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# Jurnal Ners

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## Logotherapy for social isolation and loneliness of informal carers

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Informal carers are people who offer care and support to family members and friends who have a disability, mental illness, chronic condition, terminal illness, an alcohol or other drug issue or who are frail aged (Australian Institute of Health Welfare, 2023). As a result of the global ageing population, the demand for care from informal carers is expected to grow continuously. Carers are an integral part of the health system around the world, but they are more likely to experience detrimental mental health impacts. A recent systematic review and meta-analysis reported that the prevalence of informal carers of individuals with dementia reported loneliness was as high as 50.8% and 37.1% for social isolation (Liao, et al., 2024).

Although the two concepts are related, social isolation is an objective condition of being left out of society, whereas loneliness refers to the feeling of having a discrepancy between one's desired and achieved levels of social relations (Javis, et al., 2020). Being an informal carer, the status of social relations is likely to be disrupted. The responsibility of caring for another one may limit one's time for social activities beyond their caregiving duties, contributing to social isolation [3]. In addition, sometimes the challenges faced by the carer were ignored and not empathized with by friends or family members, causing a lack of satisfaction in interactions apart from feeling deprived of social relations (Velloze, et al., 2022). This may further contribute to a sense of separateness from others and the world, showing a lack of meaning in life. While many studies have focused on interventions to reduce carer burden, few have investigated the impact of social isolation and loneliness on carers.

Loneliness is receiving greater attention and has been identified as a key public health concern. The

situation is further worsened during the COVID-19 pandemic (Ho & Chiang, 2024). Social isolation and loneliness are related to higher mortality and poorer physical and mental health. The World Health Organization suggests identifying effective interventions and strategies to address these issues at three levels: (1) individual- & relationship-level interventions; (2) community-level strategies; and (3) societal-level strategies (World Health Organization, 2021). Among the various interventions, logotherapy may have a high potential to address the issues as well as upscaling it to reach a wider target group by integrating with technology.

Logotherapy is a psychotherapy based on the meaning-focused existential philosophy of Viktor Frankl (Frankl, 2006). 'Logo' based on the Greek word "logos" as "meaning" (Schulenberg & Hutzell, 2008). The fundamental tenets of logotherapy advocate that (i) human life have meanings; (ii) human are motivated to search meanings in life; and (iii) there are meanings in life even in the most suffering situation (Frankl, 2006). The theoretical foundation of logotherapy has been well-validated. It has been successfully applied to various groups of patients (e.g., mental disorders, substance abuse, end-of-life) with positive and significant effects on their quality of life, life satisfaction, depression, anxiety, and life purpose (Thir & Batthyány, 2016).

Recently, there are increasing evidence of effectiveness of logotherapy on loneliness (Heidary, et al., 2022; Naghdi, et al., 2023). Logotherapy, particularly in group, was suggested to facilitate sharing of experiences with significant others, resulting in a genuine interpersonal connectedness (Heidary, et al., 2022). Logotherapy may be particularly helpful for

informal carers to tackle their loneliness by promoting a sense of purpose in their caring journey, through building genuine interpersonal connectedness with other informal carers and significant others.

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# Lived experiences of hypertensive older adults living alone in Kendari City: a phenomenological approach

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## ABSTRACT

**Introduction:** A decline in the function of the cardiovascular system organs among older adults can be due to age risk factors such as living alone and reporting feelings of isolation or loneliness, thus increasing the prevalence of hypertension. However, their lived experiences including health changes, coping mechanisms, and healthcare needs are largely underexplored. This study aimed to explore lived experiences as evidence-based in developing health services for hypertensive older adults living alone.

**Methods:** This study employed a qualitative phenomenological approach, with in-depth and semi-structured interviews of hypertensive older adults living alone in Kendari City Southeast Sulawesi. Purposive sampling was utilized. 15 participating older adults, predominantly female, and with ages ranging from 61-80. Data were collected from April until July 2022, and Colaizzi's steps were used to guide the data analysis.

**Results:** Three themes were identified: 1) health changes in the older adults living alone consisting of physical, emotional, social, and spiritual changes; 2) coping mechanisms consisting of emotion-focused coping, biobehavior-focused coping, social-focused coping, and spiritual-focused coping; and 3) healthcare needs consisting of health information needs, regular health checks, group activities, and spiritual activities.

**Conclusions:** This research highlights the needs of hypertensive older adults living alone to adapt to their health changes and requiring holistic hypertensive care as well as regular health services. Recommendations in this study include developing a holistic hypertensive care program consisting of physical, psychological, social, and spiritual activities. Further research needs to explore the effectiveness of holistic hypertension care on blood pressure, stress, coping, and quality of life of older adults with hypertension by comparing older adults living alone with older adults living with family, and qualitative research using ethnographic methods to determine the adaptation process of the older adults living alone according to culture.

**Keywords:** coping mechanisms, healthcare changes, healthcare needs, holistic care, hypertensive older adults, living alone, qualitative study.

## Introduction

Hypertension in older adults is caused by changes in the cardiovascular system due to the aging process. Older adults will experience a decline in the function of the cardiovascular system organs which causes vasoconstriction of blood vessels, thereby increasing blood pressure. Hypertension in older adults is caused by changes due to old age and related risk factors

(Miller, [2012](#)). uncontrollable risk factors are: age, gender, genetics, ethnicity ([Ernawati et al., 2022](#); Jana and Chattopadhyay, [2022](#); Kothavale, Puri and Sangani, [2022](#); Ntiyani, Letamo and Keetile, [2022](#); Ren et al., [2022](#)), while controllable risk factors are: lifestyle, including obesity, sodium intake, physical activity, smoking, alcohol intake (Gorni and Finco, [2020](#); Hardiany, Kirana and Prafiantini, [2021](#); Yamaguchi,

Tuliao and Matsuo, [2021](#); Kothavale, Puri and Sangani, [2022](#); Wahyuni, Romadhoni and Ramadhani, [2022](#)), and stress (Miller, [2012](#); Williams, [2016](#); Kurniawati, Adi and Widyastuti, [2020](#); Hardiany, Kirana and Prafiantini, [2021](#)). Changes due to old age and risk factors owned by older adults increase the prevalence of hypertension. Thus, the increase in the number of older adults will be accompanied by an increase in the number of hypertension sufferers.

The prevalence of hypertension increases with age. Nearly two-thirds of older adults experience two or more conditions of chronic health problems and only 0.9 - 2.2% of the older adults do not have chronic disease; the main chronic problem is hypertension (Piotrowicz *et al.*, [2021](#)). The 2020 National Social Economical Survey data in Indonesia show that 9.80% of older adults live alone. Older adult women living alone number almost three times more than men (Wandera *et al.*, [2017](#); Badan Pusat Statistik, [2020](#); Adana *et al.*, [2022](#)). Poor older adults increase the risk of living alone 2.84 times compared to rich older adults. Those with high school and higher education levels have 2.38 times the risk of living alone compared to people with low education. The risk of living alone increases 1.90 times if the house they live in is not their own (Adana *et al.*, [2022](#)).

Factors related to older adults living alone include age, area of residence, marital status, poverty status, main source of household income, poor health, and disability. The prevalence of living alone is higher among older parents (70+), living in central areas, and those who are divorced or separated. In addition, living alone is also high among older people who are disabled, financially dependent, and reporting poor health in the past 30 days (Wandera *et al.*, [2017](#); Shams Ghahfarokhi, [2022](#)). A qualitative study conducted on 10 older adults living alone and experiencing loneliness in Finland found that there were four themes identified behind emotional loneliness: (1) loss or lack of a partner, (2) lack of meaningful friendships, (3) the complexity of being a person of old age, and (4) disturbing childhood experiences (Tiilikainen and Seppänen, [2017](#)).

Research conducted in Indonesia in 2022 found that, out of 1233 participants, 16.4% of older adults were living alone. Half of older women living alone reported being lonely and one-fifth of older women living alone reported depressive symptoms (Widhowati *et al.*, [2020](#)). Stress, depression, and loneliness experienced by older adults living alone will affect blood pressure and put them at risk of experiencing various health problems.

Various health risks associated with older adults living alone have been identified. Physical-related risks

include increase in hypertension, arthritis, risk of cardiovascular death, coronary heart disease, stroke, risk of dementia, poor sleeping patterns, poor diet, accelerated signs of cognitive decline, and reduced ability to perform activities of daily living (Somes, [2021](#); Carrasco *et al.*, [2022](#); Huang *et al.*, [2023](#)); psychological related risk including stress, depression, loneliness, and suicidal ideation (Klinenberg, [2016](#); Widhowati *et al.*, [2020](#); Somes, [2021](#); Carrasco *et al.*, [2022](#)); social related risk including loss of interaction ability or isolation (Somes, [2021](#); Carrasco *et al.*, [2022](#); Imamura *et al.*, [2024](#)). Many studies have been conducted on the prevalence, related factors, and health risks arising from social isolation and loneliness in older adults living alone but studies on the experiences of hypertensive older adults living alone which include health changes and coping mechanisms used in Indonesia are unclear.

Older people may have illnesses, disabilities, or dysfunctionality that makes them dependent on daily care. Older people living alone may require home care and specialized services such as community outings, meal delivery, financial support, housework support, and so on, as well as healthcare services for mental and physical support. Optimizing social services and healthcare for older adults living alone can help them maintain their independence and promote their physical and mental health. The important goal of welfare policies for older people is to provide appropriate services that allow older adults to stay in their homes and communities instead of entering institutional care (Yi *et al.*, [2021](#)). There have not been any qualitative studies identifying health service needs in hypertensive older adults living alone in Indonesia. High attention is needed from all elements of society in this regard because hypertensive older adults living alone need support from their surroundings considering their lives are more vulnerable. This study aimed to explore lived experience in hypertensive older adults living alone as evidence-based in the development of health services for hypertensive older adults living alone.

## Materials and Methods

### Research Design

Based on Husserl's perspective, a qualitative descriptive study was conducted utilizing the phenomenological approach. Phenomenological research is a research approach that investigates the everyday experiences of human beings (Larsen and Adu, [2021](#); Liquori *et al.*, [2024](#)). With this design, diverse themes and subthemes were obtained, and categories

generated about the experiences of hypertensive older adults living alone.

### Participants and Setting

This study was conducted in a community setting from April until July 2022 in Kendari City. The sample size was determined by data saturation at which point new themes were no longer emerging. Participants were selected through a purposive sampling technique. This type of sampling calls for the researcher to set a specific criterion that should be followed for participants to take part in the study. Criterion sampling differs from one study to the other and the implementation is according to the study's set research question and available population. It helps to ensure that a quality sample is located without biases to increase the reliability and trustworthiness of the findings (Nyimbili and Nyimbili, 2024). The participants were 15 hypertensive older adults with the criteria: diagnosed with hypertension by doctor, living alone, aged > 60 years, not experiencing cognitive function disorders, and understanding Indonesian. Participant selection commenced by identifying each participant, explaining the research aims, and asking their willingness to participate. The investigators simultaneously recruited the participants while analyzing the data, conducting interviews until data saturation was achieved, indicating that no new concepts of information emerged from the interviews.

### Research instruments

The older adults' experiences were explored through a combination of in-depth and semi-structured interview techniques. The interview guidelines were developed based on a thorough literature review. Our research team, comprising experienced professionals, collaboratively developed the interview guidelines. The data collection instruments included demographic data questionnaires, field notes, interview guides, and audio tape recorders. The demographic questionnaires were used to obtain the participant's age, gender, educational level, ethnic group, and length of time the older adults had lived alone. The following topics were asked during each interview in the Indonesian language: 1) What are the problems experienced by hypertensive older adults living alone; 2) How do they cope with their problems; 3) What they thought and felt would support them. Several probing follow-up questions were used to gain more in-depth information from the participants. Field notes were used to capture nonverbal responses and a written record of observed facial expressions and gestures from participants. Audio tape recorders were

used to capture deliberations during the interview and later typed up verbatim in the form of a transcript.

### Ethical consideration

The research ethics committee of the Faculty of Nursing at Universitas Indonesia approved this study and granted ethical permission number KET-164/UN2.F12.D1.2.1/PPM.00.02/ 2023. The rights of participants were ensured by obtaining both written and verbal consent before data collection. Privacy was safeguarded by pseudonyms. Confidentiality was ascertained by reassuring the study participants that facts and information shared would be unreachable by any other persons except those involved in the study. Anonymity was ensured by using pseudonyms instead of the participant's real identities.

### Data collection

The researchers screened potential participants by taking data from the person in charge of the older adults program at the Talia Health Center. Furthermore, the researcher visited the homes of the older adults living alone and explained the aims and objectives of the research. Researchers first conducted a Mini Mental State Examination (MMSE) to determine the cognitive function of older adults. If the older adults did not experience cognitive dysfunction and were willing to become respondents, the researcher submitted informed consent to be signed by the older adult participants. The next researcher contracted the time and place for collecting interview data. Time for the interview was 30 to 50 minutes. The language used was Indonesian. To enhance the data's reliability, participants were invited to review interview transcripts and analyses and make corrections, adding to the credibility of the findings. The triangulation method, incorporating field notes and observations, enriched the research findings by cross-verifying information from multiple sources. The data collection process concluded when data saturation was reached, i.e., when new major themes were no longer emerging.

### Data analysis

Fifteen interview transcripts were analyzed using inductive thematic analysis—namely, the interview results were analyzed using Colaizzi's original seven-step method (Praveena and Sasikumar, 2021). The analytical process unfolded as follows: First, the phenomenon was described verbatim based on the participants' opinions or statements in the transcript. Second, the researchers read the entire description of the phenomenon, reread the transcript, and quoted the statement. Third, the

researchers described the meaning in the form of keywords. Fourth, the researchers organized the keywords into a collection of meanings arranged into categories, subthemes, and themes. Fifth, the researchers wrote a comprehensive report on the results. Strict adherence to the original seven-step method was maintained throughout this analytical process, ensuring a thorough exploration of the experiences of older adults living alone with hypertension. The duration of the audit process was one month.

#### Trustworthiness

The trustworthiness of data is the validity and reliability of qualitative research including credibility, dependability, confirmability, and transferability. Credibility was ensured by returning interview transcripts to participants for verification. All participants in this study agreed with the results of the transcript submitted by the researcher by placing a checklist (v) on each of their answers and not adding to the results of the existing transcript. Dependability involved an external reviewer with a supervisor, also known as an audit inquiry. In this study, the researcher submitted all the results of the interview transcripts and field notes to the supervisor in the form of a soft file which was sent via email so that the supervisor could review the research results that had been obtained. Confirmability was by attaching the final research report and the article was constructed so that readers follow the researcher's flow of thought. This was done by the researcher by showing all transcripts along with field notes, theme categorization tables, and theme analysis tables to external reviewers and attaching them to the final research report and articles so that the reader

follows the researcher's flow of thought. Transferability was by describing the themes that have been identified in a similar sample that is not involved in the study to determine using the external check method on other older adults by submitting printouts of the themes that have been identified and asking the trial participants to give a checklist (v) if they agreed with the themes that appeared.

## Results

### Participants' characteristics

This study explores 15 older adults' characteristics as research participants. [Table 1](#) provides an overview of the participants' characteristics consisting of 10 women and five men with participants' ages ranging from 61 to 80 years. The average participant's education level was not attending school. The participants came from different ethnic groups, namely Bugis, Muna, Buton, Tolaki, and Javanese. The length of time the older adults lived alone varied, from a range of 1 year to 13 years. The participants' characteristics can be seen in [Table 1](#).

Based on inductive thematic analysis method, three themes were identified: 1) health changes in the older adults living alone consisting of physical, emotional, social, and spiritual changes; 2) coping mechanisms consisting of emotion-focused coping, biobehavioral-focused coping, social-focused coping, and spiritual-focused coping; and 3) healthcare needs consisting of health information needs, health checks regularly, group activities, and spiritual activities.

### Health changes in hypertensive older adults living alone

Four themes were identified from 15 interview transcripts, namely physical changes, emotional changes, social changes, and spiritual changes. The

Table 1. Study participants' characteristics

Code	Gender	Age (Years)	Education	Ethnic	Time living alone (years)
P1	F	69	Not attending school	Bugis	13
P2	F	70	Not attending school	Bugis	1
P3	F	66	Elementary school	Muna	10
P4	F	80	Not attending school	Bugis	6
P5	F	67	Elementary school	Jawa	3
P6	M	65	Senior high school	Tolaki	2
P7	F	62	Junior high school	Tolaki	4
P8	M	71	Not attending school	Buton	3
P9	F	69	Elementary school	Tolaki	2
P10	F	75	Not attending school	Muna	1
P11	M	66	Elementary school	Muna	5
P12	F	63	Elementary school	Muna	8
P13	M	70	Not attending school	Tolaki	3
P14	M	68	Not attending school	Buton	7
P15	F	60	Senior high school	Muna	4

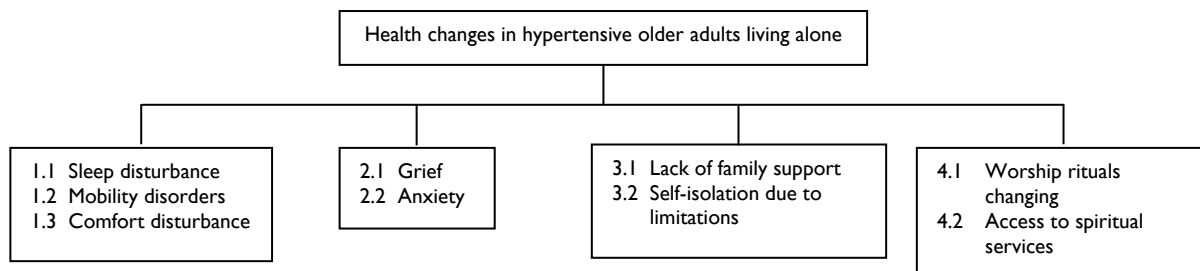


Figure 1. The four themes and nine subthemes related to health changes in hypertensive older adults living alone

theme of physical changes consists of subthemes of sleep disturbances, mobility disorders, and comfort disturbances. The emotional change theme consists of the subthemes of grief and anxiety. The theme of social changes consists of the subthemes of lack of family support and self-isolation due to limitations. The theme of spiritual change consists of the subthemes of worship rituals changing and access to spiritual services. The four themes and nine subthemes related to health changes in hypertensive older adults living alone can be seen in [Figure 1](#). The selection of statements based on themes and subthemes can be seen in [Table 2](#).

**Coping of hypertensive older adults living alone**

Four themes were identified from 15 interview transcripts, namely emotion-focused coping, biobehavior-focused coping, social-focused coping, and spiritual-focused coping. The emotion-focused coping theme consists of the subthemes of expressing feelings, harboring feelings, ignoring, and positive thinking. The biobehavior-focused coping theme consists of subthemes self-soothing activities, diversion activities, and communicating with others. The social-focused coping theme consists of subthemes of neighbor interaction, peer interaction, and visiting family homes. The spiritually focused coping theme consists of subthemes of praying and performing worship rituals. The four themes and twelve subthemes related to coping of hypertensive older adults living alone can be

seen in [Figure 2](#). The election of statements based on themes and subthemes can be seen in [Table 3](#).

**The healthcare needs for hypertensive older adults living alone**

Four themes were identified from 15 interview transcripts, namely health information, health check regularly, group activities, and spiritual activities. The theme of health information needs consists of the subthemes of information from health workers and sharing with others. The theme of the need for health checks regularly consists of the subthemes of healthcare facilities and home visits. The theme of needs for group activities consists of the subthemes of exercise and group activities. The theme of spiritual activities consists of the subthemes of spiritual guidance and worship ritual guidance. The four themes and eight subthemes related to the health services needs of hypertensive older adults living alone can be seen in [Figure 3](#). The selection of statements based on themes and subthemes can be seen in [Table 4](#).

**Discussions**

**Health changes in hypertensive older adults living alone**

Physical changes in hypertensive older adults living alone identified in this study are sleep disturbances, mobility disorders, and disturbances of safety and comfort. Aging is associated with several changes in sleep patterns. Older adults have an increased

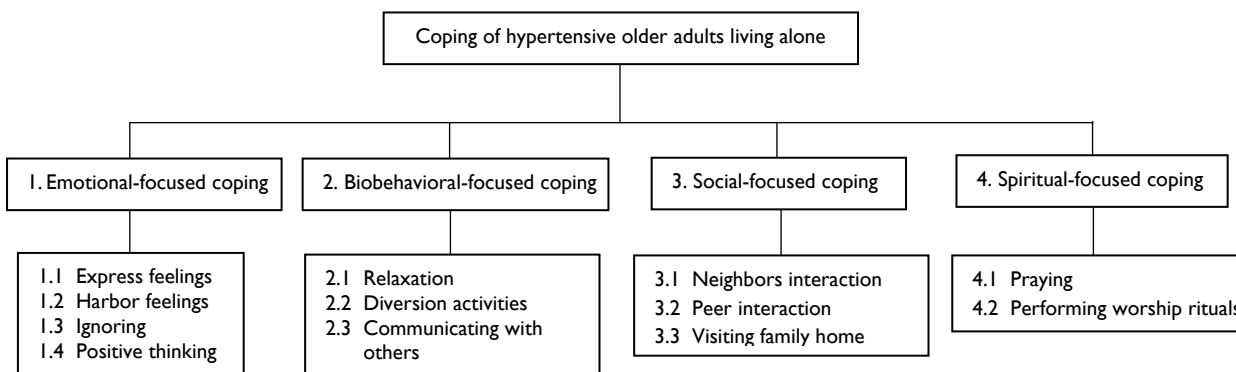


Figure 2. The four themes and twelve subthemes related to coping with hypertensive older adults living alone

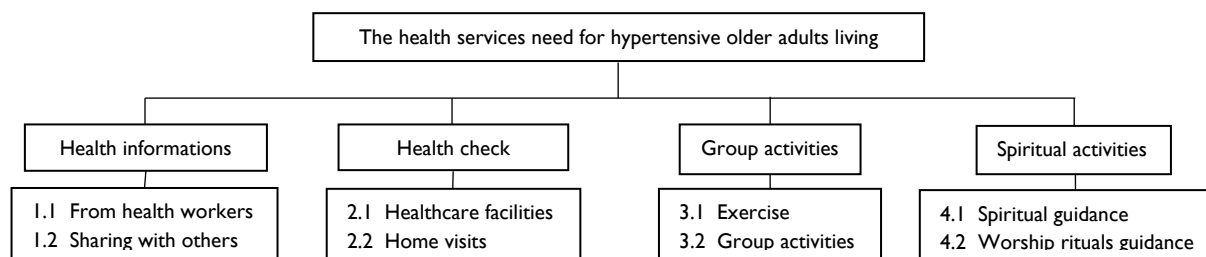


Figure 3. The four themes and eight subthemes related to the health services needs of hypertensive older adults living alone

prevalence of primary sleep disorders including insomnia, sleep-disordered breathing, restless legs syndrome, REM sleep behavior disorder, and circadian rhythm disturbances (Tatineny *et al.*, 2020). In the older adult's group, sleep problems were found in 7% of cases in the 60-year age group and 22% of cases in the 70-year age group. In addition, there are 30% of cases in the age group of 70 years who woke up a lot at night. Sleep disturbance can be caused by extrinsic factors, such as a noisy environment, cold environment, and medication side effects (Tatineny *et al.*, 2020), and intrinsic factors, namely organic factors, such as pain, itching, calf cramps, toothache, moving limb syndrome (akathisia), and psychogenic factors such as depression, anxiety, stress, irritability, and anger which causes anxiety (Widuri, 2010; Tatineny *et al.*, 2020; Song *et al.*, 2022; Zhang *et al.*, 2023). Raised blood pressure was associated with obstructive sleep apnea (OSA), oxygen desaturation index (ODI), short sleep duration, and long sleep duration (Han *et al.*, 2020). Unhealthy sleep behaviors were found during daytime and bedtime, particularly among those who were retired/unemployed or living alone (Song *et al.*, 2022). The results of the study showed that hypertensive older adults living alone experience sleep disturbances due to physical problems, including muscle pain and cramps, as well as environmental problems, including noisy or cold environments. Psychological factors also contribute to sleep disturbance in older adults living alone such as stress, depression, and loneliness (Tatineny *et al.*, 2020; Zhang *et al.*, 2023). It is important to identify the physical, psychological, and environmental factors that cause sleep disorders in older adults living alone so that sleep disorder management can be more effective. Methods for coping with sleep problems, non-sleep behaviors in bed, or beliefs about sleep may differ between older adults. For example, some older adults may think that sleep problems are a part of aging and thus may not seek treatment for their sleep issues. Some behaviors before going to bed or in bed may be culturally unique and indicate a required modification to traditional sleep disorder management. Understanding

beliefs and attitudes about sleep and sleep disorders is an important first step in tailoring sleep disorder management to meet the needs of racial and ethnic older adults with sleep problems (Song *et al.*, 2022).

Another physical change in hypertensive older adults living alone was impaired mobility including frailty or weakness and risk of fall. Lower extremity function had a high value for predicting the frail status of older adults with hypertension (Zhang *et al.*, 2022). The study found that increasing age, living alone, low levels of exercise, polypharmacy, malnutrition, and lower vitamin D levels were associated with aging individuals being more likely to experience frailty (Wang, Hu and Wu, 2022). It is necessary to develop physical activities as weakness improvement interventions to improve the quality of life of older adults living alone (Kim and Cho, 2022). Physical activity needs to be done to increase the strength of the lower extremity muscles so it can prevent weakness and falls for older adults living alone. Another study showed that weakness fully mediates the relationship between major depression and falls in older people living alone. Thus, older people living alone and suffering from major depression need special attention from nurses in the community, and treatment for oxidative stress resulting from diminished antioxidant levels is important because it is a key vulnerability for the pathogenesis of frailty, exacerbating illnesses related to human aging (Kameda *et al.*, 2020). Thus physical activity, stress management, and prevention of depression and loneliness are important to prevent weakness and risk of falls in older adults living alone.

Another finding in this study about physical change in hypertensive older adults living alone was safety and comfort disturbances often complained about by older adults including cramps in the extremities and risk of falling. Chronic pain and cramps often occur in older adults, it is estimated that 80% of the older adults experience at least one chronic condition associated with pain. The cause may be known to be persistent or progressive such as increased blood pressure, rheumatoid arthritis, cancer, or unknown or difficult to find. Pain and cramps can cause decreased activity,

Table 2. Selection of participant statements based on the theme of health changes in hypertensive older adults living alone

Themes, Subthemes, and Category Quotes	
<b>Theme 1. Physical changes</b>	
<b>Subtheme 1. Sleep disturbances</b>	
1. Sleep disturbance due to physical problems	"At night my legs seem to die... cramps... cramps... I tie them up so I can sleep." (P2)
2. Sleep disturbance due to environmental conditions	"I have 24 grandchildren, 4 great-grandchildren. When they all come, it's so crowded... The tension increases, and I can't sleep because everyone's screaming... playing... Going in and out... I used to get angry. I told them to go home... it was very noisy." (P2)
<b>Subtheme 2. Mobility disorders</b>	
1. Weakness	"I can't walk long distances... just inside the house or around the house... that's why I've never been to an older adults center." (P2)
2. Fear of traveling alone	"Now I'm afraid to go to the city alone... even though I used to walk alone to all around the City to sell oil when I was young." (P4)
<b>Subtheme 3. Comfort disturbances</b>	
1. Risk of falling	"If I get dizzy... my blood pressure rises... I'm afraid to fall."(P2)
2. Cramps in the legs	"My leg (stroking leg)... usually cramps... I don't feel good." (P4)
<b>Theme 2. Emotional changes</b>	
<b>Subtheme 1. Grief</b>	
1. Denial	"Until now I still prepare food where he usually eats... I feel like he's still there." (P2) "I have lots of kids but now I'm living alone."(P2)
2. Anger	"I'm not feeling well... Usually there is a husband... if we are sick, who do we complain to... if there is a shortage, who will we talk to." (P5) "Live alone sometimes makes me happy... calm... not noisy... but sad it's feeling lonely...but if it's crowded you get dizzy too... I want my children and grandchildren to come but don't make a fuss."(P2)
3. Bargaining	"I feel sad. I have many children... now I live alone... what if we get sick at night... die immediately... until now I'm still sad... I still remember." (P1,P2,P10)
4. Depression	"It's feeling hurts... but. I keep it to myself. I can't get angry... They have husbands and wives. I don't expect it.. if they have a conflict because of me I will be the target... so I keep it."(P1,P3) "I skip this... I usually move to sleep... hear every sound of the mosque going to prayer, and realize that it's already night again... I skip it... calm down." (P7) "If I am alone... Enjoy sleeping... nothing will disturb me." (P1) "There is no feeling of sadness or loneliness. I don't know that either. I don't have any bad feelings... thank goodness. it's okay." (P6) "There's nothing... not afraid... nothing at all... that's what people say... Ugh, grandma lives alone not afraid? ... I lock my house... there is God... we pray to God... I sleep normally... praying God bless us." (P3)
5. Acceptance	"If I get sick at night... I'll die right away...stay alone." (P2, P3) "I thought about how to eat...if I can't cook, I bite the bread...since I've been sick I haven't cooked anymore." (P1) "We are old... while young people can die suddenly... moreover, we are sick... we are old... I think... if I get sick at night... I will die right away... cause stay alone." (P2) "That's a pity... in my heart... I feel sorry for myself...fortunately, I have two nephews... if not... nobody cares... so sad... I'm lucky that I have them." (P5) "I only thinking of my death... I know that I have the disease and I kept crying... I'll just be ready to die... I'll order my children to take care of their child... don't hit them...I'm going to die."
<b>Subtheme 2. Anxiety</b>	
1. Anxiety about disease recurrence	
2. Anxiety about meeting daily needs	
3. Anxiety about facing death	
<b>Theme 3. Social changes</b>	
<b>Subtheme 1. Lack of family support</b>	
1. Differences in children's characters	"I don't know... there are good children... there are also children who talk a lot when I speak to... that's why sometimes I cry again and don't talk to my children." (P1) "Children don't necessarily come to visit me...they have work too." (P2, P4)
2. Busy child	
<b>Subtheme 2. Self-isolation due to limitations</b>	
1. Disease limitations	"Before I got sick, I used to take part in mobile older adults' exercise activities with the midwife... I've been to the Mayor's office, Governor's office...but now I can't join because of my illness." (P1) "I never went to a health center because of my weakness...I couldn't walk." (P2)
2. Weakness	"I rarely talk to my neighbors... I don't want to start the conversation first... I listen to it... I can't get on with it... there's no point in telling a story if it's not important." (P5)
3. Limit interactions	"There's a neighbor who can see us on the street but he doesn't care... what I want is he could ask me... where am I going? It can make me feel glad." (P1)
4. Feel neglected	
<b>Theme 4. Spiritual changes</b>	
<b>Subtheme 1. Changes in worship rituals</b>	
1. Changes due to disease	"Usually, I am called to pray together at the mosque or their house... I said I couldn't... although they said I can do it by sitting on the chair or the floor... but I won't do it if my pain comes again." (P1) They usually call me to join... but I said no... I don't know how to recite the Koran." (P3)
2. Lack of knowledge	
<b>Subtheme 2. Access to spiritual services</b>	
1. Distance to health facilities	"I keep my prayers... 5 times a day... because my house is near to the mosque." (P3)
2. The exclamation or invitation or alarm of worship	"I skip the time... I go to pray when I hear the sound of the call to prayer in the mosque... time has passed and oh... it's already midnight again." (P4)

social isolation, sleep disturbances, and depression, (Stanley and Beare, 2007). Older age, lower education level, polypharmacy, malnutrition, living alone, living in

Table 3. Selection of participant statements based on the theme of coping with hypertensive older adults living alone

Themes, Subthemes, and Category Quotes	
<b>Theme 1. Emotional focus coping</b>	
<b>Subtheme 1. Express feelings</b>	
1. Crying	"I'm so sad... I'm crying alone... I thinking of living alone." (P1,P2,P3)
2. Talk to other	"I have children... if they come to visit me... I talk to them." (P2, P8,P9)
<b>Subtheme 2. Harbor feelings</b>	
1. Save feelings	"It hurts... but I keep it to myself... if the pain comes, I don't wake up my son...he will get angry... they have husbands and wives... if they fight because of me, I am the target so I save it." (P1)
2. No hopes	"What do I want... I don't have a husband so just be patient... I don't have expectations of my children." (P1)
<b>Subtheme 3. Ignoring</b>	
1. Ignore	"I usually feel my legs are cramped... but I don't bother it." (P4)
<b>Subtheme 4. Positive thinking</b>	
1. Positive thinking	"My older adult neighbor told me... what would I do if I died... I have nothing.. my children are not there either.. but for me, if I die I have many children... there are my grandchildren." (P3)
<b>Theme 2. Behavioral focus coping</b>	
<b>Subtheme 1. Relaxation</b>	
1. Relaxation	"If there are sad thoughts... I sit down first... I keep calm." (P1,P2) "If I feel sad... I'll lie down first... make myself calm and relax." (P3)
<b>Subtheme 2. Doing diversion activities</b>	
2. Doing home activities	"I stay at home... doing something like cooking... clean the house." (P4)
3. Productive activity	"I make something for sales... it's called Tenteng... beans give brown sugar." (P2) "I sell filtered sago... I buy sago... I filter it... I pack it up... I sell it at home... people who buy come to my house."(P2) "I have a small shop in my house... if anyone wants to buy something I go to serve them." (P3, P5)
4. Walking	"If I have sad thoughts... I sit and if it can't go away, I went out walking on the street so that it's gone." (P1)
<b>Subtheme 3. Communicating with others</b>	
5. Calling children	"If I'm sick at home... I call all my children... I said I'm going to die...so everyone can come to my house." (P3)
<b>Theme 3. Social-focused coping</b>	
<b>Subtheme 1. Interaction with neighbors</b>	
1. Interaction with neighbors	"I usually go there... (while pointing at the neighbor's house)... when I'm tired, I'll go and tell stories again... but if the grandchildren are in trouble again... I'm going home." (P4)
<b>Subtheme 2. Interaction with peers</b>	
1. Stories from fellow older adults	"There is an older adult neighbor... when I sit on the terrace there he comes here to tell stories." (P2) "Going out to meet an older adult friend too... talk to each other." (P1, P6, P7)
<b>Subtheme 3. Visits to family home</b>	
1. Visits to family home	"My house is surrounded by children's houses... I usually go to their house or those who come to my house." (P2) "So far, only my grandchildren and nephews have been invited to tell stories." (P1) "I went out to my niece's house." (P1, P5)
<b>Theme 4. Spiritual-focused coping</b>	
<b>Subtheme 1. Praying</b>	
1. Praying	"I pray to God, I pray for my child to be healthy, if I die who wants to see me." (P1)
<b>Subtheme 2. Performing worship rituals</b>	
1. Sholat	"There is a God, we pray... Sholat... God will take care of us." (P4)

an urban area, smoking, and alcohol consumption increase the risk of falls in the aging population. Additionally, comorbidities such as cardiac disease, hypertension, diabetes, stroke, frailty, previous history of falls, depression, Parkinson's disease, and pain increase the risk of falls (Xu, Ou and Li, 2022). For those reasons, older adults living alone are more vulnerable to physical, mental, and social impacts on health, which highlights the need for societal attention and support to help them maintain multilateral aspects of health and function as well as their independence (Wang, Hu and Wu, 2022).

The studies on emotional changes in hypertensive older adults living alone show that hypertensive older adults living alone experience the grieving process. Kübler-Ross's fundamental premise was that the stages

of grief or a dying individual go through five stages: denial, anger, bargaining, depression, and acceptance (Wright and Hogan, 2008; Avis et al., 2021). The length of time older adults lived alone in this study varied from a range of 1 year to 13 years. The highest intensity of grieving is felt in years 1-2, and the stage of receiving is experienced after the fifth year (Meuser and Marwit, 2001). The grieving process has an important role in the ability to adapt to stressors (Noyes et al., 2010). Factors associated with an increased risk of complicated grieving included living alone, not having a partner, dying while intubated, problematic communication, and not having the opportunity to say goodbye (Sanderson et al., 2022). Community nurses need to be able to identify dysfunctional grieving in older adults living alone so that appropriate interventions can be identified so that the



Table 4. Selection of participant statements based on the theme of healthcare needs of hypertensive older adults living alone

Themes, Subthemes, and Category	
<b>Theme 1. Health information</b>	
<b>Subtheme 1. Health education</b>	
1. Health education from health workers	“If an officer comes I ask them... if I don't know... I hope they teach me... so I know what to do.” (P2)
<b>Subtheme 2. Sharing among older adults</b>	
1. Sharing among the older adults	“If there was the older adults came home from the health center, I am asking them what was conveyed.” (P2)
<b>Theme 2. Health check regularly</b>	
<b>Subtheme 1. The examinations in healthcare facilities</b>	
1. Information about the time	“If there are any more activities I will go again... I am waiting for the information.”(P5)
2. Availability of facilities	“If I'm sick, I go to the health center (Pustu) and get checked... there are always officers.”(P4)
<b>Subtheme 2. Home visit</b>	
1. Home visit	“I want to be examined... someone is coming to check me at home... I can't go there.” (P4)
<b>Theme 3. Group activities</b>	
<b>Subtheme 1. Older adults exercise</b>	
1. Older adults exercise	“If it's older adults exercise and some officers invite... I'll join.” (P1)
<b>Subtheme 2. Group activities</b>	
1. Older adults group activities	“If there is an older adults group activity, I want to join.” (P1, P2, P3, P4, P5)
<b>Theme 4. Spiritual activities</b>	
<b>Subtheme 1. Spiritual guidance</b>	
1. Guidance in dealing with death	“We are old... while young people can die suddenly... moreover, we are sick... so we want someone to teach us.” (P2)
<b>Subtheme 2. Guidance of worship rituals</b>	
1. Prayer Guidance	“People say you can pray by sitting but I don't know how... I don't do it... I want someone to teach me.”(P2)
2. Guidance on Reading the Scriptures or Koran	“They often take me to recite the Koran... but I don't go because I can't... because I didn't learn about it before.” (P4)

older adults can carry out their grieving process functionally and properly.

