: A scoping review of psychological, social, and institutional strategies

Yuniar Mansye Soeli[1*], Novy Helena Catharina Daulima[1], Mustikasari Mustikasari[2], Evi Martha[2]

[1] Faculty of Nursing, Indonesia University, Depok, Indonesia
[2] Faculty of Public Health, Indonesia University, Depok, Indonesia

Abstract

Background: Suicide represents a significant mental health issue worldwide, particularly among undergraduate students, and is intensified by various psychological, social, and institutional stressors. Despite heightened awareness of the problem, existing prevention strategies frequently concentrate on discrete interventions while overlooking broader systemic and societal factors that influence student well-being.
Purpose: This scoping review seeks to investigate current suicide prevention methods aimed at undergraduate students by organizing these strategies into three main domains: psychological, social, and institutional.
Methods: The research adhered to Arksey and O'Malley's (2005) framework for scoping reviews as well as PRISMA-ScR guidelines. A comprehensive search was performed across numerous databases—such as PubMed, ScienceDirect, ProQuest, and Google Scholar—for studies published between 2010 and 2024. The inclusion criteria targeted interventions specifically designed for undergraduate populations utilizing either psychological or social approaches within an institutional context. Thematic synthesis facilitated the categorization of intervention types while descriptive statistics provided a summary of study characteristics.
Results: Seventeen studies were included in this review that assessed suicide prevention initiatives across different levels. Psychological approaches like cognitive-behavioral therapy (CBT), digital mental health resources, along with peer support programs demonstrated considerable effectiveness in reducing suicide risk and improving overall mental wellness. Social elements such as family involvement, cultural sensitivity, and community-based programs were identified as vital contributors to emotional resilience enhancement. Institutional measures—including gatekeeper training sessions, crisis response policies, and adaptable academic accommodations were highlighted as essential components necessary for fostering supportive environments within universities. Importantly, "digital"mental health solutions are gaining traction; although they present scalable opportunities for improvement.
Conclusion: The study emphasizes the need for a comprehensive approach to suicide prevention in university settings, involving psychological, social, and institutional strategies. Future efforts should focus on building digital-human hybrid models that strengthen early detection and empathetic engagement.

Keywords: higher education; mental health interventions; suicide prevention; undergraduate students

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***Corresponding author**

Yuniar Mansye Soeli*
Faculty of Nursing, Indonesia University, Depok, Indonesia; Address: Jl. Prof. DR. Sudjono D. Pusponegoro, Pondok Cina, Kecamatan Beji, Kota Depok, Jawa Barat 16424; Phone: +62 821-8929-0206; E-mail: yuniar.mansye31@ui.ac.id

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Introduction

Suicide among undergraduate students has emerged as a critical public health concern, with rising instances of suicidal ideation and attempts reported globally (World Health Organization [WHO], 2021). College students encounter numerous stressors, including academic pressures,

social expectations, and emotional challenges, which frequently culminate in mental health issues such as depression, anxiety, and suicidal inclinations (Auerbach et al., 2018). Studies indicate that approximately 10–15% of university students experience suicidal thoughts annually, with 1–2% making suicide attempts each year (Mortier et al., 2018; Eskin et al., 2016). Significant contributors to suicidal behavior among this demographic encompass emotional distress, substance abuse, lack of adequate social support, and the weight of academic demands (Garlow et al., 2008; Ribeiro et al., 2018). Furthermore, documented variations in suicide risk correlate with factors such as gender identity, cultural background, and access to mental health resources (Arnett et al., 2014). Given these alarming trends, it is essential for universities and policymakers to adopt effective suicide prevention strategies. These may include mental health screenings, accessible counseling services, and peer support programs (Lipson et al., 2019; Liu et al., 2019). The interplay between these elements often creates a complex web of vulnerabilities that heighten the risk of suicide.

Conventional mental health interventions such as counseling services and crisis hotlines, are crucial for providing immediate support. Nonetheless, their effectiveness is frequently compromised by obstacles like stigma surrounding mental health issues, limited service availability, and inadequate coordination with broader institutional and community support frameworks (Eisenberg et al., 2013; Zalsman et al., 2016). Stigmatization remains a significant barrier that prevents individuals from seeking assistance due to apprehensions about judgment or discrimination (Clement et al., 2015). Accessibility challenges—including geographical barriers and financial constraints—further restrict the utilization of these services, particularly in rural or disadvantaged regions (Andrade et al., 2014). Additionally, the disjointed nature of mental health services across educational institutions, workplaces, and community organizations often results in fragmented care that diminishes intervention efficacy (Kral et al., 2018). Consequently, there is an urgent need for comprehensive suicide prevention strategies that address psychological, social, and institutional dimensions. Integrating digital mental health tools with community-based initiatives and policy-driven approaches is vital for establishing a more accessible and stigma-free supportive system (Luxton et al., 2012; Torous et al., 2021).

Suicide prevention refers to a series of evidence-based strategies aimed at reducing suicidal ideation, suicide attempts, and deaths by suicide through early detection, timely intervention, and sustained support (World Health Organization [WHO], 2023; Niederkrotenthaler et al., 2022; Zalsman et al., 2016). In this study, suicidal ideation is defined as the presence of thoughts about self-inflicted harm or death, while suicide prevention interventions encompass both psychological and social approaches implemented at the individual, community, and institutional levels (Klonsky et al., 2019; Wasserman et al., 2021). These definitions are provided to ensure conceptual clarity for readers who may be less familiar with suicide prevention terminology.

Current suicide prevention initiatives targeting undergraduate students frequently emphasize individual-level strategies such as therapy or medication (Cuijpers et al., 2019). While these approaches are valuable in their own right, they tend to neglect the wider social and institutional factors influencing suicide risk. For instance, peer support networks on campuses along with proactive policies from faculty members are often underutilized despite their potential to foster a supportive atmosphere for vulnerable students (Horgan et al., 2016; Lattie et al., 2019). Moreover, the insufficient integration of psychological support with social and institutional measures can lead to ineffective prevention efforts characterized by fragmentation (Klonsky et al., 2018). This gap highlights the necessity for a holistic methodology that merges individual assistance with systemic reforms aimed at enhancing mental health awareness and resilience within college environments. Therefore, this scoping review is crucial because previous reviews have been limited in scope, focusing predominantly on individual-level strategies while lacking integration of psychological support with social and institutional efforts. These gaps highlight the need for a more comprehensive mapping of suicide prevention approaches for undergraduate students to better inform the development of future campus-based interventions.

This scoping review intends to compile existing research on psychological, social, and institutional methods for preventing suicide among undergraduate students. It draws upon theoretical frameworks such as the Interpersonal Theory of Suicide (Joiner, 2005) alongside the Stress-Vulnerability Model (Zubin & Spring, 1977), both emphasizing how individual vulnerabilities interact with environmental stressors contributing to suicide risk. Additionally, the Public Health Framework adopts a multi-tiered perspective underlining the significance of addressing risk factors across individual, social, and institutional levels. These frameworks advocate for an integrated approach combining psychological,social,and institutional tactics tailored to effectively mitigate student suicide risks.

Through analysing current intervention practices, this study aims to uncover best practices, rising trends, and areas needing further research within this field. The outcomes have significant implications for shaping institutional policies improving mental health services while fostering campus environments centered on student well-being. The specific objectives include: 1) Mapping existing psychological, social, and institutional strategies related to suicide prevention among undergraduate students.; 2) Identifying effective practices and

emerging interventions within higher education contexts.; 3) Highlighting gaps in both research and practical applications, to lay groundwork for future investigations.

Materials and Methods

Study Design

This scoping review was carried out in accordance with the framework developed by Arksey and O'Malley (2005) and subsequently refined by Levac et al. (2010). The methodology comprises five key steps: (1) formulating the research question, (2) identifying pertinent studies, (3) selecting studies based on established criteria, (4) extracting and organizing data, and (5) summarizing and presenting pivotal findings. This method was selected to systematically investigate existing literature concerning suicide prevention strategies aimed at undergraduate students while pinpointing research gaps that warrant further exploration. Adherence to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews guidelines (PRISMA-ScR), as outlined by Tricco et al. (2018), ensured methodological transparency and rigorous reporting.

Search Strategy

The scoping review followed the PRISMA-ScR guidelines. A thorough literature search was conducted utilizing various electronic databases such as PubMed, Science Direct, ProQuest, and Google Scholar to find studies published from 2010 through 2024. The search strategy incorporated both controlled vocabulary terms ((MeSH terms)) along with keywords while employing Boolean operators like AND/OR to refine results effectively. Essential search phrases included "suicide prevention," "undergraduate students," "mental health interventions," "psychological support," "social support," "institutional policies," and "university mental health programs." Only peer-reviewed journal articles written in English were considered within this review scope; additionally, reference lists of qualifying articles alongside previous systematic reviews were manually scrutinized for other relevant sources. To enhance comprehensiveness in searching efforts a consultation with a research librarian took place.

Inclusion and Exclusion Criteria

The following inclusion criteria guided which studies were accepted into the review: 1) Focused specifically on suicide prevention strategies tailored for undergraduate students. 2) interventions targeting suicidal ideation, behavior, or risk among university students. 3) Examined psychological or social approaches aiming at reducing suicide risk. 3) Empirical articles using quantitative or qualitative methodology that have been peer-reviewed. 4) Published between 2010–2024 in English. Conversely, exclusion criteria encompassed: 1) Studies addressing populations outside those of undergraduate students, such as high schoolers or general adult demographics. 2) Research centred mainly around postvention measures rather than preventative tactics. 3) Articles categorized merely as commentaries, opinion pieces, editorials, case reports, or conference abstracts lacking original empirical findings. 4) Studies without publicly accessible full-text versions or failing specifically report concrete suicide intervention methods. 5) studies focused solely on non-suicidal self-injury, 6) commentaries or editorials, and 7) non-university populations. Studies were categorized into three domains: (1) individual-level interventions (e.g., CBT, mindfulness, resilience training), (2) social and peer-based interventions, and (3) institutional or digital-based prevention models.