Hypertensive older adults living alone also experience anxiety related to disease recurrence, meeting their daily needs, and facing death. Older adults living alone with poorer sleep quality and more pronounced anxiety were positively associated with higher levels of depressive symptoms. Older adults living alone should be encouraged to engage in social activities that may improve sleep quality, relieve anxiety, and improve feelings of loneliness caused by living alone. Meanwhile, older adults living alone should receive attention and support to alleviate their depressive symptoms (Huang *et al.*, 2023). Community nurses must provide preparation for older adults living alone when facing disease recurrence and death. Preparing for death is very important to anticipate death and grieve. The results of previous research show that discussing death, preparing for death, planning long-term plans, and reducing stress can improve adaptation in dealing with loss (Garrido and Prigerson, 2014). Reducing stress and anxiety are the needs detected in older women (Espinoza *et al.*, 2019).

Social changes in the older adults living alone identified in this study are the lack of interaction with family and self-isolation due to limitations. Older people living alone are at higher risk for isolation because of physical frailty as well as deaths in their family and friendship networks (Klinenberg, 2016). Psychological

distress has a considerable impact on the social functioning of older adults (Matud and García, 2019). Isolation or limitation of social relations is also created by environmental situations, loss of partner, the busyness of the closest family members such as children, and lack of public concern. People need to maintain the need for interpersonal intimacy and contact with others until they die. Research shows that the road to successful aging is to stay active. Several studies report that after the death of a spouse contact with others is limited, resulting in moments of intense loneliness (Jeon, Hong and Jang, 2022). Increased social participation is associated with lower rates of weakness and feelings of loneliness. It was suggested that loneliness and weakness should be measured and addressed simultaneously among adults living in the community (Ge, Yap and Heng, 2022). Healthcare providers should focus on enhancing social interactions and support for older adults living alone because of their effects on health (Imamura *et al.*, 2024).

The spiritual changes in older adults living alone are changes in worship rituals and access to spiritual services. Spirituality is described as a transcendence relationship between humans and the Most High, described as a source of strength and hope, giving meaning to life. Spirituality is different from religion or religiosity. Spirituality deals with one's internal beliefs and personal experience with God whereas religion or religiosity is a way of expressing aspects of one's

personal beliefs. Religion or religiosity is more related to worship practices, community practices, and external behavior. The need for religiosity can be fulfilled by religious actions such as praying or confession, reading holy books, or improving human relations. Older men living alone missed their departed spouse or longed for a companion, and they experienced loneliness and anxiety; comparing objective measures of their health status with others in the same age group increased their subjective well-being, and transcendence was one of the most significant factors enhancing spiritual health (Hirakawa *et al.*, 2019). The self-transcendence enhancement program is effective in improving the level of self-transcendence in older adults living alone and helping them to attain spiritual and psychological well-being (Kim and Ahn, 2021). The types of nursing interventions vary according to the unique spiritual needs determined by basic assessment and ongoing assessment. Interventions that can be given include worship rituals guidance like praying, spending time with the older adults to listen to their feelings, listening to religious music or chanting scriptures, watching the sunset by the lake, walking along the river, or giving a touch. Conversations about spiritual matters, the spiritual benefits of illness and adversity, and preparation for death are some of the topics that older people enjoy that have a therapeutic effect (Stanley and Beare, 2007). For nearly all patients it is recommended integrating the kind of personal spiritual conversation into primary care (Mächler *et al.*, 2022).

#### Coping of hypertensive older adults living alone

The coping mechanisms of the older adults living alone identified in this study are emotion-focused coping mechanisms, biobehavior-focused coping mechanisms, social-focused coping mechanisms, and spiritual-focused coping mechanisms. The emotion-focused coping mechanisms identified are expressing feelings, harboring feelings, ignoring them, and thinking positively. Several participants expressed feelings and thought positively about their condition. Gratitude for small pleasures, acceptance of situations, and optimism for the future are generally owned by older adults. Comparing the positive aspects with others who are less fortunate will give positive thoughts. Making meaning and positive reappraisal are important strategies that enable them to strengthen their relationships (Fiocco, Gryspeerdt and Franco, 2021). Another emotion-focused coping mechanism of the older adults living alone was ignoring and harboring feelings by seeking to change one's expectations about relationships. Individuals in higher age groups look more to emotional

regulation strategies (i.e., lowering expectations) than means of improving relationships (Willis and Vickery, 2022). It is important to identify how hypertensive older adults living alone adapted to the problems so as to find out whether the coping mechanisms used are adaptive or maladaptive so that appropriate interventions can be developed by changing maladaptive coping mechanisms to adaptive ones, including positive reframing and assertiveness.

The biobehavior-focused coping mechanisms identified in this study are relaxation, diversion activities, and communication with children. Behavioral strategies such as maintaining a daily schedule are important coping strategies for older adults. Participants also talked about the importance of staying busy and doing activities such as cleaning the house, making cakes to sell, taking walks, and communicating with children as behavioral strategies that distract older adults from feeling sad, lonely, and depressed due to living alone. Doing sports and staying physically active is another common behavioral method for coping with grief and maintaining health in older adults with chronic disease (Bahtiar, Sahar and Wiarsih, 2022). Getting outside on walks was considered an important strategy for staying healthy, especially for those living in smaller spaces (Fiocco, Gryspeerdt and Franco, 2021). This study also identified that all participants carried out diversion activities to adapt to the changes caused by living alone. Diversion activity is self-control that can prevent panic and detrimental actions in threatening situations; self-control is a response that is very helpful in finding self-strength (Kozier and Erb, 2014).

The social-focused coping mechanisms identified in this study are interactions with neighbors, stories from fellow older adults, and visits to family homes. The support received from family and community, including emotional and tangible support, was highly valued by the participants. The majority of them were grateful for a good relationship with their family and environment. Participants who did not have children reflected support from other families such as nephews and the surrounding environment. Several participants emphasized the importance of connecting with fellow older adults as a way of not feeling alone and disseminating health information obtained from healthcare workers and facilities. Many seniors share a deep sense of community with their neighbors, reflecting on time spent socializing with the neighborhood, helping one another, sharing resources, and engaging in social activities in their community. Older adults living alone require a greater quantity and

need of social support than is regularly available (Fiocco, Gryspeerdt and Franco, [2021](#)).

Spiritually-focused coping mechanisms identified in this study are praying and performing worship rituals. Religion or religiosity is more related to worship practices, community practices, and external behavior. The need for religiosity can be fulfilled by religious actions such as praying or confession, reading holy books, or improving human relations (Stanley and Beare, [2007](#)). The prayer and *dhikr* activities carried out by the participants caused the older adults to feel calm and able to adapt to the conditions of being old. This type of coping does not solve the problem but can make older adults feel better (Kozier and Erb, [2014](#)). Older adults living alone were enjoying their autonomous status and freedom, despite widespread negative views of them. Spiritual care is a core element of end-of-life care for older people. The spiritual health of older adults living alone was enhanced through gratitude to everyone with whom they had crossed paths in their life, and confirming their health measurements were comparative or better than those of others in the same age group (Hirakawa *et al.*, [2019](#)).

The health services need for hypertensive older adults living alone.

The health service needs of the older adults living alone identified in this study are health information, regular health checks, group activities, and spiritual activities. Participants expect information related to the management of older adults with various health problems they experience. This is consistent with research that states that educational programs can increase knowledge and skills, reduce psychological stress, increase social networks, and help people feel more confident (Klimova *et al.*, [2019](#)). Besides that, discussing and exchanging ideas and stories is one of the efforts in taking a social approach. Allowing gathering with fellow older adults means creating socialization for them. Communication with fellow older adults is important to improve social relations, and provide awareness of a sense of shared fate and having shared rights and obligations (Widuri, [2010](#)).

Older adults with chronic diseases need health checks regularly as do older adults who experience physical and cognitive weaknesses and limitations so that they experience impaired mobility and thus require home visits. The hope of having home visits to be able to carry out health checks, and provide education and assistance to older adults living alone at home is supported by research which states that when home visits are carried out by nurses it can make clients feel

comfortable and experience reduced stress, clients also get information related to health so that cause positive changes and improve their quality of life (Vullings *et al.*, [2020](#)). Becoming empowered and recognized as a person was experienced as the major benefit of the support and advice given during the preventive home visit. The support and advice generated conditions for the person to become empowered by contributing to a feeling of control and preparedness for the future. Furthermore, the support and advice contributed to the feeling of becoming recognized as a person, as an outcome of the supportive dialogue and the assessments of their health, behavior, and surrounding environment (Nivestam *et al.*, [2021](#)).

Group activities for the older adults living alone identified in this study are physical exercise and peer group activities. Physical exercises such as gymnastics for older adults can be effective against weakness, gait parameters, cognitive function, and quality of life for older adults in nursing homes. The design of physical exercise for older adults is aimed at providing them with proper exercises, improving their physical function, and improving or delaying weakness, which is principally important for developing countries in East Asia where rehabilitation resources are generally scarce (Liu *et al.*, [2022](#)). The group process describes a process that is always changing, developing, and adapting to changing circumstances. It takes communication, team motivation, and team diversity to resolve conflicts during the group process, and groups usually show the same interests needs, and goals. Peer support groups are one of the social support systems that can be formed for older adults in the community (Achjar, [2011](#)). Research shows that participants express hope that there is a peer group to increase knowledge. This condition is found by research that states that peer-group-based education can increase and improve support (van Wezel *et al.*, [2021](#)).

Spiritual activities for the older adults living alone identified in this study are spiritual guidance in dealing with death and guidance on religious rituals including prayer guidance when sick and guidance on reading the holy book. In facing death, every older adult has a different reaction, depending on their personality and how they face life. Therefore, nurses must carefully examine the strengths and weaknesses of older adults. If the weakness is in an aspect of spirituality, the nurse is obliged to look for efforts so that the older adult client's suffering can be alleviated. Nurses can provide opportunities for the older adults to carry out their worship or directly provide spiritual guidance by

recommending carrying out their worship, such as reading the holy book or helping teach the older adults to fulfill their religious obligations. Generally, at the time of death, one's religion or belief is an important factor. Thus the presence of a spiritual teacher is necessary to comfort older adults in the face of death (Widuri, 2010). Implementation of religious intervention resulted in improved subjective vitality and a diminished sense of loneliness among older adults (Borji and Tarjoman, 2020). The study showed more frequent therapeutics of nurse-provided spiritual care included: presence, assessment of spiritual or religious beliefs and practices, and listening for either spiritual themes in patient stories or spiritual concerns. The least common therapeutics provided included: offering to read a spiritually nurturing passage; arranging for the patient's clergy or a chaplain to visit; and documenting spiritual care. Other rather infrequent therapeutics with means around included: asking how to support their spiritual or religious practices, telling patients about spiritual resources, encouraging patients to talk about spiritual challenges, and discussing spiritual care for a patient with colleagues (Taylor *et al.*, 2023). Community nurses need to provide spiritual care needs of hypertensive older adults living alone, including guidance on worship rituals according to their respective religions and facilitating access to spiritual guidance needs in the community.

## Conclusion

This phenomenological study explored lived experiences including health changes, coping mechanisms, and healthcare needs of hypertensive older adults living alone consisting of physical, emotional, social, and spiritual aspects. Hypertensive older adults living alone need support from their surroundings considering that their lives are at greater risk. Implications of the findings for practice were that community health nurses can create effective holistic care programs including physical, psychological, social, and spiritual for hypertensive older adults living alone, leveraging the role of community volunteers as support groups to enhance hypertensive prevention and promotion efforts among older adults. In addition, hypertensive older adults living alone also need support from their families even though they do not live in the same house and support from the social environment such as older adults group activities. Group activities need to be developed to prevent and overcome physical, psychological, social, and spiritual problems holistically to increase social involvement so that they

can prevent and treat physical complaints, stress, depression, and loneliness, and could prevent the severity or complications of hypertension.

Recommendations in this study include developing a holistic hypertensive care program consisting of physical, psychological, social, and spiritual activities. It is necessary to develop family support even though they do not live in the same house, social support in the form of group activities with various activities to prevent and overcome physical, psychological, social, and spiritual problems in hypertensive older adults living alone. Further research needs to develop an adaptive coping strategies model for hypertensive older adults living alone, factors influencing the adaptation process of the older adults living alone, explore the effectiveness of holistic hypertension care on blood pressure, stress, coping, and quality of life of hypertensive older adults by comparing older adults living alone with older adults living with family, and qualitative research using ethnographic methods to determine the adaptation process of the older adults living alone according to culture.

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## Exploring empathy of nursing students and the extent of their clinical experiences: a cross-case analysis

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### ABSTRACT

**Introduction:** Empathy is the ability of a nurse to understand the circumstances, experiences, and feelings of the patients. It is a vital component of a nurse as this enables the nurse to respond therapeutically to the needs of the clients, thereby providing quality nursing care. This study explored the development of empathy among nursing students based on their hospital exposure and other factors that provide a more in-depth understanding of the phenomenon investigated.

**Methods:** Using the intrinsic case study method, the study interviewed six nursing students as informants, selected based on their extent of clinical exposure through purposive sampling. A standardized Jefferson Scale of Empathy (JSE) was also used to provide information on empathy. A cross-case analysis was used to generate the findings of this study.

**Results:** Findings generated five themes: maintaining empathy level across different conditions, prior clinical experiences affect empathy levels, empathy increases with knowledge, expression of empathy is hindered by academic workload and mismatch between perceived and objectively measured empathy levels.

**Conclusions:** Empathy was more developed by nursing students when they were exposed to patient care experiences. The extent of knowledge and the continued experience in the clinical field are major factors that contribute to their increased empathy levels of nursing students.

**Keywords:** case study, clinical experience, empathy, nursing

### Introduction

As a fundamental element of nursing, empathy is the ability of a nurse to understand the circumstances, experiences, and feelings of the patients. It is a vital component in the promotion of health and the formation of the therapeutic relationship which leads to the delivery of quality nursing care. Empathy has been associated with multiple positive health outcomes such as better patient compliance, fewer clinical errors, and more effective accomplishment of the nursing process (Ahrweiler et al., 2014). In addition, patients who experience empathetic behavior are less anxious and

have better self-esteem. Empathy is referred to as the essence of all nurse-patient interactions and should be perceived as an indicator of quality nursing care (Wu, 2021). The use of technology in nursing is perceived to have reduced opportunities for direct patient communication as the focus of the nursing care is directed using care gadgets and equipment, hence reducing the chance to demonstrate empathy in patient care (Pealing et al., 2018). However, on the other hand, technology can also hasten the implementation of nursing procedures providing more time for nurse-patient interaction (Ali et al., 2022). Nursing students

must have the ability to empathize as this is part of the therapeutic nursing competencies that will help them see and meet the needs of their patients in an appropriate way (Heggstad et al., 2018). With empathetic behaviors, future nurses can contribute to a higher satisfaction and better and health outcomes for patients ( Yu et al., 2022). In nursing students, empathy is not immediately developed and there are factors that influence this, such as age, gender, experience (Adriaansen, Van Achterberg, & Borm, 2008; Williams et al., 2014 ) and many others (Dulay et al., 2018; Juniarta et al., 2023).

Despite the emphasis on empathy being at the heart of patient care, studies suggest a decline in the level of empathy among nursing students as they gain hospital experience. A study comparing the empathy of nurses and nursing students showed higher empathy among nursing students compared to nurses. This was attributed to the burnout level experienced by nurses who were more exposed to patient care than nursing students (Ferri et al., 2015; Koehl-Hackert et al., 2012). This study implies that as nursing students are more exposed to clinical experiences and patient interaction in comparison to those who were in their first year of the nursing program, it is assumed that their empathy reduces. On the contrary, according to a quantitative study (Saeidi et al., 2017) there have been no significant differences found in the empathy scores of the first and final-year students. Similarly, Günaydın and Barlas (2015) reported that students from higher levels have higher empathy scores compared to those in their first year of nursing education. However, it was noted by the researchers that most studies on empathy are conducted using the quantitative method.

As such, this study explored the development of empathy of nursing students based on their hospital exposure and other factors such as stressors in finances, and academic loads, which provide a more in-depth understanding of the phenomenon investigated. Exploring the concept of empathy is important in establishing the mental capacity of an individual to initiate professional rapport and communication with patients. It is a dynamic and ceaselessly developing concept influenced by a variety of factors. These include high, medium, and low stability factors that encompass innate and acquired personal, social, and environmental factors ( Yu et al., 2022). The results of the study will be utilized in strengthening the integration of developing empathy as competency in nursing education for nursing students across all levels.

## Materials and Methods

### Study Design

The study utilized a qualitative multiple case study. Intrinsic case study is used to provide a detailed description of a unique case (Creswell, 2013). The multiple intrinsic case study was used to gain an in-depth, multi-faceted understanding of the differences in the empathy levels of nursing students as their clinical exposure increases. This qualitative investigation used a multiple-case study approach to examine the cases separately to understand their unique factors, and also examined the data across cases to determine points of similarity and difference (Cobian & Ramos, 2021). An intrinsic case study design was further indicated as the researchers desired to learn this uniqueness of empathy levels of nursing students across their academic levels. Intrinsic case study is undertaken to learn about a unique phenomenon and to define the uniqueness which distinguishes it from all others (Crowe et al., 2011; Sibbald et al., 2021). The case selection was based on the extent of clinical hospital duty exposure of nursing students. The number of hours of clinical exposure varies according to the year levels. Lower years are exposed to basic nursing practice and theories without clinical exposure compared to higher year students who've been exposed to patient care and real nursing roles, and who've undergone a more complex level of understanding of the nursing knowledge and skills. In this study, the second-year nursing students were considered for the non-clinical exposure as this group used the online alternative related learning experience during the pandemic and were not exposed to hospital duty. Those with clinical exposures in the hospital were taken from the fourth- and third-year levels.

### Study Setting and Participants

The research was conducted in a public nursing school in Cebu City, Philippines. A purposive sampling technique was used to select the participants for this study. Criteria in the selection include at least 18 years old to allow legal consent of the participants, male or female, currently enrolled in the Bachelor of Science in Nursing program, exposed and not exposed to hospital clinical duty. The study intentionally did not include first- and third-year students since they have not been exposed to actual hospital duty due to the pandemic. The study sample size was determined by maximum data saturation which was achieved when no new themes arose from the respondents' answers following the processing of collected data. The actual number of participants was six, three from the lower level and



three from the higher level. These groups were chosen to provide a variation of the extent of clinical exposure of nursing students. The number of participants in a qualitative study in order to reach saturation level ranges from 5 and 24 participants (Constantinou et al., 2017). Generalizability in qualitative research is least intended if the purpose of the study is providing in-depth explanations of the case rather than generalizing findings (Carminati, 2018).

#### Instrument and Data Collection

Intensive interviews were conducted with the selected informants. The interview was composed of a series of subjective questions that were in line with knowing the student's current empathy level and empathic behavior. The interviewer was a senior nursing student with a senior faculty researcher. The interviewers were part of the academic community where the participants were studying. As the researchers were part of the phenomenon explored, the researchers conducted a pre-interview discussion to consider their biases. The average duration of the interview was an hour wherein participants freely expounded on each question given and depending on the extent of the researcher's exploration of the participant's experiences. In addition to our interview, participants answered the Jefferson Scale of Empathy (JSE), a 20-item questionnaire that would reflect the respondent's empathy level using a Likert Scale (Hojat et al., 2018). JSE was subjected to exploratory factor analysis and was found to be acceptable with a Cronbach's alpha of 0.80 (Yu et al., 2024). The JSE is an additional parameter in exploring the levels of empathy among the respondents that serves as supplemental data for this research. Unique in comparison to other qualitative approaches, within case study research, investigators can collect and integrate quantitative survey data, which facilitates reaching a holistic understanding of the phenomenon being studied (Yin, 2003). Before the interview commenced, the participants were given information on the study. They also gave their written consent form, and they were informed of their right to withdraw from the study.

Interviews were transcribed for easier coding of the data. Using the constant comparison data analysis method, data from the interviews were analyzed by developing key parameters through continually creating and assessing meaning units (Ontario Public Health Unit, 2020). Key parameters served as the basis for comparison. The parameters generated were sex, year level, knowledge on empathy, perception of empathy, extent of hospital clinical experience, perceived

empathy level, JSE score, which is an objective measure of empathy, and effects of stressors, families/friends, and academic workload on empathy. Data were then compared to examine the relationships between the parameters. Individual case analysis was sent back to research participants to verify accuracy. Cross-case analysis across all the cases within each parameter was examined by the researchers to examine if there were overarching similarities and differences across all six cases. This was done using an iterative research approach where all individual cases within each parameter were analyzed. Over-arching cross-case themes were developed.

The trustworthiness of the study was done through the thick description of the experiences gathered from the participants and audit trail of interviews. Ethical issues were addressed in this study prior to its conduct. The Cebu Normal University -Research Ethics Committee through CNU-REC Code 568/2023-06 Cabataña issued last June 20, 2023, provided the ethics clearance. Written consents were obtained from the informants and voluntary participation was respected. Data confidentiality was observed with a storage of at least one year after the study is published.

#### Ethical consideration

The research ethics committee of the Faculty of Nursing at Universitas Indonesia approved this study and granted ethical permission number KET-164/UN2.F12.D1.2.1/PPM.00.02/ 2023. The rights of participants were ensured by obtaining both written and verbal consent before data collection. Privacy was safeguarded by pseudonyms. Confidentiality was ascertained by reassuring the study participants that facts and information shared would be unreachable by any other persons except those involved in the study. Anonymity was ensured by using pseudonyms instead of the participant's real identities.

#### Data collection

The researchers screened potential participants by taking data from the person in charge of the older adults program at the Talia Health Center. Furthermore, the researcher visited the homes of the older adults living alone and explained the aims and objectives of the research. Researchers first conducted a Mini Mental State Examination (MMSE) to determine the cognitive function of older adults. If the older adults did not experience cognitive dysfunction and were willing to become respondents, the researcher submitted informed consent to be signed by the older adult participants. The next researcher contracted the time

and place for collecting interview data. Time for the interview was 30 to 50 minutes. The language used was Indonesian. To enhance the data's reliability, participants were invited to review interview transcripts and analyses and make corrections, adding to the credibility of the findings. The triangulation method, incorporating field notes and observations, enriched the research findings by cross-verifying information from multiple sources. The data collection process concluded when data saturation was reached, i.e., when new major themes were no longer emerging.

#### Data analysis

Fifteen interview transcripts were analyzed using inductive thematic analysis—namely, the interview results were analyzed using Colaizzi's original seven-step method (Praveena and Sasikumar, 2021). The analytical process unfolded as follows: First, the phenomenon was described verbatim based on the participants' opinions or statements in the transcript. Second, the researchers read the entire description of the phenomenon, reread the transcript, and quoted the statement. Third, the researchers described the meaning in the form of keywords. Fourth, the researchers organized the keywords into a collection of meanings arranged into categories, subthemes, and themes. Fifth, the researchers wrote a comprehensive report on the results. Strict adherence to the original seven-step method was maintained throughout this analytical process, ensuring a thorough exploration of the experiences of older adults living alone with hypertension. The duration of the audit process was one month.

#### Trustworthiness

The trustworthiness of data is the validity and reliability of qualitative research including credibility, dependability, confirmability, and transferability. Credibility was ensured by returning interview transcripts to participants for verification. All participants in this study agreed with the results of the transcript submitted by the researcher by placing a checklist (v) on each of their answers and not adding to the results of the existing transcript. Dependability involved an external reviewer with a supervisor, also known as an audit inquiry. In this study, the researcher submitted all the results of the interview transcripts and field notes to the supervisor in the form of a soft file which was sent via email so that the supervisor could review the research results that had been obtained. Confirmability was by attaching the final research report and the article was constructed so that readers follow

the researcher's flow of thought. This was done by the researcher by showing all transcripts along with field notes, theme categorization tables, and theme analysis tables to external reviewers and attaching them to the final research report and articles so that the reader follows the researcher's flow of thought. Transferability was by describing the themes that have been identified in a similar sample that is not involved in the study to determine using the external check method on other older adults by submitting printouts of the themes that have been identified and asking the trial participants to give a checklist (v) if they agreed with the themes that appeared.

#### Results

Six participants were involved in this study and were nursing students aged 19-22 years old. Three of the six were higher-level nursing students who had undergone clinical experiences while the remaining three were from the lower level and who were yet to experience hospital duty.

**Case 1:** Mr. A is the case of a 22-year-old, male, higher-level nursing student who has been exposed to clinical duties in different hospitals. Mr. A shared his definition of empathy as the ability to put oneself in another person's shoes and think about how one would like to be treated if one were the patient being cared for. He answered the Jefferson Scale of Empathy questionnaire and yielded a score of 97, categorized as a medium-low level of empathy. He also shared a situation where he exhibited empathy when assigned to a patient. Mr. A stated that he exhibited empathy by talking to the patient and providing comfort for the patient by assisting with their needs throughout the shift. When asked if he considers himself an empathetic person, he answered yes explaining that he is sensitive to even the little things. He further stated that empathy is a good skill to have as a nurse because it helps pinpoint the needs of a person and the right interventions for those needs. Mr. A asserted that their empathy comes from what he learned, which included his upbringing as a kind person by his mother. Mr. A also shared stressors that he believes affect their level of empathy and which include workload and time constraints which impede his ability to fully cater to and empathize with the needs of their client during hospital duty. He stated that empathy has helped him become closer to the patient beyond the assessment form by allowing for a deeper exploration of the patient's experiences and feelings. He also shared that stressors affect his level of empathy by increasing as he tries to do more for the patient. Mr. A stated that

the contributing factor to his current level of empathy is the experience he has gained with caring for a family member as well as the lessons that were taught in nursing school that allowed him to grasp the situation regarding the patient. When asked about his perception of his current level of empathy, he believed that he has a high level of empathy due to his interactions with the patients and learning about their stories.

**Case 2:** Mr. B is a case of a 19-year-old, male, lower-level nursing student who currently doesn't have any exposure to clinical duties. Mr. B's understanding of empathy is about a feeling experienced when one perceives someone but he also verbalized he does not fully understand what it is. Mr. B answered the Jefferson Scale of Empathy where he got 88 points, which is categorized as low level of empathy. Mr. B shared how return demonstrations conducted at school allowed him to have the opportunity to vicariously perform what it's like to be a nurse in a hospital. He also explained that, with that experience, he learned how to empathize. Mr. B considered himself an empathetic person in certain situations because of personal interest and biases on whom he should empathize with. He shared how empathy can help him in his future clinical duties by allowing him to understand his patient more— he also included that too much empathy can be draining. Mr. B thinks that empathy is developed and influenced by people. He also shared that he isn't affected when exposed to problems and stressors. Mr. B shared how his level of empathy may be affected by the academic requirements, his financial situation, and his overall energy level. He shared how providing care is not limited to medical interventions but extends to connecting with the patient on an emotional level as it also helps in the improvement of the patient's well-being. He also expressed that his sense of empathy is not fully built but is expected to develop when he can experience real hospital duties. Since he does not have any clinical experience in hospitals, he believed that his level of empathy is low, which is rooted in his lack of experience in interacting with patients.

**Case 3:** Ms. C is a 22-year-old, female, higher-level nursing student who has undergone multiple clinical experiences. The respondent was asked to explain empathy in her own words to which she replied that she thinks that the simplest analogy is to put yourself in other people's shoes and consider the perspective of the other person. Ms. C answered the Jefferson Scale of Empathy wherein they got a score of 82 and was categorized as having a low level of empathy. She shared an experience wherein she was able to exhibit empathy

when she had to help take care of an infant and help the mother accomplish their own self-care tasks. Ms. C stated that she perceives herself as an empathetic person. She expressed that empathy is important in dealing with other people and failing to empathize means failing to communicate with others holistically. Ms. C shared that everyone has the capability to empathize, but it is also something that must be worked on or built upon. A person choosing empathy means choosing to love and develop this trait. Like previous respondents, she also shared that her level of empathy is affected by problems. She mentioned perceived factors that affect the level of empathy including predisposed biases that are adapted from other people and society and which could get in the way of empathy. She also said that the academic workload causes her stress, which can hinder from thinking about what's best for their patient. Moreover, she shared that nursing theories and practices foster empathy by emphasizing holistic care and how it is given to the patient in the best way possible while also treating the patient as the person that they are. When asked to compare her level of empathy before and after her experiences in the clinical setting, she claimed that it had increased and built from those experiences.

**Case 4:** Ms. D believed that empathy is what you would feel when you see others in different situations, and when the intent is pleasing others. She answered the Jefferson Scale of Empathy and got 95 points, categorized as medium-low. She shared that she isn't an empathetic person, but when the time calls for being empathetic, she believes that she can be. Ms. D shared that she agrees when people say that empathy can be developed and innate; she expressed her belief by stating that empathy can be learned from others but can also arise when the person really feels pity toward others. Ms. D relates to people who maintain a level of empathy despite being bombarded by different problems in life and added that she should be empathetic to everyone no matter the situation. She stated factors that would increase and decrease her level of empathy wherein she shared that she doesn't want to empathize with people who are cruel and that people who are kind can really increase her level of empathy, especially when the same people are having a hard time. She also shared how she reached a certain level of empathy citing the lessons that were taught in some of her nursing subjects that highlighted connecting with the patient to give care, warmth, and comfort. Additionally, she expounded how these lessons and activities allowed her to apply what she learned in

theories and practices, leading to an increased level of empathy. When asked to compare her level of empathy to her previous self, she expressed that it had increased compared to before due to what she learned while studying nursing.

**Case 5:** Mr. E is a 22-year-old, male, higher-level student who has been exposed to the clinical setting. He defined empathy as relating to someone and how to put oneself into their shoes and allow one to understand another person more and have a glimpse of their feelings and experiences. He answered the Jefferson Scale of Empathy and got a score of 86, categorized as a low empathy level. Mr. E shared his experience in exhibiting empathy when he encountered a patient who had to wait for the government's aid to acquire the implant for the surgery. He stated how it was important to empathize with the patient and be there for them by discussing their feelings and plans to lighten the load of the patient. In addition, he also asserted himself as an empathetic person most of the time except when dealing with personal problems. When asked if he thinks empathy is innate or developed, Mr. E expressed that it is inherent within us but is further developed as a person grows and experiences new things, meets new people, and forms new relationships. On factors that affect their level of empathy, he shared that academics and personal relationships are major stressors that affect his level of empathy. Moreover, he emphasized how empathy has improved the quality of care by providing for the specific needs of the patient and encouraging compliance to promote better health outcomes and well-being. He shared that this is further reaffirmed by the nursing curriculum as it helps hone empathy to become a nursing student's second nature. On the difference in his level of empathy before and now, he expressed that he believes it has increased as he has developed a deeper understanding through his various interactions with patients.

**Case 6:** Mr. F is a 19-year-old male student nurse who does not have any experience in the clinical setting. His idea about empathy is about the quality wherein the self can feel what it's like to be in the other's shoes and be able to view how the different actions influenced by empathy affect another person. He shared that when he can undergo clinical duties, he will use empathy to connect with his patients and to apply empathetic skills because of his passion for providing care to the patients. He further stated that empathy may be developed or innate, which will vary from person to person. He said that empathy may be nurtured due to the environment and culture and that empathy can also be a matter of

choice of whether or not you choose to foster that type of quality. With regard to maintaining a certain level of empathy despite having been bombarded with different problems, he expressed that he is the type of person who rationalizes everything, which can help him be logical in his actions and which often leads to being empathetic. For him, factors that would increase his level of empathy are when he knows there are personal benefits when providing empathy to a specific person. He mentioned that observing and analyzing the current situation of a person's problem helped him to understand others' problems. He also shared his idea about how empathy can allow him to become an effective student nurse by determining the non-verbal cues that he deemed important when treating a patient. Mr. F believed that moments where he felt down were the moments where his empathy rose as he did not want to let others experience what he had already experienced. He stated that when he practiced the health assessment procedure, he saw the importance of empathy. He stated that these learnings that highlighted knowledge with compassion aided him to do more than just retain knowledge but to use this to connect to people and become an effective and empathetic nurse in the future. He then expressed that his level of empathy has increased because he sees empathy as a vital role in dealing with patients in the future.

[Table 1](#) shows the summary of information pertaining to the participants' knowledge, clinical experience, perception on empathy, perceived empathy, Jefferson Scale of Empathy, which serves as objective measure, and perceived empathy as affected by stressors and academics workload. A cross-case analysis was used to generate the themes based on the comparison of the parameters based on the experiences shared by the informants.

#### Theme 1. Maintaining empathy level across different conditions

The respondents of this study stated that participants who were both exposed and not yet exposed to clinical duty are able to maintain their empathy levels despite the stressors that they are facing, like people or finances. As shown in [Table 1](#) (column 10), most of the participants shared that their perceived empathy level is not affected by stressors. In an excerpt from one of the interviews, a respondent stated that:

*"...every time I go on clinical duty, I say to myself that all those things go out the door. Now that you're in the hospital, it's about the patients and not about you."*

## Theme 2. Prior clinical experiences affect perceived empathy

The respondents who had prior clinical experience in the hospital *perceived* (column 8) that they have high empathy. In contrast, those who have not undergone hospital duty perceived their empathy as low. This means that actual contact with the patients results in the enhancement of a nursing student's empathy skills. An excerpt from an interview with one of the respondents stated,

*"I realized then and there that I felt his pain. I did not go through the said situation myself, but it was heartbreaking for me. It was one of the signs that I knew that I was able to feel empathy for my patients."*

He further explained how being in the presence of his patients taught him how to become a more empathetic and compassionate person. Prior experience aside from clinical exposure has also been mentioned as a factor that contributed to their increased level of empathy. Being able to take care of patients first-hand proves to be an emotional experience that can foster empathy and allow one to initiate a deeper understanding of their patient's experiences and perspectives.

## Theme 3. Knowledge on empathy enhances perceived empathy

The respondents defined their knowledge of empathy as "putting themselves in other people's shoes." They expressed that it is how a person would relate to another person and understand how they feel, as stated in an excerpt from one of the interviews:

*"It allows you to understand the person more, and have a glimpse of what they felt and experienced."* In the context of empathy in *healthcare*, a respondent stated that *"empathy is the ability to think about how one would like to be treated if one were the patient."*

He further stated that *he perceives he has a high level of empathy*. Most of the respondents answered that they think empathy is innate or inherent to a person, but it is further developed as the person grows and gathers more life experiences. One interviewee stated:

*"It's innate in a sense that it's in everyone. You have the capability to be empathetic. But it's also something that you must work on, it's a skill that you must build upon..."*

There are subjects included in the undergraduate nursing curriculum that explore the meaning of empathy and its importance to nursing care and outcomes. The more knowledge about empathy the students have gained through their nursing education and experience, the higher their perceived level of empathy. Nursing students, with their increased knowledge about empathy and its facets, develop a deeper understanding of the perspectives of the patients that they care for. Thus, they are more inclined to empathize with patients and report a higher level of subjective empathy.

## Theme 4. Expression of empathy is hindered by academic workload

The respondents of this study stated that the perceived empathy is reduced with increased academic workload. This finding is consistent in both those who have not yet been exposed to clinical duty and those who have. In an excerpt from one of the interviews, a Level 4 respondent who has been on clinical duty, stated that

*"workload is a major stressor because depending on the gravity of your workload [for example] if you have many patients, you have to manage your time."*

The number of academic responsibilities take time away from interacting with patients, thus decreasing the individual's perceived subjective levels. Moreover, the amount of academic workload exhausts the nursing students. This can be seen in one of the statements of the respondents who was not yet exposed to clinical duty:

*"... it can be related to academic load. If you are tired physically, emotionally, then what can you give to others if you yourself do not have anything [empathy] to give?"*

## Theme 5. Mismatch between perceived empathy and objective measure of empathy

The subjective empathy, when compared to the objective empathy, reveals a noticeable disparity among most respondents. Respondents who exhibited conflicting subjective and objective empathy shared a common issue: while their subjective empathy is high, their objective empathy is low. Which suggests that their perception of their ability to empathize doesn't reflect their empathy when they are in a situation where being empathetic is needed. Another noteworthy observation concerns the connection between perceived high empathy based on their clinical exposure. Those who have undergone clinical exposure, reported perceiving high empathy, whereas respondents lacking clinical

exposure tended to report lower perceived levels of empathy. In a section of the interview, one respondent expressed,

*"... I would consider myself an empathetic person most of the time."* This indicates that there are certain instances or occasions wherein the person can be empathetic, but it does imply that the person has high levels of empathy. Another respondent similarly conveyed, *"I don't just interact just for the sake of interacting - I interact with a purpose. I try to connect with an individual more on a deeper level,"*

implying a heightened level of empathy. Interestingly, both respondents scored low and medium-low levels of empathy in the Jefferson Scale of Empathy, respectively.

## Discussions

Empathy has been considered as a cornerstone of human connection and compassion (Moudatsou et al., [2020](#)). In-depth study of empathy in nursing students exposed and not exposed to clinical exposure has unraveled five distinct themes - with each theme illuminating a unique facet of empathy in nursing. Empathy differs among nursing students and is influenced by factors such as age, sex, job training and experience (Adriaansen et al., [2008](#); Ferri et al., [2015](#)). Exploring how empathy can be developed or sustained all throughout the pre-nursing to the actual nursing professional career is a challenge to be considered.

Cognitive empathy is defined to be the individual's capacity to perceive and accept the emotions of other people (Thompson et al., [2016](#)). With regard to the finding that empathy is sustained across different conditions such as relational and financial concerns, a study (Gupta & Nc, [2021](#)) further stated that there is no significant relationship between cognitive empathy and perceived stress. Furthermore, Nitschke and Bartz ([2023](#)) stated that there are no conclusive effects for the simplistic measures of cognitive empathy and emotion recognition when placed in stressful situations. However, more complex empathy tasks may affect an individual's cognitive empathy. Furthermore, empathy can be driven by an intrinsic desire to connect and understand others. Despite having stressors and distractions, empathy can persist even in challenging situations. Moreover, studies (Adolphs, [2002](#); Jeon, [2022](#); Rymarczyk et al., [2019](#)) identified that some aspects of empathy, such as basic emotional processing and mirroring, can be automatic and unconscious. Findings from the same studies identified brain regions

activated in both the self and another person when experiencing similar emotions, suggesting shared neural networks for perceiving and processing emotions. This automatic response helps maintain some level of empathy even when challenging situations are being faced by the individual.

Nursing students who have had more experience with patient care, such as those in the higher academic level in third or fourth years, had more opportunities to hone and increase their level of empathy through these interactions. It is important for nurses to understand their patients completely to address their needs, which requires being able to empathize and communicate therapeutically. Direct patient interaction while providing care helps foster a nursing student's ability to relate and be attuned to the feelings and emotions of their patients, which further increases their perceived level of empathy. Furthermore, this allows them to identify the needs of their patient and render the necessary care and therapy required. This is consistent with the results of certain studies (Günaydın & Barlas, [2015](#); Ouzouni & Nakakis, [2012](#)) that higher-level nursing students reported a higher level of empathy compared to students at the lower level. However, this was contrary to previous studies (Berduzco-Torres et al., [2021](#); Ghazwani et al., [2023](#); Wilson et al., [2012](#)) which stated that there are lower empathy levels in nursing students with more clinical experience. The higher degree of clinical experience is where nursing students can apply their knowledge directly and further increase empathy through the formation of therapeutic relationships (Jeong & Lee, [2021](#)). Moreover, empathy is enhanced through expert training among nursing students and the constant enhancement of their awareness and knowledge of empathy simulation intervention for patients (Cho & Kim, [2024](#); Ferri et al., [2019](#)).

Firstly, empathy, as an innate human attribute, can be malleable and can change over time (Ratka, [2018](#)). Responses of the respondents denote that they perceive to have developed a higher level of empathy through the nursing course that encourages the acquisition of a greater capacity for empathy to attend to the needs of the patient, as observed in other studies. To add, knowledge on emotions, social cues, and human behavior equip individuals with tools to better understand others - this is taught while in nursing. This includes understanding facial expressions, body language, and the impact of different situations on emotions. These are essential cues that will help the nurse understand the conditions and feelings of the

client. Studies further suggest that knowledge about ethical principles, fairness, and social justice can strengthen one's moral compass and encourage prosocial behavior. This, in turn, can lead to a greater awareness of and sensitivity toward the needs and struggles of others (Di Lorenzo et al., 2019). It is important, however, to note that the relationship between one's knowledge and empathy is not linear and is influenced by several factors, such as individual differences in one's personality, emotional intelligence, and life experiences. However, research provides strong evidence that being knowledgeable about empathy, along with knowledge about social processes and ethical principles can help in contributing to a higher perceived empathy level.

Lastly, in a study conducted by Sulaiman et al. (2023), it was found that exhaustion from high academic demands and stressors, deadlines, and balancing academics with one's social and interpersonal life have been known to cause burnout. Burnout in this sense has been identified to be one of the main reasons as to why empathy levels significantly decrease in the healthcare profession. Moreover, in a study by Chaabane et al. (2021) found clinical training stressors that have been identified to decrease the level of empathy of nursing students undergoing clinical training are academic training-related stressors that include: course load, lack of break times, and exams. Thus, this implies that the more preoccupied nursing students are, the more hindered they are to express their empathy - thereby, decreasing their empathetic expression toward their patients.

Moreover, self-concept, which is the idea of how a person sees themselves, is associated with the perceived levels of empathy while the actual self is in line with the objective levels of empathy, which is based on the experiences of the person. Self-concept is a basic part of the personality that can influence one's empathy, which is a good predictor of the actual level of empathy (Stojiljković et al., 2014). This suggests that the higher the person perceives themselves as empathetic, the more they are empathetic. This self-concept also relates to one's self-efficacy, which highlights the idea about how one perceives their own ability to perform something- and in this case, to empathize with others. In a study about self-efficacy (Artino Jr., 2012), it was found that improved self-efficacy had greater impact in subjects reaching their academic goals and which was grounded by strong resilient efficacy beliefs. Self-efficacy, in this sense, can also relate to how the nursing students view themselves as capable of empathizing

with their patient, which in turn can help improve their ability to empathize.

The study has explored in-depth the experiences of nursing participants and has shown how empathy can be developed. The limitation of the study is in the triangulation of data using multiple sources of information.

## Conclusion

Based on the findings of the study, a pattern emerged which suggests that empathy among nursing students is sustained despite personal stressors and is enhanced with more exposure to patient care in the clinical areas, which is further reinforced with the knowledge and previous experiences in these clinical areas. However, there are certain conditions that limit the opportunity to express and demonstrate one's empathetic capabilities due to increased academic workload. The recommendation for future research on empathy levels among nursing students and the correlation with clinical experiences is to review the education and training programs for prospective nursing students and carefully assess the academic demands within the nursing curriculum. This focus is essential to ensure that the intensity of the academic requirements does not impede the ongoing personal and professional development of nursing students toward cultivating and expressing their empathetic nature.

Further research is needed on empathy levels among nursing students and the correlation with clinical experiences and which review the education and training programs for prospective nursing students and carefully assess the academic demands within the nursing curriculum. This focus is essential to ensure that the intensity of the academic requirements does not impede the ongoing personal and professional development of nursing students toward cultivating and expressing their empathetic nature. It is also recommended that they explore the relationship between their innate empathy and learned empathy as well as how these impact the level of empathy that they perceive. This is essential to gauge the need to further cultivate and hone one's empathy.

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The authors declare no conflict of interest.

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Table 1. Cross-Case Analysis of the Respondents' Profile and Background on Empathy

Case (1)	Sex (2)	Yr Level (3)	Age (4)	Knowledge On Empathy (5)	Degree Of Experience (6)	Perception On How Empathy Is Developed (7)	Current Perceived Empathy Level (Subjective) (8)	Jefferson Scale Empathy /Objective Empathy (9)	Perceived Level Of Empathy When Affected By Stressors (10)	Effect Of Academic Workload On Empathy (11)
1	Male	4	22	Sees empathy as the ability to put oneself into other shoes.	Has hospital duty experience.	His upbringing prompted him to be empathetic to all.	High	Score: 97 "Medium Low" Empathy	Empathy levels increase.	Empathy expression is hindered by academic workload.
2	Male	2	19	Empathy is a feeling that you perceive in someone but confused it with interest towards another person.	No hospital duty experience. Worked as an emergency medical responder.	Believes that empathy is innate and is more on one's interest or degree of liking another person	Low	Score: 88 "Low" Empathy	His empathy level is affected by his current financial state and energy.	Many return demonstrations and exams reduce empathy level.
3	Female	4	22	Empathy is putting yourself in other people's shoes.	Has hospital duty experience.	Empathy is both innate and a skill that can be developed.	High	Score: 82 "Low" Empathy	Able to maintain empathy level.	Increased academic workload takes her attention away from her patient.
4	Female	2	19	Empathy is what you would feel when you see others in different situations; pleasing others	No hospital duty experience	Empathy can be developed, learned from others, and stem from pity and when you want to please others	Low	Score: 95 "Medium Low" Empathy	Do not change empathy to people with bad personality;	Clinical instructors' advice on avoiding attachment to the patient decreases one's empathy.
5	Male	4	22	Empathy is how you put yourself in someone else's shoes.	Has hospital duty experience.	Empathy is innate, but a skill that can also be developed as one grows.	High	Score: 86 "Low" Empathy	Able to maintain empathy levels.	Patient's responsiveness affects one's empathy level.
6	Male	2	19	Sees empathy as putting himself in the shoes of others.	No hospital duty experience.	Empathy is innate - but is MORE NURTURED because of one's environment.	High	Score: 89 "Medium Low" Empathy	Able to maintain level of empathy.	Academic workload decreases empathy level.

# Barriers and enablers to the implementation of person-centred care in an Indonesian hospital: a qualitative study

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## ABSTRACT

**Introduction:** Person-centred care (PCC) is increasingly considered as one of the criteria standards for delivering healthcare in hospitals. Registered nurses are increasingly expected to provide PCC in daily practice. However, although the hospital commits to enhancing and improving PCC, implementing this approach into practice has faced barriers and enablers. As the implementation of PCC is still at an early stage of development, it is well-recognised that the need to identify barriers and enablers is essential. This study aims to explore these barriers and enablers to implementing PCC in Indonesian hospitals.

**Methods:** This study employed a qualitative exploratory study conducted from July 2023 to September 2023 at a public hospital in Pekanbaru, Riau Province. It applied semi-structured interviews to collect data on barriers and enablers to implement PCC from 2 managers and 12 nurses from the medical ward. All participants were selected using a purposive sampling technique. Data collected from interviews were transcribed and then thematically analysed.

**Results:** Three barriers-related themes emerged, namely time constraints and workload, lack of resources, and communication challenges. Furthermore, three enablers themes also emerged, including leadership, commitment, and sufficient monitoring and supervision.

**Conclusions:** The study results lead hospital managers and policymakers to overcome existing barriers using adaptive planning and strategies and to improve enablers with well-trained professionals and strong leadership to deliver a PCC approach into practice. The implications to practice are that healthcare organisations must continue their support to decrease the barriers and optimise professional care in healthcare facilities to improve healthcare services.

**Keywords:** barriers, enablers, Indonesia, nursing, person-centred care

## Introduction

In recent years, the concept of person-centred care (PCC) has emerged as a transformative approach in the healthcare landscape, shifting the focus from merely treating medical conditions to fostering a holistic, patient-centred experience. PCC is about selecting and delivering interventions or treatments that are respectful of and responsive to the characteristics,

needs, preferences and values of a person or individual (Lloyd, Elkins and Innes, [2018](#); Dewi and Safri, [2020](#)). PCC has attracted the attention of leaders of visionary healthcare organisations, research institutions and public policy centres, who advocate that patients' interests and concerns should be at the centre of their healthcare experience (Dewi *et al.*, [2014](#)). This approach is increasingly recognised for its potential to improve

patient outcomes, enhance satisfaction, and foster a more collaborative and respectful relationship between patients and healthcare providers. This model sees clients as no longer passive clients and is where all stakeholders work together to ensure the best possible quality of care (Nkrumah and Abekah-Nkrumah, 2019).

In Indonesia, the healthcare system faces significant challenges, including a growing demand for services, diverse patient populations, and disparities in care quality across regions (Dewi *et al.*, 2014). As the country continues to develop its healthcare infrastructure and address these challenges, integrating PCC into Indonesian hospitals becomes crucial (Dewi and Safri, 2020). Therefore, the Indonesian government has presented its plan to enhance PCC within the healthcare systems at both national and state levels. This strategy includes the development of comprehensive frameworks, plans, and standards. As an illustration, Indonesian hospitals undergo evaluations based on PCC criteria outlined in the National Safety and Quality Health Service Standards as part of their accreditation requirements (Sutoto, 2022).

In addition, increasing recognition of the benefits and values of PCC is driving many health systems worldwide to implement strategies to improve PCC (McCormack, Dewing and McCance, 2011). Potential benefits of implementing PCC in hospitals include significantly transforming the patient experience and enhancing the overall effectiveness of healthcare services. For patients, PCC promises a more personalised approach that respects their needs and preferences, improving satisfaction and better health outcomes (Richter *et al.*, 2022). For healthcare providers, embracing PCC can foster a more collaborative and supportive environment. It encourages more profound engagement with patients, leading to more accurate assessments of needs and tailored interventions. Overall, PCC has the potential to enhance care quality, promote more efficient use of resources, and contribute to a more responsive and compassionate healthcare system (McCormack, Dewing and McCance, 2011; Richter *et al.*, 2022).

Embracing PCC could address issues such as fragmented care, inefficiencies, and gaps in patient engagement, thereby enhancing the overall quality of care (Kong, Kim and Kim, 2022). Over the past ten years, PCC has been introduced and implemented in the hospital's medical wards where this research was conducted. This ward has since become a pilot unit and a centre of excellence for implementing PCC. However, despite introducing and practising PCC for a decade, its

Table 1 Interview Questions

Interview Questions
1. Please tell me your understanding of person-centred care.
2. What does person-centred care mean to you?
3. How does your service contribute to person-centred care?
4. What is working well or not well for you to deliver person-centred care?
5. What are the barriers to delivering person-centred care?
6. What are the enablers to deliver person-centred care?
7. How does the hospital support providing person-centred care in the clinical practice?
8. Do you have any suggestions for how the hospital could deliver better person-centred care?

implementation still has obstacles and challenges. Both authors are facilitators of the PCC development in the medical ward and are responsible for investigating what hinders its implementation.

A study by Terry and Kayes (2020) found that integrating PCC into the health system may face difficulties. The effectiveness of PCC implementation is more than just dependent on adopting person-centred practices. However, it is significantly shaped by the hospital system's ability to support and integrate these practices into daily operations (Johnsen *et al.*, 2022). Key factors such as leadership support, staff training and the availability of appropriate infrastructure play crucial roles in either facilitating or hindering the adoption of PCC. Many studies in developed and developing countries have identified several PCC barriers and enablers (Oppert, O'Keeffe and Duong, 2018; Nkrumah and Abekah-Nkrumah, 2019). Common barriers include a lack of time, insufficient staffing, inadequate training, environmental constraints and unsupportive staff attitudes (Johnsen *et al.*, 2022; Kong, Kim and Kim, 2022). Enablers consist of strong and dedicated leadership; effective communication of strategic goals; involvement of patients and families; emphasis on employee happiness; development of staff skills; responsibility and rewards; measurement and feedback on patient-centred care; sufficient resources for improvement; technology; workplace environment; and a culture that encourages learning and adaptation (Lloyd, Elkins and Innes, 2018; Martín-Sanz *et al.*, 2022). The absence of precise details regarding the relevance of similar barriers and enablers to PCC in Indonesian hospital settings is evident. Therefore, this study's research question is: What are the barriers and enablers to implementing PCC in an Indonesian hospital? This study aims to address this gap by pinpointing and examining the obstacles and facilitators of PCC in an Indonesian hospital environment, specifically in the context of medical-surgical care.

## Materials and Methods

### Study Design

This study used a qualitative exploratory approach based on an interpretive framework, which is the best method to provide a direct picture of the phenomena and to achieve the study's aim. A qualitative exploratory approach fits well with the purpose of this study, which is to use an in-depth exploration to collect data on PCC barriers and enablers (Bekele and Ago, [2022](#)).

### Setting

The study setting was a medical ward at a public hospital in Pekanbaru, Riau Province, in Sumatra, Indonesia. The authors chose this location due to its convenient accessibility, and both authors are facilitators who first introduced PCC and its practice development in this hospital, in particular in the medical ward. In addition, both authors are lecturers at the Faculty of Nursing and the Faculty of Medicine at Universitas Riau, and also act as clinical educators for students of nursing and medicine at the same hospital. The authors have not, however, have any direct personal or professional relationships with the participants involved in this study. Universitas Riau and the hospital where this research was conducted have a strong partnership involving practical development, human resource development and research activities. Also, the moderate size of the site allowed for a thorough exploration within the constraints of time and resources available.

### Sampling

Purposive sampling was used to recruit various participants and to achieve data saturation. This sampling method allowed the author to recruit managers and nurses from the designated ward. The participants were recruited using the inclusion criteria of nurses who provide care at medical wards. Participants were invited to the study by providing a cover letter distributed by the authors to the ward managers for distribution to the nurses. Registered nurses who agreed to participate then signed informed consent and participated in the study. A sample total of 14 participants (two managers and 12 nurses) were involved in the study. Data saturation was achieved with 14 interviews, consistent with the recommendation of Bekele and Ago ([2022](#)) and Hennink and Kaiser ([2022](#)). Bekele and Ago ([2022](#)) conclude that the minimum number of participants (6 – 12) is required to achieve data saturation. Data saturation in this study was achieved by conducting initial data analysis during

interviews to understand the participants' perspectives on the research topic. When additional data collection no longer provided new insights related to the research topic, the authors were deemed to have had gathered sufficient data to understand the phenomena being studied comprehensively.

### Data Collection

The authors conducted semi-structured in-person interviews at the hospital site (n=14). Both authors have more than 15 years of leadership experience with expertise in qualitative research. Interviews were conducted in *Bahasa Indonesia* and transcribed and translated into English for publication. The first author translated Indonesian into English as the author had previous experience. After completing the translation, the author cross-checked with a colleague who possesses both active and passive English skills and has engaged in similar activities so as to prevent any loss of words or changes in meaning. The authors guaranteed the participants' privacy during the interviews. Interviews were conducted in secure and comfortable locations chosen by the participants and lasted, on average, one hour. The authors developed eight primary questions (Table 1) following a review of the PCC literature and the purposes of the study. These questions were piloted internally through interviews with registered nurses at the hospital. A paper survey was used at the beginning of each interview to collect demographic information. Interviews were audio-recorded using a digital recorder and then transcribed.

### Rigour

The authors conducted trustworthiness of data collection by checking accuracy against interview audio recordings, and participants were asked to review the transcript of their interviews. The initial author's role as a clinical educator at the identical institution facilitated candid and transparent conversations during interviews, as she had no prior interaction with the individuals involved in the study. This situation enabled her to connect closely to the study environment while being mindful of specific contextual factors.

### Data analysis

The authors conducted data analysis independently. All authors read every transcript several times to familiarise themselves with the data and then conducted data analysis. The authors employed qualitative thematic analysis to examine the data and enable them to comprehensively incorporate all aspects of the observed phenomena, deriving themes directly

Table 2 Individual participant characteristics

Participants' code (Manager = M)	Gender	Highest education level	Years of employment
M-01	F	Master Degree	18
M-02	F	Master Degree	14

Participants' code (Nurses = N)	Gender	Highest education level	Years of employment
N-01	F	Bachelor Degree	7
N-02	F	Bachelor Degree	11
N-03	F	Diploma	8
N-04	F	Bachelor Degree	12
N-05	F	Diploma	8
N-06	F	Bachelor Degree	9
N-07	F	Diploma	6
N-08	F	Diploma	6
N-09	F	Bachelor Degree	10
N-10	F	Bachelor Degree	10
N-11	F	Bachelor Degree	14
N-12	F	Bachelor Degree	14

from the unprocessed data. Moreover, thematic analysis is considered a fundamental approach to qualitative analysis due to its adaptability (Clarke, Braun and Hayfield, 2015; Peel, 2020). Each sentence within the interviews served as the unit of analysis for this study. The thematic analysis utilised in this research was guided by Clarke et al.'s (2015) framework for analysing qualitative data, which involves six distinct steps. All these steps encompass becoming familiar with the data to generate initial codes, identifying themes, reviewing the identified themes, defining and labelling the themes, and ultimately producing a comprehensive report.

First, data were managed and appropriately organised into secure files. Second, data were familiarised by reading and re-reading while manually highlighting patterns in the data to find the most relevant statements. Third, the coding process involves breaking down accurate data into smaller, more manageable pieces that can then be categorised and analysed for patterns and themes. Coding enables authors to identify specific data elements relevant to the research question, which can then be used to develop a more comprehensive understanding of the underlying concepts and ideas. Fourth, in developing themes, the authors engaged in deeper interpretation, moving beyond the concrete categories derived from the initial coding process to uncover abstract patterns or trends that shed light on the research questions. Fifth, pattern codes were generated through second-cycle coding to identify emerging themes. Sub-themes described participant experiences by providing quotes, emotions and context to ensure that the participants' voices, feelings and meanings were described in sufficient detail. Finally, these were contextualised and represent the findings. This step signifies the culmination of the

Table 3 Profile of Managers (M) and Nurses (N)

Characteristics of Managers (M)	(n=2)	(%)
Gender		
• Female	2	(100%)
Age		
• 45-54	2	(100%)
Educational background		
• Master of Nursing	1	(100%)
Years employed in the hospital		
• > 10 years	2	(100%)

Characteristics of Nurses (N)	(n=12)	(%)
Gender		
• Female	12	(100%)
Age		
• 25-34	5	(41.7%)
• 35-44	5	(41.7%)
• 45-54	2	(16.6%)
Education background		
• Bachelor of Nursing	8	(66.7%)
• Diploma of Nursing	4	(33.3%)
Years employed in the hospital		
• 6-10	8	(66.7%)
• >10 years	4	(33.3%)

analysis; it encapsulates all the findings and insights derived from the data.

The authors formulated a conceptual model grounded in the research findings to address the research questions comprehensively and adopted an inductive analysis method by identifying themes based on the data collected from the participants. Once these themes were identified, a deductive approach was employed to interpret and provide further insights concerning existing literature (Li and Zhang, 2022). The authors carried out the coding process manually and independently. Peer checking was utilised to ensure the credibility and reliability of the data analysis, where the authors independently coded two transcripts. Any discrepancies or differences in coding or interpretation of the thematic framework were resolved through discussions between the authors.

### Ethical Consideration

Before conducting the study, ethics approval was obtained from the Ethic Committee of Nursing and Health Research Universitas Riau (No.385/UN.19.5.1.8/2023). Participants were required to give written informed consent, receive a written study information sheet, and listen to a verbal explanation of the study before the interview. Subsequently, written informed consent for audio-recording interviews, anonymous reporting, and publication of research data were also acquired from all participants.

## Results

A total of fourteen individuals were interviewed, with their ages ranging from 35 to 50 minutes. The participant's characteristics can be found in Table 2. It is worth noting that all participants were female, and the majority (67%) had 5-10 years of experience in both work and care within the medical ward. Upon analysing the interview data, three primary barriers PCC were identified, along with two key enablers. The barriers included time constraints, workload, lack of resources and communication challenges, while the enablers consisted of leadership, commitment to PCC and sufficient monitoring and supervision. For a more comprehensive understanding of each barrier and enabler, please refer to the detailed information in Table 3.

### Barriers to Person-centred Care

#### Time constraints and workload

Most nurses constantly reported that time constraints and workload limited the implementation of PCC. The issues of 'time' and 'task allocation' were an ongoing concern for nurses. Much of the attention was given to the idea that better care was associated with time-effective and clear-cut task allocation. Nurses spoke about the need to spend more time with clients and families, but time was limited by the demands of other important tasks and the limited availability of staff numbers.

*"The tasks (patient care and paperwork) are important and need our full attention ... but we do not have much time. It is so hard to prioritise." (N-01-68)*

Managers reported that inappropriate time utilisation and management restricted the nurses' ability to engage therapeutically with the patients, discuss their care and attend to complaints. Factors contributing to poor time utilisation include general work demands and the necessity of completing other auxiliary tasks.

*"Sometimes, nurses were still not providing direct care and promptly getting to know their patients... instead, they busied themselves with other jobs that were not their primary tasks, such as collecting samples for the laboratory. The time is gone ... it is useless... the patient should be their priority." (M-01-7)*

#### Lack of resources

A lack of resources in the ward was also considered an obstacle to implementing person-centred care, resulting in clients perceiving that care delivery needed to be more appropriate. More basic equipment was needed for adequate care, and the lack of supporting resources in the ward had become an issue within the

hospital. The poor availability of appropriate resources, such as bedframes, mattresses, wound care kits, oxygen cylinders and suctions and even clean water, were also reported during the interviews. One manager reported:

*"Shockingly ... the wound care kit has been shared between two patients. This is a hazardous practice ... the nurse attended to the minor wound before the larger wound of the next patient. She must have believed this is the most innovative way to avoid cross-infection ... but it is unsafe." (M-02-9)*

During the interview, participants reported that more capital investment was needed to increase service demand. One of the nurses stated that;

*"The hospital's lack of facilities and equipment has made the services hard to deliver safely." (N-04-47)*

#### Communication challenges

Effective communication between the nursing staff and patients was essential in implementing person-centred care. Some participants identified that inadequate communication among nurses and between nurses and patients might inhibit the practice of PCC. A nurse manager reported:

*"What can I say? ... Honestly, the nurse rarely visited the patient ... the only time they come to the patient is to accompany a doctor's visit and during the shift handover. It is worse at night ... no one asked nor visited. How can the staff member know the patient's condition? They (the nurses) should communicate and attempt to find out if there are any concerns or questions about our medication." (M-02-19)*

Moreover, limited information and education were provided to patients or their families during their stay and before discharge (discharge information is an integral part of the care). Patients and their families were uncertain about any follow-up information without appropriate discharge planning.

*"Sometimes, patients and families are only advised about the outpatient check-up schedule and limited information about prevention after discharge from the hospital. Patients receive no further explanation, for example, on what food to avoid and how to administer the medication ... as a result, patients were hospitalised again." (M-01-21)*

### Enablers of Person-centred Care

#### Leadership and commitment to PCC

One critical enabler of practising PCC was the focus of frontline and executive managers on leading PCC

among their teams. In this study, the commitment of the nurses and managers in the ward was evident, and there were considerable changes in nursing practice. All participants recognised that person-centred care requires commitment and that it could not be achieved instantly, so they encouraged themselves to move towards the achievement of the desired outcomes.

*"Providing..... high-quality healthcare that is person-centred... on highly motivated and trained staff is compulsory to deliver PCC." (N-02-32)*

An executive (manager) recognised as favouring PCC highlighted the importance of establishing committees tasked with pinpointing quality deficiencies and creating strategies to enhance healthcare quality. The quality assurance committee was noted to be responsible for executing both targeted and broad quality enhancement measures within the hospital, with designated champions in different units overseeing the implementation and coordination of improvement efforts.

*"We have Quality Assurance and Quality Improvement committees charged with ensuring that the healthcare provided to patients is of good quality." (M-01-23)*

*"Patients' complaints and feedback are discussed at management meetings. We involve ward heads in such meetings to provide solutions to patients' concerns. Where necessary, we hold emergency staff meetings to disseminate decisions to improve patient care among staff management." (M-02-25)*

Managers articulated leadership as a means to enhance employee engagement within PCC, foster harmonious staff relationships, and convey unambiguous expectations for PCC. During specific interviews, managers also emphasised leadership's significance in cultivating a PCC practice.

*"It is about leadership ... that person-centred care matters to me and our service, and therefore ... I am going to ensure you, as part of my service, are part of that cultural path.' These are our responsibilities in the nursing division." (M-01-26)*

#### *Sufficient monitoring and supervision*

The participants reported that mid-level management nurses regularly monitored and provided direct supervision. Participants reported that they were well-supported and that the head of the ward understood and valued their efforts to deliver PCC in daily practice.

*"The supervision provided is sufficient and ideal. The head of the ward and the supervisors carried out direct supervision and communicated with the nurse and the patients." (N-03-47)*

They also reported that supervision from this level of managers had influenced the change process because it encouraged them to discuss and share their experiences and problems in practice. This was also evident from the participant's statement:

*"The supervisors reminded us in a friendly manner that this is what we want ... support and supervision ... not just pointing out and being told what to do." (N-05-62)*

## **Discussions**

Interviews with participants revealed three critical barriers to, and two key enablers of, PCC. The factors that participants reported as restricting PCC were time constraints and workload, lack of resources and communication challenges. The factors reported enabling PCC were leadership, commitment to PCC, and sufficient monitoring and supervision. This study depicts that all these factors have an essential impact on constraining and enabling PCC delivery at the study site. Compared to studies carried out in diverse countries, they reported similar issues related to barriers and enablers of PCC. Factors barriers to PCC identified in this study are consistent with the literature found in various studies where time constraints and workload, lack of resources and communication challenges limit PCC delivery (Lloyd, Elkins and Innes, [2018](#); Oppert, O'Keeffe and Duong, [2018](#); Nkrumah and Abekah-Nkrumah, [2019](#); Kong, Kim and Kim, [2022](#); Lee, Yang and Lee, [2023](#)). Moreover, the barriers relating to workload were also broadly consistent with those reported in the international literature and included a lack of staff and interruptions to the delivery of nursing care (Huang *et al.*, [2020](#); Marulappa *et al.*, [2022](#)). Time constraints and demands for completing unrelated tasks have also been reported as barriers (Lloyd, Elkins and Innes, [2018](#)).

Consequently, providing effective person-centred care was reported to be difficult and illustrated how limited resources can act as a barrier to implementing PCC. The nurses highlighted several impediments that interrupted the delivery of direct personal care. Many of these resulted from high client-nurse ratios and extensive paperwork requirements.

A significant barrier identified during this study was a lack of equipment or resources. This barrier differed from the situations reported in Western literature about



shortages of the correct sizes of equipment or resources (Huang et al., 2020; Johnsen et al., 2022). The nurses reported that a lack of essential equipment in the ward impeded the effective and safe delivery of the person-centred model of care. The most basic requirements for health, such as water for washing, were in short supply. Individual needles and dressing trays were observed being used for multiple clients. These issues were related to funding the overall infrastructure and the hospital's financial management system, which the nurses need to control.

More resources are needed to deliver a new system, particularly in human services organisations, which many public hospitals in developing contexts will likely experience. For person-centred care to promote a philosophical change in practice, it must be linked to how resources are allocated and used. Scholars have discussed the factors, such as the financial costs of change and resource constraints, that impede the transformation process (Huang et al., 2020; Johnsen et al., 2022; Marulappa et al., 2022), and it has been suggested that organisations that value flexibility are reasonable environments in which to implement new healthcare models (Johnsen et al., 2022). However, the fact that the concept of person-centred care could be introduced provides evidence that this hospital was a reasonable environment in which to implement the model.

Effective communication between the nursing staff and patient was found to be essential in implementing person-centred care. However, the challenge of communication was found to be a significant barrier in this study. Some nurses preferred to use facial expressions or physical gestures instead of verbal language. Instead of responding verbally, the nurses bowed their heads to indicate they understood. Little communication occurred amongst themselves to confirm that care had indeed occurred, and, as a consequence, some clients complained that the care delivered needed to be based on their needs due to a lack of communication.

Effective communication's significance regarding patient satisfaction, compliance and recovery cannot be overstated. It is widely acknowledged as the cornerstone of all patient care, as emphasised by Maeda and Socha-Dietrich (2021). Effective communication and strong communication skills are crucial in nursing, as they significantly impact the quality of care provided. Research indicates that individuals often express concerns regarding communication issues and a lack of information about their medical condition (Maeda and

Socha-Dietrich, 2021). Recent findings suggest that poor communication poses a significant obstacle to delivering quality healthcare, with notable disparities in the effectiveness and frequency of nurse-patient interactions (Tiainen, Suominen and Koivula, 2021). Various elements could have played a role in causing this issue, such as insufficient support from colleagues and ineffective policies. The type of support provided plays a significant role in influencing nurses' ability to communicate effectively, impacting their job satisfaction and overall outcomes in healthcare settings.

It is worth noting that this study has successfully identified two crucial elements that played a pivotal role in enabling the adoption of person-centred care: leadership and commitment to PCC and sufficient monitoring and supervision. In this study, the nurses' commitment as a team in the ward was evident during the interviews. The participants recognised that person-centred care requires commitment and that it could not be achieved instantly, so they encouraged themselves to move towards achieving the desired outcomes. Engaging a new approach in practice requires attention, energy and commitment from a whole team (McCormack, Dewing and McCance, 2011; Ferreira et al., 2022; Richter et al., 2022), suggesting that the transformation to a new culture or practice is a challenging process requiring a sustained effort and commitment from all levels of the organisation.

Management voiced a desire to become a centre of excellence for person-centred care in Indonesia. This situation highlights the commitment of the nurses and the managers to this new model of care. However, it is apparent in the literature that changes to practice will only occur by relying on something other than individual or team motivation. Instead, the implementation of person-centred care requires support and motivation from leaders at all levels of an organisation (Ferreira et al., 2022), as supervision and monitoring have been identified as essential facilitators during the process of transforming care practice (Marulappa et al., 2022).

Monitoring and supervision are also considered key elements to deliver PCC. The participants reported that mid-level management nurses regularly monitored and provided direct supervision. The managers were deeply connected to the organisation's goal of providing patient-centred care due to their strong sense of professional identity as healthcare professionals. This connection to the mission of delivering high-quality care was a driving force behind their dedication and commitment to their work within the organisation. This finding is consistent with previous studies that suggest

that facilitating organisational change and developing practices require managerial support and supervision (Huang *et al.*, 2020; de Jong *et al.*, 2021; Petersson *et al.*, 2023). The literature suggests that investment in staff that can supervise has become a framework that could contribute to quality service provision. As noted in this study, support can also provide opportunities to share and enhance staff knowledge (Marulappa *et al.*, 2022). Here, it was revealed that the middle-level managers directly communicated with the patients and the nurses in a friendly way to remind them of their responsibilities and that they were there to support and discuss issues with them if needed. This direct communication helped the nurses deliver care appropriately.

Implementing person-centred care in practice is complex (McCormack, Dewing and McCance, 2011; Ferreira *et al.*, 2022; Richter *et al.*, 2022). Facilitating factors, such as supervision and a strong team commitment, emerged in this study as aspects that positively influence the development of new practices in the ward; however, implementing a new model of care required a sustained commitment and support from all levels of the organisation. Increasing awareness at all levels helped ensure that person-centred care was made more explicit and operationalised in everyday care services. Potthoff *et al.* (2023) have pointed out that the reliance on interview data in this study is seen as a limitation, as there is a possibility that the actual events differed from what the participants described. This limitation may be attributed to various biases that could have influenced the information shared by the participants, such as the protection of their professional identity and values or a lack of trust in participant anonymity. This limitation could have significantly impacted the findings since clinical nurses and managers identified the barriers and enablers directly. Nonetheless, due to the limited timeframe, additional barriers and enablers may have yet to be reported, thus potentially affecting the results and analysis. Furthermore, there is a possibility of author or interviewer bias influencing the outcomes, but the authors took measures to address this concern by engaging in reflexive discussions throughout the research process.

The limitation of this study was that, due to hospital regulations, the participants involved were limited to the nurse managers and nurses in the inpatient medical ward. The participants should represent several wards to provide a general overview of the barriers and enablers to implementing person-centred care. However, this is still appropriate for a qualitative study.

## Conclusion

Implementing PCC can lead to significant health benefits for individuals, yet there is room for improvement in its application. This research study highlights various barriers to implementing PCC, explicitly focusing on the study site. As noted by local health professionals, factors influencing PCC in different countries were found to be equally important in this particular setting. Further investigation is required to fully comprehend the relationships between these factors and their impact on PCC. The study underscores the importance of healthcare organisations paying close attention to these identified factors when developing targeted strategies to enhance PCC. For instance, organisations could consider implementing interventions aimed at bolstering staff leadership skills to support PCC better, improving available resources, enhancing staff relationships and communication abilities, and establishing formal structures and methodologies to facilitate the delivery of PCC. The practical implications are that healthcare organisations must maintain support to identify and implement effective strategies for applying person-centred care in clinical settings. This ongoing support is essential to overcoming barriers and enhancing professional care within healthcare facilities, ultimately leading to improved healthcare services.

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## Conflict of Interest

The researcher holds a specific role within the institution where this study was conducted. This role may introduce potential biases in the research process. However, the two authors have taken into account professional relationships, as there are no direct

personal relationships with the participants involved in this study

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## Chronic energy deficiency in young pregnant women in rural Indonesia: an analysis of basic health survey 2018

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### ABSTRACT

**Introduction:** Chronic energy deficiency (CED) significantly impacts maternal health and child development. Socioeconomic conditions and access to health services cause young mothers in rural areas to have different health problems from those in urban areas. The study aimed to analyze the factors associated with CED among young pregnant women in rural areas in Indonesia.