Data Extraction

To maintain consistency during data capture processes, a structured extraction framework was created capturing essential study details accurately. Extracted information comprised authorship attributes including publication year, design specifics regarding methodology involved, population characteristics paired sample size descriptions, detailed accounts related each intervention examined primarily observed outcomes coupled any limitations noted throughout investigation process. Two independent reviewers performed extractions cross-referenced entries ensuring accuracy validating integrity extracted content where discrepancies occurred consensus facilitated via third reviewer's involvement.

Quality Assessment

Methodological rigor across included publications assessed using appropriate evaluative tools corresponding respective designs employed. For instance Joanna Briggs Institute Critical Appraisal Checklist utilized assess quality among cohort-based cross-sectional qualitative investigations Moola et al. (2020), randomized controlled trials evaluated through Cochrane Risk Bias Tool Higgins et al. (2011). Each individual piece classified low moderate high-risk bias categories according predefined evaluation standards although no exclusions applied solely due identified methodological shortcomings consistent principles underpinning scoping reviews approach taken here.

Data Analysis & Synthesis

Extracted datasets underwent thematic synthesis analysis revealing recurring patterns present strategic initiatives targeting suicides preventive practices. Findings organized three core themes: First theme revolves around psychological intervention techniques inclusive cognitive-behavioural therapy (CBT) digital mental wellness instruments peer-support networks formed second category describes sociocultural factors involving family engagement community-driven programming

Table 1. Characteristics of included studies (n=17)

Author(s) & Year	Study Design	Sample	Instrument	Intervention Name	Approach	Duration	Content	Findings
Worsley et al. (2022)	Systematic review	Review of multiple interventions in higher education settings	Analysis of intervention effectiveness	Various institutional and psychological interventions	Institutional, psychological	Varied intervention durations	Institutional policies, mental health services, digital interventions	Multi-component interventions improve mental health and reduce suicide risk
Horgan et al. (2020)	Qualitative study	30 undergraduate students	Semi-structured interviews	Peer support for mental health	Peer-led, social support	Ongoing peer support programs	Peer-led discussions, emotional support	Peer support reduces stigma and enhances help-seeking behaviors
Lattie et al. (2019)	Systematic review	Various digital mental health interventions	Evaluation of digital mental health interventions	Digital mental health interventions	Digital, psychological	Varied based on intervention type	Online CBT, self-guided digital mental health tools	Digital interventions effectively reduce anxiety and depression
Lipson et al. (2019)	Longitudinal analysis	National data from U.S. college students	Survey on mental health service utilization	Tracking mental health trends	Policy-level, survey-based	10-year trend analysis (2007–2017)	Analysis of increased mental health service use	Increasing mental health service utilization over a decade
Wang et al. (2023)	Randomized controlled trial (RCT)	University students (exact number unspecified)	e-Mental health intervention assessment	e-Mental Health Intervention	Digital mental health support	Short-term intervention (exact duration unspecified)	Co-designed digital support tools	e-Mental health programs can improve student mental health
Mortier et al. (2018)	Meta-analysis	60,000+ students from 19 countries	Standardized mental health surveys	WMH-ICS project	Survey-based epidemiological research	Cross-sectional meta-analysis	Prevalence of suicidal ideation and behavior	17.2% of students experienced suicidal ideation; 2.8% attempted suicide
Spafford et al. (2024)	Systematic review & meta-analysis	15 gatekeeper training studies	Assessment of gatekeeper training impact	Gatekeeper training programs	Gatekeeper intervention	Varied training program durations	Training programs for suicide prevention	Gatekeeper training improves knowledge and intervention skills
Stanley et al. (2018)	RCT	1,200 participants, including college students	Safety Planning Intervention (SPI) assessment	Safety Planning Intervention (SPI)	Safety planning, crisis intervention	Follow-up intervention compared to usual care	Safety planning techniques for crisis intervention	SPI significantly reduces suicidal behaviors

Cont. Table 1. Characteristics of included studies (n=17)

Author(s) & Year	Study Design	Sample	Instrument	Intervention Name	Approach	Duration	Content	Findings
Torous et al. (2021)	Review	Various digital mental health approaches	Analysis of mental health technology adoption	Digital mental health support	Digital mental health enhancement	Analysis of past and present interventions	Use of technology for mental health support	Digital approaches are effective but require integration with traditional care
Kral & Kidd (2018)	Community-based participatory research	University students and local community groups	Community-driven research methods	Community engagement for suicide prevention	Community-based participatory approach	Long-term community engagement	Community-driven suicide prevention initiatives	Community involvement is key to effective suicide prevention
Fajarwati (2023)	Qualitative study	University faculty and students in Indonesia	Interviews, thematic analysis	University Suicide Prevention Program	Psychological and social	Ongoing university initiative	University-led suicide prevention through faculty-student collaboration	Effective in fostering collaboration but requires institutional support
Hjelvik et al. (2022)	Intervention study	Medical students	Workshop participation and feedback surveys	Peer-to-Peer Suicide Prevention Workshop	Peer-support and psychological	Single-session workshop	Medical students trained to identify and support peers at risk	Improved peer intervention skills and awareness of suicide risk
Hasimoto et al. (2021)	Quasi-experimental study	University teachers in Japan	Pre-post intervention survey	Gatekeeper Training for University Teachers	Educational and gatekeeping	Multi-session program	University teachers trained to recognize and intervene in suicide risk cases	Increased confidence and knowledge among university teachers in suicide prevention
Mariyati (2020)	Experimental study (RCT)	Undergraduate students with suicidal ideation	Psychological assessment tools	Group Cognitive Therapy for Suicide Prevention (GCT-SP)	Cognitive therapy	8-week program	CBT-based group intervention to reduce suicidal ideation	Significant reduction in suicidal ideation among participants
Nugraha (2020)	Educational intervention study	College students in Indonesia	Infographic-based learning assessment	Infographic-Based Suicide Prevention Education	Educational media intervention	One-time educational intervention	Animated infographics as an educational medium for suicide prevention	Enhanced understanding of suicide prevention strategies
Scalora et al. (2022)	Open trial study	University students with depressive symptoms	Mental health assessment scales	Awakened Awareness Spiritual-Mind-Body Program	Holistic mind-body approach	4-week program	Holistic intervention integrating spirituality and mental health strategies	Reduced depressive symptoms and improved resilience
Willson et al. (2020)	Educational intervention study	Pharmacy students in the U.S.	Training evaluation questionnaire	Pharmacy Student Suicide Awareness Training	Educational and skill-based	One-day training session	Pharmacy students trained to provide suicide awareness and prevention support	Enhanced suicide awareness and intervention skills among pharmacy students

Table 2. Summary of Suicide Prevention Strategies by Core Intervention Domains

Core Theme	Representative Studies	Key Intervention Strategies	Main Components / Activities	Findings / Outcomes	Implications for University Settings
Individual-Level Interventions	Mariyati (2020); Scalora et al. (2022); Stanley et al. (2018)	Cognitive Behavioral Therapy (CBT), Safety Planning Intervention (SPI), Holistic Mind–Body Program	CBT-based group therapy, safety planning for crisis management, mind-body resilience and spiritual integration	Significant reductions in suicidal ideation, depressive symptoms, and self-harm risk	Psychological training programs should be embedded in counseling centers to enhance coping and resilience among students
Social and Peer Based Interventions	Horgan et al. (2020); Hjelvik et al. (2022); Hasimoto et al. (2021); Kral & Kidd (2018)	Peer support workshops, gatekeeper training, community engagement initiatives	Peer-led discussions, skill-based training for suicide awareness, community-based participatory approaches	Increased peer awareness, reduced stigma, improved confidence and help-seeking behavior	Peer-support and gatekeeper systems should be institutionalized through student organizations and trained mentors
Institutional and Digital Based Interventions	Worsley et al. (2022); Wang et al. (2023); Torous et al. (2021); Lipson et al. (2019); Fajarwati (2023); Nugraha (2020); Spafford et al. (2024)	Institutional mental health policies, e-Mental health platforms, digital education media, gatekeeper training for staff	Campus-wide mental health initiatives, AI-based monitoring tools, online counseling, infographic-based learning	Improved service utilization, increased literacy on suicide prevention, enhanced detection and crisis response	Universities should integrate digital and policy-level mental health strategies into the 'Kampus Sehat Mental' framework

lastly institutional policy frameworks focus university-provided arrangements staff training procedures administrative regulations oriented towards preventing suicidal behavior. Descriptive statistics summarized overall study traits narrative synthesis interpreted trends assessing effectiveness whilst illuminating crucial existent knowledge voids evident field explorations undertaken. A comprehensive understanding emerged outlining avenues necessitating additional scrutiny moving forward surrounding topic area addressed herein respectively.

Results

Search results

After applying category adjustments, the number of relevant studies was refined to 1,564. The screening process ensured that selected journals met inclusion and exclusion criteria related to suicide prevention in college students, focusing on studies published between 2019 and 2023. Literature selection was guided by criteria such as the last five years' publication range, inclusion in Medline, open access availability, relevance to nursing and science, and mental health and prevention topics. Ultimately, 17 studies and scoping reviews were included in the final analysis (Figure 1).