**Methods:** Secondary data for this cross-sectional study were obtained from the 2018 Basic Health Research Survey. One thousand one hundred and thirty-nine pregnant women aged <25 years were involved as subjects. Age, number of family members, education, occupation, gravida, abortion, supplementary feeding, and iron tablets during pregnancy were included as independent variables. Binomial logistic regression analysis was performed to measure the association between the independent and dependent variables. The strength of the association was expressed by p-value <0.05.

**Results:** The three factors associated with CED were age (p=0.001), education (p=0.013), and supplementary feeding (p<0.001).

**Conclusions:** Equitable education, increasing the age at which moms can become pregnant, and efforts to fulfill the nutrition needs of pregnant women by providing supplemental food based on community empowerment are significant. Family and community involvement will ensure the sustainability of this CED prevention program.

**Keywords:** Chronic energy deficiency, nutritional status, pregnancy, rural area, supplementary feeding

### Introduction

Malnutrition, whether undernutrition or overnutrition, remains a major global health problem, such as overweight or obesity. One in three of the world's population is malnourished (Dagne *et al.*, 2021). Adolescent girls and pregnant women are groups that are vulnerable to malnutrition, in addition to nursing mothers and children. Malnutrition in adolescent girls has remained relatively high since 2000 (United Nations Children's Fund, 2023).

Malnutrition that occurs in adolescent girls, if not treated properly, will continue until they become pregnant and breastfeed. Many young pregnant women live in poor and developing countries. It is correlated with a lack of sexual education, employment, and access to family planning. Pregnancy in these young women will have an impact on the health outcomes of the mother and her child, such as low birth weight, prematurity, bleeding, and others (Larasati, Nindya and Arief, 2018; Maravilla *et al.*, 2020; Saleh *et al.*, 2021). These complications are associated with malnutrition,



which is common among young pregnant women (Maheshwari *et al.*, 2022). Malnutrition in pregnant women also increases the risk of intrauterine growth retardation (IUGR) and weakens the immune system, making the mother more vulnerable to infections. The mother's nutritional state during pregnancy and breastfeeding impacts the quality of breast milk, affecting the baby's nutritional intake (Mate *et al.*, 2021). The United Nations Children's Fund (UNICEF) estimates an increase in cases of malnutrition in pregnant women due to the food crisis in several countries. About 6.9 million pregnant and lactating women will be malnourished in 2022, an increase of about 25% compared to 2020. This condition is further exacerbated by the climate crisis and the COVID-19 pandemic, which impacts people's socioeconomics and ability to obtain food (United Nations Children's Fund, 2023).

Chronic energy deficiency (CED) is malnutrition that pregnant women often experience due to a long-lasting imbalance in nutrient intake. The 2018 Basic Health Research data show that the prevalence of CED among pregnant women in Indonesia is highest among those aged 15-19 years (33.5%) and 20-24 years (23.3%). The prevalence of pregnant women in rural areas experiencing CED is also higher than those living in urban areas, at 19.3% compared to 15.7% (Ministry of Health Republic of Indonesia, 2018). Young women less than 25 years old, pregnant, and living in rural areas are at twice the risk of CED. Several studies have found that children, adolescent girls, and pregnant women in rural areas are more vulnerable to malnutrition, including anemia and CED, which could be attributed to less accessible access to antenatal care and adherence to iron and folic acid supplements (Edeo Berarti, Gebrie and Beyene, 2023), timing of antenatal care (Aboagye *et al.*, 2022), mother's education level, husband's education level, and family's socioeconomic ability, which differs from urban areas (Islam *et al.*, 2016).

Based on what has been described earlier, various programs have been implemented to address the problem of CED among young pregnant women in rural areas in Indonesia, such as pregnancy monitoring with antenatal care, supplementary feeding, and micronutrient supplementation. These programs were part of the effort to achieve the target of reducing all forms of malnutrition by 2025 and Sustainable Development Goals 2 and 3 by 2030 (World Health Organization, 2023). More than 800 million individuals experience chronic malnutrition. The second SDG aims to abolish all types of hunger and malnutrition while the

third is to achieve good health and well-being, with mother and child health being one of the primary focus areas. Children's morbidity and mortality rates must be dramatically decreased (UNDP, 2024). Efforts to implement comprehensive and integrated antenatal care services, including nutrition education for pregnant women, in Indonesia, face several challenges, including low health worker competence, low family participation and support, a lack of facilities, and cultural influences (Rahmawati *et al.*, 2021). An understanding of the determinants of CED in young pregnant women is needed to determine appropriate interventions. This study aimed to analyze the factors associated with the incidence of CED among young pregnant women in rural Indonesia.

## Materials and Methods

### Study Design

A cross-sectional study used 2018 Basic Health Research data from the Health Development Policy Agency, Ministry of Health of the Republic of Indonesia. The survey covered 34 provinces in Indonesia. The target sample was 300,000 families from 30,000 blocks of the 2018 National Socioeconomic Survey (Susenas).

### Population

The study population was young women, less than 25 years old, who were pregnant at the time of data collection. The study then focused on mothers living in rural areas. The rural residence category was determined based on Basic Health Research data. Of the 2,397 young pregnant women, 1,519 (63.33%) lived in rural areas and the rest in urban areas. Based on the completeness of available data, 1,139 young pregnant women living in Indonesia's rural areas were included in the study.

### Data Analysis

The dependent variable in this study was maternal nutritional status. The nutritional status of pregnant women was determined based on upper arm circumference information. This variable was categorized into chronic energy deficiency or CED (arm circumference less than 23.5 cm) and not CED (upper arm circumference 23.5 cm or more).

Based on the availability and completeness of basic health survey data, we identified many independent variables that may be linked to CED risk. Some variables, such as anemia and the timing of the initial ANC visit, were not investigated due to many missing data points. The independent variables included age, number of



Figure 1. The Distribution of the prevalence of chronic energy deficiency in young pregnant women in rural Indonesia

family members, education, occupation, gravida, history of abortion, supplementary feeding, and ferrous sulfate during pregnancy. Based on the risks that may arise during pregnancy, we classify young mothers into two groups: those under 20 and those aged 20 to 24. Education level is the highest level of formal education completed by the respondent. Education level was categorized as low for junior high or lower and high for senior high or higher. Based on employment, respondents were categorized into either employed or unemployed. Gravida was determined according to the order of pregnancy experienced at the time of data collection and classified into primigravida and multigravida. History of abortion, supplementary feeding, and ferrous sulfate tablet administration were categorized into "yes" and "no." Descriptive analysis illustrated the distribution of CED prevalence among young pregnant women in rural Indonesia by province, presented as a geospatial map. Characteristics of young pregnant women in rural areas are presented as frequency distribution tables.

We conducted univariate and then multivariate analyses. The results of the univariate analysis of subject characteristics are presented in the frequency distribution table. Meanwhile, the percentage of young rural pregnant women who experienced CED in each province is shown in the map image. The percentage value was obtained from the number of young pregnant women in rural areas in a particular province who experienced CED compared to the total number of young pregnant women in rural areas in that province. We performed multivariate analysis with binary logistic

regression to determine the association of various independent variables and dependent variables. The relationship was significant if the p-value was  $<0.05$ .

#### Ethics

The researchers did not submit an independent ethical assessment because they relied on secondary data from the 2018 Basic Health Research which are available to the public. Basic Health Research was done following an ethical evaluation by the Ethics Commission for Health Research, Agency for Health Research and Development, under letter LB 02.01/2/KE.267/2017. The researchers received the data set by submitting a request to the Health Development Policy Agency of the Ministry of Health of the Republic of Indonesia, following the protocol outlined on [www.layanandata.kemendes.go.id](http://www.layanandata.kemendes.go.id).

#### Results

Data showed that 328 people out of 1139 young pregnant women experienced chronic energy deficiency (28.8%). The highest prevalence of young pregnant women with CED is in Maluku Province, which is 55%. The lowest prevalence is in Riau Islands Province and North Kalimantan Province (0%). The distribution of CED prevalence in young rural pregnant in each province in Indonesia is presented as a map (Figure 1).

Table 1 shows that the majority of mothers are in the age range of 21-24 years (58.8%), have a senior high school education (41.4%), have family members of more than four people (47.3%), and are not working (68.0%). Judging from pregnancy history, most of them were primigravida (75.1%), had no previous history of

Table 1. The characteristics of young pregnant women in rural Indonesia (n= 1139)

Characteristics	N	Percentage	
<b>Age</b>			
=<19 years old	469	41.2	
20-24 years old	670	58.8	
<b>Number of household members</b>			
1-4	600	62.7.0	
>=5	539	47.3	
<b>Education</b>			
No education	15	1.3	
Not graduated from elementary school	69	6.1	
Graduated elementary school	185	16.2	
Graduated junior high school	338	29.7	
Graduated senior high school	471	41.4	
Diploma	30	2.6	
Undergraduate	31	2.7	
<b>Employment</b>			
Unemployed	774	68.0	
Students	19	1.7	
Civil servants	5	0.4	
Official private sector	50	4.4	
Unofficial private sector	38	3.3	
Farmer	121	10.6	
Fisherman	2	0.2	
Labor/driver/household assistant	11	1.0	
Others	119	10.4	
<b>Gravida</b>			
Primigravida	855	75.1	
Multigravida	284	24.9	
<b>Abortion</b>			
Yes	127	11.2	
No	1012	88.8	
<b>Supplementary feeding</b>			
Yes	437	38.4	
No	702	61.6	
<b>Ferrous sulfate supplementation</b>			
< 90 tablets	1012	88.8	
≥90 tablets	127	11.2	
<b>Upper Arms Circumference</b>			
<b>Mean</b>	<b>Min</b>	<b>Max</b>	<b>Standard Deviation</b>
25.2 cm	17.6 cm	39.5 cm	3.16

abortion (88.8%), did not get supplementary food supplementation (PMT) during pregnancy (61.6%), and had taken ferrous sulfate less than 90 tablets (75.0%).

Table 2. Logistic regression of chronic energy deficiency in young pregnant women in rural Indonesia

Characteristics	CED (+)	CED (-)	P-value	Multivariate aOR (95% CI)
<b>Age</b>				
=<19 y.o	156	313	0.001	1.583 (1.198-2.091)
20-24 y.o	172	498		
<b>Number of household members</b>				
1-4	162	438	0.373	0.887 (0.682-1.154)
>=5	166	373		
<b>Education</b>				
Low (junior high school education or lower)	168	364	0.013	1.409 (1.075-1.846)
Higher (high school or above)	160	447		
<b>Occupation</b>				
Unemployed	107	258	0.715	1.054 (0.796-1.394)
Employed	221	553		
<b>Gravida</b>				
Primigravida	250	605	0.623	0.916 (0.644-1.301)
multigravida	78	206		
<b>Abortion</b>				
Yes	35	92	0.883	0.965 (0.603-1.545)
No	293	719		
<b>Supplementary feeding</b>				
Yes	154	283	0.000	1.696 (1.303-2.208)
No	174	528		
<b>Ferrous sulfate supplementation</b>				
<90 tablets	298	714	0.118	1.419 (0.915-2.199)
>90 tablets	30	97		

Table 2 presents the multivariate analysis results using binary logistic regression. Age, level of education, and supplementary feeding are the factors most associated with the risk of CED in young pregnant women. Based on their age, pregnant women aged 11-20 years have a more negligible risk of developing CED than pregnant women aged 21-24 years (OR=1.583; 95% CI=1.198-2.091; p=0.001). Pregnant women with junior high school education or lower have a higher risk than mothers with high school education and above (OR=1.409; 95% CI=1.075-1.846; p=0.013), and so do the mothers who get supplementary food (OR=1.696, 95% CI=1.303-2.208; p<0.001). Meanwhile, the number of family members, occupation, gravida, history of abortion, and consumption of ferrous sulfate tablets were not significantly associated with the incidence of CED in young pregnant women in rural areas.

### Discussions

Chronic energy deficiency (CED) in adults is often diagnosed based on body mass index (BMI). BMI measurement becomes more complex and less valid in pregnant women since the mother's body weight includes the weight of the fetus she carries. In addition, pregnant women experience physiological changes that impact their body volume. According to research, upper arm circumference is an alternative measure for determining pregnant women's nutritional status (Bari et al., 2021; Musa et al., 2022; 2023; Salih et al., 2023). Based on data (Table 1), the average upper arm circumference in this study was 25.2 cm. This figure is still lower than the national average for upper arm circumference among pregnant women in Indonesia, which is 26.8 cm. Meanwhile, the average rate of CED

among young pregnant women in rural regions was 28.8%, significantly higher than the provincial average of 17.3% (Ministry of Health Republic of Indonesia, [2018](#)).

According to this study, maternal age is an essential variable in determining the risk of malnutrition among young pregnant women. Young pregnancies, particularly in rural settings, are often complex and subject to a variety of risk factors. Rural women are more likely to suffer from nutritional inadequacies than urban women due to discrepancies in access to health, education, and social services and information (Black *et al.*, [2013](#)). Due to her young age, the mother depends significantly on the help of others, particularly her family. Young mothers' education, knowledge, and economic capacity affect their ability to obtain nourishing food and access to healthcare (Hellyana, Aritonang and Sanusi, [2019](#)).

The binary regression logistic test indicated that education level was substantially related to CED in young pregnant women in Rural Indonesia. The mother's formal education level correlates positively with family food consumption patterns (Novelia, Rukmaini and Annisa, [2021](#)). It is also related to the mother's awareness of food ingredients and how to process food for the family (Robiyati, Aisyah and Anggraini, [2022](#)). The mother's level of education also reflects the family's economic capabilities, which influences the ability to purchase food. However, several other investigations have yielded different findings ( Moediarso *et al.*, [2020](#); Wiyono *et al.*, [2020](#); Akbarini and Siswina, [2022](#)).

Providing supplementary food has a significant effect on CED. Several related studies have found similar results (Rahmah, Nurlinda and Kurnaesih, [2022](#); Retnaningtyas *et al.*, [2023](#)). This supplementary food can boost energy intake (Putri *et al.*, [2022](#)), which is essential for maternal metabolism and fetal development. Furthermore, supplementary food can increase nutritional intake (Putri *et al.*, [2022](#)) and benefit fetal growth and development (Prameswari, Marliyati and Dewi, [2020](#)).

Although this study found no significant association between the number of family members and the risk of CED, other research has found that having more family members raises the risk of malnutrition in mother-child couples (Andriani *et al.*, [2023](#)). However, this is modified by the family members' personalities. Productive adult family members can help enhance family income, improve food quality, and provide access to education and healthcare. The reverse situation happens among

households with several children and elderly (Lowe *et al.*, [2021](#)).

This study discovered that employment had no relationship with the prevalence of CED among young pregnant women in rural locations. These findings are consistent with several other researches, which demonstrate that the status of mothers who are neither employed nor unemployed does not correlate with the incidence of CED in pregnant women ( Moediarso *et al.*, [2020](#); Wiyono *et al.*, [2020](#); Akbarini and Siswina, [2022](#)). Other factors, including wealth and birth spacing, were associated with CED (Akbarini and Siswina, [2022](#)). Rural housewives are accustomed to conducting household tasks on their own; whether they are housewives or work outside the home, they have almost the same physical obligations. The work that women conduct at home is frequently unaccounted for and not recognized as employment (Bhan *et al.*, [2020](#)). However, the results of this study contradict research in Ethiopia, which states that employment status and wealth index are significant predictors of chronic energy deficiency (Dagne *et al.*, [2021](#)). Economic factors are related to family income, which describes the level of purchasing power of individuals in determining the quality and quantity of diet (Novelia, Rukmaini and Annisa, [2021](#)), which can affect the adequacy of food intake. Shortages that last for a long time can result in CED, especially in pregnant women (Robiyati, Aisyah and Anggraini, [2022](#)). Research in iodine deficiency areas in Indonesia shows that nutritional intake deficiencies in pregnant women are higher than in non-CED pregnant women (Supadmi, Kusri and Kusumawardani, [2020](#)).

Young pregnant women who are multigravida are at greater risk than primigravida to have CED. Multigravidity, or the condition of having had multiple pregnancies, may have a significant impact on the risk of chronic energy deficiency (CED) during pregnancy (Rizkah and Mahmudiono, [2017](#); Kumera *et al.*, [2018](#); Karemoi *et al.*, [2020](#)).

A mother's chance of having CED increases with the number of children. With each subsequent pregnancy, the body may become increasingly depleted of essential nutrients and energy reserves, making it more difficult to adequately support both the mother and the developing fetus. On the contrary, Tejayanti ([2019](#)) analyzed Indonesian Riskesdas 2013 data and reported that one-child parity is a significant factor in CED due to the potential of lower mothers' readiness (Tejayanti, [2020](#)). However, the current study did not reveal a significant effect of parity toward the CED. The impact of multiple parities may cause it, and CED is attributed to



other factors, such as anemia and other nutrition depletion, which has received much attention in national programs. It also follows the hypothesis of maternal depletion syndrome, in which high parity and short intervals between deliveries are strongly associated with poor maternal nutrition status (Bigiu *et al.*, 2015)

Abortion and CED are complicated, multilayered topics. Given that CED is not an instant procedure, a history of abortion may imply that CED caused it. Potential links between CED and abortion include malnutrition (Black *et al.*, 2013), which can have an impact on the pregnancy's overall health and hormonal imbalances (The ESHRE Capri Workshop Group, 2006), which have the potential to disrupt the hormonal balance required for successful implantation and development of the pregnancy, and decreased immunity, which makes women more vulnerable to infections that can lead to abortion. However, the impact of CED varies according to the severity and length of the deficit, the individual's health status, and other circumstances.

This study found that iron tablet administration in young pregnant women was not substantially associated with the risk of CED. The prevalence of anemia among pregnant women in Indonesia is 48.9%, and 22.3% among women of reproductive age (Ministry of Health Republic of Indonesia, 2018). According to the WHO, anemia is a moderate health problem in Indonesia. Therefore, pregnant women in Indonesia are given iron supplements for 90 days during pregnancy (Kuntari, Supadmi and Purwoko, 2023). CED frequently causes micronutrient deficiencies, including iron deficiency anemia (IDA) (Hellyana, Aritonang and Sanusi, 2019; Lipoeto, Masrul and Nindrea, 2020), which is extremely common among pregnant women in rural areas. Iron is required for oxygen transport to the fetus, and IDA can result in adverse pregnancy outcomes such as low birth weight (Rahmati *et al.*, 2017; Figueiredo *et al.*, 2018) preterm birth (Rahmati *et al.*, 2020), and maternal complications (Kemppinen *et al.*, 2020). Ferrous sulfate supplements provide iron, which helps to combat IDA and improve outcomes (Seaharattanapatum *et al.*, 2021). While iron deficiency is a concern, excessive iron consumption can also be harmful. Iron supplementation in women without IDA may overload iron stores, increasing the risk of complications such as gestational diabetes (Petry, 2022). Iron may also cause issues with the absorption of other essential nutrients such as zinc and calcium. Careful planning and monitoring are required to ensure adequate nutrient intake.

The mother's nutritional state before and during pregnancy significantly impacts fetal growth and development, the delivery process, and the mother and child's subsequent health (Marshall *et al.*, 2022). As a result, initiatives to satisfy dietary needs must be implemented even before women get pregnant. As a preventive precaution, supplementation and additional food programs are administered to children as young as school age, especially in vulnerable groups. Thus, women are in good nutritional and health status when entering marriage and are ready to give birth to healthy children.

This study's limitation is that, because it uses secondary data, not all factors that affect the risk of CED are available, complete, and can be analyzed, such as anemia or hemoglobin levels. Furthermore, the available Basic Health Research data were collected in 2018. More recent data from this survey are not yet available.

## Conclusion

The prevalence of CED among young pregnant women in rural Indonesia has remained significant. The mapping results indicate that the proportion of CED in this age group is higher in Eastern Indonesia than in Western Indonesia, with Maluku Province having the most significant incidence. The three most important factors influencing the occurrence of CED are maternal age, education level, and supplementary feeding.

Equal access to education in rural communities is crucial. Adolescent girls should be taught about reproductive health and nutrition from an early age. Pregnant women should get nutrition instruction and counselling on their nutritional needs, nutrient sources, and how to process them. The high dependence of young pregnant women or adolescents on people around them requires interventions that also involve social support from the closest people, especially family. Therefore, education and counseling should target not only pregnant women but also their partners and closest family members.

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## Conflict of Interest

The authors declare that there was no conflict of interest during the research process or the publication of this article.

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## Factors, barriers and adherence of nurses to patient education in public hospitals of Lanao del Sur, Philippines

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### ABSTRACT

**Introduction:** Patient education is a core responsibility in nursing, vital for improving patient understanding and active participation in their healthcare decisions. There are various factors that impact nurses' ability to provide patient education, but little is known about how these factors influence adherence in public hospitals, particularly in resource-limited settings. This study investigates nurses' adherence to patient education protocols in Lanao del Sur, Philippines, while evaluating facilitating factors and barriers.

**Methods:** This study employed a quantitative, descriptive, cross-sectional correlational research design. Seventy-six nurses from two public district hospitals participated. Data were gathered through surveys on demographics, adherence to patient education, facilitators, and barriers. Correlation analyses, including Pearson's correlation and Spearman's rho, assessed relationships between variables, with Cramer's V used for categorical data. Statistical significance was set at  $\alpha = 0.05$ .

**Results:** Most participants were married females aged 31-40, with incomes of 10,000-39,000 PHP, college-educated, and assigned to wards, with 3 months to 3 years of tenure. Nurses acknowledged the importance of patient education and identified 14 barriers. Adherence to patient education showed negative correlations with age, income, educational attainment, and tenure, but positive correlations with gender, marital status, and area of assignment. Facilitating factors positively correlated with adherence, as did barriers.

**Conclusions:** Identifying factors affecting nurses' adherence to patient education is vital for improving these practices. Findings will support the Nursing Patient Education Development Program, enhancing patient education in Lanao del Sur's public hospitals.

**Keywords:** Adherence, Nurses, Nurse-Patient Relations, Patient education, Professional Competence

### Introduction

Patient education is a fundamental component of healthcare delivery that empowers individuals to make informed decisions about their health and effectively manage their conditions (Bhattad and Pacifico, 2022). Nurses play a crucial role in providing patient education due to their frequent interactions with patients in various healthcare settings. Effective patient education can lead to improved health outcomes, increased patient satisfaction, better adherence to treatment

regimens, and reduced healthcare cost. (Correia *et al.*, 2023). Barriers and challenges faced by nurses when delivering patient education can impact the quality and effectiveness of these interventions (Cutilli, 2020). Understanding the facilitating factors, barriers, and adherence of nurses to patient education guidelines is essential to enhance patient education practices in public hospitals (Visintini *et al.*, 2023).

The consequences of not providing adequate patient education can have far-reaching impacts on patient



outcomes and healthcare systems. Patients who do not receive proper education about their health conditions, treatment plans, and self-management strategies may be at a higher risk of medication errors, hospital readmissions, treatment non-adherence, and poorer health outcomes (Ghisi *et al.*, 2014). Inadequate patient education can lead to misunderstandings, non-adherence with treatment, and increased healthcare utilization, adding pressure to already burdened healthcare systems (Wieczorek *et al.*, 2022). Furthermore, patients who do not feel well-informed or supported in managing their health may experience a decreased quality of life, higher levels of anxiety, and lower satisfaction with their healthcare experiences (Maneze *et al.*, 2014). Therefore, addressing the barriers to effective patient education delivery by nurses is crucial to mitigating these negative consequences and improving overall patient outcomes.

Previous research in the Philippine context has identified various factors that influence nurses' adherence to patient education guidelines, including organizational support, training opportunities, communication skills, and interprofessional collaboration (Gutierrez and Sakulbumrungsil, 2021; Gallione *et al.*, 2022; Serquiña and Benig, 2023). These studies have highlighted the importance of context-specific approaches to addressing these barriers. However, there is a significant gap in knowledge regarding patient education practices specifically in the Mindanao region and particularly in the province of Lanao del Sur. Understanding the patient education practices in Mindanao, specifically in the province of Lanao del Sur, is essential for developing targeted interventions and strategies to improve.

Public hospitals in Lanao del Sur serve a diverse population with varying healthcare needs, cultural beliefs, and levels of access to healthcare services. To improve patient education and health outcomes in this region, it is essential to identify and understand the specific factors that influence nurses' adherence to patient education guidelines. By gaining a deeper understanding of these factors, healthcare administrators and policymakers can develop targeted interventions and policies that directly address the barriers faced by nurses while reinforcing the facilitators. This study seeks to fill this critical knowledge gap by investigating the factors that either support or hinder nurses' adherence to patient education protocols in public hospitals in Lanao del Sur. The ultimate objective is to provide a foundation for evidence-based policy development and to implement effective

strategies that enhance patient education practices, thereby improving health outcomes for the population in this region.

## Materials and Methods

### Research Design

This study employed a quantitative, descriptive, cross-sectional correlational research design to quantify nurses' adherence levels and identify the facilitating factors and barriers in patient education within public hospitals in Lanao del Sur. This methodological approach also allowed for an exploration of the relationships between these factors. By using this research design, the study provided valuable insights into the factors affecting nurses' adherence to patient education.

### Locale and Settings

ucted from January 25, 2024, to March 30, 2024, in Lanao del Sur, a province located in Central Mindanao and part of the Bangsamoro Autonomous Region in Muslim Mindanao. Specifically, the research was conducted on two public hospitals in Lanao del Sur, to represent all nurses in both districts. Lanao del Sur is a province in Central Mindanao, part of the Bangsamoro Autonomous Region in Muslim Mindanao.

The first public hospital is a government-owned facility in the first district of Lanao del Sur. It currently operates with a 100-bed capacity, though ongoing upgrades aim to increase this to 150 beds, with further plans to accommodate up to 200 beds. The hospital serves as a catchment facility for the municipalities of Taraka, Bubong, Lumbatan, and Mulondo. In 2020, the hospital reported an average daily occupancy rate of 85% and provided services primarily in internal medicine, obstetrics, gynecology, and pediatrics. The hospital's outpatient department handles about 150 patient consultations daily, while inpatient services admit 70 to 100 patients per day (Department of Health, 2020).

The second public hospital, located in the municipality of Binidayan, initially operated with a 10-bed capacity but expanded to 50 beds in 2019 due to increased patient demand. It serves a predominantly rural population of around 26,000, with healthcare services extending to neighboring towns. In 2020, it reported an average daily patient load of 40 inpatients and 80 outpatient consultations, with a bed occupancy rate of around 90%(Department of Health, 2020).

Conducting the study in Lanao del Sur, particularly Tamparan and Binidayan municipalities, and focusing on these two hospitals was intentional. Lanao del Sur's

unique cultural context and resource constraints make it an ideal location to study patient education practices and healthcare challenges. This region is characterized by a distinct cultural landscape, predominantly influenced by *Maranao* traditions, which significantly shape health beliefs, practices, and patient education approaches. As a second class province, it also has significant resource constraints, such as limited access to medical supplies and inadequate healthcare infrastructure. These factors create a unique context for exploring the effectiveness of patient education practices and identifying specific healthcare challenges in this underserved region.

### Population and Sampling

The study included all nurses employed at two district hospitals in Lanao del Sur. Out of 25 nurses at Unayan District Hospital, 24 participated, and out of 58 nurses at Tamparan District Hospital, 52 participated, resulting in 76 respondents out of a total of 83, representing 92% of the population. The study included two district-level hospitals that serve similar demographic populations and face comparable resource constraints, making them representative of the healthcare environment in Lanao del Sur. Although both hospitals cater to a predominantly rural and underserved population with similar patient loads and staff structures, data were collected across various wards to account for differences in workplace environments. This approach ensured a comprehensive understanding of the factors, barriers, and adherence to patient education practices in diverse hospital settings.

The researchers employed a census sampling technique, which involves including every member of the population that meets the eligibility criteria in the study. This method was chosen to ensure the inclusion of as many nurses as possible, thereby enhancing the generalizability and reliability of the study's findings. The use of census sampling was particularly appropriate given the relatively small size of the target population, as it allowed for a more accurate and comprehensive assessment of the factors influencing nurses' adherence to patient education protocols.

The inclusion criteria for this study were being a registered nurse employed at either Tamparan District Hospital or Unayan District Hospital and being willing to participate. Nurses who were on leave during the study period or those who declined to participate were excluded. By employing the census sampling technique, the study was able to gather nearly complete data from the population of interest, which contributes to the robustness of the results and ensures that the findings

are representative of the nursing workforce in these hospitals (Bujang, [2021](#)).

### Research Instrument

The study utilized a researcher-developed questionnaire whereby respondents selected their answers to provided statements. The questionnaire was developed by combining questions from various researchers with similarities to this study and received input from research experts, including five professors recognized in the nursing field. These experts, who specialize in nursing education, clinical practice, and healthcare management, provided valuable insights to ensure the tool's validity and relevance. The finalized tool contained 45 items for respondents to address. The survey used a standard four-point Likert scale as a measurement tool. Participants were asked to indicate their level of agreement on a scale ranging from strongly agree to strongly disagree. A rating of 4 indicated strong agreement, 3 denoted agreements, 2 represented disagreement, and 1 signified strong disagreement.

The questionnaire had four parts. Part one examined demographic characteristics of the participants, including age, gender, marital status, monthly income, education level, area of assignment, and length of service. Part two contained 12 items about facilitating factors for patient education. Part three consisted of 14 questions on barriers to patient education such as workload and time constraints. The fourth part focused on adherence to patient education with 12 questions assessing variables like recognizing it as a responsibility and provision of pamphlets (Fink, [2003](#); Bolarinwa, [2015](#); Martens, [2020](#)).

### Validity and Reliability

To ensure the validity and reliability of the research instrument, a comprehensive approach was employed. Initially, content validity was assessed with input from five nursing experts, who evaluated the relevance, clarity, and comprehensiveness of the questionnaire items. Each expert provided feedback that led to significant refinements in the instrument. The experts' evaluations confirmed that the items effectively represented the constructs being measured, resulting in a content validity index (CVI) of 0.90, indicating a high level of agreement on the instrument's content validity.

Following the content validity assessment, the researchers conducted a pilot test with 11 nurses who shared similar characteristics to the respondents but worked in other hospitals. The purpose of the pilot test was to evaluate the clarity and comprehensibility of the

items included in the questionnaire. The nurses were asked to complete the questionnaire and provide feedback on the items, as well as the overall structure of the instrument. Based on their feedback, the researcher made further revisions to the questionnaire to enhance its reliability and validity.

In addition to content validity assessment and pilot testing, the researcher calculated the overall Cronbach's alpha value for the entire questionnaire and its three dimensions. The study found high levels of internal consistency with a total Cronbach's alpha value of 0.967. Each dimension also demonstrated excellent reliability, with values ranging from 0.957 to 0.974, indicating consistent assessment of intended variables.

**Data Collection**

The data collection process in this study was conducted systematically. Before proceeding, informed consent was obtained from each participant by explaining the study's purpose, potential risks, and benefits.

In March 2024, data collection was executed through the self-administration of questionnaires. The researcher prepared a formal letter requesting permission to conduct the survey, which was submitted to the Chief of Hospitals at both research sites. This courtesy measure allowed hospital administrators to raise any concerns related to the study.

Once approval was granted, questionnaires were distributed to eligible nurses across various hospital units. Nurses who met the inclusion criteria were encouraged to participate. Each participant received a

letter containing an informed consent form along with the research tool. The researchers addressed any questions or concerns raised by the eligible nurses to ensure clarity. Before participating in the study, respondents were required to sign the informed consent form, assuring them of confidentiality and anonymity. They began by completing the demographic profile section of the questionnaire, followed by the patient education section, which utilized a 4-point Likert scale. Participants were allotted sufficient time to complete the survey, with the researcher's contact information provided for any necessary clarifications. Respondents had three days to finish the questionnaire, which minimized disruption to their work. Upon completion, the questionnaires were collected for data consolidation and analysis.

**Data Analysis**

Following the collection of survey questionnaires, data consolidation was performed using Excel software. The analysis was conducted with SPSS version 25, utilizing both descriptive and inferential statistics (Pallant, 2020).

Descriptive statistics, including frequency and percentage, were used to analyze the demographic profiles of respondents, providing a clear overview of characteristics such as age, gender, marital status, education, income, assignment area, and service length (Williams, Wiggins and Vogt, 2021). The mean and standard deviation were employed to examine facilitating factors and barriers to nurses' adherence to

Table I. Frequency and Percentage Distribution of Respondents' Demographic Profile (N=76)

Characteristic	Category	Frequency (f)	Percentage (%)
Age	20 – 25 years old	13	17.1
	26 – 30 years old	17	22.4
	31 – 40 years old	39	51.3
	41 – 50 years old	6	7.9
	51 – 60 years old	1	1.3
Gender	Female	75	98.6
	Male	1	1.4
Marital Status	Single	27	37.4
	Married	46	63.7
	Separated	3	4.2
Monthly Income	≤ 9,999 Php	5	6.6
	10,000 - 19,999 Php	22	28.9
	20,000 - 29,999 Php	15	19.7
	30,000 - 39,999 Php	19	25.0
	40,000 Php and above	15	19.7
Highest Educational Attainment	College Graduate	59	77.6
	Master's Degree with Units	11	14.5
	Master's Degree	5	6.6
	Doctoral Student with Units	1	1.3
Area of Assignment	Ward	49	64.5
	Emergency Room	22	28.9
	Delivery Room	3	3.9
	OB-Gyne	2	2.6
Length of Service	3 months to 3 years	32	42.1
	4 - 6 years	28	36.8
	7 - 9 years	8	10.5
	10 years and beyond	8	10.5

Table 2. Mean, Standard Deviation, and Descriptive Interpretation of Facilitating Factors to Patient Education

Facilitating Factors to Patient Education		Mean	SD	Descriptive Interpretation
1	The patient appreciates the health education provided by the nurse on duty.	3.55	0.526	Strongly Agree
2	Giving of rewards for performing patient education motivates nurses in providing quality patient education about health.	3.54	0.528	Strongly Agree
3	Recognition of nurses with exemplary performance on patient education encourages more nurses to enhance their communication and teaching skills.	3.59	0.495	Strongly Agree
4	Standard training for specific nurses on providing patient education improves their health teaching through time.	3.76	0.428	Strongly Agree
5	Nurses are aware that providing education is their responsibility.	3.70	0.490	Strongly Agree
6	Understanding the importance of patient education ensures adherence of nurses in this care.	3.72	0.479	Strongly Agree
7	Having the right skills on how to do patient education helps nurses to strengthen their practice of patient education.	3.71	0.457	Strongly Agree
8	Knowledge on different diseases helps nurses to perform patient education confidently and effectively.	3.71	0.457	Strongly Agree
9	Mentoring from seasoned and expert nurses to novice nurses regarding patient education facilitates excellent imparting of knowledge.	3.62	0.516	Strongly Agree
10	A conducive environment for learning encourages nurses to provide patient education	3.61	0.492	Strongly Agree
11	Availability of learning materials encourages nurses to perform patient education.	3.58	0.595	Strongly Agree
12	Collaboration of nurses with other healthcare professionals (e.g. physicians, medical technicians, midwives) in sharing essential information to patients improves services on patient education.	3.71	0.512	Strongly Agree
<b>Weighted Mean</b>		<b>3.65</b>		<b>Strongly Agree</b>

Note: 1.00-1.75 = Strongly Disagree, 2.51-3.25 = Agree, 1.76-2.50 = Disagree, 3.26-4.00 = Strongly Agree

patient education, measuring central tendency and variability.

Bivariate analyses, including Pearson's correlation, explored relationships between demographic variables and adherence to patient education, as well as the associations between facilitators, barriers, and adherence. Spearman's rho assessed the relationship between educational attainment and adherence, suitable for non-linear relationships. Cramer's V determined the strength of association between categorical variables (gender, marital status, assignment area) and adherence (Williams, Wiggins and Vogt, 2021).

To further understand the relationships among key variables, multivariate analysis was conducted, including

regression analysis. This analysis examined how multiple independent variables simultaneously influenced adherence to patient education, providing a comprehensive view of the interrelationships among the factors involved.

The significance level for correlation analysis was set at  $\alpha = 0.05$ . Correlation coefficients were interpreted based on the following ranges: a coefficient of 0.9 to 1.0 indicated a very high correlation, 0.7 to 0.9 a high correlation, 0.5 to 0.7 a moderate correlation, 0.3 to 0.5 a low correlation, and below 0.3 indicated little to no correlation. To ensure clarity, any correlation coefficient falling exactly on a boundary was categorized according to the higher label (Ellis, 2010).

Table 3 Mean, Standard Deviation, and Descriptive Interpretation, Barriers to Patient Education

Barriers to Patient Education		Mean	SD	Descriptive Interpretation
1	Nurses' workload affects their performance of patient education.	3.20	0.910	Agree
2	Lack of time hinders nurses from performing patient education.	3.01	1.089	Agree
3	Nurses are not competent enough to do patient education.	2.38	0.993	Disagree
4	Nurses providing patient education fear to be reprimanded for providing wrong information to patients.	2.61	1.021	Agree
5	Having limited knowledge on patient's case hinders nurses to perform patient education.	2.86	0.962	Agree
6	Nurses believe that patient education is not their responsibility.	2.21	1.050	Disagree
7	Language or dialect is a challenge for nurses in giving patient education to patients and their family.	2.91	0.941	Agree
8	Illiteracy of patients makes it difficult for nurses in performing patient education.	2.80	1.096	Agree
9	Attitude of patients makes patient education challenging to nurses.	2.99	0.973	Agree
10	Patients do not cooperate with learning activities given to them.	2.54	1.038	Agree
11	Non-collaboration of nurses with other healthcare professionals for essential information on patients care hinders patient education.	2.75	1.021	Agree
12	Nurses lack empowerment and encouragement in providing patient education.	2.55	0.958	Agree
13	Current venue for patient education is not conducive for learning and bilateral sharing of information.	2.67	0.971	Agree
14	Nurse managers strictly implements policies on patient education	2.76	0.936	Agree
<b>Weighted Mean</b>		<b>2.731</b>		<b>Agree</b>

Note: 1.00-1.75 = Strongly Disagree, 1.76-2.50 = Disagree, 2.51-3.25 = Agree, 3.26-4.00 = Strongly Agree



Table 4. Mean, Standard Deviation, and Descriptive Interpretation, Adherence to Patient Education

Adherence to Patient Education		Mean	SD	Descriptive Interpretation
1	Nurses provide patient education to patients and their families.	3.45	0.551	Strongly Agree
2	Nurses relay health information to patient as per physician's order.	3.51	0.600	Strongly Agree
3	Nurses provide patient education as it is part of nurses' responsibility.	3.53	0.528	Strongly Agree
4	Patient education is done by nurses as it is part of daily nursing care.	3.59	0.546	Strongly Agree
5	Nurses perform patient education to help the patients recover from their health conditions.	3.64	0.509	Strongly Agree
6	Appropriate schedule and time management make patient education effective and convenient.	3.68	0.468	Strongly Agree
7	Nurses perform patient education according to the policies of the hospital.	3.47	0.663	Strongly Agree
8	Patient education is provided only when a patient or family member asks about their case.	2.99	1.000	Agree
9	The need for patients to comply on health teachings given to them has been emphasized by nurses.	3.46	0.576	Strongly Agree
10	Nurses provide booklets or pamphlets to patients regarding their health condition.	3.33	0.641	Strongly Agree
11	Nurses document patient education activities and findings in the patients' records.	3.47	0.642	Strongly Agree
12	Nurses provide patient education according to evidence-based practices and to the standards of the Department of Health.	3.43	0.618	Strongly Agree
<b>Weighted Mean</b>		<b>3.462</b>		<b>Strongly Agree</b>

Note: 1.00-1.75 = Strongly Disagree, 1.76-2.50 = Disagree, 2.51-3.25 = Agree, 3.26-4.00 = Strongly Agree

### Ethics

The study on nurses' adherence to patient education in Lanao del Sur public hospitals addresses key ethical considerations to safeguard participants' well-being. Participants were fully informed about the study's purpose, the voluntary nature of their participation, and how their data would be used. They were also assured they could withdraw from the study at any time without any negative consequences. Confidentiality was maintained through encryption, anonymization, and explicit consent for data use. Risks and benefits were disclosed, with steps taken to minimize harm.

Additionally, ethical approval was obtained from Mindanao State University's College of Health Sciences Research Ethics Committee (CREC) with approval number 2024-02, aligning with World Health Organization guidelines, emphasizing beneficence, nonmaleficence, respect for autonomy, and justice.

### Results

#### Sociodemographic Profile of the Respondents

The majority of the nurses (51.3%) were aged 31-40 years, suggesting that this age group constitutes a significant portion of the nursing workforce and likely possesses substantial experience in patient education.. The nursing workforce was predominantly female, with 98.6% of respondents identifying as such. This significant gender imbalance highlights the underrepresentation of male nurses in public hospitals in Lanao del Sur. Regarding marital status, most nurses were married (63.7%), while 37.4% were single, and 4.2% were separated.

In terms of income, the majority of nurses earned between 10,000 and 39,999 Php per month, with the highest concentration (28.9%) in the 10,000-19,999 Php range, indicating that many nurses have relatively low to moderate income levels. Educational attainment among the respondents showed that most nurses (77.6%) were college graduates. A smaller percentage held a Master's

Table 5. Significant Relationship Between Respondents' Profile and Adherence in Patient Education

Adherence vs.	Statistical Tool	Correlation Value	Degree of Correlation	Sig (p-value)	Interpretation
Age	Pearson <i>r</i>	-0.822*	Strong negative correlation	<0.001	Significant
Gender	Cramer's <i>V</i>	1.000*	Perfect positive correlation	<0.001	Significant
Marital Status	Cramer's <i>V</i>	0.947*	Strong positive correlation	<0.001	Significant
Monthly Income	Pearson <i>r</i>	-0.907*	Strong negative correlation	<0.001	Significant
Highest Educational Attainment	Spearman <i>rho</i>	-0.710*	Strong negative correlation	<0.001	Significant
Area of Assignment	Cramer's <i>V</i>	0.985*	Strong positive correlation	<0.001	Significant
Length of Service	Pearson <i>r</i>	-0.898*	Strong negative correlation	<0.001	Significant

\*Correlation is significant at the 0.01 level (2-tailed).

Table 6. Multivariate Regression Analysis Between Facilitating Factors, Barriers, and Adherence to Patient Education

Predictor Variable	Regression Coefficient (B)	Standard Error (SE)	Beta ( $\beta$ )	Sig (p-value)
Facilitating Factors	0.750	0.040	0.935	<0.001
Barriers	0.780	0.035	0.936	<0.001
R <sup>2</sup>			0.890	
Adjusted R <sup>2</sup>			0.880	

degree (6.6%), and even fewer were doctoral students (1.3%).

The area of assignment varied, with the majority of nurses (64.5%) working in the ward, followed by 28.9% in the emergency room, 3.9% in the delivery room, and 2.6% in OB-Gyne. Regarding length of service, many nurses (42.1%) had been in service for between 3 months to 3 years, indicating a relatively new workforce. This was followed by 36.8% with 4-6 years of service, 10.5% with 7-9 years, and another 10.5% with 10 years or more of service.

#### Facilitating Factors on the Nurses' Adherence to Patient Education

The analysis of 12 key factors influencing nurses' adherence to patient education in public hospitals in Lanao del Sur revealed strong positive perceptions among the respondents. The mean scores for these factors ranged from 3.54 to 3.76, with an overall weighted mean of 3.65, indicating a general agreement on the importance of these factors.

The highest mean score (3.76) was associated with the belief that structured training programs for nurses significantly improve their ability to provide effective patient education over time. This highlights the critical role of standard training in equipping nurses with the necessary skills and knowledge.

Other notable factors with high mean scores included understanding the importance of patient education (mean score: 3.72), having the right skills to conduct patient education (3.71), and possessing knowledge about different diseases (3.71). These findings underscore that nurses' comprehension, skills, and knowledge are essential for delivering high-quality patient education.

Additionally, the study found strong support for the role of collaboration and recognition. Nurses agreed that working with other healthcare professionals (3.71), receiving recognition for exemplary performance (3.59), and mentoring from experienced nurses (3.62) significantly enhance their ability to deliver patient education.

#### Barriers Hindering Nurses' Adherence to Patient Education

In the following section, the various challenges and obstacles that nurses face while carrying out patient

education are presented. Understanding these barriers is essential to devise effective strategies for improving patient care and fostering a supportive environment for healthcare professionals.

The study on barriers to patient education in public hospitals in Lanao del Sur identified several key challenges faced by nurses. The overall weighted mean for the barriers was 2.731, indicating a general agreement among nurses on the difficulties they encounter.

The most significant barrier identified was the impact of workload on patient education, with a mean score of 3.20. This suggests that heavy workloads prevent nurses from dedicating sufficient time to educate patients. Similarly, the lack of time, with a mean score of 3.01, was a major barrier, echoing findings from international studies highlighting time constraints as a common issue in healthcare settings.

Other notable barriers included limited knowledge of patients' cases (mean score: 2.86), language barriers (2.91), and patient illiteracy (2.80). These factors complicate the communication process and hinder effective patient education. Organizational issues also played a role, with strict policy implementation by nurse managers (mean score: 2.76) and lack of empowerment and encouragement among nurses (2.55) being significant barriers.

The inadequacy of the current venues for patient education (mean score: 2.67) pointed to the need for better educational environments in healthcare settings. Patient-related challenges, such as negative attitudes (mean score: 2.99) and lack of collaboration in learning activities (2.54), further impeded the provision of patient education.

Interprofessional collaboration was also highlighted as a barrier, with a mean score of 2.75 for insufficient cooperation among healthcare professionals. This lack of collaboration can lead to misinformation, negatively impacting patient education quality.

Conversely, nurses generally disagreed with statements questioning their competency and responsibility for patient education. For example, the statement "Nurses are not competent enough to do patient education" had a mean score of 2.38, indicating that nurses feel competent in their roles. Similarly, the statement "Nurses believe that patient education is not

their responsibility" had a mean score of 2.21, suggesting that nurses view patient education as a crucial part of their job.

### Nurses' Adherence on Patient Education

The status of nurses' adherence to patient education is a crucial concern in the healthcare industry, as it significantly impacts the quality of care and patient outcomes.

The study results summarized in Table 4 provide a comprehensive understanding of the role of nurses in patient education within public hospitals in Lanao del Sur. The overall weighted mean score of 3.462 indicates strong agreement among nurses on the significance of patient education, underscoring the necessity for healthcare institutions and policymakers to address facilitating factors and barriers to ensure effective patient education and improve healthcare outcomes.

The mean scores for the 12 items related to adherence to patient education ranged from 3.33 to 3.68, all falling within the "Strongly Agree" category. This suggests that nurses in the region recognize the importance of patient education and view it as an integral part of their roles and responsibilities.

Overall, the results highlight that nurses in Lanao del Sur are generally proactive and committed to patient education, recognizing its importance in patient recovery and adhering to established guidelines and standards. However, there is room for improvement in ensuring that patient education is provided proactively rather than reactively. Enhancing communication skills and implementing standardized protocols for initiating patient education could further improve the effectiveness of patient education practices in public hospitals in Lanao del Sur.

### Correlation Between the Key Variables

The results in Table 5 reveal significant relationships between nurses' sociodemographic profiles and their adherence to patient education in public hospitals in Lanao del Sur. Using Pearson correlation, Cramer's V, and Spearman rho, the study found strong negative correlations between adherence and age ( $r = -0.822$ ,  $p < 0.001$ ), monthly income ( $r = -0.907$ ,  $p < 0.001$ ), highest educational attainment ( $\rho = -0.710$ ,  $p < 0.001$ ), and length of service ( $r = -0.898$ ,  $p < 0.001$ ). This indicates that younger nurses, those with lower income, lower educational attainment, and shorter service lengths are more likely to adhere to patient education guidelines.

For categorical variables, the study used nominal data, designating 'Female' and 'Single' as categories for gender and marital status, respectively, and 'Ward' as a

category for the area of assignment. The analysis showed perfect positive correlations between gender ( $V = 1.000$ ,  $p < 0.001$ ), marital status ( $V = 0.947$ ,  $p < 0.001$ ), and area of assignment ( $V = 0.985$ ,  $p < 0.001$ ) with adherence to patient education. This suggests that female nurses, single nurses, and those assigned to ward areas adhere more to patient education programs compared to their counterparts.

The multivariate regression analysis for facilitating factors and barriers shows that both have strong positive associations with adherence to patient education. Facilitating factors ( $B = 0.750$ ,  $p < 0.001$ ) and barriers ( $B = 0.780$ ,  $p < 0.001$ ) are significant predictors of adherence, with nearly equal predictive power ( $\beta = 0.935$  and  $\beta = 0.936$ , respectively). This indicates that as facilitators, such as supportive environments and training, increase, adherence also improves. Surprisingly, even as barriers increase, adherence remains strong, potentially due to compensatory mechanisms employed by nurses. The model accounts for 89% of the variance in adherence ( $R^2 = 0.890$ ).

### Discussions

The demographic profile of the study's respondents, nurses working in public hospitals in Lanao del Sur, suggests that the majority are aged 31-40 years old. This indicates that the nursing workforce in this area tends to be middle-aged and likely has accumulated significant experience and expertise. Research conducted by Smiley et al. (2021) and Jiang et al. (2023) supports this finding by showing that nurses in this age group are more actively involved in patient education activities.

Studies have found a higher prevalence of female nurses in the healthcare workforce, indicating a gender imbalance with significantly fewer male nurses (Gavine et al., 2020; Guy, Hughes and Ferris-Day, 2022). The majority of respondents being female may suggest that many nurses are married and possibly managing professional responsibilities alongside family commitments (Kearns and Mahon, 2021).

The majority of respondents were college graduates with some holding Master's degrees or pursuing postgraduate studies; indicating an educated nursing workforce contributing positively toward providing quality care at public hospitals (Al-Salmani et al., 2020). The findings on length of service reflect existing trends within Filipino nursing, highlighting turnover challenges faced due to less experienced professionals, potentially impacting high-quality patient education outcomes (Labrague et al., 2018). This underscores ongoing training needs for ensuring high-quality care provided

through continual development opportunities for these dedicated professionals.

Our study's results are comparable to findings from international research on barriers to patient education. The primary barrier identified, workload, is consistent with Carayon and Gurses (2008) who found that excessive workloads contribute to stress and reduced capacity for patient education. This finding is particularly relevant in the context of global healthcare settings where similar challenges are observed. The statistical significance of workload as a barrier suggests that nurses, particularly those with higher patient loads, are less likely to engage in comprehensive patient education due to competing priorities (Silvitasari, Gati and Hermawati, 2023).

Additionally, organizational factors were found to play a significant role. Strict implementation of policies without adequate support was another barrier identified in the analysis. This aligns with the findings of Wieczorek et al. (2022) who discussed how rigid policies might create resistance among nurses, negatively impacting their willingness to adhere to patient education protocols (Sangay Chozom, 2022). The statistical analysis further indicated that limited empowerment and lack of institutional support are significant predictors of lower adherence rates, underscoring the need for policy frameworks that not only mandate patient education but also empower nurses to fulfil these requirements effectively.

Another critical barrier identified was the lack of knowledge or familiarity with patient conditions. The statistical analysis showed that nurses who reported insufficient knowledge about patients' cases were less likely to engage in patient education. This finding is consistent with the literature, where a lack of understanding is a well-documented barrier to effective patient communication (Vargas-Benítez et al., 2023).

Language barriers also emerged as a statistically significant factor, particularly in regions with diverse linguistic groups. The analysis showed that language differences between nurses and patients often hinder effective communication, leading to gaps in patient education. This aligns with previous research, which has documented that language discrepancies can lead to misunderstandings, decreased patient satisfaction, and poor health outcomes (Gerchow et al., 2021).

On the other hand, the study also identified several factors that facilitated adherence to patient education protocols. Standardized training programs were one of the most significant facilitators identified through the statistical analysis (Huang and Pun, 2022; Wieczorek et

al., 2022). Nurses who participated in these programs reported higher adherence rates, which aligns with the findings of Changsieng et al. (2023) and Townsend et al. (2023). These programs are shown to enhance nurses' competence and confidence, enabling them to overcome some of the barriers identified, such as lack of knowledge and role ambiguity.

Recognition of exemplary performance also emerged as a key facilitating factor. The statistical analysis indicated that nurses who received recognition for their patient education efforts were more motivated and likely to continue engaging in such activities (Senara, Abdel Wahed and Mabrouk, 2019). This finding is supported by Alahiane et al. (2023), who found that acknowledgment of efforts is crucial in sustaining high-quality patient education practices.

Another significant factor identified was collaboration with other healthcare professionals. The analysis showed that nurses who worked in teams with other healthcare providers had higher adherence rates to patient education protocols. This finding underscores the importance of a multidisciplinary approach to patient education, where support from colleagues can mitigate some of the identified barriers, such as workload and lack of knowledge (Contreras-Vergara et al., 2022).

Research indicates that effective collaboration among healthcare teams not only enhances communication but also improves the quality of patient care and education. For instance, when nurses work closely with physicians, pharmacists, and other specialists, they can share insights and resources, which contributes to more comprehensive patient education (Sonali and Kaur, 2020). This collaborative effort fosters a supportive environment that empowers nurses, encourages knowledge sharing, and ultimately leads to better health outcomes for patients. Therefore, integrating multidisciplinary teamwork into patient education strategies is essential for overcoming barriers and enhancing adherence to educational protocols (Raeisi, Rarani and Soltani, 2019).

The study provides valuable insights into the factors affecting nurses' adherence to patient education protocols in public hospitals in Lanao del Sur. This study adds novelty by focusing on a specific regional context (Lanao del Sur) and providing insights into how local demographic and organizational factors influence patient education adherence. Our findings contribute to the broader research area by identifying specific barriers and facilitators unique to this context, which may differ from those reported in other countries.

The statistical analysis identified workload, organizational factors, and knowledge gaps as significant barriers, while standardized training, recognition of performance, and teamwork emerged as key facilitators. Addressing these barriers and enhancing these facilitators can lead to improved patient education practices, ultimately contributing to better patient outcomes. Policymakers and healthcare administrators should focus on creating supportive environments that reduce barriers and enhance facilitators to optimize patient education practices among nurses.

This study provides valuable insights into nurses' perceptions of adherence to patient education in public hospitals, focusing on facilitating factors and barriers. The structured questionnaire enabled consistent data collection across respondents, and the focus on Lanao del Sur highlights adherence practices in a resource-limited setting.

However, the study's limitations include its reliance on self-reported perceptions rather than actual adherence behaviors, which may introduce social desirability bias. Additionally, no observational or objective measures were used to validate responses. Future research could address these limitations by incorporating mixed methods, such as observational approaches, to more accurately assess adherence.

## Conclusion

The study presents essential findings regarding the factors that impact nurses' adherence to patient education protocols in public hospitals in Lanao del Sur, identifying significant barriers such as heavy workloads, rigid organizational policies, lack of knowledge, and language barriers that compromise the quality of patient education. In contrast, it also highlights that standardized training programs, recognition of exemplary performance, and collaborative teamwork significantly enhance adherence to these protocols, empowering nurses by increasing their competence and motivation. To improve patient education practices, healthcare organizations must address these barriers by optimizing staffing levels, revising policies to support educational efforts, and providing ongoing training and recognition to boost morale. Future research should focus on targeted interventions to address these challenges in various healthcare contexts, providing insights that could lead to more effective strategies. Ultimately, fostering supportive environments that mitigate barriers while enhancing facilitators is essential for advancing patient education and improving outcomes across diverse healthcare settings.

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## Conflict of Interest

The authors declare that they have no competing interests.

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# The performance of physical activity and health-related quality of life in patients with heart failure: a cross-sectional study

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## ABSTRACT

**Introduction:** Physical activity (PA) is one of the recommendations for people living with heart failure. However, patients frequently do not comply with it, which often negatively impacts their health. This study aimed to describe self-reported PA performance and determine predictors regarding health-related quality of life (HRQOL) among heart failure (HF) patients.

**Methods:** A cross-sectional design was adopted, and data were collected using a questionnaire comprising demographic characteristics, illness-related factors, self-report health status (SRHS) questionnaire, international PA questionnaire, and Minnesota Living with Heart Failure questionnaire. Subsequently, data were analyzed using Pearson correlation coefficient, t-test, one-way ANOVA, and hierarchical multiple regression.

**Results:** The mean age for the total participants of 180 HF patients was  $59.92 \pm 11.90$  years, with 60% being male, and the mean HRQOL score was  $42.96 \pm 20.47$ . HRQOL had significant correlations with HF medication ( $r = 0.20$ ,  $p < 0.01$ ), health status (HS) ( $r = 0.35$ ,  $p < 0.01$ ), PA ( $r = -0.52$ ,  $p < 0.01$ ), and HRQOL was associated with the New York Heart Association (NYHA) classification ( $F = 94.57$ ,  $p < 0.001$ ). Meanwhile, age, gender, job, marital status, religion, level of education, hemoglobin, body mass index, length of diagnostic HF, and comorbidities did not have a significant relationship with HRQOL. Three variables were significant predictors of HRQOL, namely HS ( $\beta = 0.21$ ,  $p < 0.01$ ), NYHA Class III ( $\beta = 0.15$ ,  $p < 0.05$ ), and PA ( $\beta = -0.31$ ,  $p < 0.001$ ).

**Conclusions:** Regular PA is crucial in improving HRQOL of HF patients. In addition, HS, HF medication, and NYHA Class should be considered in providing care for HF patients aimed at improving HRQOL.

**Keywords:** heart failure, health-related quality of life, physical activity.

## Introduction

Heart failure (HF) is a serious issue in public health, with cases consistently increasing annually (Shahim et al., 2023). Several advanced and innovative treatments have been introduced in providing care for HF patients. However, the uncertainty of prognosis and illness progression tend to impact the morbidity and mortality rates (Gerges et al., 2015), necessitating the improvement of Health-related Quality of Life (HRQOL) (Alanazi et al., 2023). The New York Heart Association

(NYHA) classification is an important indicator for patients in carrying out daily activities, as it has a direct relationship with symptoms experienced by HF patients (Gallagher et al., 2019). Symptoms frequently experienced include shortness of breath (SOB), dyspnea, and fatigue and can influence physical, mental, or social health, which are crucial aspects of HRQOL (Uchmanowicz & Gobbens, 2015; Wu et al., 2016). Meanwhile, HRQOL serves as a parameter for illness severity, treatment response, symptom progression,

and a measure for re-hospitalizations (Jarab et al., 2023; Tegegne et al., 2022). It is essentially a complex concept that includes both the physical and psychosocial dimensions of an individual (Fitz et al., 2021; Floegel & Perez, 2016). Therefore, maintaining good HRQOL is one of the primary objectives in comprehensive management for HF patients (Rankin et al., 2019).

Physical activity (PA) is one of the rehabilitative measures for HF patients (Esnaasharieh et al., 2022). Performance provides positive benefits on several factors such as exercise capacity, functional capacity, physical performance, physical fitness, and cardiopulmonary exercise of patients (da Silva et al., 2013; Lindgren & Borjesson, 2021). These factors can directly relate to the rate of re-hospitalization, morbidity, and mortality (Fitz et al., 2021). The American College of Cardiology (ACC) and the American Heart Association (AHA) recommend that stable HF patients engage in routine PA alongside continuous medication therapy (Ponikowski et al., 2016). The American College of Sports Medicine (ACSM) also recommends that moderate PA for more than 30 minutes five days per week or vigorous PA for more than 20 minutes three days per week can improve and maintain health of adults (Varghese et al., 2016). Performance of PA can improve immunology for patients with HF, as there is an increase in oxygen intake in the body, facilitating peripheral metabolism (Hummel et al., 2016), and inhibiting progressive cardiac remodeling (Naylor et al., 2016). However, symptoms of HF such as dyspnea, fatigue, and shortness of breath (SOB) can impede the patient from doing PA based on recommendations. Therefore, promoting PA remains a challenge for patients facing a condition associated with HF symptoms.

Previous studies found that only 30% to 56% of HF patients engaged in routine PA at a recommended level of 20 to 30 minutes per 3 to 5 days per week (Andreae et al., 2019; Heidenreich et al., 2022). Low PA may be prevalent in people with HF but the research on this topic is limited in Indonesian people. An estimated 22.8% of Indonesian adults have a low PA level; likewise, low PA is an important risk factor for increasing incidence and mortality rates of HF in Indonesia (Lam, 2015). Moreover, absence of PA can have detrimental effects on health and stimulate the progression of HF severity (Andreae et al., 2019; Naylor et al., 2016). Therefore, understanding the benefits of performing PA in an effort to improve HRQOL is crucial. However, it should be noted that several studies have argued that demographic characteristics and illness-related factors

play a role in changes in HRQOL among patients with HF. Therefore, the current study aimed to investigate the relationship between demographic characteristics, illness-related factors, PA, and HRQOL in HF patients, and to identify predictive factors influencing HRQOL.

## Materials and Methods

### Study design and Participants

This study used a cross-sectional design, and a convenience sampling method was used to obtain respondents who met the inclusion criteria of HF patients according to the International Classification of Diseases (ICD) tenth revision (code number 150), aged >18 years, and classified as NYHA Class I to III in a cardiology outpatient department of North Sulawesi-Indonesia. The exclusion criteria were patients experiencing acute attacks (dyspnea, fatigue) and patients with decreased consciousness. Respondents who agreed to participate were provided with informed consent, and the study was approved by the Hospital Institutional Review Board (HIRB) (PP04.03/XIX.3/3580/2023). The sample size estimation was calculated using the G-Power software 3.1.9.2 version with an effect size of 0.15, an  $\alpha$  level of 0.05, a power of 0.80, and an additional 10% missing data rate. The participants were a total of 180 patients with HF, consisting of males ( $n=108$ ) and females ( $n=72$ ).

### Instruments

The following measuring tools were adopted: (1) Demographic characteristics questionnaire (age, gender, job, marital status, income level, religion, living arrangement, and education); (2) Illness-related factors consist of hemoglobin (Hgb), body mass index (BMI), length of diagnostic HF, NYHA classes, HF standard medications, and comorbidity using Charlson Comorbidity Index (CCI) (a high score shows the seriousness of comorbidities) (Charlson et al., 1987); (3) Health status (HS) using the modified 4-item Self-Rated Health Subscale (SRHS) (a higher score showing lower HS) (Lawton et al., 1982); (4) PA using international PA questionnaire (IPAQ), comprising 27 items covering four domains, namely occupational, transportation, housework, and leisure time (a high score shows better PA performance) (Craig et al., 2003); (5) HRQOL using the Minnesota Living with Heart Failure Questionnaire (MLHFQ), comprising 21 items including physical, emotional dimensions, and other dimensions (a higher score shows poorer HRQOL) (Rector, 2005).



Table 1. Characteristics of the respondents (n= 180)

Variable	n (%)	Mean $\pm$ SD
<b>Demographic characteristics</b>		
Age (year)		59.98 $\pm$ 11.86
Gender		
Male	108 (60.0)	
Female	72 (40.0)	
Job		
Yes	109 (60.6)	
No	71 (7.1)	
Marital status		
Married	167 (92.3)	
Single/widow/widowed	13 (7.1)	
Religion		
Christian	132 (73.3)	
Others	48 (26.7)	
Living arrangements		
With families	132 (73.3)	
Others	48 (26.7)	
Income level		
Low	55 (30.6)	
Moderate	33 (18.3)	
High	92 (51.1)	
Education		
Elementary school	37 (20.6)	
Junior high school	36 (20.0)	
Senior high school	81 (45.0)	
College and above	26 (14.4)	
<b>Illness-related factors</b>		
Hgb (g/dL)		12.88 $\pm$ 1.79
BMI (kg/m <sup>2</sup> )		25.10 $\pm$ 4.56
< 18.5	3 (1.7)	
18.5 to 24.9	101 (56.1)	
25.0 to 29.9	57 (31.7)	
> 30	19 (10.6)	
Length of diagnostic HF (month)		32.29 $\pm$ 35.81
Comorbidities (CCI number)		2.87 $\pm$ 1.44
Cardiovascular		
Hypertension	121 (67.2)	
CAD and MI	77 (42.7)	
Valvular disease	6 (3.3)	
Non-cardiovascular		
DM	50 (27.8)	
Chronic renal insufficiency	32 (17.8)	
Hepatitis and Cirrhosis	3 (1.7)	
HF medication		
Diuretics	76 (57.8)	
ACEi	67 (37.2)	
ARBs	47 (26.1)	
Beta-blocker	25 (13.9)	
Aldosterone inhibitor	24 (13.3)	
Health status		10.15 $\pm$ 1.92
FTSST (second)		8.46 $\pm$ 6.30
< 6	106 (58.9)	$\pm$ 0.87
6 to 16	45 (25.0)	10.50 $\pm$ 4.10
> 16	29 (16.1)	20.93 $\pm$ 2.97
NYHA Classes		
Class I	43 (23.9)	
Class II	93 (51.7)	
Class III	44 (24.4)	
HRQOL overall		42.96 $\pm$ 20.47

ACEi: angiotensin-converting enzyme inhibitors; ARBs: angiotensin II receptor blockers;

BMI: body mass index; CAD: coronary artery disease; DM:

diabetes mellitus; Hgb, hemoglobin;

MI, myocardial infarction; NYHA: New York Heart Association

## Statistics

Before data analysis, inspection was conducted to minimize errors and missing values, assess the distribution, normality of data on the main variables, homogeneity of variance, homoscedasticity, and linearity for each statistical procedure. The results found

that the normality of the main variables was accepted; therefore, the relationship between demographic characteristics, illness-related factors, PA, and HRQOL was analyzed using Pearson correlation coefficient, t-test, and One-way ANOVA. Data transformation was conducted on total PA using LOQ 10. Hierarchical multiple regressions were used to explain predictors related to HRQOL, and relevant variables with cut-off point value of  $p < 0.20$  to HRQOL were included in the regression model. NYHA Classes, level of education, and marital status were transformed into dummy variables.

## Results

### Demographic characteristics, illness-related factors, PA, and HRQOL

A total of 180 HF patients participated in this study, and the demographic characteristics as well as illness-related factors are presented in [Tables 1](#) and [2](#). The average age of respondents was 59.92  $\pm$  11.90 years, with 60% being male. A significant number had an education level of senior high school (45%) and were married (92.3%). [Table 2](#) shows that the mean Hgb was (12.88  $\pm$  1.79) g/dL, the length of diagnostic HF was (32.29  $\pm$  35.81) months, mean comorbidities was (2.87  $\pm$  1.44), and HS was (10.12  $\pm$  1.91). The majority had NYHA Class II (57.8%), and the mean PA score was (3009.84  $\pm$  4903.37) MET-second/week (data transformed using LOQ 10 was 3.03  $\pm$  .69).

[Table 1](#) and the Appendix show that the average HRQOL score of respondents was (43.14  $\pm$  20.74). The most prevalent HRQOL issues were in physical dimension, with an average of (18.44  $\pm$  8.20). The breakdown of five highest and lowest problems affecting HRQOL of respondents is as follows: difficulty walking or climbing stairs (2.60  $\pm$  1.36); feeling tired, fatigued, or having low energy (2.49  $\pm$  1.27); SOB (2.41  $\pm$  1.30), difficulty sleeping at night (2.37  $\pm$  1.15); difficulty going far from home (2.34  $\pm$  1.29) (highest problems); feeling a burden to family/friends (1.52  $\pm$  1.19); difficulty concentrating/remembering (1.47  $\pm$  1.20); loss of self-control (1.42  $\pm$  1.21); side effects from medications (1.12  $\pm$  1.02); and swelling in ankles or legs (0.99  $\pm$  1.33) (lowest problems).

Association between demographic characteristics, illness-related factors, and HRQOL

[Tables 2](#) and [3](#) show that HRQOL had significant relationships with several variables. There was a weak positive correlation with HF medication ( $r = 0.20$ ,  $p < 0.01$ ), a moderate positive correlation with HS ( $r = 0.35$ ,  $p < 0.01$ ), but a strong negative relationship with PA (PA)

Table 2. Correlation between demographic characteristics, illness-related factors, and HRQOL (n = 180)

	1	2	3	4	5	6	7	8
1 Age								
2 Hb	-0.04							
3 BMI	0.07	0.10						
4 Length of HF	0.15	0.01	0.05					
5 CCI	0.54**	-0.23**	-0.01	-0.01				
6 HF Medication	0.08	-0.07	0.09	-0.09	0.08			
7 Health Status	-0.18*	-0.16*	-0.13	-0.01	0.09	0.03		
8 IPAQ total	-0.06	0.05	0.04	0.01	-0.06	-0.11	-0.23**	
9 MLHFQ overall	0.06	-0.10	-0.07	0.07	0.10	0.15	<b>0.24**</b>	<b>-0.24**</b>

\*  $p < .05$ , \*\*  $p < .01$  level of significance (2-tailed). Hgb: hemoglobin; BMI: body mass index; CCI: Charlson comorbidity index; HF: heart failure; PA: physical activity; LOQ: limit of quantitation; HRQOL: health-related quality of life

( $r = -0.52$ ,  $p < 0.01$ ). HRQOL was associated with NYHA Classification ( $F = 94.57$ ,  $p < 0.001$ ), while post hoc analysis showed that NYHA Class III had a mean score ( $68.14 \pm 20.47$ ) higher than Class I ( $29.42 \pm 14.67$ ), and Class II ( $37.30 \pm 13.56$ ). On the other hand, variables such as age, gender, job, marital status, religion, education level, Hgb, BMI, length of diagnostic HF, and comorbidities had no significant relationship with HRQOL among HF patients.

Table 4 shows the predictors of HRQOL. Model 1: education and marital status were entered as predictors accounting for 3.9% of the variance in HRQOL, with significant variable being senior high school ( $\beta = -0.21$ ,  $p < 0.05$ ). Model II, six predictors namely comorbidities, length of diagnostic HF, HF medication, HS, NYHA Class, and PA were included in the model. The results showed that, after controlling for education and marital status, R2 increased by 19% of the variance ( $p < 0.001$ ) from 0.06 to 0.23. Significant

Table 3. Association between demographic characteristics, illness-related factors, and HRQOL (n = 180)

Variable	n	HRQOL			p	Post hoc test
		Mean	SD	t / F		
Gender <sup>a</sup>						
Male	108	42.85	21.08	-0.23	0.817	
Female	72	43.58	20.36			
Job <sup>a</sup>						
Yes	109	41.82	20.65	1.07	0.288	
No	71	45.18	20.87			
Marital status <sup>a</sup>						
Married	167	42.70	20.92	-1.03	0.305	
Single	13	48.85	18.02			
Religion <sup>a</sup>						
Christian	132	42.65	20.19	-0.53	0.598	
Others	48	44.50	22.37			
Living arrangement <sup>a</sup>						
Alone	4	42.75	24.10	-0.04	0.969	
With family	176	43.15	20.73			
Income level <sup>b</sup>						
Low	55	44.80	19.77	0.28	0.760	
Moderate	33	41.73	20.44			
High	92	42.66	21.56			
Education <sup>b</sup>						
Elementary	81	48.22	20.29	1.73	0.162	
Middle school	36	42.86	21.53			
High school	26	39.79	20.47			
College	37	46.77	20.24			
NYHA Class <sup>b</sup>						
Class I (A)	43	37.98	18.79	<b>8.36</b>	<b>&lt; 0.001</b>	A < C
Class II (B)	104	41.32	18.68			B < C
Class III (C)	33	55.64	24.75			
FTSST (second) <sup>b</sup>						
< 6 (A)	103	35.50	16.48	<b>26.01</b>	<b>&lt; 0.001</b>	A < B
6 to < 16 (B)	42	47.31	18.31			A < C
> 16 (C)	35	60.66	23.04			B < C

a T-test (t); b One-way ANOVA (F); Bold values: significant with HRQOL

Table 4. Predictors variables on HRQOL (n= 180)

Variables	Model 1		Model 2		Model 3	
	$\beta$	<i>t</i>	$\beta$	<i>t</i>	$\beta$	<i>t</i>
Education Elementary	0.13	1.68	0.13	1.94	0.08	1.36
NYHA Class III			-0.10	-1.06	-0.06	-0.65
Hgb			0.01	0.09	0.04	0.60
CCI			-0.03	-0.49	0.03	0.43
HF Medication			0.08	1.22	0.08	1.23
HS			0.06	0.85	0.04	0.59
FTSST			<b>0.52</b>	<b>5.40<sup>b</sup></b>	<b>0.36</b>	<b>3.88<sup>b</sup></b>
Occupational					<b>-0.20</b>	<b>-2.57<sup>a</sup></b>
Transportation					-0.08	-0.90
Housework					<b>-0.22</b>	<b>-2.03<sup>a</sup></b>
Leisure time					-0.04	-0.43
F	2.81		8.64 <sup>b</sup>		10.19 <sup>b</sup>	
R <sup>2</sup> Change	0.016		0.244 <sup>b</sup>		0.140 <sup>b</sup>	
R <sup>2</sup>	0.016		0.260		0.400	
Adjusted R <sup>2</sup>	0.010		0.230		0.361	

ap < .05, bp < .001 level of significance (2-tailed); Bold values: predictors of HRQOL  
Hgb: hemoglobin; HF: heart failure; HS: health status; NYHA: New York Heart Association; FTSST: five times sit to stand test

variables in Model II were senior high school ( $\beta = -0.19$ ), HS ( $\beta = 0.27$ ), and NYHA Class III ( $\beta = 0.17$ ). When PA was included in Model III, R<sup>2</sup> increased by 7.9% ( $p < 0.001$ ) from 0.229 to 0.308. Significant variables were HS ( $\beta = 0.21$ ), NYHA Class III ( $\beta = 0.15$ ), and PA ( $\beta = -0.31$ ).

## Discussions

Analysis showed that HF patients tended to have issues with HRQOL, specifically patients with higher NYHA classes (Smolis-Bak et al., 2015). Furthermore, the HRQOL of the respondents was moderate. Issues commonly faced by patients with higher NYHA Class such as SOB, dyspnea, and fatigue had an impact on restricting PA (Santos-Lozano et al., 2017). This was supported by the current study, where the five highest issues faced were in the physical dimension (see Appendix 2 and 3). The impact of chronic illness like HF could affect the psychological, social, and emotional problems of patients (Cheng et al., 2024).