Characteristics of Included Studies

The selected studies employ a diverse range of quantitative and qualitative methodologies, including systematic reviews (Worsley et al., 2022; Lattie et al., 2019; Spafford et al., 2024), randomized controlled trials (Stanley et al., 2018; Wang et al., 2023; Mariyati, 2020), meta-analyses (Mortier et al., 2018), intervention studies (Hjelvik et al., 2022), and community-based participatory research (Kral & Kidd, 2018). The sample sizes vary widely, with some studies analyzing large-scale epidemiological data, such as Mortier et al. (2018), which included over 60,000 students from 19 countries, while others, such as Horgan et al. (2020), conducted in-depth qualitative research with smaller groups of 30 undergraduate students. Most interventions were implemented in higher education settings, targeting undergraduate students, faculty, and university administrators. The instruments used ranged from psychological assessment tools (Mariyati, 2020), training evaluation questionnaires (Willson et al., 2020), and digital mental health platform assessments (Torous et al., 2021) to survey-based mental health monitoring (Lipson et al., 2019).

Psychological Intervention Techniques

One of the dominant themes in the reviewed literature is the use of cognitive-behavioral therapy

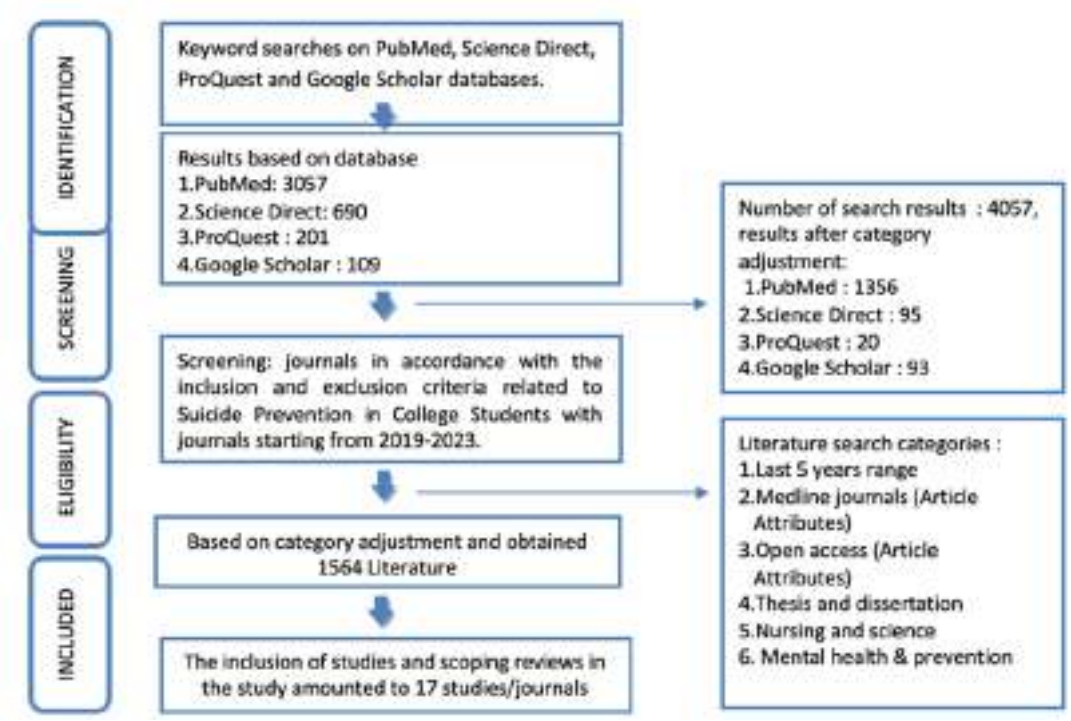

Figure 1. Searching results flow

(CBT), digital mental health interventions, and peer-support networks to mitigate suicide risk. Studies emphasize that CBT-based interventions, such as Mariyati (2020), demonstrate significant reductions in suicidal ideation, reinforcing CBT's role in structured intervention programs. Lattie et al. (2019) and Wang et al. (2023) highlight the effectiveness of digital mental health interventions, with findings suggesting that e-mental health programs and self-guided CBT-based digital tools improve student mental health outcomes. Horgan et al. (2020) and Hjelvik et al. (2022) explore peer-support networks, finding that peer-led suicide prevention discussions and emotional support programs help reduce stigma and encourage help-seeking behaviors among students. The results of these studies indicate that multi-component interventions combining CBT, digital tools, and peer-support mechanisms are highly effective in reducing mental health distress and preventing suicidal ideation.

Sociocultural Factors: Family Engagement and Community-Driven Programming

A second thematic category focuses on the role of sociocultural influences in suicide prevention, including family engagement, cultural adaptation of mental health interventions, and community-driven programming. Kral & Kidd (2018) and Fajarwati (2023) underscore the importance of community-based participatory approaches, finding that long-term community engagement and collaboration between faculty and students foster a more inclusive support system for mental health awareness. Nugraha (2020) investigates the use of educational media interventions, showing that infographic-based suicide prevention education enhances students' understanding of mental health issues, while Scalora et al. (2022) introduces a spiritual-mind-body approach to mental health, demonstrating that holistic interventions integrating spirituality and psychological well-being significantly reduce depressive symptoms. These findings highlight the value of cultural sensitivity in designing effective suicide prevention strategies, particularly in diverse university settings where social dynamics play a crucial role in shaping mental health perceptions.

Institutional Policy Frameworks: University-Provided Arrangements and Administrative Regulations

The third thematic category focuses on institutional efforts in suicide prevention, including university-led policies, staff training procedures, and administrative measures to address suicide risk. Worsley et al. (2022) and Lipson et al. (2019) explore the impact of institutional mental health policies, with findings indicating that Universities implementing structured mental health programs and crisis intervention protocols report improved student mental health outcomes over time. Spafford et al. (2024) and Hasimoto et al. (2021) examine gatekeeper training programs, which equip faculty and staff with the skills to identify and intervene in potential suicide cases, showing notable improvements in confidence and intervention capabilities among university personnel. Stanley et al. (2018) evaluates the effectiveness of the Safety Planning Intervention (SPI), revealing that SPI significantly reduces suicidal behaviors

compared to standard care approaches. These studies collectively suggest that institutional investment in suicide prevention through staff training, crisis intervention mechanisms, and policy-driven support structures is crucial in mitigating suicide risk among undergraduate students. The findings suggest that multilevel and integrated interventions particularly those involving both digital platforms and human support, show promise in reducing suicidal ideation among university students. These findings have strong implications for campus-based policy and practice, highlighting the need for sustained funding and structural integration of mental health services within Kampus Sehat Mental frameworks. Moreover, Universities should prioritize partnerships with mental health professionals and student organizations to ensure early identification and continuous psychological support.

Discussion

This scoping review sought to explore existing psychological, social, and institutional strategies aimed at suicide prevention among undergraduate students. The goal was to identify effective interventions while highlighting gaps in current research and practical applications. The findings demonstrate a broad spectrum of strategies, ranging from individualized psychological support to institution-wide policy changes, emphasizing the complexity of suicide prevention within higher education. While these results align with prior research, they also underscore emerging trends and areas that require further investigation.

The review's findings are consistent with existing literature that underscores the necessity of multi-level interventions in suicide prevention. Studies such as those by Mortier et al. (2019) and Worsley et al. (2022) have demonstrated that gatekeeper training and peer-support programs effectively reduce suicidal ideation among university students. Similarly, this review identifies gatekeeper training as a widely adopted and effective strategy, particularly when supplemented with mental health awareness initiatives and accessible counseling services. However, a notable distinction from previous reviews is the increasing emphasis on digital interventions, including mobile mental health applications and online cognitive behavioral therapy (CBT), which have proven beneficial for students who may be reluctant to engage in traditional in-person therapy (Wang et al., 2023). While earlier research primarily focused on psychological and peer-support approaches, this review highlights the evolving role of institutional policies in shaping a supportive academic environment. Universities are now increasingly incorporating policies that alleviate academic stress, such as flexible assignment deadlines and designated mental health days, measures that received less emphasis in past literature (Lipson et al., 2019). This shift suggests a growing awareness of systemic contributors to student mental health challenges.

The insights from this review carry important implications for clinical practice and policy development within higher education institutions. First, the demonstrated effectiveness of gatekeeper training and peer-support initiatives suggests that these interventions should be prioritized and expanded across campuses. Integrating these programs into existing mental health support frameworks can enhance accessibility and impact. Second, the rise of digital interventions presents a promising solution for overcoming common barriers to mental health care, such as stigma and limited access to in-person services. Clinicians and university administrators should consider incorporating evidence-based digital tools, including CBT-based mobile apps and online mental health screenings, as complementary resources alongside traditional therapy. However, these tools must be culturally adaptable and tailored to the specific needs of undergraduate populations to maximize their effectiveness. Finally, this review highlights the necessity of institutional policies that foster a comprehensive, student-centered approach to suicide prevention. Universities should implement policies that not only support individual students but also address broader systemic factors, such as reducing academic pressure, promoting mental health awareness, and ensuring inclusivity in mental health services. By adopting a holistic, multi-faceted approach, higher education institutions can create an environment that prioritizes student well-being and effectively mitigates suicide risk. The results underscore the importance of institutional responsibility in suicide prevention. Beyond individual-level interventions, universities should develop policies that systematically integrate mental health literacy, peer counseling programs, and digital monitoring mechanisms into academic life. Within this framework, nursing practice—particularly psychiatric nursing—plays a strategic yet often underrecognized role in university settings. Psychiatric nurses working in university hospitals, student clinics, and campus health centers are positioned to conduct early detection of psychological distress, deliver crisis intervention, provide psychosocial support, and promote mental health literacy among the student population.