Tables 2 and 3 show that HF medication and HS correlated with HRQOL of patients. While HF medication had a positive effect in reducing the workload of heart, the side effects could lead to a decrease in heart rate, cardiac output, as well as dehydration and electrolyte imbalance (Girerd et al., 2023; Maria et al., 2023). This could significantly decrease HRQOL of patients (Girerd et al., 2023). Similarly, HS was one of the indicators for HRQOL, where HS decreased with HRQOL (Butler et al., 2022).

One of the HS issues included perceived changes in HS compared to the previous year. A significant number of patients had limitations in participating in preferred activities and felt better with general health (see Appendix 1). Therefore, maintaining good HS was necessary to improve HRQOL status. This supported previous results that maintaining good HS could provide

positive benefits for PA (Myers et al., 2015). However, demographic characteristics and illness-related factors such as age, gender, job, marital status, religion, education, Hgb, BMI, length of diagnostic HF, and comorbidities did not correlate with HRQOL. There were contradictions with studies that found HRQOL to be associated with age, gender, Hgb, and comorbidities (Dmitrieva et al., 2022; Marx et al., 2022; Shuvy et al., 2020).

Table 2 shows a significant negative relationship between PA and HRQOL, indicating that increasing PA performance tended to benefit the improvement of HRQOL. Several studies found that performing routine PA could increase cardiorespiratory fitness, exercise capacity, and functional capacity in HF patients, positively impacting the improvement of HRQOL (Brubaker et al., 2020; Lindgren & Borjesson, 2021; Tegegne et al., 2022). Moreover, performing PA for more than 30 minutes could also increase Interleukin 6 (IL 6), which is beneficial for skeletal muscle metabolism and oxygen consumption, and in inhibiting the progression of HF severity (Hummel et al., 2016; Nayor et al., 2016; Ribeiro-Samora et al., 2017). Furthermore, the benefits of routine PA can improve HS (Table 2). However, PA performance might decline with an increase in the number of HF medications used (Table 2); therefore, monitoring the use of HF medications was found necessary as medication side effects could decrease PA (Sharma et al., 2019).

## Predictors of HRQOL

Analysis showed that out of eight variables included as predictors of HRQOL, only three were significant, namely HS, NYHA Class III, and PA, accounting for 30.8% of the variance in HRQOL (Table 3). A low HS and a higher NYHA Class could lead to a decrease in HRQOL, while

increasing PA was found beneficial and crucial for HRQOL improvement. A decrease in HS and a higher NYHA Class tended to negatively impact HRQOL.

### Relevance in practice

This study aimed to clarify HRQOL of HF patients and the variables impacting the changes. Therefore, the empirical data could serve as a guide in providing care for patients. HF medication, HS, NYHA Class, and PA were significant variables affecting HRQOL changes. Moreover, HS, NYHA Class III, and PA were predictors of HRQOL.

This study had several limitations. Firstly, the generalizability of the results was limited due to the use of non-probability sampling and a cross-sectional design. Correlations between demographic characteristics, illness-related factors, PA, and HRQOL should not be interpreted to reflect causal relationships. Therefore, longitudinal designs should be implemented for future studies. Secondly, objective measurements of LVEF were not included in participants using echocardiography to identify left ventricular systolic function. This necessitated the adoption of LVEF to identify left ventricular systolic function. Thirdly, cultural differences might affect outcomes, specifically regarding demographic characteristics (age, gender, job, marital status, religion, and education). Consequently, the influence of culture on HRQOL among people living with HF should be considered.

### Conclusion

In conclusion, the decrease in HRQOL among HF patients required more efforts to improve PA performance and prevent the progression of illness severity. Factors such as HF medication, HS, and NYHA Class were associated with HRQOL development. Furthermore, predictor factors such as HS, NYHA Class III, and PA played a significant role in HRQOL. These results could serve as a reference for patients, families, or healthcare providers in developing care strategies and improving HRQOL among HF patients.

### Author Contributions

DMR and HMC were accountable for the modelling studies. The other authors were accountable for the data collection, and analyzing the clinical outcomes of the respondents. All authors have equally contributed to the study design, data analysis, and writing of the study.

### Conflict of Interest

This study has no conflicts of interest.

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## A pilot translation and adaptation of the Diabetes Obstacle Questionnaire (DOQ) to measure obstacles and challenges in diabetes management for people with diabetes in Indonesia

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### ABSTRACT

**Introduction:** Identifying the issues faced by Indonesians living with diabetes is crucial to address them appropriately. However, a standardized tool cannot measure the obstacles encountered in managing illness. Therefore, there is a need for widely accepted assessment tools to investigate these problems. This article explains the findings of the pilot translation and adaptation of the Diabetes Obstacle Questionnaire (DOQ) for people with diabetes in Indonesia.

**Methods:** The English version of the DOQ was cross-culturally adapted and translated into Bahasa, Indonesia. The completion of the questionnaire required approximately 30 min for each of the 61 respondents, all of whom were Indonesians diagnosed with diabetes. Factor analysis, product moment, and Cronbach's alpha were used in STATA SE 13.1 for data analysis.

**Results:** The original 78 items underwent a systematic process of translation and adaptation to align with the Indonesian context. Twenty-one items were eliminated, leaving 57 valid question items following a judgement of expert and statistical analysis. The reliability coefficient of the Indonesian version of the DOQ was acceptable, with a value of 0.96 for all items. The coefficient varied between 0.82 and 0.99 for different scales, indicating high internal consistency reliability.

**Conclusions:** The Indonesian version of the 57-item DOQ is an acceptable instrument that can be used to identify obstacles faced by people with diabetes in Indonesia. This can facilitate researchers in investigating the problems faced by those living with diabetes in managing their condition.

**Keywords:** adaptation, diabetes management, questionnaire, translation

### Introduction

Diabetes mellitus (DM) is a chronic metabolic condition characterized by excessive levels of blood glucose caused by beta-pancreas deterioration, which eventually causes catastrophic damage to vital organs, including the heart, blood vessels, eyes, kidneys, and nerves (Chatterjee, Khunti and Davies, 2017; Punthakee, Goldenberg and Katz, 2018; Egan and Dinneen, 2019; World Health Organization (WHO), 2023). This condition

is one of the major health issues in which long-life suffering has reached alarming levels. According to the most recent projections, general diabetes in Indonesia will grow by over 7% between 2020 and 2045, from 18.69 million cases to 40.7 million (Wahidin *et al.*, 2024). The mortality rate of type 2 diabetes mellitus (T2DM) has increased by 13% in lower-middle-income countries between 2000 and 2019, even though the probability of



dying from other non-communicable diseases has decreased (WHO, 2023).

Globally, the International Diabetes Federation (IDF) states that more than one in 10 adults is living with diabetes, and Indonesia has the highest proportion of undiagnosed diabetes (IDF, 2021; Tanoey and Becher, 2021). Newly diagnosed people living with diabetes face several challenges, not only physically but also psychologically, such as emotional disturbances, fear, anger, denial, frustration, depression, and uncertainty (Krishna, 2018; Arifin, van Asselt, *et al.*, 2019; Rariden, 2019). In addition, the direct and indirect costs of diabetes also limit access to healthcare services (Soewondo, Ferrario and Tahapary, 2013; Patty, Mufarrihah and Nita, 2021). Moreover, a meta-synthesis indicated that living with T2DM presents several obstacles in all parts of everyday life and across all dimensions of life, including physical, social, emotional, and spiritual (Inga-Britt and Kerstin, 2018). People living with this endocrine disorder often experience multiple problems.

Understanding the problems experienced by people with diabetes is essential. However, these issues remain unclear. Moreover, exploring people with diabetes and their experiences of living with diabetes is challenging. People with diabetes may have difficulty expressing their feelings even if they are unaware of their exact issues (Kalra, Jena and Yeravdekar, 2018). Bhagavathula *et al.* (2018) reported that people living with diabetes in Ethiopia face several obstacles related to relationships with health providers, a lack of support from their friends, a lack of knowledge about diabetes, and a lack of motivation to exercise. Mwila *et al.* (2019) emphasized that some adults living with T2DM in Zambia experienced physical sickness; mental ailments; poor family support and adherence; and inadequate information, education, and communication.

In Indonesia, people with diabetes act only after they have received recommendations that they consider trustworthy (Ligita *et al.*, 2019). Additionally, an important finding in Indonesia explains the potential diabetes distress associated with healthcare delivery and the unique obstacles experienced by housewives diagnosed with T2DM (Arifin, Probandari, *et al.*, 2019). Studies on the obstacles faced by patients regarding diabetes management in Indonesia are scarce, leaving a gap that needs to be addressed. However, Suastika *et al.* (2022) reported that experts noted that Indonesians with T2DM have unhealthy lifestyle habits such as smoking, excessive alcohol consumption, and insufficient sleep.

Standardized instruments to measure the obstacles faced by patients with diabetes in managing their illness are limited. One widely used instrument in diabetes research is the Diabetes Obstacles Questionnaire (DOQ), which was specifically developed and rigorously validated for use among the English-speaking population in the United Kingdom (Hearnshaw *et al.*, 2007). Moreover, the short version of this questionnaire, called the DOQ-30, was studied in six European countries, including Belgium, France, Estonia, Serbia, Slovenia, and Turkey (Pilv *et al.*, 2016). A globally accepted translated instrument would be useful in investigating the obstacles experienced by individuals with diabetes in Indonesia. Therefore, this study aimed to translate and adapt the Indonesian version of the DOQ into an appropriate instrument to assess the obstacles faced by people with diabetes in managing their condition.

## Materials and Methods

### Design and samples

This pilot translation and adaptation study was conducted in two public health centers that reported the highest number of people with diabetes in Semarang, Central Java, to assess the challenges experienced by people with diabetes in managing their condition. Healthcare and linguistic professionals were invited to validate the instrument, while people with diabetes registered in the public health centers' medical records were recruited to participate in the pilot test of the instrument.

### Measurement and data collection

#### *Translation and adaptation process*

In the first stage, the English version of the DOQ was translated into Bahasa Indonesia based on the guidelines for the cross-cultural adaptation of self-report measures (Beaton *et al.*, 2000). Three independent experts, including a nurse and linguistic professional, conducted a forward translation from the original language (English) to the target language (Bahasa Indonesia). The questionnaire was then translated back into English to ensure that it represented the same item content as the original version. A native English speaker and a language professional without a health background produced back-translated documents with limited awareness of the concepts explored. Each translator was given an instrument and translation instructions.

After all translation processes were complete, the researchers consolidated all versions of the

questionnaire and prepared them for field testing. To address these discrepancies, thorough discussions were conducted and resolved with the input of researchers and three experts, including nurses and a psychologist, to uphold fidelity to the original concept.

The DOQ, which was developed in the UK and consists of 78 statements, is divided into eight scales: medication (10 items), self-monitoring (5 items), knowledge and beliefs (9 items), diagnosis (6 items), relationships with healthcare professionals (18 items), lifestyle changes (13 items), coping (8 items), and advice and support (8 items) (Hearnshaw et al., 2007). Responses are based on a five-point Likert scale labelled Strongly Agree, Agree, Neutral, Disagree, and Strongly Disagree. The author approved the permission to translate and adapt the DOQ via email.

*Pilot test process*

A pilot study was conducted consecutively on patients living with diabetes at two public health centers from February to May 2023. Individuals who were diagnosed with diabetes and registered in public health centers were approached either online or in person to participate in the study. Eligible patients were informed about the objectives and methods of the study. Participants filled out a paper or soft-file format of the

Table 1. Socio-demographic characteristics and disease history of participants

Variable	n	%
<b>Socio-demographic characteristics</b>		
Age – years (min-max; mean; SD)	35-82; 60.57; 9.47	
Sex		
Male	15	27.78
Female	39	72.22
Level of education		
Low	18	33.33
Middle	26	48.15
High	10	18.52
Occupation		
Not working	35	64.81
Non-government employee	16	29.63
Government employee	3	5.56
<b>Disease history</b>		
Duration of diabetes - years (min-max; mean; SD)	0.25-45; 8.42; 7.73	

Indonesian version of the DOQ, which lasted for approximately 20–30 minutes. Each participant was assisted by a pre-trained nurse to fill in the questionnaire.

**Data analysis**

Data were statistically analyzed using STATA SE 13.1. Demographic characteristics were descriptively analyzed by presenting the frequency distribution, percentage, mean, and standard deviation.

To examine construct validity, eight factors were extracted using Principal Component Analysis (PCA),

Table 2. Component matrix

Factor	Variable	Coefficient correlation	Factor	Variable	Coefficient correlation	
Medication	Medication 4	0.746	Relationships with Healthcare providers	HCP 1	0.758	
	Medication 5	0.689		HCP 2	0.753	
	Medication 7	0.730		HCP 3	0.754	
	Medication 9	0.709		HCP 4	0.791	
	Medication 10	0.836		HCP 5	0.753	
Self-monitoring	Self-monitoring 1	0.740		HCP 6	0.546	
	Self-monitoring 2	0.840		HCP 7	0.781	
	Self-monitoring 3	0.779		HCP 8	0.681	
	Self-monitoring 4	0.803		HCP 10	0.688	
	Self-monitoring 5	0.650		HCP 11	0.655	
Knowledge and beliefs	Knowledge and belief 1	0.820		HCP 14	0.762	
	Knowledge and belief 2	0.641		HCP 15	0.709	
	Knowledge and belief 3	0.814		HCP 16	0.680	
	Knowledge and belief 4	0.797		HCP 17	0.617	
	Knowledge and belief 5	0.542		Lifestyle changes	Lifestyle changes 1	0.765
	Knowledge and belief 6	0.787			Lifestyle changes 2	0.673
	Knowledge and belief 7	0.792			Lifestyle changes 3	0.806
	Knowledge and belief 9	0.755	Lifestyle changes 4		0.668	
	Knowledge and belief 10	0.678	Lifestyle changes 5		0.842	
	Diagnosis	Diagnosis 3	0.816		Lifestyle changes 6	0.756
Diagnosis 4		0.896	Lifestyle changes 7		0.705	
Diagnosis 5		0.787	Lifestyle changes 8		0.591	
Diagnosis 6		0.622	Lifestyle changes 13	0.677		
Advice and support	Support 1	0.550	Coping with diabetes	Coping diabetes 1	0.681	
	Support 3	0.710		Coping diabetes 2	0.684	
	Support 6	0.712		Coping diabetes 3	0.804	
	Support 7	0.788		Coping diabetes 4	0.846	
	Support 8	0.835		Coping diabetes 5	0.797	
				Coping diabetes 8	0.557	



Table 3. The Diabetes Obstacles Questionnaire (Bahasa Indonesia version) result after analysis

DOQ scale	Items	% of variance explained	Kaiser-Meyer Olkin	Cronbach's alpha
Obstacles in medication	5	55.323	0.666	0.817
Obstacles in self-monitoring	5	58.56	0.797	0.862
Obstacles of knowledge and beliefs	9	55.013	0.85	0.915
Obstacles at diagnosis	4	61.85	0.734	0.844
Obstacles in Relationships with healthcare professionals	9	52.43	0.793	0.907
Obstacles to lifestyle changes	14	50.74	0.76	0.994
Obstacles to coping with diabetes	6	54	0.823	0.866
Obstacles around advice and support	5	52.61	0.675	0.839

each ranging from four to 18 indicators. The Kaiser-Meyer-Olkin (KMO) value was measured to indicate sampling adequacy in comparing the correlations and partial correlations between variables, and its result was used to determine the suitability of data for factor analysis (Kaiser and Rice, 1974). Additionally, face validity was considered to represent the construct to be measured. It relies on individuals' subjective assessments to determine if the measure being applied is appropriate (Bagby, Goldbloom and Schulte, 2006). Seven individuals with diabetes were asked about the readability and clarity of the Indonesian version of the DOQ.

Internal consistency is a measure of reliability that represents the extent to which items within an instrument measure distinct parts of the same trait or concept (Revicki, 2014). Cronbach's alpha was calculated to measure the scale's internal consistency, which reflects the degree of correlation between individual questionnaire items.

#### Ethical considerations

Ethical approval was obtained from the Health Research Ethics Committee of the Faculty of Medicine Universitas Diponegoro (No: 367/EC/KEPK/FK-UNDIP/X/2022). All methods of this study, which involved human research participants, were performed in accordance with the Declaration of Helsinki. All subjects, including their legal guardians, provided informed consent. Each participant signed a written consent form indicating their permission to participate in the study.

#### Results

The translation and adaptation of the DOQ into Bahasa Indonesia involved multiple steps. Seven individuals with diabetes participated in face validation of a paper-based questionnaire. This validation followed the detailed procedures outlined in the Methods section, and was conducted by researchers and experts. The participants stated that some of the questions were

confusing and difficult to understand. They also specified that many questions and domains should be answered, which is time consuming. The time taken to complete the questionnaire was approximately 30 minutes. Responding to the participants' comments, minor corrections and fine-tuning of the questionnaire were performed by researchers to improve clarity before continuing the data collection.

All data from the questionnaires completed by participants were entered into the statistical software program. The sociodemographic characteristics and disease history of the participants are presented in Table 1. Among 220 documented cases of diabetes across the two public health centers, the participation rate was 27.73%. Of the 61 voluntary respondents who completed the questionnaire, 54 were included in the analysis. One participant answered the questions below 5% of the items, and six of them only partially completed the questionnaire (around 88% of the items), so they were omitted from the analysis.

The results showed that the age of participants ranged from 35 to 82 years, with a mean of 60.57 (SD=9.47) and more females (72.22%) than males participated in this study. More than half of the participants were not working (64.81%) and had a middle level of education (48.15%). The mean time of diabetes since they have been diagnosed was 8.42 years (SD=7.73), with the longest diagnosis of diabetes being 45 years.

The component matrix shows the correlation between each variable and identified factors. From the output of each factor, it can be seen that all included indicators met the minimal requirement correlation towards its factor between 0.5 and 1. The coefficient of the variables ranged from 0.542 to 0.896, where the closer it was to 1 of the component value matrices, the better the contribution. Therefore, these indicators are suitable for the application of these factors. The summarized correlation coefficients for each variable and factor are presented in Table 2.

The internal consistency reliability coefficient of the Indonesian version of the DOQ ranges from 0.839 to 0.994. These scores were above 0.80 on each scale

which indicated a high reliability. A summary of the internal consistency reliability is presented in Table 3.

The validated DOQ retained 57 items in its final version. After expert judgment and statistical analysis,

Table 4. Details of the DOQ original items removed or adjusted to Indonesian versions

Original item	Adapted item	Rationale
<b>Scale 1 - Obstacles in Medication</b>		
Item 1: I do not feel I am being prescribed the medication that is right for me.	Deleted	In Indonesia, the patriarchal culture has resulted in a tendency for individuals to place considerable trust in healthcare providers when it comes to their medications.
Item 2: I do not feel I am being prescribed the medication dose that is right for me.	Deleted	Individuals or patients generally have limited awareness regarding the calculation of drug dosages.
Item 3: I don't know what to do about taking my medication when I am feeling unwell.	Deleted	Individuals or patients generally have limited awareness regarding the medication before they get severe conditions.
Item 6: People treat insulin users differently.	Deleted	This question is not significant as such cases are rarely found.
Item 8: I forget to take my medication.	Deleted	While this question is important, it can be confusing, whether they forget to take their medication at the appropriate time, yesterday, or in a frequent occurrence. In reality, patients often forget to take their medication because it needs to be consumed daily.
<b>Scale 2 – Obstacles in Self-Monitoring</b>		
All items were included.		
<b>Scale 3 – Obstacles of Knowledge and Belief</b>		
Item 8: I believe type 2 diabetes is mild compared with type 1.	Deleted	The statistical analysis indicates that the results are not deemed to be statistically significant.
<b>Scale 4 – Obstacles at Diagnosis</b>		
Item 1: The way that I was told that I had diabetes made me feel confused.	Deleted	The statistical analysis indicates that the results are not deemed to be statistically significant.
Item 2: The way that I was told that I had diabetes made me feel afraid.	Deleted	The statistical analysis indicates that the results are not deemed to be statistically significant.
Item 3: The way that I was told that I had diabetes made me feel that it was not a serious condition.	Item 3: Change the order of the clause. <i>Saya merasa diabetes bukan kondisi yang serius karena cara tenaga kesehatan memberi tahu bahwa saya menderita diabetes ketika pertama kali.</i>	The sentence has been simplified for better understanding.
Item 4: The way that I was told that I had diabetes did not motivate me to manage my diabetes well.	Item 4: Change the order of the clause. <i>Saya tidak termotivasi untuk mengelola diabetes dengan baik karena cara tenaga kesehatan memberi tahu bahwa saya menderita diabetes ketika pertama kali.</i>	The sentence has been simplified for better understanding.
Item 6: The way that I was told that I had diabetes made me feel guilty.	Item 6: Change the order of the clause. <i>Saya merasa bersalah karena cara tenaga kesehatan ketika pertama kali memberi tahu bahwa saya menderita diabetes.</i>	The sentence has been simplified for better understanding.
<b>Scale 5 – Obstacles in Relationships with Health Care Professionals</b>		
Item 9: I do not feel I am part of the diabetes team.	Deleted	The statistical analysis indicates that the results are not deemed to be statistically significant.
Item 12: Talking about my diabetes with members of the diabetes team does not make me feel better.	Deleted	The statistical analysis indicates that the results are not deemed to be statistically significant.
Item 13: Adjustments to my diabetes plan cannot be discussed.	Deleted	In the realm of healthcare services, individuals are not given choices concerning the treatments that can be administered to them.
Item 18: I have to spend too much time waiting in clinics.	Deleted	The statistical analysis indicates that the results are not deemed to be statistically significant.

Original item	Adapted item	Rationale
<b>Scale 6 – Obstacles to Lifestyle Changes</b>		
Item 9: I am unable to afford the cost of exercising on a regular basis.	Deleted	The statistical analysis indicates that the results are not deemed to be statistically significant.
Item 10: I haven't found an exercise I enjoy.	Deleted	The statistical analysis indicates that the results are not deemed to be statistically significant.
Item 11: I lack the motivation to exercise.	Deleted	The statistical analysis indicates that the results are not deemed to be statistically significant.
Item 12: Weight control is real problem for me.	Deleted	The statistical analysis indicates that the results are not deemed to be statistically significant.
<b>Scale 7 – Obstacles to coping with Diabetes</b>		
Item 1: Self-management of diabetes is difficult to maintain because diabetes complications are not immediate.	Item 1: Rephrase. <i>Saya merasa tidak perlu merawat diri karena saya belum merasa adanya komplikasi diabetes.</i>	Individuals generally have limited awareness of their treatment until their condition becomes severe.
Item 6: I feel that I would like to take a holiday from my diabetes.	Deleted	The statistical analysis indicates that the results are not deemed to be statistically significant.
Item 7: I eat something I should not rather than I say have diabetes.	Deleted	The statistical analysis indicates that the results are not deemed to be statistically significant.
<b>Scale 8 – Obstacles around Advice and Support</b>		
Item 2: I am told too often what I should and should not be doing to manage my diabetes.	Deleted	The statistical analysis indicates that the results are not deemed to be statistically significant.
Item 4: I am criticized too often about the way I manage my diabetes.	Deleted	The statistical analysis indicates that the results are not deemed to be statistically significant.
Item 5: I would manage my diabetes much better if I had more encouragement socially.	Deleted	The statistical analysis indicates that the results are not deemed to be statistically significant.

21 items were excluded. The details outlining the specific items from the original DOQ that were either removed or adjusted in the Bahasa Indonesia version are comprehensively documented in Table 4.

## Discussions

To the best of our knowledge, this is a comprehensive validation study in Indonesia that used the same analytical approach as the original UK study. Some items are eliminated because of local considerations, which are relatively different between developing countries and developed countries. For example, we deleted the questions related to medication and dose. In Indonesia, it is uncommon for patients to want to know details and manage their treatment due to patriarchal culture, which results in a tendency for individuals to place considerable trust in healthcare providers regarding their medications. Moreover, individuals or patients generally have limited awareness regarding the calculation of drug dosages.

In addition, certain conditions in Europe may not be applicable to Asia, particularly Indonesia. This includes the relationship between healthcare providers and

patients as well as aspects related to lifestyle. Putri, et.al. (2020) discovered that healthcare providers noted that individuals living with diabetes in rural areas tend to exhibit poorer care-seeking behavior than their urban counterparts. Moreover, healthcare facilities are often limited, hindering the achievement of treatment goals for people with diabetes (Alkaff *et al.*, 2021).

The DOQ was translated and back translated during the first stage of the study. However, the duration of this step exceeded expectations as not all experts were contacted to confirm their approval to be involved in the process. This phase relies heavily on language proficiency and cultural acuity, which unfortunately deters some individuals from taking part due to time constraints or other factors. A previous study concerning this condition also stated that as globalization continues to elevate the significance of English in Indonesia, it is imperative that Indonesians feel empowered to assert themselves and engage with English speakers from all over the world on an equal level (Dewi, 2011).

This pilot survey involved patients with diabetes who were registered in the Chronic Diseases Management Program (*Program Pengelolaan Penyakit*

*Kronis/PROLANIS*), which is a program from BPJS Health (National Health Insurance) that aims to improve the quality of life of patients with chronic diseases. The participation rate is extremely low. Some conditions, such as patients' willingness to participate in research, are an ongoing problem often faced by health research investigators.

A previous study revealed that 25% of respondents confirmed that they would not be willing, and 29% stated that they were undecided regarding participation (Trauth *et al.*, 2000). In this study, demographic characteristics, such as education degree and age, were considered to have affected their decision to participate in the research. The mean age of the participants who voluntarily participated in this study was classified as an older adult, which might lead to difficulties in filling up the questionnaire. Whether related to the interpretation of questions or how to fill it up. A former study stated that adults may perceive data-gathering procedures differently, resulting in variation rates of involvement and response (Quinn, 2010). Apart from this, they tend to see first whether the process is difficult or takes longer.

In the area of statistics, Kaiser introduced the Measure of Sampling Adequacy (MSA), which was later modified by Kaiser and Rice (Kaiser, 1970; Kaiser and Rice, 1974). The Kaiser-Meyer-Olkin (KMO) statistic, which ranges from 0 to 1, indicates how accurately other variables predict each variable in a set. KMO determines the relevance of the data used in the Factor Analysis. This test determines the sufficiency of the sample for each indicator of the variable. In this test, the minimum KMO value was 0.5.

The MSA test is used to measure the homogeneity between indicators in one factor and select indicators so that only qualified indicators can be processed further (Cerny and Kaiser, 1977). Where the MSA value is 0.5 – 1.0. This test can be seen in the Anti-Image Matrices table in the Anti-Image Correlation section.

The extraction process determines the contribution of obtaining how much an indicator to a factor. Principal component analysis (PCA) was used to obtain the extraction value of each indicator. The number of indicators to be extracted is shown in the component matrix table. The component matrix helps interpret the factors produced by factor analysis. By examining the correlation coefficient between the input variable and the factors, we can identify the variable that has the strongest correlation with each factor. A variable with a high correlation coefficient for a particular factor can be considered to have a greater contribution to that factor.

By examining the component matrix, researchers can understand how input variables relate to the factors produced, which can help in understanding factor construction or decision making in factor analysis.

The Total Variance Explained is useful for understanding how much variation in data can be explained by factors resulting from the factor analysis. For example, if we have a 30% variance, that factor explains 30% of the variance in our data. In the CFA, only one factor is used, so the resulting variance value must be at least 50%.

The component matrix shows the correlation coefficient between each input variable and the identified factors. In the component matrix, each cell represents the correlation coefficient between a particular input variable and the resulting factor. This coefficient is closer to 1, the better with the minimum limit value used to indicate that the indicator is valid at 0.5. This component matrix helps interpret the factors produced by factor analysis. By examining the correlation between the input variables and factors, we can identify which variable has the strongest correlation with each factor. Variables with a high correlation coefficient with other factors can be considered to have a greater contribution to this factor (Mukaka, 2012).

The KMO and Bartlett's test table show two tests that demonstrate the suitability of the data used for structure detection. The KMO value in the table is 0.678, which means that the indicators used are suitable for continued factor analysis. Bartlett's Test of Sphericity tests the correlation matrix hypothesis that the indicators used are unrelated, and therefore unsuitable for structure detection. If the significance value is less than 0.05 (hypothesis rejected) which means then factor analysis is quite feasible with the data used. The KMO and Bartlett's test table shows a sig value, which means that the data are feasible enough to continue in the factor analysis.

Reliability was measured based on consistency. The internal consistency reliability coefficient of the Indonesian version of the DOQ was high for each scale, indicating high reliability. However, a previous study elaborated that although the coefficient alpha may be a good estimator of reliability under certain circumstances, it has limitations. Coefficient alpha is related to reliability and not validity. A former study stated that coefficient alpha is useful for predicting reliability in a particular case in which item-specific variance in a unidimensional test is of interest (Cortina, 1993). A high coefficient alpha does not prove that researchers measure what they intend to do; rather,

they measure the same thing consistently. Reliability and validity complement each other for a valid instrument, and the reliability of the instrument must be high. However, if the test is invalid, reliability does not matter. Additionally, the alpha coefficient did not provide evidence of the dimensionality of the scale. A scale can be unidimensional and have a low or high coefficient alpha; however, a scale can be multidimensional and has a low or a high coefficient alpha.

The DOQ is a valid and reliable instrument to inform patients of the kind of obstacles they face in their daily lives regarding self-management of diabetes. However, some adjustments must be made in the context of Indonesia. The cultural context, how it is delivered, and terms used need to be checked to obtain valid information from patients. Diabetes was perceived as a visible and scary disease. The patients seemed to have unrealistic optimism and believed that it would not affect them because no family member had previously been affected (Pujilestari *et al.*, 2014). Another study found that people with diabetes often construct illness notions into their narratives based on their experiences, and the usage of local words may lead to misconceptions about the disease and its symptoms (Widayanti *et al.*, 2020). In addition, an ethnographic exploration of the cultural beliefs and practices of persons with diabetes showed that some misconceptions concerning diabetes and its care are often experienced among Japanese patients (Sari *et al.*, 2022). However, some studies have reported promising results for diabetes (Arifin, Probandari, *et al.*, 2019; Ligita *et al.*, 2019).

The questionnaire included a diverse range of statements, including both positive and negative questions. These statements were designed to confirm the situation rather than to question it. When a statement is presented negatively, listeners must be able to adapt to the presented conditions. Negative statements serve to express opposing ideas, but they simply indicate what is not factual. To respond to these statements correctly, it is necessary to convert affirmative statements to negative ones. A study reported that it is more difficult for the brain to process, as it works in opposition to affirmation (Spychalska, Kontinen and Werning, 2016). Problems may arise in response to negative statements, as this is the reverse of the real situation. Additionally, it is confusing for the majority of people because the brain will only focus on the first stimulus we are thinking about. The size of attentional focus can be adjusted in response to pre-

cues, although increasing the attentional focus area reduces processing efficiency (Castiello and Umilta, 1990). This proves that the human brain can concentrate on only one thing at a time.

After evaluating the process used in this pilot study, several limitations were identified. These shortcomings are a cause for concern and must be addressed to ensure effective implementation in future studies. First, the sample of patients may not be completely representative of the Indonesian population. Even though there is no agreement in the worldwide literature on how large a sample size should be to verify a questionnaire, a rule of thumb of 100–300 is frequently proposed. Therefore, the number of 54 participants is probably insufficient. Second, the recruitment of people living with diabetes might have been biased, as they were not categorized as having type 1 diabetes or T2DM. Third, the measurement of HbA1c and C-peptide levels and diabetes confirmatory diagnostic tests were not conducted because of presumed urgency and limited financial resources. These diagnostic tests, which were examined less frequently, were not administered. Implementing diabetes management programs may improve access to services by eliminating direct medical costs, but significant socioeconomic and geographical disparities persist among National Health Insurance users (Mulyanto *et al.*, 2023).

Despite its shortcomings, the DOQ enables a more explanatory and comprehensive approach to adherence, which is crucial for listening comprehension, concordance, and personalized care. The use of this questionnaire to assess people with diabetes barriers to diabetes self-management helps healthcare providers recognize what individuals face, so that they can design appropriate tailored interventions to solve their problems.

## Conclusion

This study concluded that the Indonesian version of the 57-item DOQ is a valid tool for identifying the challenges faced by individuals with diabetes in Indonesia. This can aid researchers in exploring the difficulties faced by these individuals in managing their condition. Future research should include a larger participant group and consider the specific types of diabetes diagnosed in individuals.

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## Data Availability

The data that support the findings of this study are not openly available owing to reasons of sensitivity and are available from the corresponding author upon reasonable request.

## Competing interests

The authors declare that there is no competing interest.

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## Effectiveness of prone position with its moderating factors in non-intubated acute respiratory distress syndrome patients: a meta-analysis

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### ABSTRACT

**Introduction:** While numerous meta-analyses have explored the efficacy of awake prone position (APP), most have concentrated solely on intubation rate among Covid-19 patients without comprehensively identifying the influencing factors. This study aims to evaluate the efficacy of APP along with its moderating factors on oxygenation, intubation rate, and mortality in non-intubated acute respiratory distress syndrome (ARDS) patients.

**Methods:** We conducted a systematic search in PubMed, Web of Science, and CINAHL from inception to December 2022. JBI critical appraisal tools were used to assess the study quality. Random-effects model was employed to calculate pooled standardized mean difference for continuous outcomes and risk ratio for dichotomous outcomes.

**Results:** Among the 39 studies included, most patients were suffering from Covid-19, using conventional oxygen therapy, and receiving APP outside the ICU. APP significantly improved the PaO<sub>2</sub>/FiO<sub>2</sub> ratio (SMD=0.70, 95% CI=0.51-0.88) and SpO<sub>2</sub>/FiO<sub>2</sub> ratio (SMD=0.76, 95% CI=0.51-1.01), while also reducing the risk of intubation (RR=0.66, 95% CI=0.51-0.85) and mortality (RR=0.62, 95% CI=0.49-0.78). Factors including severity, respiratory device, body mass index, detail of position, use of medication assistance, total duration, follow-up time, position at follow-up, and study design significantly influence the effectiveness of APP. APP did not lead to significant improvements in length of stay and adverse events

**Conclusions:** APP is a safe and beneficial intervention, enhancing oxygenation and reducing intubation and mortality rates in non-intubated ARDS patients. Importantly, various patient and intervention characteristics should be taken into account when implementing APP. Further well-designed experimental studies are needed to strengthen the evidence base.

**Keywords:** ARDS, awake prone positioning, intubation rate, length of stay, mortality, oxygenation

### Introduction

Acute respiratory distress syndrome (ARDS) is a critical condition associated with respiratory failure, and

its incidence has increased during the Covid-19 pandemic. ARDS patient, particularly those with severe cases, are at a higher risk of developing pneumonia and





ventilator-associated lung injury (VALI), leading to significant morbidity and mortality (Slutsky and Ranieri, [2013](#)). Despite optimized standard therapies, the mortality rate remains high, necessitating additional interventions to prevent clinical deterioration and disease progression (Bellani et al., [2016](#); Matthay et al., [2019](#)).

The prone position has emerged as one of the most effective interventions for preventing and treating lung injury in ARDS (Koulouras et al., [2016](#); Scholten et al., [2017](#); Guérin et al., [2020](#)). By modifying the regional distribution of transpulmonary pressure, the prone position has been shown to reduce mortality, improve oxygenation, and enhance survival rates (Hu et al., [2014](#); Bloomfield, Noble and Sudlow, [2015](#); Kallet, [2015](#); Mora-Arteaga, Bernal-Ramírez and Rodríguez, [2015](#); Munshi et al., [2017](#)). International practice guidelines widely recommend its use in intubated ARDS patients (Fan et al., [2017](#); Griffiths et al., [2019](#); Papazian et al., [2019](#); World Health Organization, [2023](#)). However, the effectiveness of the prone position in non-intubated patients, known as the awake prone position (APP), necessitates further investigations (McNicholas, Ehrmann and Laffey, [2022](#)).

While numerous meta-analyses have explored the efficacy of APP, their primary focus has predominantly been on intubation rates in Covid-19 patients (Beran et al., [2022](#); Chong, Saha and Tan, [2022](#); Cruz et al., [2022](#); Kang, Gu and Tong, [2022](#); Li et al., [2022](#); Weatherald et al., [2022](#); Cheema et al., [2023](#); Peng et al., [2023](#); Qin et al., [2023](#); Wang et al., [2023](#)). Moreover, only one meta-analysis has delved into the influence of different patient and intervention factors on prone positioning's effectiveness, mainly in terms of oxygenation and not specifically APP (Ashra et al., [2022](#)). Despite some studies calling for more comprehensive analyses (Aeen et al., [2021](#); Li et al., [2022](#)), many have only concentrated on variables such as respiratory devices, settings, and duration. To address this gap in knowledge, our study aimed to systematically evaluate the impact of APP on oxygenation and the rate of intubation and mortality, while also considering the factors that moderate these outcomes through an extensive meta-analysis. This meta-analysis has the potential to illuminate the benefits of APP and offer valuable insights for informed clinical decision-making and improved patient care.