In addition to clinical services, psychiatric nurses can extend outreach efforts to student dormitories, student activity centers, and surrounding campus communities, thereby creating a more comprehensive safety network for at-risk students. The integration of these roles strengthens the campus mental health ecosystem by bridging clinical care, community engagement, and preventive efforts. At the national level, insights from nursing practices in university settings may inform funding priorities and guide the development of mental health policies that are responsive to the needs of young adults. Such initiatives align with Indonesia's National Strategy on Mental Health Promotion and

can support evidence-based decision-making for higher education policymakers.

Study Limitations

Despite its extensive coverage, this review is not without limitations. Firstly, by only including studies published in English, it may have omitted pertinent research from non-English-speaking regions, thereby constraining the applicability of the findings. Secondly, concentrating solely on peer-reviewed articles likely resulted in missing out on critical information present in grey literature such as institutional reports and policy documents. Additionally, the diversity among the methodologies and outcome measures of the included studies complicated efforts to reach conclusive insights regarding the effectiveness of particular interventions. Lastly, given that digital mental health strategies are rapidly evolving, some new approaches might not be represented within this review.

Conclusions

This scoping review concludes that effective suicide prevention among university students requires hybrid interventions that combine psychological support, social connectedness, and institutional commitment. Future efforts should focus on building digital-human hybrid models that strengthen early detection and empathetic engagement. Actionable recommendations include :

(1) integrating suicide prevention training into university health programs, (2) developing AI-assisted tools for emotional risk screening, and (3) establishing cross-sectoral collaboration between universities, ministries, and mental health institutions to ensure sustainability.

Implications for Nursing Knowledge, Practice, and Future Research

This scoping review carries substantial implications for the nursing discipline, particularly in strengthening nursing knowledge, clinical and community practice, and future research directions related to mental health and suicide prevention among university students. From a knowledge standpoint, the findings expand the understanding of how psychological, social, and institutional factors interact to influence suicide risk, thereby providing a more holistic conceptual framework for nurses in conducting assessment and intervention. In terms of practice, the review underscores the critical role of psychiatric nurses working in university hospitals, campus clinics, student health centers, and community outreach programs. Nurses occupy a strategic position in early screening, crisis intervention, facilitation of peer-support programs, and the enhancement of mental health literacy within academic environments. Moreover, this review identifies several key gaps that warrant future nursing research, including the development of hybrid digital human nursing interventions, culturally sensitive prevention strategies, and evidence based protocols that integrate clinical services with campus mental health systems. Overall, these implications position the nursing profession as a central pillar in strengthening the mental health ecosystem for university students and in shaping national mental health policies for young adult populations.

Declaration of Interest

All author declare no conflict of interest.

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Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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The application of nursing diagnoses in Intensive Care Units: A scoping review of clinical indicators and patient outcomes

Erna Dwi Wahyuni[1*], Nursalam Nursalam[2], Yulis Setiya Dewi[2], Novalia Puspitasary[1], Sirikanok Klankhajhon[3], Jia-You Ye[4,5], Hidayat Arifin[1, 4, 6, 7*]

[1] Department of Basic Nursing, Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia
[2] Department of Advanced Nursing, Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia
[3] Faculty of Nursing, Naresuan University, Phitsanulok, Thailand
[4] School of Nursing, College of Nursing, Taipei Medical University, Taipei, Taiwan
[5] Post-Baccalaureate Program in Nursing, College of Nursing, Taipei Medical University, Taipei, Taiwan
[6] Research Group in Medical-Surgical Nursing, Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia
[7] Department of Epidemiology and Public Health, Medical Research Center of Indonesia, Surabaya, Indonesia

Abstract

Background: Nursing diagnoses are essential in Intensive Care Units (ICUs) for guiding decisions, prioritizing care, and improving outcomes. However, inconsistent terminology and documentation burdens hinder their effective implementation and evaluation.
Purpose: The aimed of this study was to examine the application of nursing diagnoses in ICUs, exploring their relationships with clinical indicators, patient outcomes, and the impact of standardized diagnostic frameworks on nursing practice.
Methods: This scoping review followed PRISMA-ScR guidelines We searched PubMed, CINAHL, Scopus, and Web of Science from 2019 to 2024. Studies examining nursing diagnoses in ICU settings were included. The reviewers independently screened 527 records, with nineteen full-text articles assessed for eligibility, resulting in thirteen included studies.
Results:. Thirteen studies with diverse methodologies from multiple countries were analyzed. Four key themes emerged: 1) Clinical indicators linked to specific nursing diagnoses, particularly respiratory conditions where impaired spontaneous ventilation was associated with dyspnea, fever, fatigue, and cough; 2) Implementation processes for nursing diagnoses, including electronic health records and nurse-delivered thoracic ultrasound that enhanced clinical decision-making; 3) Diagnostic validation and prevalence studies highlighting the importance of standardized frameworks for accurate diagnosis; and 4) Interventions that improved nursing practice and patient outcomes, including the institutionalization of nursing processes and development of electronic care plans.
Conclusions: Standardized nursing diagnoses optimize ICU patient care by providing a structured approach to assessment, intervention planning, and outcome evaluation. Technology integration and consistent terminology enhance diagnostic accuracy and intervention effectiveness. Future research should focus on validating these frameworks across diverse ICU settings and patient populations to establish best practices for implementation.

Keywords: clinical indicators; intensive care units; nursing diagnoses; patient outcome; standardization

Introduction

The intensive care unit (ICU) constitutes a complex healthcare environment,

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***Corresponding author**

Erna Dwi Wahyuni*
Department of Basic Nursing, Faculty of Nursing, Universitas Airlangga, Surabaya, Indonesia; Address: PQJP+726, Mulyorejo, Surabaya, East Java 60115; Phone: +62 813-3205-6940 ;E-mail: erna-d-w@fkp.unair.ac.id

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characterized by the management of critically ill patients with diverse and often rapidly evolving health needs (Leong et al., 2023). Within this dynamic setting, effective patient assessment, care planning, and intervention strategies are crucial for ensuring optimal outcomes (Kotfis et al., 2024; Latour et al., 2022). Patients in ICUs typically present with multiple comorbidities and require specialized, vigilant attention from interdisciplinary healthcare teams working in coordination to provide timely and effective interventions.

Nursing diagnoses serve as essential tools that guide clinical decision-making and promote patient-centered care within ICUs (Chung et al., 2021; Rahne, 2023). These diagnoses provide a systematic framework for identifying and addressing complex health needs, extending beyond mere categorization of patient conditions to offer a structured approach for comprehensive assessment, individualized care planning, and interdisciplinary collaboration (Allum et al., 2020). Through systematic analysis of patient data and clinical indicators, nurses can identify actual and potential health problems, prioritize interventions, and monitor patient responses with precision and efficiency (Buyukyilmaz et al., 2020; Cardoso et al., 2020).

The body of literature concerning nursing diagnoses in ICUs has undergone significant evolution, mirroring advancements in critical care practices and shifts in healthcare priorities. Initial studies predominantly concentrated on the development and validation of nursing diagnosis taxonomies (Allum et al., 2020). Subsequent research investigated the implementation of these diagnoses in specific ICU populations, including patients experiencing respiratory failure, sepsis, or trauma (Buyukyilmaz et al., 2020). More recent scholarly work has examined innovative strategies to enhance the utilization of nursing diagnoses, such as the integration of technology and decision support tools (Ghazali et al., 2022).

Despite the recognized importance of nursing diagnoses, significant challenges persist in their implementation and utilization in high-acuity settings. These challenges include inconsistent terminology, documentation burden, and variable integration with electronic health records (Hidayati et al., 2022). Furthermore, there remains a critical gap in our understanding of how specific clinical indicators relate to nursing diagnoses and how standardized diagnostic frameworks impact measurable patient outcomes in ICU environments. While individual studies have examined aspects of nursing diagnoses in specific contexts, no previous review has comprehensively synthesized the evidence linking nursing diagnoses to clinical indicators and patient outcomes across diverse ICU settings.

The challenges associated with implementing nursing diagnoses in ICU necessitates a multifaceted approach involving organizational, educational, and technological interventions. The adoption of standardized terminology and documentation practices, supported by organizational initiatives, can significantly enhance consistency and accuracy (Hidayati et al., 2022). Continuous education is essential for improving nurses' diagnostic proficiency and fostering evidence-based practice. The integration of technology, such as electronic health records, streamlines processes and facilitates collaboration (Lu et al., 2021). Although challenges such as terminology variability and documentation burden persist, addressing these issues can drive innovation and improve patient care.

Addressing this knowledge gap requires a systematic examination of the current evidence. A scoping review methodology was selected for this study due to the heterogeneous nature of research on nursing diagnoses in ICUs and the need to map the available evidence. This approach allows for the inclusion of diverse study designs

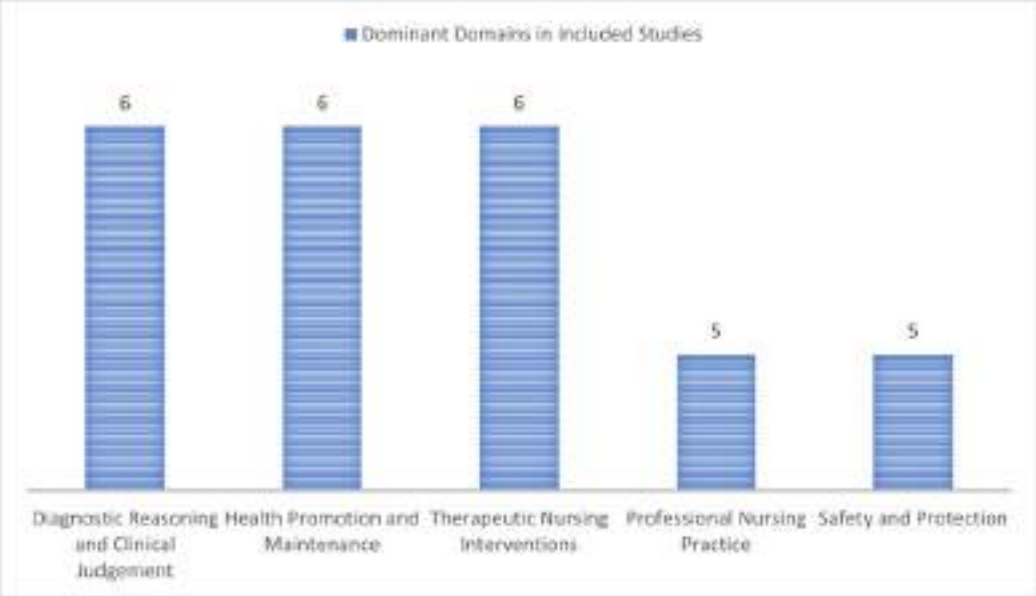

Figure 1. Dominant Domains

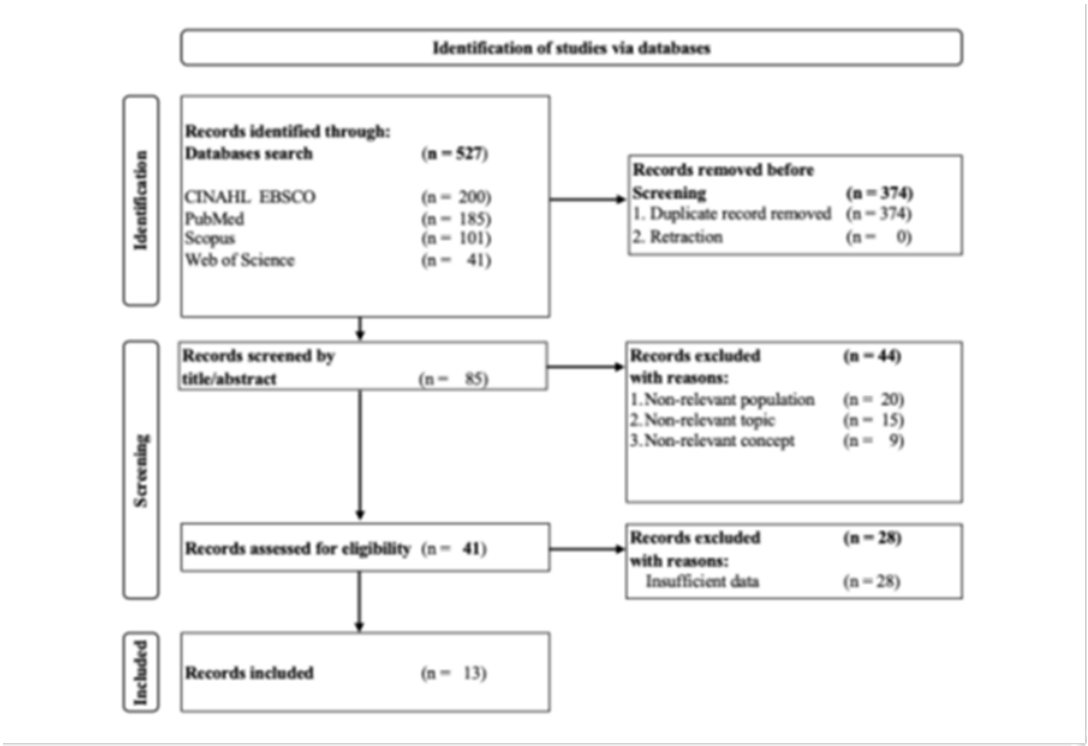

Figure 2. PRISMA-ScR Flow Chart

and methodologies, providing a comprehensive overview of the current state of knowledge in this field. This scoping review aims to examines the significance, challenges, and implications of nursing diagnoses in ICUs. By addressing these objectives, this review seeks to provide clinicians, educators, and researchers with a comprehensive synthesis of evidence to guide practice, education, and future research in this critical area of nursing practice.

Materials and Methods

Protocol and Registration

This study employed a scoping review methodology following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews (PRISMA-ScR) guidelines (Tricco et al., 2018). As scoping reviews are currently ineligible for registration on PROSPERO, no protocol registration was undertaken.

Eligibility Criteria

Studies were included if: (1) focused on nursing diagnoses in intensive care unit settings; (2) were published in peer-reviewed journals between January 2019 and April 2024; (3) were written in English; and (4) examined aspects related to nursing diagnoses including clinical application, implementation strategies, diagnostic accuracy, or patient outcomes. We excluded conference abstracts, editorials, commentaries, letters to editors, and studies focusing solely on nursing diagnoses in non-ICU settings. No restrictions were placed on study design, allowing for the inclusion of quantitative, qualitative, and mixed-methods research to capture the breadth of evidence in this field.

Information Sources and Search Strategy

A comprehensive search of electronic databases was conducted on March 28, 2024, including PubMed, CINAHL Complete, Scopus, and Web of Science. The five-year timeframe (2019-2024) was selected to ensure inclusion of the most current evidence and recent advancements in nursing diagnosis application within intensive care settings. The search strategy employed a combination of controlled vocabulary (MeSH terms) and free-text terms. The core search terms included: (“nursing diagnos*” OR “NANDA” OR “nursing assessment” OR “nursing process”) AND (“intensive care” OR “critical care” OR “ICU” OR “critical illness” OR “critically ill”). The complete search strategy for each database is provided in Supplementary.

Data Extraction and Synthesis

Three independent reviewers screened the titles and abstracts of the retrieved articles to assess their eligibility based on predefined inclusion and exclusion criteria. Full-text versions of potentially relevant studies were then reviewed to determine final inclusion. Any discrepancies among reviewers were resolved through discussion and consensus. Data were extracted systematically using a

Table 1. Characteristics of Included Study

Author(s), years, country	Study design, Participant(s), Aim	Key findings	Domain	Nursing Diagnoses
(Barioni et al., 2022), Brazil	1. A retrospective cohort design 2. 57 adult and elderly patients, diagnosed with COVID-19 3. To identify clinical indicators and nursing diagnoses associated with a higher risk of mortality in critically ill patients with COVID-19.	1. Clinical Indicators: Main symptoms in COVID-19 ICU patients: Dyspnea, fever, fatigue, and cough. Consistent with severe respiratory illness. 2. Nursing Diagnoses: Ineffective Protection, Ineffective Tissue Perfusion, Contamination. Ineffective Breathing Pattern, Impaired Spontaneous Ventilation. Acute Confusion, Frailty Syndrome, Obesity, Decreased Cardiac Output. Limited research on diagnoses in specific domains. 3. Implications: Early recognition of clinical indicators and high-risk diagnoses is critical. Targeted interventions may improve patient survival rates.	1. Physiological Integrity 2. Health Promotion 3. Cognitive-Perceptual 4. Safety and Protection 5. Functional Health Patterns	1. Ineffective Protection 2. Ineffective Tissue Perfusion 3. Contamination 4. Ineffective Breathing Pattern 5. Impaired Spontaneous Ventilation 6. Acute Confusion 7. Frailty Syndrome 8. Obesity 9. Decreased Cardiac Output
(Albuquerque et al., 2023), Brazil	1. A concept analysis based on the framework proposed by Walker and Avant 2. 38 relevant studies of critically ill patients requiring intensive care due to respiratory compromise or related conditions 3. To conduct a comprehensive concept analysis of impaired spontaneous ventilation in critically ill patients within the ICU setting	1. Defining Attributes: Symptoms: Distress, fatigue, dyspnea, anxiety, agitation. Clinical signs: Tachycardia, hemodynamic instability, altered mental status. Lab findings: Abnormal ABG, hypoxemia, hypercapnia. 2. Antecedents: Demographics: Sex, age. Physiological factors: Oxygen saturation <90%, respiratory, cardiovascular, neurological, and metabolic diseases. Medical conditions: Respiratory infections, trauma, exposure to toxins/sedatives. 3. Consequences: Physiological responses: Increased HR, dyspnea, respiratory muscle use, metabolic rate. Clinical impact: Decreased oxygen saturation, restlessness.	1. Physiology Integrity 2. Health Promotion 3. Safety and Protection 4. Cognitive-Perceptual	1. Impaired Spontaneous Ventilation 2. Respiratory Distress 3. Dyspnea 4. Anxiety 5. Agitation 6. Tachycardia 7. Hemodynamic Instability 8. Abnormal Arterial Blood Gas Results 9. Fatigue 10. Sweating 11. Hypoxemia 12. Hypercapnia