## Materials and Methods

This meta-analysis was conducted by following the Preferred Reporting Items for Systematic Reviews and

Meta-Analyses (PRISMA) 2020 statement (Page et al., [2021](#)). The study protocol was registered in the International Prospective Register of Systematic Reviews (PROSPERO) database at the National Institute for Health Research on July 13, 2023. The registration number is CRD42023444945.

## Eligibility criteria

The PICO (population, intervention, comparison, outcome) framework was used to determine the eligibility criteria for the required studies. We focused on studies involving non-intubated patients aged  $\geq 18$  years with ARDS or acute hypoxemic respiratory failure (AHRF) who underwent the prone position. Among these studies, we primarily investigated post-APP PaO<sub>2</sub>/FiO<sub>2</sub> (PF) ratio, SpO<sub>2</sub>/FiO<sub>2</sub> (SF) ratio, mortality rate, and intubation rate as the primary outcomes. Additionally, we examined secondary outcomes, which encompassed various oxygenation parameters, the length of stay (LOS) and the occurrence of adverse events. We considered all original articles published in English and used experimental or observational study designs. However, to enhance the methodological rigor, observational studies were limited to cohort studies, as they are the only ones that can distinguish cause and effect.

## Search strategy

All articles included in this study were searched in three international databases from November to December 2022. The databases were PubMed, Web of Science, and Cumulative Index to Nursing and Allied Health Literature (CINAHL) Plus with Full Text via EBSCOhost. The search included articles without limitations on geographic location or publication year. We employed Medical Subject Heading (MeSH) terminology and key-word such as “prone position” OR “awake prone position” AND “respiratory distress syndrome” OR “hypoxemic respiratory failure” OR “acute respiratory distress syndrome” OR “acute lung injury” OR “ARDS” AND “oxygen saturation” OR “blood gas analysis” ([Supplementary file 1](#)).

## Study selection

All identified articles were collated and uploaded into the Rayyan website application for article review (Ouzzani et al., [2016](#)). Rayyan streamlines and accelerates the systematic review process by enabling efficient study screening, unbiased collaboration, and organized data management for authors. The initial process involved removing duplicates and screening titles and abstracts. The first and second author

independently reviewed and confirmed potentially relevant articles. These articles were retrieved in full text and assessed in detail by all authors based on the eligibility criteria. The article selection process was documented in the PRISMA 2020 flow diagram (Page et al., [2021](#)). Any disagreements during the selection process were resolved through discussion and consensus.

#### Data extraction

The first and second author independently extracted data from the identified articles using the Joanna Briggs Institute (JBI) data extraction instrument designed for this review's purpose. The extracted data covered article characteristics, sample details, intervention specifics, and outcomes. Data on authors, publication year, country, and study design were collected as article characteristics. For sample details, we extracted criteria, numbers, age, gender, body mass index (BMI), comorbidities, respiratory device, and room setting. Intervention specifics included the protocol or procedure, time to initiate APP from admission and/or on-set, and the actual duration and/or frequency of APP. Outcome data comprised details of follow-up time and position, mortality rate, intubation rate, adverse events reported, and the mean and standard deviation (SD) of oxygen parameters and LOS. In instances where necessary, values were converted from median and interquartile or range to mean and SD using statistical formulas from Wan et al. ([2014](#)). GetData Graph Digitizer 2.26 was used to extract data from figures or graphs. The third and fourth authors independently confirmed the extracted data, and any disagreements were resolved through discussion and consensus.

#### Critical appraisal

The quality of studies was appraised independently by all authors using the JBI critical appraisal tools, specifically those for RCT, quasi-experimental (Tufanaru et al., [2020](#)), and cohort studies (Moola et al., [2020](#)). The assessment focused on methodological quality, addressing potential bias in study design, conduct, and analysis. The studies were classified as good or poor quality based on the percentage of "Yes" responses, which had to be greater than or equal to 70%. Discrepancies in appraisal were resolved through discussion and consensus.

#### Data synthesis

This study utilized the standardized mean difference (SMD) along with the corresponding 95% confidence interval (95% CI) for continuous outcome data, and the

risk ratio (RR) with 95% CI for dichotomous outcome data. To account for the observed variability among the included studies, the inverse variance method and random-effects model were employed to calculate pooled effect sizes and their associated CI. SMD values were interpreted as trivial (SMD < 0.2), small (SMD 0.2 to <0.5), medium (SMD 0.5 to <0.8), and large (SMD ≥0.8) (Andrade, [2020](#)). Forest plot was used to present the result. Heterogeneity among studies was assessed using the  $I^2$  statistic and  $\chi^2$  test. A significance level of  $p < 0.05$  was adopted for the  $\chi^2$  test to ascertain the presence of heterogeneity (Higgins et al., [2022](#)).  $I^2$  values were then categorized as low ( $\leq 25\%$ ), moderate ( $\leq 50\%$ ), or high ( $\leq 75\%$ ) to provide insights into the degree of heterogeneity (Melsen et al., [2014](#)). Sensitivity analyses were conducted to evaluate the potential influence of outlier studies. Potential outliers were identified using Cook's distances, with a cutoff value larger than  $4/N$ , and studentized residuals with a cutoff value larger than 2 or -2. The impact of potential outlier studies was carefully assessed by comparing the overall results with and without their inclusion. Additionally, a sensitivity analysis was performed again by excluding one study at a time to examine the stability of the results. This analysis aimed to ensure the robustness of the findings and to identify any potential sources of variation or bias in the meta-analysis. All data synthesis was performed using the statistical software package, Review Manager 5.4.1 from the Cochrane Collaboration (Oxford, UK) and R 4.3.1.

#### Moderator analysis

Subgroup analysis and meta-regression were conducted for several variables that could potentially influence the observed effect sizes of primary outcome. Subgroup analysis was performed for age (adult and old), severity (mild [baseline PF ratio 201-300 or SF ratio 285-323], moderate [baseline PF ratio 100-200 or SF ratio <285], and severe [baseline PF ratio <100]), respiratory device (conventional oxygen therapy [nasal cannula, face mask, or non-rebreathing mask] and noninvasive ventilation [HFNC or CPAP]), room setting (ICU and Non ICU), BMI (non-obese [BMI <30] and obese [BMI ≥30]), study design (RCT, quasi-experimental, prospective cohort, retrospective cohort), time of admission to APP (<1 day, 1-3 days, >3 days), detail of position (only prone or combined positions), medication to maintain APP (used and not used), and total duration (<1 hour, 1-6 hours, >6 hours). The total duration was measured in hour per day for intubation and mortality rates, and per follow up time for PF ratio and SF ratio. Studies were categorized into subgroups

based on majority or mean reported data. Meta-regression was performed on sample size, mean severity (baseline PF ratio and SF ratio), mean age, mean BMI, time of admission to APP (day), and total duration (hour). For the PF ratio and SF ratio, subgroup analysis was also performed for position at follow-up (prone and supine) and follow-up time (after initiation and after finish), with meta-regression also focused on follow-up time after initiation (hour) and follow-up time after finish (hour). A result with p-value less than 0.05 indicated statistically significant. The meta-regression was performed using the statistical software package, Jamovi 2.3.28.

## Results

Of 3284 records identified, we retrieved 57 full-text articles and ultimately included 39 studies. The details of our study selection process were recorded in the PRISMA 2020 diagram at [Figure 1](#).

### Characteristics of studies

The year of publication of the included studies ranged from 2015 to 2022. Most of these studies (32/39 studies) were conducted in single-center settings, with Italy (Scaravilli et al., [2015](#); Coppo et al., [2020](#); Cammarota et al., [2021](#); Chiumello et al., [2021](#); Musso et al., [2022](#)) and the USA (Caputo, Strayer and Levitan, [2020](#); Thompson et al., [2020](#); Dubosh et al., [2021](#); Ehrmann et al., [2021](#); Fralick et al., [2022](#)) being the most frequently represented study locations. The study designs varied, consisting of 14 prospective cohort studies, 12 retrospective cohort studies, eight RCTs, and five quasi-experimental studies.

Most of the included studies were of good quality ([Supplementary file 2, Table S3](#)). However, a few RCTs were of poor quality (Gad, [2021](#); Jayakumar et al., [2021](#); Kharat et al., [2021](#); Taylor et al., [2021](#); Fralick et al., [2022](#)). The identified limitation of these RCTs included lack of blinding to participants and staff, inadequate allocation concealment, and differences in group characteristics. For the cohort studies, some studies lacked strategies to deal with incomplete follow-up. Detailed characteristics of each study are available in Table 1.

### Characteristics of participants

The sample sizes in the studies ranged from 15 (Scaravilli et al., [2015](#)) to 1121 patients (Ehrmann et al., [2021](#)), totaling 4797 non-intubated ARDS patients. The mean age of patients varied across the studies, ranging from 45.7 (Liu et al., [2021](#)) to 70.6 years (Wormser, Romanet and Philippart, [2021](#)), with an overall mean

age of 58.4 years. The majority of patients were male (59.6%), with a mean BMI ranging from 25.8 (Altinay et al., [2022](#); Koike et al., [2022](#)) to 32.1 kg/m<sup>2</sup> (Taylor et al., [2021](#)). Hypertension was the most prevalent comorbidity, present in 24 out of 39 studies. Out of the included studies, Ding et al. ([2020](#)) and Scaravilli et al. ([2015](#)) studies were the only ones that did not involve patients diagnosed with or suspected of Covid-19. During the course of each study, most patients received treatment outside the ICU (22/39 studies), including in the emergency department (ED), general wards, and intermediate care units (IMCU). The patients had an overall mean baseline ratio of arterial oxygen partial pressure to fractional inspired oxygen (PF ratio) and peripheral oxygen saturation to inspiratory oxygen fraction (SF ratio) of 146.8 and 209.4, respectively, indicating a moderate severity of ARDS. In terms of oxygen therapy, 22 of the 39 included studies reported that the patients used conventional oxygen therapy. For a more detailed overview of the patient characteristics in each study, please refer to [Table 1](#).

### Characteristics of intervention

Rather than being based solely on patient tolerance (Winearls et al., [2020](#); Cammarota et al., [2021](#); Chiumello et al., [2021](#); Dubosh et al., [2021](#); Khanum et al., [2021](#); Solverson, Weatherald and Parhar, [2021](#); Dos Santos Rocha et al., [2022](#); Fazzini, Fowler and Zolfaghari, [2022](#)), most studies (31/39 studies) implemented APP using well-defined procedures and protocols, including duration, frequency, and/or clear initiation and termination criteria to ensure consistent implementation across studies. The procedures included combined positions such as left lateral decubitus, right lateral decubitus, and upright sitting position (Caputo, Strayer and Levitan, [2020](#); Thompson et al., [2020](#); Winearls et al., [2020](#); Dubosh et al., [2021](#); Dueñas-Castell et al., [2021](#); Gad, [2021](#); Kharat et al., [2021](#); Misra, Pal and Pawar, [2021](#); Althunayyan et al., [2022](#); Kumar et al., [2022](#)), strategically designed to optimize patient outcomes and safety. Additionally, various strategies were employed to sustain APP, such as the administration of medication (mild sedation (Scaravilli et al., [2015](#); Cammarota et al., [2021](#); Koike et al., [2022](#); Musso et al., [2022](#)), analgesics (Cammarota et al., [2021](#); Chiumello et al., [2021](#); Koike et al., [2022](#); Lupieri et al., [2022](#); Musso et al., [2022](#)), neuromuscular blocking agents (Dos Santos Rocha et al., [2022](#)), or anxiolytics (Aisa et al., [2022](#); Oliveira et al., [2022](#)) and recreational means (music and additional pillows for comfort and support) (Thompson et al., [2020](#); Gad, [2021](#); Jayakumar et al., [2021](#); Silva Junior et al., [2021](#);

Sryma et al., [2021](#); Fralick et al., [2022](#); Ibarra-Estrada et al., [2022](#); Kumar et al., [2022](#); Lupieri et al., [2022](#); Musso et al., [2022](#); Othman, El-Menshaway and Mohamed, [2022](#)). Bed positions were also adjusted to maintain the prone position (Sryma et al., [2021](#)). The initiation of APP occurred from immediately upon admission (Caputo, Strayer and Levitan, [2020](#); Dubosh et al., [2021](#); Althunayyan et al., [2022](#)) to five days after admission (Liu et al., [2021](#)), with daily duration ranging from 0.16 (Taylor et al., [2021](#)) to 16 (Khanum et al., [2021](#)) hours and a maximum frequency of six sessions (Fazzini, Fowler and Zolfaghari, [2022](#)). Detailed APP characteristics in each study are available in [Supplementary file 2, Table S1](#).

#### Oxygenation status

There were eight oxygen parameters evaluated before and after APP, with PF ratio and SF ratio evaluated by 18 studies and 16 studies, respectively. The other six parameters were PaO<sub>2</sub> (13 studies), SpO<sub>2</sub> (19 studies), respiratory rate (25 studies), ROX index (6 studies), FiO<sub>2</sub> levels (7 studies), and SaO<sub>2</sub> (4 studies). Regarding the follow-up time, the majority of studies (26/39 studies) evaluated the oxygen parameters after the initiation of APP, ranging from 10 minutes (Coppo et al., [2020](#)) to three weeks (Koike et al., [2022](#)). Thus, most of these evaluations were performed while patients were still in the prone position. Only a subset of studies (16/39 studies) conducted follow-up assessments after APP had been finished, ranging from immediately after finishing APP (Dueñas-Castell et al., [2021](#); Misra, Pal and Pawar, [2021](#); Wormser, Romanet and Philippart, [2021](#); Althunayyan et al., [2022](#); Oliveira et al., [2022](#)) to 12 hours afterward (Elharrar et al., [2020](#)).

#### Intubation and mortality rates

Intubation and mortality rates were documented in over half of the encompassed studies, constituting 31 studies each. These event rates were not only examined during the entire hospital stay but also across various time intervals (such as upon admission, 24 hours, 48 hours, 28 days, and 90 days) and settings (including both the ward and ICU). In regard to these rates, the minimum observed value was consistent across both the APP and control groups, standing at 0% (Jagan et al., [2020](#); Taylor et al., [2021](#); Othman, El-Menshaway and Mohamed, [2022](#)). Nevertheless, the maximum rates displayed variations. Specifically, for the intubation rate, the highest rates in the APP group were recorded at 31.8% upon admission (Dubosh et al., [2021](#)), 26% within 24 hours (Caputo, Strayer and Levitan, [2020](#)), 36.5% within 48 hours (Oliveira et al., [2022](#)), 32.8% at 28 days

(Ehrmann et al., [2021](#)), and 48% for the entire hospitalization duration (Thompson et al., [2020](#)). In contrast, the control group's rates fluctuated, reaching 42.9% at 28 days (Ibarra-Estrada et al., [2022](#)) and 82.6% for the entire hospitalization period (Altinay et al., [2022](#)). It is noteworthy that these findings showcasing lower intubation rates within the APP group align with the mortality rates, which predominantly remained lower compared to the control group. Specifically, the APP group exhibited rates of 66.7% at 28 days (Bahloul et al., [2021](#)), 30.4% at 90 days (Fazzini, Fowler and Zolfaghari, [2022](#)), 7.4% in the ward (Koike et al., [2022](#)), 20% in the ICU (Scaravilli et al., [2015](#); Gad, [2021](#)), and 24.4% for the entire hospital stay (Oliveira et al., [2022](#)). Conversely, the control group's mortality rates were 70.5% at 28 days (Bahloul et al., [2021](#)), 0% in the ward (Koike et al., [2022](#)), 25.8% in the ICU (Koike et al., [2022](#)), and 37.4% for the entire hospitalization period (Perez-Nieto et al., [2022](#)).

#### Length of stay

Twenty studies provided information regarding the LOS for patients. Specifically, LOS was reported for patients within the ICU (7 studies), Covid-19 units (1 study), and encompassing the entire hospitalization period (17 studies). Notably, the LOS for the APP group within the ICU exhibited variability, ranging from 6.7±5.5 days (Altinay et al., [2022](#)) to 12.6±7.4 days (Silva Junior et al., [2021](#)). In the control group, the LOS ranged from 7±2 days (Gad, [2021](#)) to 11.5±6.9 days (Jayakumar et al., [2021](#)). This finding underscores the potential for a prolonged hospital stay for non-intubated ARDS patients who undergo the APP intervention compared to the control group. Moreover, considering the overall hospitalization period, the shortest and longest mean of LOS for the APP group were also exceeded those of the control group, 5.3±4.1 days (Taylor et al., [2021](#)) and 28±5 days (Gad, [2021](#)) in comparison to 5±3.8 days (Fralick et al., [2022](#)) and 26±5 days (Gad, [2021](#)), respectively. Then, the mean LOS within Covid-19 unit was exclusively reported for the APP group, with a value of 6±3.1 days (Khanum et al., [2021](#)).

#### Adverse events

Among the 24 studies that examined the occurrence of adverse events, four studies reported no adverse events in the APP group (Coppo et al., [2020](#); Winearls et al., [2020](#); Fazzini, Fowler and Zolfaghari, [2022](#); Lupieri et al., [2022](#)). In total, 27 adverse events were identified across the studies. While some studies did not specify the precise number of events, pain (45 events) and line dislodgment (46 events) emerged as the most prevalent

events. Then, among the 27 adverse events, pain, discomfort, as well as nausea and vomiting emerged as the most frequently documented adverse events (8 studies each). Additionally, it is noteworthy that certain adverse events such as device removal (Scaravilli et al., 2015; Solverson, Weatherald and Parhar, 2021), hemodynamic decompensation (Solverson, Weatherald and Parhar, 2021; Sryma et al., 2021; Kumar et al., 2022), pressure ulcers (Jayakumar et al., 2021; Solverson, Weatherald and Parhar, 2021; Taylor et al., 2021; Oliveira et al., 2022), nerve compression (Scaravilli et al., 2015; Jayakumar et al., 2021), pneumothorax (Musso et al., 2022), pressure neuropathies (Scaravilli et al., 2015), and emergent intubation (Taylor et al., 2021) were recognized as potential risks but were not manifest during the course of the studies. A detailed breakdown of the adverse events is available in [Supplementary Material 2, Table S2](#).

#### Meta-analysis for primary outcomes

Our comprehensive analysis encompassed 17 studies with 22 subsets of data for the PF ratio, 14 studies with 26 subsets of data for the SF ratio, 14 studies with 14 subsets of data for the intubation rate, and 13 studies with 14 subsets of data for the mortality rate. This refined selection of studies followed the exclusion of one study (Silva Junior et al., 2021) for the PF ratio due to being identified as an outlier, and two studies (Jagan et al., 2020; Taylor et al., 2021) for the SF ratio due to incomplete data.

In the initial round of our iterative sensitivity analyses, certain data subsets were flagged as potential outliers. Specifically, a subset of Ehrmann et al.'s (2021) study was identified as a potential outlier for the SF ratio ([Supplementary file 2, Table S5](#)) and intubation rate ([Supplementary file 2, Table S6](#)). Additionally, subsets from the studies conducted by Aisa et al. (2022), Liu et al. (2021), and Silva Junior et al. (2021) were flagged as potential outliers for the PF ratio ([Supplementary file 2, Table S4](#)). Further examination revealed that, except for the intubation rate, these identified subsets data were found to substantially inflate the overall effect size, reduce precision, and contribute to the observed heterogeneity. Consequently, these subsets were excluded from the analysis to enhance the overall reliability of our results. In the subsequent round, even though several other studies emerged as potential outliers for both PF ratio and SF ratio, their exclusion did not substantially affect the overall effect size and heterogeneity ([Supplementary file 2, Table S8](#)).

Our meta-analysis demonstrated a medium improvement in oxygenation levels, with a SMD of 0.70

(95% CI=0.51, 0.88) for PF ratio ([Figure 2](#)) and 0.76 (95% CI=0.51, 1.01) for SF ratio ([Figure 3](#)). Moreover, the analysis revealed a RR of 0.62 (95% CI=0.49, 0.78) for intubation rate ([Figure 4](#)) and 0.66 (95% CI=0.51, 0.85) for mortality rate ([Figure 5](#)). The robustness of these findings was reinforced by the results of the leave-one-out sensitivity analysis, which revealed that the effect size ranged from 0.65 to 0.73 for the PF ratio, 0.71 to 0.79 for the SF ratio, 0.57 to 0.65 for the intubation rate, and 0.61 to 0.71 for the mortality rate. As a result, we confidently confirm that the positive effect of APP on oxygenation, intubation rate, and mortality in non-intubated ARDS patients is consistent and reliable.

However, it is important to note that our analysis revealed significant heterogeneity across the included studies, with  $I^2$  values of 72% ( $\chi^2$  [21] =76.33,  $p<0.001$ ) for PF ratio, 93% ( $\chi^2$  [25] =333.4,  $p<0.001$ ) for SF ratio, 56% ( $\chi^2$  [13] =26.98,  $p=0.008$ ) for intubation rate, and 54% ( $\chi^2$  [13] = 29.13,  $p=0.004$ ) for mortality rate, suggesting high and considerable variability in the effect sizes. Despite this heterogeneity, the Egger test and funnel plot, which assess publication bias, showed no evidence of bias for the PF ratio (Egger test value = 1.291,  $p=0.197$ ), SF ratio (Egger test value = -0.442,  $p=0.659$ ), intubation rate (Egger test value = -0.589,  $p=0.555$ ), and mortality rate (Egger test value = -0.542,  $p=0.587$ ). Funnel plots are available in [Supplementary file 2, Figure S1-S4](#).

#### Meta-analysis for secondary outcomes

The respiratory rate showed a substantial reduction with an SMD of -0.82 (95% CI=-1.32 to -0.41), indicating a notable improvement in the oxygenation status ([Supplementary file 2, Figure S5](#)). PaO<sub>2</sub> demonstrated a moderate improvement with an SMD of 0.57 (95% CI=0.40 to 0.75) ([Supplementary file 2, Figure S6](#)), while SpO<sub>2</sub> exhibited a large improvement with an SMD of 0.97 (95% CI=0.71, 1.24), indicating considerable enhancement in oxygen saturation levels ([Supplementary file 2, Figure S7](#)). Similarly, SaO<sub>2</sub> showed a significant improvement with an SMD of 0.90 (95% CI=0.34, 1.46), further supporting the positive effect of APP on oxygenation ([Supplementary file 2, Figure S8](#)). Conversely, FiO<sub>2</sub> presented a moderate reduction with an SMD of -0.70 (95% CI=-1.20, -0.20), indicating a decrease in the fraction of inspired oxygen required by patients ([Supplementary file 2, Figure S9](#)). The ROX index, a reliable indicator of oxygenation, demonstrated a large improvement with an SMD of 1.62 (95% CI=0.63, 2.61), further corroborating the overall positive impact of APP on oxygenation status ([Supplementary file 2, Figure S10](#)). However, it is

essential to note that the analyses showed considerable heterogeneity for all parameters, as evidenced by the high  $I^2$  values (ranging from 63% to 99%). These results highlight the significant variability in the effect sizes across the included studies.

Regarding the LOS and adverse events, our analysis did not reveal a significant impact of APP on both of these outcomes. The RR for LOS was -0.09 (95% CI=-0.26, 0.08), suggesting no substantial difference between the APP group and control group in terms of patient duration to stay ([Supplementary file 2, Figure S11](#)). Similarly, the RR for adverse events was 0.98 (95% CI=0.73, 1.32), indicating that the occurrence of adverse events did not significantly differ between the two groups ([Supplementary file 2, Figure S12](#)). These findings were associated with moderate to high heterogeneity, with  $I^2$  values of 62% for LOS and 39% for adverse events.

#### Moderator analysis

Among the 12 variables assessed, it is noteworthy that only the age, room setting, BMI, and time of admission to APP were not found to be associated with the effect size of the primary outcomes.

The type of respiratory device used ( $p=0.02$ ), the position at follow-up ( $p=0.02$ ), and the follow-up time ( $p=0.03$ ) emerged as significant contributors to the PF ratio. Patients receiving noninvasive ventilation showed a more significant improvement in oxygenation (SMD=0.82, 95% CI=0.59 to 1.05) compared to those on conventional oxygen therapy (SMD=0.43, 95% CI=0.20 to 0.67). Moreover, patients assessed in the prone position exhibited the most pronounced effect size (SMD=0.95, 95% CI=0.70 to 1.20), compared to those assessed in the supine position (SMD=0.56, 95% CI=0.35 to 0.76). Additionally, patients assessed shortly after initiation of APP demonstrated a larger improvement in the PF ratio (SMD=0.87, 95% CI=0.65 to 1.09) compared to those assessed after the completion of APP (SMD=0.50, 95% CI=0.25 to 0.76) ([Table 2](#)).

For the SF ratio, two variables were identified as significant influencers of SF ratio post-APP: the severity of ARDS ( $p=0.001$ ) and the total duration per follow-up ( $p=0.004$ ). Patients with moderate ARDS (SF ratio <285) displayed a more substantial improvement in oxygenation (SMD=0.82, 95% CI=0.55 to 1.08) compared to those with mild ARDS (SF ratio 285-323) (SMD=0.24, 95% CI=0.02 to 0.46). Furthermore, the patients who underwent APP for more than six hours per follow-up had a significantly greater improvement in the SF ratio (SMD=1.15, 95% CI=0.77 to 1.53) compared to those with shorter duration ([Table 2](#)).

Specific to the intubation rate, significant differences in effect sizes were observed in the subgroup analysis of study design ( $p=0.001$ ), detail of position used ( $p=0.04$ ), and the use of medication assistance ( $p=0.03$ ). The quasi-experimental study subgroup (RR=0.33, 95% CI=0.17, 0.62) displayed the lowest risk of intubation in patient using APP, compared to the RCT subgroup (RR=0.79, 95% CI=0.69, 0.90), retrospective cohort study subgroup (RR=0.46, 95% CI=0.31, 0.67), and even prospective study subgroup, which did not show significant association. Then, patients using only the prone position in their protocol exhibited a lower intubation risk (RR=0.55, 95% CI=0.47, 0.64) compared to those using combined positions (RR=2.44, 95% CI=0.59, 10.04), which was not statistically significant. Moreover, patients receiving any medication to maintain APP were associated with a lower risk of intubation (RR=0.31, 95% CI=0.17, 0.59) compared to those without medication (RR=0.67, 95% CI=0.54, 0.84).

Moving to the analysis of the mortality rate, the effect size was significantly difference in the subgroup analysis of the respiratory device used ( $p=0.04$ ) and study design ( $p=0.001$ ). Specifically, within the conventional oxygen therapy subgroup, APP was associated with a substantial reduction in the risk of mortality (RR=0.54, 95% CI=0.44, 0.66) compared to noninvasive ventilation (RR=0.78, 95% CI=0.58, 1.05). Additionally, the subgroup of quasi-experimental studies (RR=0.33, 95% CI=0.18, 0.58) and retrospective cohort studies (RR=0.51, 95% CI=0.35, 0.76) exhibited a more pronounced reduction in mortality risk associated with APP compared to other study designs, which did not show significant association.

In our meta-regression analysis for the PF ratio, intubation rate, and mortality, none of the examined potential moderator variables, including sample size, mean severity, mean age, mean BMI, total duration, follow-up time after initiation, and follow-up time after finish, were found to be significantly associated with the effect size of APP in non-intubated ARDS patients ( $p>0.05$ ). Additionally, due to the inclusion of fewer than 10 studies, certain variables were not estimable for the PF ratio, mortality rate, and intubation rate. On the other hand, in the case of the SF ratio, our meta-regression revealed that mean severity (SMD=-0.004, 95% CI=-0.009 to -0.001), mean body mass index (SMD=-0.228, 95% CI=-0.414 to -0.041), total duration per follow-up (SMD=0.016, 95% CI=0.005 to 0.028), and follow-up time after initiation (SMD=0.003, 95% CI=0.002 to 0.005) had a significant impact on the effectiveness of APP ( $p<0.05$ ). Patients with more severe

ARDS, lower body mass index, longer total duration per follow-up, and longer follow-up time after initiation showed a larger improvement in SF ratio with the implementation of APP. The other potential moderator variables did not show a significant association with the effect size of APP on SF ratio ( $p>0.05$ ) (Table 3).

## Discussions

This comprehensive meta-analysis amalgamated findings from a diverse array of studies, encompassing 13 experimental studies and 26 cohort studies, collectively involving a substantial cohort of 4,797 non-intubated ARDS patients, predominantly afflicted by Covid-19. The culmination of these efforts yielded robust evidence supporting the substantial efficacy of the prone position in enhancing oxygenation status among this patient population. Notably, the implementation of APP also exerted a considerable impact in reducing both intubation and mortality rates in comparison to the control groups.

In line with the consistent improvement in oxygenation observed in previous studies (Aeen et al., 2021; Fazzini et al., 2021; Reddy et al., 2021; Ashra et al., 2022; Peng et al., 2023), our analysis unveiled a broader positive effect across additional parameters, including PaO<sub>2</sub>, SpO<sub>2</sub>, SaO<sub>2</sub>, ROX index, respiratory rate, and FiO<sub>2</sub>. Moreover, our further investigations highlighted that these enhancements were significantly influenced by various patient and intervention characteristics. The augmentation of the SF ratio was particularly pronounced in patients who exhibited moderate to severe ARDS, non-obese, and underwent APP for more than six hours before evaluation. Concerning duration, the included studies consistently maintained or repeated the APP until the follow-up time, contributing to the sustained improvement in oxygenation over the longer follow-up periods. Interestingly, this finding contrasts with the study by Ashra et al. (2022), which reported a significant positive effect size on obese patients, while also aligning with the study of Fazzini et al. (2021), who noted improvement after more than four hours of APP.

Our findings suggest that the limited impact of APP on higher BMI could be attributed to potential challenges in administering the intervention effectively. Higher BMI patients might require additional adjustments or personalized approaches during prone position (Guérin et al., 2013). Furthermore, Ashra et al. (2022) did not exclusively focus on non-intubated patients and had smaller sample size. Further well-

controlled investigations are required to clarify this relationship.

As for the PF ratio, it exhibited more substantial improvements in patients who were subjected to noninvasive ventilation and were assessed while in the prone position. A similar trend was also evident in the context of the SF ratio when considering the influence of respiratory devices, although the subgroup differences in this case did not reach statistical significance. This finding aligns with Chilkoti et al. (2022) who observed that noninvasive ventilation during PP improves oxygenation without significant side effects and has a feasibility ranging from 36-100%.

Moreover, both the SF ratio and PF ratio showed more noticeable improvements when evaluated from the initiation of the intervention, during its administration, as opposed to post-intervention completion. This suggests that the immediate effects of APP may be more substantial during the intervention itself, with a potential decline in the immediate improvements after the completion of prone positioning. Some studies have also posited that this could be attributed to lung recruitment dynamics and time-dependent effects (Coppo et al., 2020; Jayakumar et al., 2021). Furthermore, considering factors such as the influence of other therapies, patient-specific characteristics, or even the possibility of recurrence of lung collapse, further investigation is needed to validate and comprehend the underlying mechanisms responsible for these observed associations.

The distinct physiological and clinical insights captured by the SF ratio and PF ratio underscore their significance in contributing valuable inputs to the decision-making process. This not only enriches our understanding of their respective influencing factors but also holds implications for tailoring patient care and optimizing treatment protocols in non-intubated ARDS cases. The results of this meta-analysis further consolidate the evolving body of evidence, affirming the vital role of the prone position and its potential to reshape the management landscape for critically ill patients, particularly those grappling with Covid-19-related respiratory challenges.

In the context of intubation risk reduction, the insight provided by Peng et al. (2023) highlights that the observed reduction might not reach statistically significant within observational studies. Interestingly, our analysis introduces a nuanced perspective, revealing that retrospective cohort studies exhibit a more pronounced reduction in intubation risk, surpassing RCTs and being second only to quasi-experimental

studies. This intriguing trend also extends to mortality risk, diverging from previous study outcomes that reported no significant reduction. This revelation underscores the potential influences of study design on the efficacy of APP, suggesting that real-world clinical scenarios captured by cohort studies might offer unique insight into the impact of this intervention.

Upon delving into the nuanced examination of intubation and mortality rates, although not all analyzed variables exhibited statistically significant subgroup differences, certain patient characteristics emerged as significant determinants. Notably, patients under the age of 60, with moderate severity of ARDS, non-obese, receiving conventional oxygen therapy, and treated outside the ICU experienced significantly lower risks of intubation and mortality. These discernible patient attributes underscore the potential benefits of implementing the prone position as an early intervention in the management of non-intubated ARDS, particularly when the patient's lung condition has not deteriorated significantly. Furthermore, these findings underscore the importance of timely and strategic use of the prone position, especially in cases where the patient's respiratory status is relatively stable.

For the characteristics of the APP itself, a noteworthy observation emerges: an intervention protocol centered exclusively on the prone position, omitting other positional changes, and not relying on medication assistance, but administered for a duration of more than six hours per day, resulted in a significant reduction in both intubation and mortality risks. While these findings necessitate further corroboration through additional studies, they underscore the inherent potency of the prone position as a primary and self-sufficient intervention strategy. This emphasizes the pivotal significance of upholding consistent and dedicated prone positioning for extended durations to harness its maximum potential and achieve improved outcomes.

Moreover, concerning intubation rates, a lower risk of intubation was also observed in patients who underwent APP initiation within one day of admission, reinforcing the notion of implementing APP as early as feasible. Additionally, it's noteworthy that a lower risk of events was also evident in patients who utilized medication to maintain the prone position. However, the confidence interval of the effect size was wide, and the limited number of studies may introduce some degree of uncertainty, particularly regarding the use of medication in conjunction with the prone position. Further research is warranted to provide a more

comprehensive understanding of the potential benefits and limitations associated with this aspect of intervention.

Notably, no significant variation in the LOS was evident between the APP and control groups, whether measured in the ICU or across the entire hospital stay. This could potentially be attributed to the limited power in assessing LOS as a secondary outcome in the included studies. Therefore, a more detailed and dedicated investigation is necessary to elucidate this finding comprehensively. Nevertheless, our findings provide reassurance regarding the safety of APP, as the analysis indicates that its implementation did not lead to a significant increase in the risk of adverse events. Notably, no serious adverse events like hemodynamic decompensation or emergent intubation were reported during the process. Among the encountered adverse events, the most frequent were pain and line dislodgment.

While our analysis yields promising outcomes and does not solely rely on sample size, as studies with smaller sample sizes can provide reliable effect size estimates, we acknowledge the limitation that our included RCTs were limited in number and exhibited poor quality. Consistent with the finding from Cruz et al. (2022), which highlighted a high risk of bias, particularly the performance bias, in all of the included RCTs. Although the nature of APP might inherently preclude blinding in the study, measures to minimize bias, especially toward the assessors, such as concealing participant allocation, should be considered. Rigorous, well-designed trials remain essential cornerstones of evidence-based practice, providing a stronger foundation for understanding the true impact of APP. Therefore, the imperative for more robust and well-designed studies is clear, both to bolster the evidence base and to address potential biases in assessing the effectiveness of APP in non-intubated ARDS patients. Future research should prioritize improved study designs, including blinding measures, to enhance the validity and reliability of findings in investigating APP as an oxygenation strategy for non-intubated ARDS patients.

Our methodology approach, which exclusively focused on cohort and experimental designs yielded in a more extensive patient cohort, encompassing cases beyond those affected by Covid-19, even though the representation was limited to before pandemic. Additionally, the study successfully incorporated feedback obtained from previous research efforts, especially in facilitating advanced analysis of primary



outcomes, which encompassed various moderating factors and summarized a comprehensive protocol (Aeen et al., 2021; Li et al., 2022; Peng et al., 2023; Wang et al., 2023). As a result, we believe this study can significantly enhance the depth of perspectives on the efficacy of prone positioning in non-intubated ARDS patients and provide a valuable contribution to inform the clinical decision-making process.

However, this study is not without its limitations, which warrant careful consideration. First, a major limitation in analyzing the outcomes is the uneven distribution of experimental and observational studies, and especially for the oxygenation parameter is the reliance on single-arm data. While observational studies are valuable in providing real-world insights, the lack of control groups in some included studies may introduce bias and limit the ability to establish direct cause-and-effect relationships. Some of the included RCTs were of poor quality, designed primarily for feasibility assessment or as pilot studies, which can introduce bias and affect the overall robustness of the findings. Second, several data had to be derived using statistical formulas and extracted from the graphs, potentially impacting the accuracy and precision of the results. Lastly, several subgroups had a small number of studies, and the presence of heterogeneity across studies remains a challenge. Although sensitivity analyses were conducted to address this issue, the influence of unmeasured confounders and the potential for residual heterogeneity should be acknowledged.

The limited number of experimental studies and the potential biases in some included studies highlight the need for rigorous and controlled trials to establish a more solid evidence base for the efficacy of APP in non-intubated ARDS patients. Healthcare providers can utilize our findings to develop well-structured APP protocol. This protocol should involve early initiation for non-intubated ARDS patients under 60-year-old, non-obese, with moderate severity, using conventional oxygen therapy, and treated outside the ICU. It should also incorporate APP for over six hour per day, avoiding combined position and medication assistance.