Cont. Table 1. Characteristics of Included Study

Author(s), years, country	Study design, Participant(s), Aim	Key findings	Domain	Nursing Diagnoses
(Fritzen et al., 2023), Brazil	1. An experience report methodology 2. Healthcare professionals involved in perioperative care delivery, such as nurses, surgeons, anesthesiologist, and other perioperative team members 3. To implement electronic records of the perioperative nursing process, specifically focusing on the stages of transoperative and immediate postoperative nursing diagnoses, within a health management software system.	1. Implementation Process: Three PDSA cycles were used to integrate electronic perioperative nursing records. Enabled systematic improvement, task assignment, and refinement. 2. Structured Model: Developed for electronic documentation of perioperative nursing. Included 7 aspects, 92 symptoms/signs, and 15 nursing diagnoses. 3. Documentation Improvements: Enhanced completeness and standardization of perioperative records. Defined clear expectations for documentation and task responsibilities. 4. Enhanced Nursing Care: Improved communication and coordination within perioperative teams. Facilitated better patient care planning and delivery.	1. Information Management 2. Quality Improvement 3. Technology Integration 4. Patient-Centered Care	1. Impaired Tissue Integrity 2. Risk for Perioperative Positioning Injury 3. Ineffective Airway Clearance 4. Acute Pain 5. Risk for Infection 6. Risk for Aspiration 7. Impaired Gas Exchange 8. Risk for Hypothermia 9. Risk for Fluid Volume Deficit 10 Anxiety 11. Impaired Mobility 12. Risk for Falls 13. Altered Nutrition: Less Than Body Requirements 14. Risk for Disuse Syndrome 15. Ineffective Coping
(Smits et al., 2023), Netherlands	1. A prospective observational single-center design 2. 65 adult patients admitted to the intensive care unit with indications for thoracic ultrasound examination 3. To investigate the effects of nurse-delivered thoracic ultrasound, performed by UltraNurses, on the clinical management of adult ICU patients	1. Impact on Management: Nurse-led thoracic ultrasound changed 26% of patient management decisions. 2. Timeliness of Changes: 96% of changes were implemented within 8 hours, ensuring rapid intervention. 3. Scope of Changes: 56% were within the nursing scope. 44% led to adjustments in fluid management. 4. Pathology Detection: 97% of cases had pathology detected, proving high diagnostic value. 5. Diagnosis Modification: 7% of cases had a diagnosis change, sometimes enabling life-saving interventions. 6. Ultrasound Frequency: Nurses performed one ultrasound per four shifts, integrating it into routine ICU care.	1. Diagnostic Reasoning and Clinical Judgment 2. Therapeutic Nursing Interventions 3. Health Promotion and Maintenance 4. Professional Nursing Practice	1. Impaired Gas Exchange 2. Ineffective Airway Clearance 3. Decreased Cardiac Output 4. Risk for Fluid Volume Deficit 5. Anxiety 6. Risk for Infection 7. Acute Pain 8. Impaired Tissue Integrity 9. Risk for Aspiration 10. Altered Nutrition: Less Than Body Requirements

Cont. Table 1. Characteristics of Included Study

Author(s), years, country	Study design, Participant(s), Aim	Key findings	Domain	Nursing Diagnoses
(Šerková and Marečková, 2019), Czech Republic	1. A descriptive design 2. 17 general nurses from the participating department of the IICU 3. To conduct content validation of selected NANDA International diagnoses for the IICU setting, and second, to identify the degree of diagnostic significance of their selected defining characteristics and relevant or risk factors	1. Validation Scores: 16 nursing diagnoses had a DCV score >0.6 (high significance). 16 diagnoses had DCV scores <0.6 (lower significance). 2. Major Characteristics: 28 major characteristics had DCV scores ≥0.80, indicating strong diagnostic accuracy. 3. Minor Characteristics: 176 minor characteristics had DCV scores between 0.79 and 0.51, with moderate relevance. 4. Insignificant Characteristics: 41 characteristics had DCV scores <0.5, indicating limited diagnostic value. 5. Recommendations: 16 NANDA-I diagnoses with 102 validated characteristics recommended for lucid adult patients in the IICU at Nový Jičín Hospital to enhance clinical decision-making.	1. Diagnostic Reasoning and Clinical Judgment 2. Health Promotion and Maintenance 3. Therapeutic Nursing Interventions 4. Professional Nursing Practice	1. Risk for Infection 2. Feeding Self-Care Deficit 3. Risk for Imbalanced Body Temperature 4. Impaired Swallowing 5. Hyperthermia 6. Bathing Self-Care Deficit 7. Constipation 8. Dressing Self-Care Deficit 9. Toileting Self-Care Deficit 10. Risk for Constipation 11. Acute Confusion 12. Excess Fluid Volume 13. Acute Pain 14. Nausea 15. Impaired Gas Exchange 16. Ineffective Airway Clearance 17. Ineffective Breathing Pattern 18. Risk for Aspiration 19. Risk for Disuse Syndrome 20. Risk for Bleeding 21. Impaired Physical Mobility 22. Risk for Peripheral Neurovascular Dysfunction 23. Impaired Bed Mobility 24. Risk for Decreased Cardiac Output 25. Risk for Pressure Ulcer 26. Risk for Perioperative Hypothermia

Cont. Table 1. Characteristics of Included Study

Author(s), years, country	Study design, Participant(s), Aim	Key findings	Domain	Nursing Diagnoses
(Araújo et al., 2023), Brazil	1. A diagnostic accuracy design with a cross-sectional analytical approach and a quantitative methodology 2. 206 adult patients admitted to an adult Intensive Care Unit 3. To analyze the clinical indicator accuracy of the nursing diagnosis proposal for ocular dryness in adult patients in the Intensive Care Unit	1. Prevalence of Ocular Dryness: 76.22% of ICU patients experienced ocular dryness, emphasizing the need for proper diagnosis and management. 2. Specificity & Sensitivity of Indicators. High specificity: Reduced tear volume (81.63%) and excessive mucous secretion (99.99%). High sensitivity: Extended blood vessels, excessive mucous secretion, mucoid filaments, and chemosis (71.97%–100.0%). 3. Optimizing Diagnosis Five key clinical indicators identified for accurate diagnosis. Enhancing diagnostic precision can improve targeted interventions and prevent complications in ICU patients.	1. Diagnostic Reasoning and Clinical Judgment 2. Health Promotion and Maintenance 3. Therapeutic Nursing Interventions 4. Professional Nursing practice	1. Ocular Dryness 2. Impaired Tear Production 3. Excessive Mucous Secretion 4. Extended Blood Vessels on the Ocular Surface 5. Mucoid Filaments 6. Chemosis
(Eren, 2023), Turkey	1. A retrospective design 2. Electronic nursing care plans of 429 patients who received treatment for COVID-19 in the intensive care units 3. To examine electronic nursing care plans for patients treated for COVID-19 in the intensive care units of a hospital	1. Nursing Diagnoses Usage. 27 nursing diagnoses used in ICU COVID-19 care. Most common: Risk for Infection, Risk for Ineffective Breathing Pattern, Risk for Impaired Oral Mucous Membrane Integrity. 2. Quality of Nursing Care Plans: 87.66% of diagnoses correctly labeled. Only 47.26% of evaluations were adequate, indicating room for improvement. 3. Quality Measurement Scores. Mean score: 51.82±6.89, suggesting above-average quality. Need for improvement in evaluating nursing interventions and outcomes. 4. Recommendations: Training needed to enhance the evaluation stage. Optimizing nursing care delivery can improve patient outcomes in ICU COVID-19 management.	1. Diagnostic Reasoning and Clinical Judgment 2. Health Promotion and Maintenance 3. Therapeutic Nursing Interventions 4. Professional Nursing practice	1. Risk for Infection 2. Risk for Ineffective Breathing Pattern 3. Risk for Impaired Oral Mucous Membrane Integrity

Cont. Table 1. Characteristics of Included Study

Author(s), years, country	Study design, Participant(s), Aim	Key findings	Domain	Nursing Diagnoses
(Ben-Tovim and Theilla, 2021), Israel	1. A descriptive exploratory design 2. 42 critical care nurses working in one intensive care unit 3. To assess the perceived and actual roles of critical care nurses in the administration of nutritional care, and second, to evaluate their knowledge regarding electrolyte monitoring, hypophosphataemia, and refeeding syndrome, including risk factors, consequences, and treatment	1. Role Perception & Knowledge Gaps: Nurses viewed dieticians as solely responsible for nutrition care. Limited knowledge on electrolyte monitoring, hypophosphatemia, and refeeding syndrome. 2. Impact on Practice: Many nurses underestimated phosphate monitoring and refeeding risks. Belief that full nutrition should start immediately, ignoring refeeding syndrome risks. 3. Knowledge-Practice Correlation: Higher knowledge linked to better adherence to nutrition guidelines. Education and training needed to improve ICU nursing practice.	1. Diagnostic Reasoning and Clinical Judgment 2. Health Promotion and Maintenance 3. Therapeutic Nursing Interventions 4. Professional Nursing practice	1. Risk for Hypophosphataemia 2. Risk for Refeeding Syndrome 3. Inadequate Nutrition Intake 4. Knowledge Deficit: Nutrition Management
(Namadi□Vosoughi et al., 2023), Iran	1. An action research design 2. 15 nurses working in the cardiology ward during the second cycle of the action research study 3. To evaluate the impact of institutionalizing the nursing process based on the TPSN model on the quality and quantity of nursing diagnoses	1. Increase in Nursing Diagnoses: Implementation of the TPSN model increased nursing diagnoses in the cardiology ward. Collaboration between healthcare centers and nursing schools positively impacted clinical practice. 2. Improved Quality of Diagnoses: Significant improvement in PES (Problem, Etiology, Signs/Symptoms) components. Enhanced comprehensive assessment and formulation of patient needs. 3. Educational & Healthcare Impact: Strengthening ties between nursing schools and hospitals improves both sectors. Full-time faculty presence in hospitals enhances evidence-based nursing care.	1. Safety and Protection 2. Coping and Stress Tolerance 3. Comfort 4. Activity and Rest 5. Nutrition 6. Self-Perception 7. Role Relationship 8. Sexuality, Life Principles, and Growth/Development	1. Risk for Falls 2. Rsik for Infection 3. Ineffective Coping 4. Stress Overload 5. Acute Pain 6. Impaired Comfort 7. Impaired Physical Mobility 8. Disturbed Sleep Pattern 9. Imbalanced Nutrition: Less Than Body Requirements 10. Risk for Imbalanced Nutrition: More Than Body Requirements 11. Disturbed Body Image 12. Low Self-Esteem 13. Impaired Social Interaction 14. Sexual Dysfunction

Cont. Table 1. Characteristics of Included Study

Author(s), years, country	Study design, Participant(s), Aim	Key findings	Domain	Nursing Diagnoses
(Cesare et al., 2023), Italy	1. A retrospective design 2. 5,027 surgical inpatients 3. To describe the prevalence and trend of nursing diagnoses in a surgical hospital setting and to analyze the relationship between nursing diagnoses and hospital outcomes	1. Prevalence & Distribution: Mean of 6.3 nursing diagnoses per patient, with a stable trend throughout the year. The safety/protection domain was the most common NANDA-I category. 2. Association with Hospital Outcomes: Longer hospital stays were linked to a higher number of nursing diagnoses on admission. More diagnoses on admission correlated with higher intra-hospital transfers and ICU admissions. 3. Clinical Significance: Nursing diagnoses play a crucial role in patient risk assessment and hospital outcome predictions in surgical settings.	1. Safety and Protection 2. Activity and Rest 3. Nutrition 4. Coping and Stress Tolerance 5. Comfort	1. Impaired Physical Mobility 2. Disturbed Sleep Pattern 3. Imbalanced Nutrition: Less Than Body Requirements 4. Ineffective Coping 5. Acute Pain 6. Impaired Comfort
(da Silva et al., 2024), Brazil	1. A quantitative approach with a descriptive and individual method 2. 57 medical records of critical care patients 3. To identify and analyze nursing diagnoses listed in the medical records of COVID-19 patients admitted to the ICU using Taxonomy II of NANDA-I	1. Standardized Nursing Diagnoses: 54.28% of diagnoses aligned with NANDA-I Taxonomy II, indicating a high level of standardization. 2. Most Frequent Diagnoses: Risk of pressure injury (66.66%). Risk of falls (64.91%). Risk of infection (45.61%). These highlight the importance of early prevention strategies in patient care. 3. Prevalence of Risk Diagnoses: Risk diagnoses dominated (among 37 mapped diagnoses). Early detection is crucial for preventing complications in ICU COVID-19 patients.	Safety and Protection	1. Risk for Developing Pressure Ulcer 2. Risk for Pressure Ulcer 3. Rsik for Falling 4. Risk for Infection

Cont. Table 1. Characteristics of Included Study

Author(s), years, country	Study design, Participant(s), Aim	Key findings	Domain	Nursing Diagnoses
(Dantas et al., 2023), Brazil	1. A diagnostic accuracy design 2. 104 adult patients hospitalized in the ICU 3. To assess the accuracy of clinical indicators for identifying ineffective airway clearance in adult ICU patients	1. Prevalence of Ineffective Airway Clearance: 36.54% of ICU patients experienced airway clearance difficulties. 2. Specificity of Clinical Indicators. High specificity indicators: Absence of cough (0.8326). Orthopnea (0.6817). Adventitious breath sounds (0.8175). Diminished breath sounds (0.8326) 3. Most Accurate Indicators: Altered respiratory rate & pattern (0.9999 sensitivity & specificity). Highly reliable for identifying ineffective airway clearance. 4. Clinical Implications: Six key indicators accurately diagnose ineffective airway clearance. Early identification aids in preventing respiratory complications in ICU patients.	Respiratory Function	1. Ineffective Airway Clearance (IAC) 2. Dyspnea 3. Ineffective Cough 4. Difficulty Verbalizing 5. Restlessness 6. Excessive Sputum 7. Wide-eyed Look
(Buyukyilmaz et al., 2020), Turkey	1. A descriptive research design 2. 121 nursing care plan records 3. To identify the nursing diagnoses frequently used in neonatal and adult ICUs and evaluate their suitability according to the NANDA-I list.	1. Neonatal ICU. Problem-focused diagnoses: Disturbed sleep pattern (85.7%). Ineffective airway clearance (60%). Ineffective breastfeeding (42.7%). Risk diagnoses: Risk for infection (100%). Risk for falls (62.9%) 2. Adult ICU. Problem-focused diagnoses: Self-care deficit (79.1%). Deficient knowledge (77.9%). Ineffective airway clearance (64.0%). Risk diagnoses: Risk for infection (87.2%). Risk for falls (79.1%) 3. Study Conclusion: Diagnoses lacked comprehensiveness in addressing patient responses. Inconsistent nursing terminology and non-compliance with NANDA-I standards.	1. Deficient Perceptual 2. Safety and Protection	1. Self-Care Deficit 2. Deficient Knowledge 3. Ineffective Airway Clearance 4. Risk for Infection 5. Risk for Falls

Note: ICU: Intensive Care Unit; COVID-19: Coronavirus Disease 2019; PDSA: Plan-Do-Study-Act; ABG: Arterial Blood Gas; TPSN: Teacher, Patient, Student, Nurse model; eRIC: electronic Record for Intensive Care; NANDA-I: North American Nursing Diagnosis Association International.

standardized table, which captured key information including author, year of publication, country, study design, population, setting, focus of nursing diagnoses, assessment methods, and major findings (Table 1). The included studies varied in design, encompassing qualitative, quantitative, and mixed-method approaches from a range of international ICU settings. A narrative synthesis was conducted to analyze and summarize the findings, focusing on the clinical application, challenges, outcomes, and implications of nursing diagnoses in intensive care. This synthesis enabled the identification of key themes, methodological trends, and gaps in the current body of knowledge.

Data Analysis

Data analysis involved a thematic analysis of the key findings extracted from the included studies. This analytical approach was chosen to systematically identify, organize, and interpret patterns of meaning across the literature. Initially, relevant data were coded line by line to capture meaningful units related to the use of nursing diagnoses in ICU settings. These codes were then reviewed and categorized into overarching themes that encapsulated the significance of nursing diagnoses, the challenges faced in their implementation, the observed patient outcomes, and their broader clinical implications. The synthesis process integrated findings from studies with diverse methodologies and geographical contexts, allowing for a comprehensive and nuanced understanding of how nursing diagnoses contribute to critical care practices. This thematic analysis provided a structured framework to highlight evidence-based insights and identify knowledge gaps that can inform future research and practice improvements in ICU nursing.

Critical Appraisal

As this was a scoping review aimed at mapping the available evidence rather than assessing the effectiveness of interventions, a formal quality assessment of included studies was not conducted. This approach is consistent with scoping review methodology guidelines, which emphasize breadth of coverage over depth of analysis.

Results

Study Selection

A total of 527 studies were identified through four electronic database searches (PubMed, CINAHL, Scopus, and WOS), following removal of duplicates. After screening titles and abstracts, 85 articles were selected for full-text review based on predetermined inclusion and exclusion criteria. Ultimately, 13 studies met the eligibility criteria and were included in the final analysis (Figure 1).

Study Characteristics

This literature review incorporates a diverse array of research designs to comprehensively examine the utilization of nursing diagnoses within intensive care units (ICUs). The selected studies encompass various methodologies, including retrospective cohort designs (Barioni et al., 2022; Cesare et al., 2023; Eren, 2023), concept analyses (Albuquerque et al., 2023), experience report methodologies (Fritzen et al., 2023), prospective observational designs (Smits et al., 2023), descriptive designs (Ben-Tovim and Theilla, 2021; Buyukyilmaz et al., 2020; da Silva et al., 2024; Šerková and Marečková, 2019), diagnostic accuracy designs (Araújo et al., 2023; Dantas et al., 2023), and action research designs (Namadi-Vosoughi et al., 2023). This comprehensive approach facilitates a multifaceted exploration of nursing diagnoses in ICU settings, considering various aspects such as clinical indicators, diagnostic accuracy, and the impact of nursing interventions (Table 1).

Furthermore, the sample characteristics of the included studies were equally diverse, representing a wide spectrum of healthcare professionals, patients, and interdisciplinary healthcare teams involved in ICU care. Lastly, the geographic distribution of the included studies was global in scope, spanning multiple countries and regions. While some studies were conducted in Brazil (Albuquerque et al., 2023; Araújo et al., 2023; Barioni et al., 2022; da Silva et al., 2024; Dantas et al., 2023; Fritzen et al., 2023), reflecting the prominence of ICU research in South America, others originated from countries such as the Netherlands (Smits et al., 2023), Czech Republic (Šerková and Marečková, 2019), Iran (Namadi-Vosoughi et al., 2023), Italy (Cesare et al., 2023), Israel (Ben-Tovim and Theilla, 2021), and Turkey (Buyukyilmaz et al., 2020; Eren, 2023). This international representation provided a comprehensive perspective on the utilization of nursing diagnoses in ICUs, considering cultural, organizational, and healthcare system differences across diverse global contexts. Collectively, the variety of study designs, sample characteristics, and countries represented in the literature review enriched the breadth and depth of the analysis, offering valuable insights into the role of nursing diagnoses in optimizing patient care within the dynamic and high-acuity environment of intensive care.

The results of the reviewed studies reveal a diverse array of nursing diagnoses utilized within intensive care units (ICUs). These diagnoses span various domains, including physiological integrity (Albuquerque et al., 2023; Barioni et al., 2022), health promotion (Albuquerque et al., 2023; Barioni et al., 2022), cognitive-perceptual (Albuquerque et al., 2023; Barioni et al., 2022), safety and protection (Albuquerque et al., 2023; Barioni et al., 2022; Buyukyilmaz et al., 2020; Cesare et al., 2023; Namadi-Vosoughi et al., 2023), information management (Fritzen et al., 2023), quality improvement (Fritzen et al., 2023), technology integration (Fritzen et al., 2023), patient-centered care (Fritzen et al., 2023), diagnostic reasoning (Araújo et al., 2023; Ben-

Tovim and Theilla, 2021; Eren, 2023; Šerková and Marečková, 2019; Smits et al., 2023), clinical judgment (Araújo et al., 2023; Ben-Tovim and Theilla, 2021; Eren, 2023; Šerková and Marečková, 2019; Smits et al., 2023), therapeutic nursing interventions (Araújo et al., 2023; Ben-Tovim and Theilla, 2021; Eren, 2023; Šerková and Marečková, 2019; Smits et al., 2023), and professional nursing practice (Araújo et al., 2023; Ben-Tovim and Theilla, 2021; Eren, 2023; Šerková and Marečková, 2019; Smits et al., 2023). Each study contributes unique insights into the identification and management of specific health concerns among critically ill patients in ICU settings. From impaired spontaneous ventilation to risk for falls, the identified nursing diagnoses provide a comprehensive framework for assessing, planning, and implementing patient-centered care.

Figure 2 shows how often different nursing domains appeared across the studies we reviewed. The domains that stood out the most were Diagnostic Reasoning and Clinical Judgment, Health Promotion and Maintenance, and Therapeutic Nursing Interventions—each mentioned in six studies. This highlights how much attention current research places on nurses' ability to make clinical decisions, support patients' ongoing health needs, and carry out effective interventions in intensive care settings. Close behind were Professional Nursing Practice and Safety and Protection, each featured in five studies. Their frequent appearance reflects the ongoing priority of upholding professional standards and ensuring patient safety in critical care. Together, these findings point to what matters most in today's nursing diagnosis research: equipping nurses with the knowledge and skills needed to navigate complex patient care environments.

Synthesis of Findings: Themes Identification

Clinical Indicators and Nursing Diagnoses

Studies such as Barioni et al. (2022) and Albuquerque et al. (2023) shed light on crucial clinical indicators and associated nursing diagnoses in critically ill patients, particularly those diagnosed with COVID-19. Barioni et al. (2022) identified dyspnea, fever, fatigue, and cough as key clinical indicators, while Albuquerque et al. (2023) explored defining attributes, antecedents, and consequences of impaired spontaneous ventilation. These findings underscored the significance of early recognition and targeted interventions to mitigate adverse outcomes in ICU patients.

Implementation Processes and Change of Management

Fritzen et al. (2023), Smits et al. (2023), and Cesare et al. (2023) examined the implementation of electronic records for perioperative nursing diagnoses, nurse-delivered thoracic ultrasound, and the prevalence and trend of nursing diagnoses in surgical settings, respectively. Fritzen et al. (2023) highlighted the iterative nature of the Plan-Do-Study-Act cycle in refining the implementation process, while Smits et al. (2023) demonstrated the substantial impact of nurse-delivered ultrasound on clinical decision-making and patient management within the ICU. Cesare et al. (2023) provided insights into the prevalence and trend of nursing diagnoses in surgical settings, emphasizing their prognostic value and association with hospital outcomes.

Diagnostic Validation and Prevalence of Specific Diagnoses

Studies such as Šerková and Marečková (2019), Araújo et al. (2023), and da Silva et al. (2024) focused on diagnostic content validation, clinical indicator accuracy, and prevalence of standardized nursing diagnoses, respectively. Šerková and Marečková (2019) provided valuable insights into the validity and prevalence of specific nursing diagnoses, emphasizing the need for standardized frameworks and accurate diagnostic inference in ICU settings. Araújo et al. (2023) identified accurate clinical indicators for specific nursing diagnoses, contributing to improved diagnostic accuracy and patient outcomes in ICU settings. da Silva et al. (2024) highlighted the prevalence of standardized nursing diagnoses, underscoring the importance of early identification and prevention strategies to enhance patient care and improve outcomes.

Impact of Interventions on Nursing Practice and Patient Outcomes

Several studies, including Eren (2023), Ben-Tovim and Theilla (2021), Namadi-Vosoughi et al. (2023), Dantas et al. (2023), and Buyukyilmaz et al. (2020), assessed the impact of interventions on nursing care delivery and patient outcomes. Eren highlighted the utilization of nursing diagnoses in electronic care plans for COVID-19 patients, while Ben-Tovim and Theilla (2021) underscored the correlation between nurses' knowledge levels and their actual practice in nutritional care. Namadi-Vosoughi et al. (2023) emphasized the importance of institutionalizing the nursing process to enhance the quantity and quality of nursing diagnoses, thereby improving patient care and fostering collaboration between academia and clinical practice. Dantas et al. (2023) identified accurate clinical indicators for specific nursing diagnoses, contributing to improved diagnostic accuracy and patient outcomes in ICU settings. Buyukyilmaz et al. (2020) examined nursing diagnoses frequently used in neonatal and adult ICUs, highlighting the need for standardization and suitability assessment according to NANDA-I terminology.

Discussion

The findings from the reviewed studies provide valuable insights of nursing diagnoses in intensive care unit (ICU) settings. Studies Barioni et al. (2022) and Albuquerque et al. (2023) underscore the

importance of recognizing key clinical indicators, such as dyspnea and impaired ventilation, in critically ill patients, particularly those diagnosed with COVID-19. These indicators serve as essential cues for timely interventions aimed at mitigating adverse outcomes and improving patient survival rates (Hidayati et al., 2022). Additionally, the implementation of electronic records for perioperative nursing diagnoses and nurse-delivered thoracic ultrasound, as demonstrated by Fritzen et al. (2023), Smits et al. (2023), and Cesare et al. (2023), has shown promising results in enhancing nursing care delivery and clinical decision-making within the ICU. The electronic Record for Intensive Care (eRIC) is an ICU information system designed to collect and integrate patient data from multiple sources every minute. The introduction of eRIC led to the creation of an additional patient record, raising concerns about its potential impact on workflow and patient safety (Li et al., 2024). Moreover, studies focusing on diagnostic validation and prevalence of specific diagnoses, such as Šerková and Marečková (2019), Araújo et al. (2023), and da Silva et al. (2024), highlight the importance of standardized frameworks and accurate diagnostic inference in improving patient care and outcomes. The prior study findings underscored the importance of standardized nursing language in pre-hospital care and highlighted the need for individualized and standardized care plans tailored to the unique needs of patients in this setting (Romero-Sánchez et al., 2024). Lastly, interventions aimed at improving nursing care delivery, as explored by Eren (2023), Ben-Tovim and Theilla (2021), Namadi-Vosoughi et al. (2023), Dantas et al. (2023), and Buyukyilmaz et al. (2020), have demonstrated significant impacts on nursing practice and patient outcomes, emphasizing the need for ongoing education, standardization, and collaboration in ICU settings (Pu et al., 2024).

Significance of Nursing Diagnoses in ICU Settings

The findings of this literature review underscore the critical role of nursing diagnoses in guiding patient care within intensive care units (ICUs). Across included studies, nursing diagnoses were consistently recognized for their contribution to comprehensive patient assessment, individualized care planning, and interdisciplinary collaboration. By providing a structured framework for clinical decision-making, nursing diagnoses facilitate early detection of health problems, prioritize interventions, and promote patient safety and quality of care delivery. Professional nursing organizations advocate for the use of nursing diagnosis as a means to enhance and standardize care practices, as well as to establish a common language among nursing practitioner (Cachón-Pérez et al., 2021; Šerková and Marečková, 2019). By recognizing and addressing the complexities of ICU practice, healthcare organizations can empower nurses to effectively integrate nursing diagnosis into their clinical decision-making processes, ultimately enhancing the delivery of care services (Cachón-Pérez et al., 2021).

Impact on Patient Outcomes

Evidence from empirical studies suggests a positive association between the use of nursing diagnoses and improved patient outcomes in ICUs. Reductions in adverse events, complications, and hospital readmissions were reported, alongside enhancements in patient satisfaction and quality of life (Cesare et al., 2023). These findings underscore the clinical significance of nursing diagnoses in optimizing patient care and highlight their potential to drive positive outcomes in the critical care setting.

Implications for Nursing Practice

The results of this review have several implications for practice, policy, and future research in ICU settings. Practically, healthcare providers can use the identified clinical indicators and nursing diagnoses to guide assessment, intervention, and evaluation processes, thereby improving the quality of care and patient outcomes. Policy-wise, healthcare organizations may consider implementing standardized frameworks and electronic record systems to support nursing diagnosis documentation and decision-making. For future research, there is a need for well-designed prospective studies with larger sample sizes to further explore the effectiveness of interventions and validate nursing diagnoses in diverse ICU populations. Additionally, longitudinal studies assessing the long-term impact of nursing interventions on patient outcomes could provide valuable insights into the sustainability and scalability of nursing practices in ICU settings.

Limitations

The reviewed studies offer valuable insights, but limitations exist. Small sample sizes and specific inclusion criteria may limit generalizability, while retrospective designs could introduce biases. Heterogeneity in study designs and populations poses challenges in drawing definitive conclusions. The review process may have limitations, including potential publication bias and language restrictions, impacting the comprehensiveness of evidence capture. Further research with larger samples and prospective designs is needed to address these limitations and enhance the robustness of findings in ICU settings.

Conclusions

This review highlights the pivotal role of nursing diagnoses in ICU settings, supported by diverse methodologies and global representation. Clinical indicators aid in timely interventions, particularly for COVID-19 patients. Interventions like electronic records and thoracic ultrasound enhance care delivery. Challenges include terminology variability and documentation burden. Evidence suggests a

positive correlation between nursing diagnoses and improved patient outcomes, urging their integration into practice and policy. Future research should prioritize prospective studies with larger samples to address limitations and strengthen evidence in ICU settings.

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