## Conclusion

Our study provides evidence that supports the safety and effectiveness of the prone position in improving oxygen levels, while also reducing intubation and mortality rates among non-intubated ARDS patients. However, we did not find significant benefits in reducing LOS. To make APP more effective, factors like the patient's severity, the type of respiratory device, BMI,

detail of position, use of medication assistance, total duration, time to follow-up, and position at follow-up should be considered. This study underscores the importance of a holistic approach in implementing prone positioning. While our findings are robust, further research and trials are needed to refine prone positioning protocols for non-intubated ARDS patients.

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## Competing interests

The authors declare no conflict of interest that could have influenced the work described in this paper

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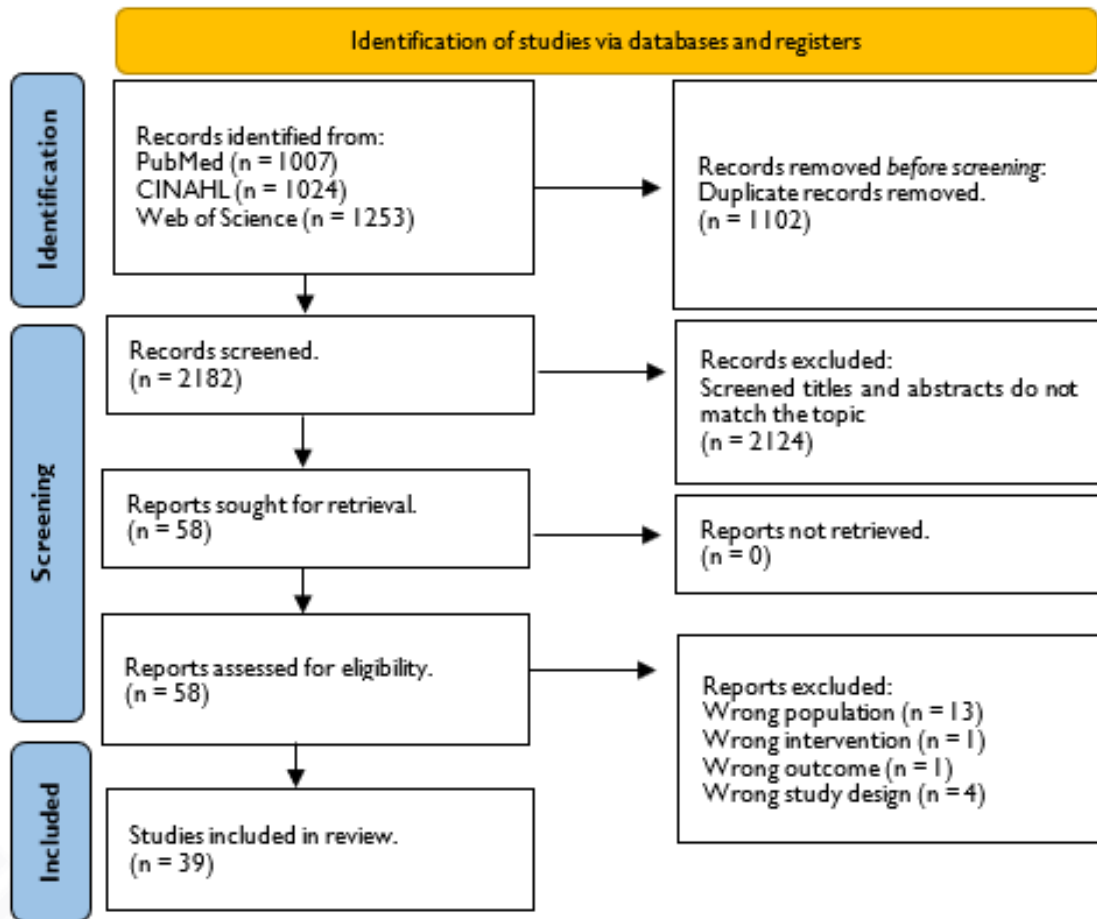


Figure 1. Process of study selection

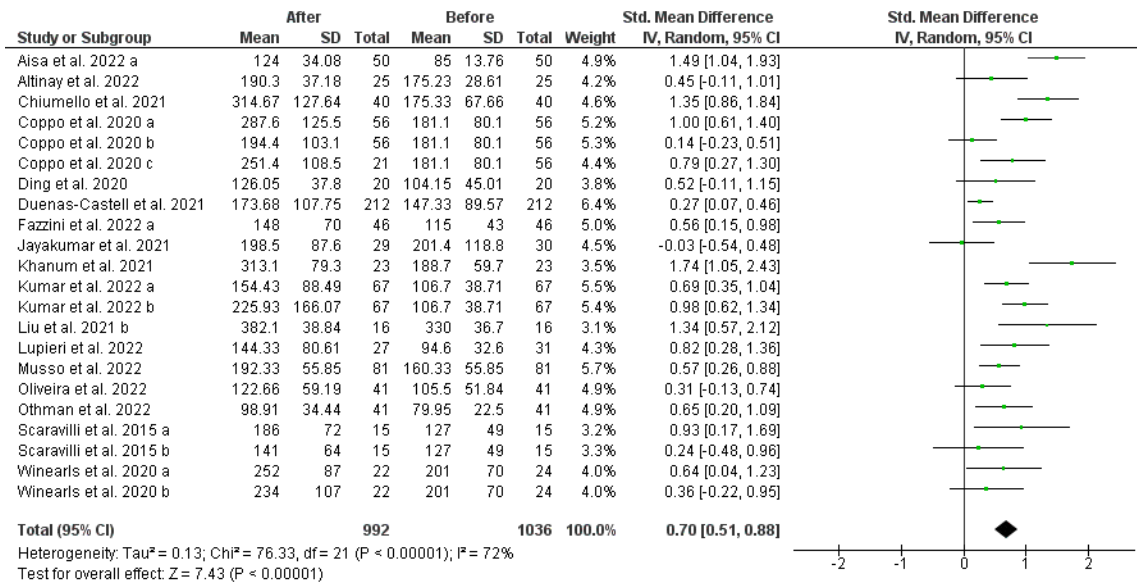


Figure 2. Forest plot of the effect of awake prone position on PF ratio

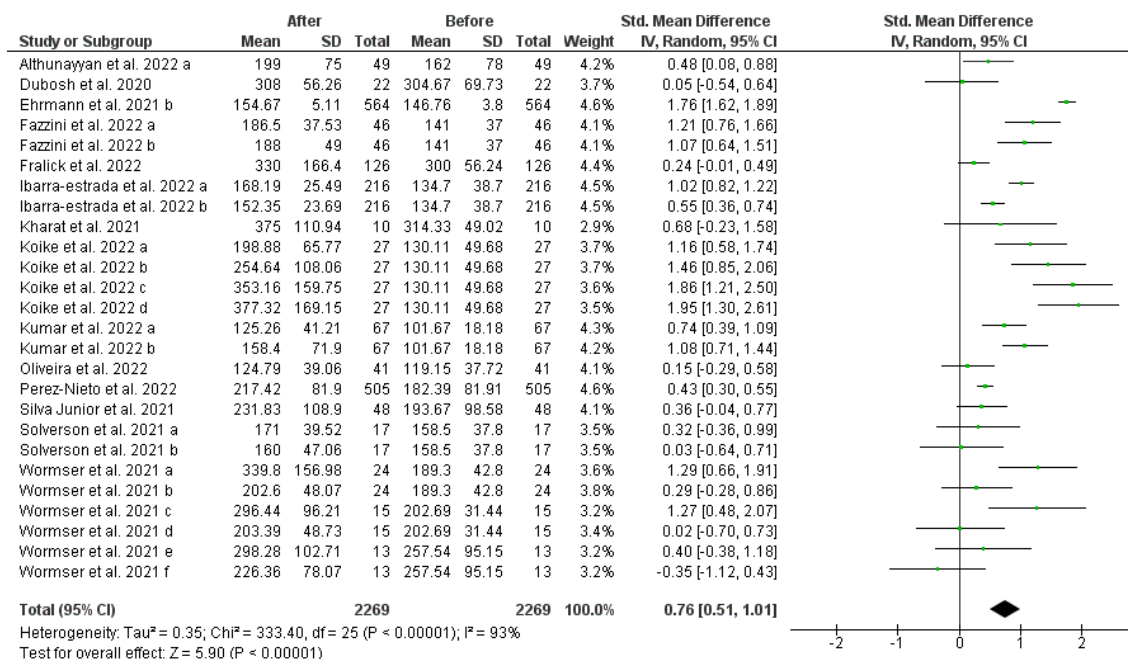


Figure 3. Forest plot of the effect of awake prone position on SF ratio

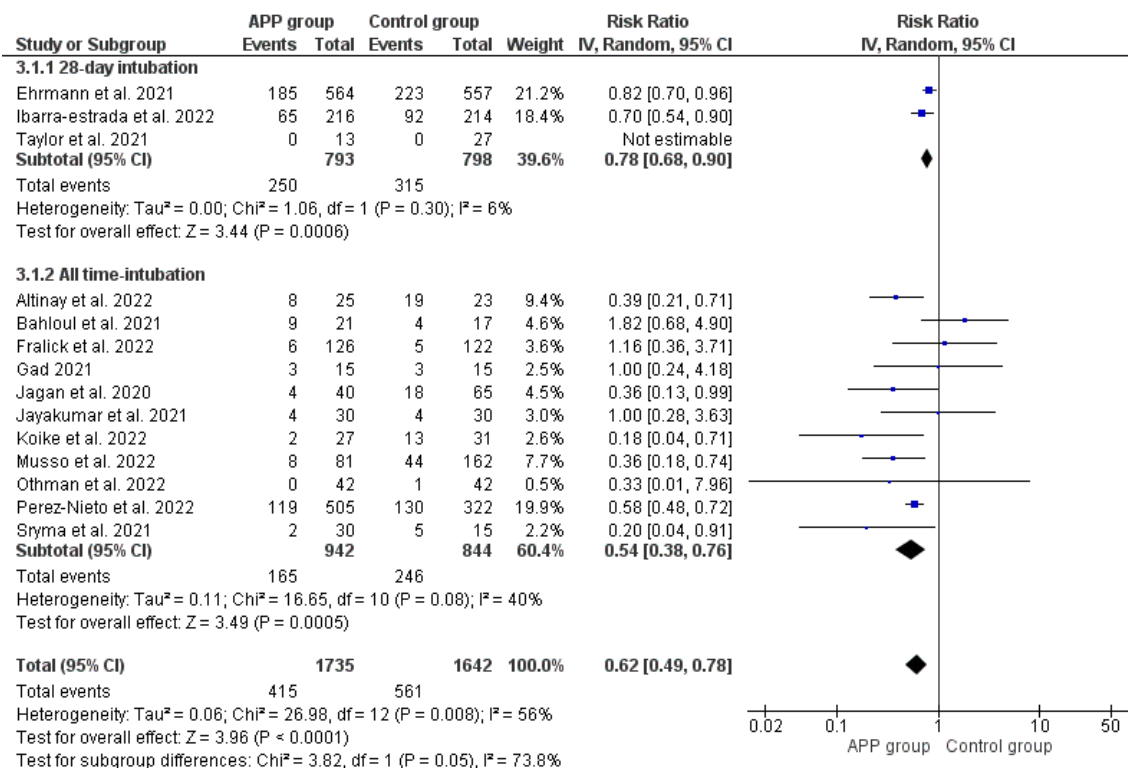


Figure 4. Forest plot of the effect of awake prone position on intubation rate

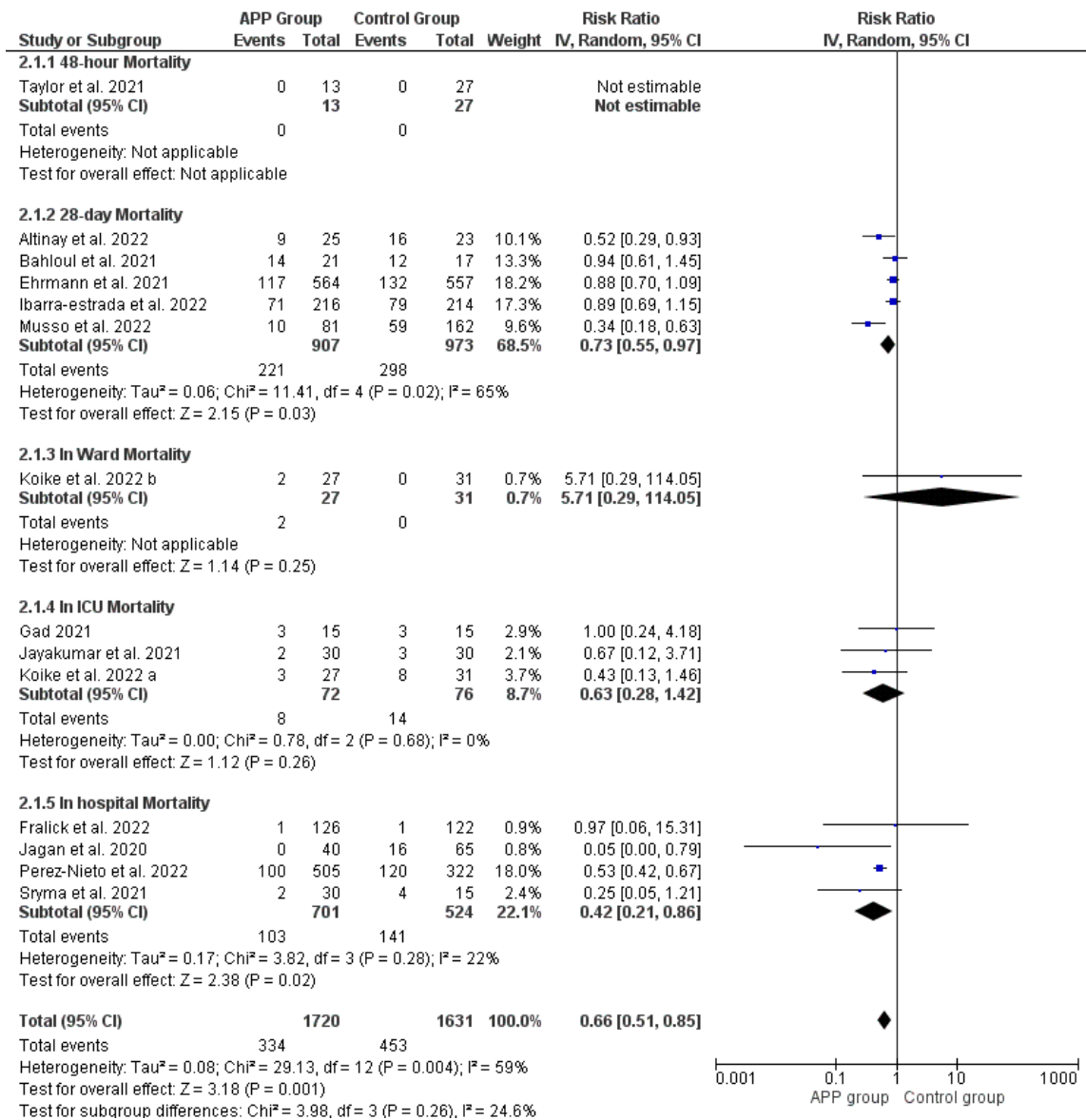


Figure 5. Forest plot of the effect of awake prone position on mortality rate

Table 1. Detail of included studies

Authors/ Year	Location	Design	Sample	N	Gender (Male, %)	Mean age (years)	BMI (kg/m <sup>2</sup> ) <sup>a</sup>	Mean baseline PF ratio/SF ratio	Comorbidities	Respiratory device	Setting	Actual duration and/or frequency of PP <sup>a</sup>	Oxygenation Parameters	Time to follow up (position)
<a href="#">Aisa et al./2022</a>	Single center, Drogheda, Ireland	Prospective cohort	Covid-19 patients with SpO <sub>2</sub> <90% or PaO <sub>2</sub> <10 kPa requiring any oxygen support	50	23 (46%)	56.2±11.9	29.5±3.7	PF ratio 85±13.7	<b>Hypertension;</b> COPD; CKD; Asthma; Autoimmune disease	HFNC, NIV	Ward	<b>Duration:</b> 8.5 ± 3.13 hours/day	PF ratio; PaO <sub>2</sub> ; SpO <sub>2</sub> ; FiO <sub>2</sub> ; RR	30 mins after initiated (prone); 1 hour after initiated (prone)
<a href="#">Althunayyan et al./2022</a>	Single center, Riyadh, Saudi Arabia	Prospective cohort	Covid-19 patients with SpO <sub>2</sub> <94%, RR >30, and accessory muscle usage	49	40 (81.6%)	53.4±11.3	Obese excluded	SF ratio 162±78	Hypertension; <b>Diabetes;</b> Sickle cell anemia; Hypothyroidism; Asthma; Parkinson; Ischemic heart disease	<b>Face mask,</b> NRM, nasal cannula	ED	<b>Duration:</b> 4 hours/day	SF ratio; SpO <sub>2</sub> ; RR	After finished (supine)
<a href="#">Altinay et al./2022</a>	Single center, Istanbul, Turkey	Retrospective cohort	Covid-19 patients with PF ratio <300 despite using NRM 6 L/min	48 PP: 25 CG: 23	20 (41.7%) PP: 11 (44%) CG: 9 (39.1%)	67.3±11.7 PP: 62.4±10.9 CG: 72.6±10.1	25.8±2.9 PP: 25.1±2.5 CG: 26.6±3.1	PF ratio: 177.6±36.1 PP: 175.2±28.6 CG: 180.2±42.6	<b>Hypertension;</b> Diabetes; CAD; COPD; CHF; CKD; Cancer; Other	NRM	ICU	<b>Duration:</b> 12 hours/day	PF ratio; PaO <sub>2</sub> ; SpO <sub>2</sub>	1 day after initiated (supine)
<a href="#">Bahloul et al./2021</a>	Single center, Sfax, Tunisia	Prospective cohort	Covid-19 patients with SpO <sub>2</sub> <92% despite using face mask or HFNC	38 PP: 21 CG: 17	PP: 16 (76%) CG: NR	60.8±10.7 PP: 61.4±9.5 CG: 60±12	Obese 14 (36.8%) PP: 10 (48%) CG: 4 (24%)	PF ratio 84.4±30.8 PP: 88±37 CG: 80±20	<b>Hypertension;</b> Diabetes; COPD	Face mask, <b>HFNC</b>	ICU	<b>Duration:</b> NR	SpO <sub>2</sub> ; RR	1 hour after initiated (prone)
<a href="#">Cammarota et al./2021</a>	Single center, Italy	Prospective cohort	Covid-19 patients with PF ratio <200 mmHg	20	16 (80%)	63.7±14.4	28.3±4	NR	<b>Hypertension;</b> Other; Cancer; Diabetes; Dyslipidemia; CKD; Cardiovascular disease;	NIV	ICU	<b>Duration:</b> NR	SpO <sub>2</sub> ; RR	1 hour after initiated (prone)
<a href="#">Caputo, Strayer and Levitan /2020</a>	Single center, New York, USA	Prospective cohort	Covid-19 patients with SpO <sub>2</sub> <90% and without resolution (SpO <sub>2</sub> >93%) despite any oxygen support	50	30 (60%)	59±13.7	NR	NR	NR	Nasal cannula, NRM	ED	<b>Duration:</b> NR	SpO <sub>2</sub>	5 mins after initiated (prone)
<a href="#">Chiumello et al./2021</a>	Single center, Milan, Italy	Quasi-experimental	Covid-19 patients with PF ratio <300mmHg and PEEP ≥5 cmH <sub>2</sub> O	40	26 (65%)	60±11.5	27.7±4.6	PF ratio 175.3±67.7	<b>Hypertension;</b> Diabetes; Tumor; Immunosuppression	Helmet CPAP	IMCU	<b>Duration:</b> 3 hours/day	PF ratio; PaO <sub>2</sub> ; RR	3 hours after initiated (prone)
<a href="#">Coppo et al./2020</a>	Single center, Monza, Italy	Prospective cohort	Covid-19 patients, required any oxygen support	56	44 (79%)	57.4±7.4	27.5±3.7	PF ratio 181.1±80.1	<b>Hypertension;</b> Myocardial infarction; Vascular disease; Chronic bronchopulmonary disease; Gastric or liver disease; Diabetes; Cancer	<b>Helmet CPAP,</b> NRM, venturi mask	Ward, ED, IMCU	<b>Duration:</b> 3.33±0.76 hours/day	PF ratio; PaO <sub>2</sub> ; SpO <sub>2</sub> ; SaO <sub>2</sub> ; FiO <sub>2</sub> ; RR	10 mins after initiated (prone); 1 hour after finished (supine); 5 days after initiated (supine)



Authors/ Year	Location	Design	Sample	N	Gender (Male, %)	Mean age (years)	BMI (kg/m <sup>2</sup> ) <sup>a</sup>	Mean baseline PF ratio/SF ratio	Comorbidities	Respiratory device	Setting	Actual duration and/or frequency of PP <sup>a</sup>	Oxygenation Parameters	Time to follow up (position)
<a href="#">Ding et al./2020</a>	Multicenter, PR China	Prospective cohort	ARDS patients on PEEP ≥ 5 cmH <sub>2</sub> O and FiO <sub>2</sub> 0.5 with PF ratio <200 mmHg	20	13 (65%)	50±10	NR	PF ratio 104.2±45	NR	HFNC, NIV	ICU	<b>Duration:</b> 1.84±1.07 hours/session <b>Frequency:</b> 2.04±1.22 session/day <b>Given for:</b> 3.32±3.09 days	PF ratio	30 mins after initiated (prone)
<a href="#">Dubosh et al./2021</a>	Single center, Massachusetts, USA	Prospective cohort	Covid-19 patients dependent on nasal cannula or NRM to maintain SpO <sub>2</sub> >93%	22	14 (64%)	58.7±11.9	32±4.6	SF ratio 304.7±69.7	<b>Hypertension;</b> Diabetes; CAD; Cancer; COPD; Arrhythmia; Hyperlipidemia; Renal disease; Thyroid disease; Asthma	Nasal cannula, NRM	ED	<b>Duration:</b> 111±74.49 minutes	SF ratio; SpO <sub>2</sub> ; FiO <sub>2</sub> ; RR	30 mins after initiated (prone)
<a href="#">Duenas-Castell et al./2021</a>	Single center, Cartagena, Colombia	Retrospective cohort	AHRF and suspected Covid-19 patients with PF ratio <300 mmHg	212	142 (67%)	61.6±18.06	Obese: 11 (5.2%)	PF ratio 147.3±89.6	<b>Hypertension;</b> Diabetes; Asthma; COPD; CKD	Nasal cannula, face mask	ED, ward, ICU	<b>Duration:</b> NR <b>Given for:</b> 1.73±1.64 days	PF ratio; SpO <sub>2</sub> ; RR	After finished (supine)
<a href="#">Ehrmann et al./2021</a>	Multicenter, Canada; France; Ireland; Mexico; USA; Spain	RCT	Covid-19 patients on HFNC and SF ratio ≤315	1121 PP: 564 CG: 557	746 (66.5%) PP: 380 (67%) CG: 366 (66%)	61.1±13.7 PP: 61.5±13.3 CG: 60.7±14.0	29.7±4.6 PP: 29.7±4.6 CG: 29.7±4.6	SF ratio 148.2±43.5 PP: 146.7±3.8 CG: 148.6±43.1	Chronic heart disease; COPD; CKD; Severe liver disease; <b>Diabetes;</b> Cancer	HFNC	Ward, ICU, IMCU, ED	<b>Duration:</b> 5.6±4.4 hours/day; 2.73±2.08 hours/session <b>Given for:</b> 14 days	SF ratio; RR; ROX index	30 min to 1 hour after initiated (prone); 30 min to 1 hour after finished (supine)
<a href="#">Elharrar et al./2020</a>	Single center, France	Quasi-experimental	Covid-19 and hypoxic respiratory failure patients required any oxygen support	24	16 (67%)	66.1±10.2	Obese: 5 (23%)	NR	Hypertension	<b>Nasal cannula,</b> HFNC	Outside ICU	<b>Duration:</b> >3 hours/day	PaO <sub>2</sub>	1-2 hours after initiated (prone); 6-12 hours after finished (supine)
<a href="#">Fazzini, Fowler and Zolfagh/2022</a>	Single center, London, UK	Prospective cohort	Covid-19 patients on face mask, HFNC or CPAP	46	NR	53.5±42.2	Obese excluded	PF ratio 115±43	NR	<b>HFNC,</b> face mask	Ward	<b>Duration:</b> 6.3±9.9 hours/session <b>Frequency:</b> 1-6 session/day	PF ratio; SF ratio; RR	During (prone); 1-4 hours after finished (supine)
<a href="#">Fralick et al./2022</a>	Multicenter, Canada, USA	RCT	Highly suspected or confirmed Covid-19 patients required any oxygen support with FiO <sub>2</sub> >0.5	248 PP: 126 CG: 122	159 (64.1%) PP: 82 (65%) CG: 77 (63%)	55.4±15.6 PP: 57.5±17.2 CG: 53.3±13.5	NR	SF ratio 301.8±55.2 PP: 300±56.2 CG: 303.7±54	Diabetes; <b>Hypertension;</b> COPD or asthma; CHF	<b>Nasal cannula,</b> face mask, HFNC	Ward	<b>Duration:</b> 2.5 hours/day; 6.76±8.47 hours/3days <b>Given for:</b> 3 days	SF ratio	3 days after initiated (supine)
<a href="#">Gad/2021</a>	Single center, Qena, Egypt	RCT	Covid-19 patients with PF ratio <200mmHg	30 PP: 15 CG: 15	17 (56.7%) PP: 9 (60%) CG: 8 (53%)	46.5±17.6 PP: 49.7±19.6 CG: 43.3±14.7	Obese 5 (16.7%) PP: 3 (20%) CG: 2 (13.3%)	PF ratio 126.9±63 PP: 126±62.1 CG: 127.7±63.8	<b>Hypertension;</b> Diabetes; COPD	<b>NRM,</b> NIV	ICU	<b>Duration:</b> 1-2 hours/session <b>Given for:</b> 3 days	PaO <sub>2</sub> ; SaO <sub>2</sub>	3 days after initiated (supine)

Authors/ Year	Location	Design	Sample	N	Gender (Male, %)	Mean age (years)	BMI (kg/m <sup>2</sup> ) <sup>a</sup>	Mean baseline PF ratio/SF ratio	Comorbidities	Respiratory device	Setting	Actual duration and/or frequency of PP <sup>a</sup>	Oxygenation Parameters	Time to follow up (position)
<a href="#">Ibarra-Estrada et al./2022</a>	Multicenter, Mexico	RCT	Covid-19 patients with SpO <sub>2</sub> <90% despite using NRM 15 L/min	430 PP: 216 CG: 214	258 (60%) PP: 132 (61.1%) CG: 126 (58.8%)	58.4±15.8 PP: 58.6±15.8 CG: 58.2±15.8	30.2±4.2 PP: 30.3±4.6 CG: 30±3.8	SF ratio 135.1±38.3 PP: 134.7±38.7 CG: 135.5±37.9	Hypertension; CAD; Heart failure; CLD; CKD; Severe liver disease	HFNC	ICU, IMCU	<b>Duration:</b> 9.3±5.4 hours/day; 3.33±0.44 hours/session <b>Frequency:</b> 4±1.5 session/day <b>Given for:</b> 6.23±3.95 days	SF ratio; ROX index; RR	1 hour after initiated (prone); 1 hours after finished (supine)
<a href="#">Jagan et al./2020</a>	Single center, Grand Island, Nebraska	Retrospective cohort	Covid-19 patients with hypoxic respiratory failure	105 PP: 40 CG: 65	57 (54.3%) PP: 37 (56.9%) CG: 20 (50%)	59.7±15.9 PP: 65.8±16.3 CG: 56±14.4	30.1±7.8 PP: 31.7±8.5 CG: 29.1±7.2	NR	<b>Hypertension;</b> Diabetes; COPD; CKD; Asthma; Heart failure; CAD; Rheumatoid arthritis; Cancer; Immunocompromised	NR	Outside ICU	<b>Duration:</b> NR <b>Given for:</b> 28 days	SF ratio	Every 4 hour for the first 48 hours (NR)
<a href="#">Jayakumar et al./2021</a>	Multicenter, India	RCT	Covid-19 patients with PF ratio 100-300 mmHg, or required any oxygen support ≥4 L/min to maintain SpO <sub>2</sub> ≥92%	60 PP: 30 CG: 30	50 (83.3%) PP: 25 (83.3%) CG: 25 (83.3%)	56.1±11.7 PP: 54.8±11.1 CG: 57.3±12.1	27±4.6 PP: 28.2±5.7 CG: 25.8±2.6	PF ratio 193.5±122.8 PP: 201.4±118.8 CG: 185.6±126.1	Hypertension; Diabetes; Asthma, Pulmonary fibrosis	<b>Face mask,</b> NRM, HFNC, NIV, nasal cannula	ICU	<b>Duration:</b> 1.67±0.7 hours/session; 4 hours/day	PF ratio	2 hours after finished (supine)
<a href="#">Khanum et al./2021</a>	Single center, Karachi, Pakistan	Retrospective cohort	Covid-19 patients with SpO <sub>2</sub> room air <94%	23	21 (91.3%)	54.5±11.7	27.5±3.3	PF ratio 188.7±59.7	<b>Hypertension;</b> Diabetes; Ischemic heart disease; CKD; COPD; Malignancy; Immunocompromised	NIV	IMCU	<b>Duration:</b> 2.5-16 hours/day <b>Given for:</b> 6±3.16 days	PF ratio	At the last session (supine)
<a href="#">Kharat et al./2021</a>	Single center, Geneva, Switzerland	RCT	Covid-19 patients required nasal cannula 1-6L/min to obtain SpO <sub>2</sub> 90-92%	27 PP: 10 CG: 17	17 (63%) PP: 6 (60%) CG: 11 (65%)	57.8±12.5 PP: 54±14 CG: 60±11	28.2±4.8 PP: 29.7±5.3 CG: 27.3±4.2	SF ratio 331.9±63.6 PP: 314.3±49 CG: 342.3±68.7	<b>Hypertension;</b> Diabetes; CKD	Nasal cannula	Ward	<b>Duration:</b> 4.91±3.6 hours/day	SF ratio; RR	24 hour after initiated (supine for 1 hour)
<a href="#">Koike et al./2022</a>	Single center, Sagamihara, Japan	Retrospective cohort	Covid-19 patients with FiO <sub>2</sub> ≥0.4	58 PP: 27 CG: 31	28 (48.3%) PP: 20 (74%) CG: 8 (25.8%)	64±17.1 PP: 67.7±17.2 CG: 60.7±16.3	25.8±5.4 PP: 26±5.4 CG: 25.7±5.4	SF ratio 153±52.1 PP: 130.1±49.7 CG: 172.9±45.6	<b>Hypertension;</b> Diabetes; Hyperlipidemia; CKD; Hemodialysis; COPD; Asthma; Interstitial pneumonia	<b>Face mask,</b> HFNC, NPPV	ICU	<b>Duration:</b> 3±1.56 hours/session <b>Frequency:</b> 2.3±0.7 session/day <b>Given for:</b> 12±7.04 days	SF ratio; ROX index; RR	3 days after initiated (NR); 1 week after initiated (NR); 2 weeks after initiated (supine); 3 weeks after initiated (supine)
<a href="#">Kumar et al./2022</a>	Single center, Delhi, India	Prospective cohort	Covid-19 patients with SpO <sub>2</sub> <94% and RR ≥25 despite using nasal cannula 6 L/min or NRM 15 L/min	102	65 (63.7%)	57.9±10	Obese excluded	PF ratio 106.7±38.71	NR	HFNC	ICU	<b>Duration:</b> 6.8±3.9 hours/session	PF ratio; SF ratio; PaO <sub>2</sub> ; RR;	After first session (supine); After last session (supine)

Authors/ Year	Location	Design	Sample	N	Gender (Male, %)	Mean age (years)	BMI (kg/m <sup>2</sup> ) <sup>a</sup>	Mean baseline PF ratio/SF ratio	Comorbidities	Respiratory device	Setting	Actual duration and/or frequency of PP <sup>a</sup>	Oxygenation Parameters	Time to follow up (position)
<a href="#">Liu et al./2021</a>	Single center, Sichuan, PR China	Retrospective cohort	Mild Covid-19 patients	28	12 (42.9%)	45.7±14.2	NR	PF ratio 328.2±32.4	NR	Nasal cannula	Outside ICU	<b>Duration of early PP:</b> 12.5±0.66 hours/day <b>Duration of late PP:</b> 12.6±0.78 hours/day <b>Early PP given for:</b> 11.1±4.17 days <b>Late PP given for:</b> 16.9±5.2 days	PF ratio; RR	1 day after initiated (supine)
<a href="#">Lupieri et al./2022</a>	Single center, Lausanne, Switzerland	Retrospective cohort	Covid-19 patients with PF ratio <200mmHg	31	23 (74%)	60±12	28.3±5.7	PF ratio 94.6±32.6	Cardiovascular disease; Hypertension; Diabetes; Respiratory comorbidities; Immunocompromised	NR	ICU	<b>Duration:</b> ≥45 minutes/session <b>Frequency:</b> 3.3±3.9 session/patient	PF ratio; PaO <sub>2</sub> ; SpO <sub>2</sub> ; FiO <sub>2</sub> ; RR;	After the first session initiated (prone)
<a href="#">Misra, Pal and Pawar/2021</a>	Single center, Madhya Pradesh, India	Quasi-experimental	Covid-19 patients required any COT	400	NR	NR	NR	NR	NR	COT	Ward, ICU	<b>Duration:</b> NR	SpO <sub>2</sub>	After finished (supine)
<a href="#">Musso et al./2022</a>	Single center, Turin, Italy	Quasi-experimental	Covid-19 patients with PF ratio <200mmHg using FiO <sub>2</sub> 50% or NRM, and required NIV	243	178 (73.3%)	68.8±12.3	28±4.8	PF ratio 156.3±61.1	Diabetes; Hypertension; COPD; Asthma; CAD; CKD; Chronic atrial fibrillation; Cancer; Immunocompromised	NIV	IMCU	<b>Duration:</b> 12.03±2.79 hours/day <b>Frequency:</b> 2±1.5 sessions/day <b>Given for:</b> 6.3±2.2 days	PF ratio; PaO <sub>2</sub> ; FiO <sub>2</sub> ; RR	7 days after initiated (supine for 1 hour)
<a href="#">Oliveira et al./2022</a>	Single center, Rio Grande do Sul, Brazil	Prospective cohort	Moderate Covid-19 patients required any oxygen support	41	28 (68.2%)	53.5±14.2	30.8±6.7	PF ratio 105.5±51.8	Diabetes; Hypertension; Neoplasm; Heart disease; Pulmonary disease; Asthma	HFNC, NIV, NRM, nasal cannula	ICU	<b>Duration:</b> 1.78±0.6 hours/session <b>Frequency:</b> 1.84±2.01 sessions/day <b>Given for:</b> 1.5±1.2 days	PF ratio; SF ratio; PaO <sub>2</sub> ; SpO <sub>2</sub> ; FiO <sub>2</sub> ; RR	After 1 <sup>st</sup> session finished (supine)
<a href="#">Othman, El-Menshaway and Mohamed/2022</a>	Single center, Damanhur, Egypt	RCT	Covid-19 patients with PF ratio ≤150mmHg required NRM or CPAP	82	52 (63.4%)	51.6±14.6	NR	PF ratio 84.3±29.3	Hypertension; Diabetes; CHF; Kidney disease	NRM, CPAP	ICU	<b>Duration:</b> ≥3 hours/session	PF ratio; PaO <sub>2</sub> ; SpO <sub>2</sub> ; SaO <sub>2</sub> ; RR; ROX index;	10 minutes after initiated (prone); 1 hour after initiated (prone)
<a href="#">Perez-Nieto et al./2022</a>	Multicenter, Mexico; Ecuador	Retrospective cohort	Covid-19 patients with SpO <sub>2</sub> <94% upon admission to ED	827	600 (72.6%)	54.3±14.2	Obese 119 (14.4%)	SF ratio	Diabetes; Hypertension; Heart disease; Lung disease; Cancer; CKD; Liver disease	Nasal cannula, HFNC, NRM	ED, ward, ICU	<b>Duration:</b> 14.6±11.8 hours during in-hospital stay	SF ratio	Within 1 hour after initiated (prone)

Authors/ Year	Location	Design	Sample	N	Gender (Male, %)	Mean age (years)	BMI (kg/m <sup>2</sup> ) <sup>a</sup>	Mean baseline PF ratio/SF ratio	Comorbidities	Respiratory device	Setting	Actual duration and/or frequency of PP <sup>a</sup>	Oxygenation Parameters	Time to follow up (position)
<a href="#">Dos Santos Rocha et al./2022</a>	Single center, Geneva, Switzerland	Prospective cohort	Covid-19 patients under NIV	28 PP: 13 CG: 15	21 (75%) PP: 9 (69%) CG: 12 (80%)	64.8±8.7 PP: 61±9 CG: 68±7	28.1±6.7 PP: 26.3±3.5 CG: 29.7±8.3	NR	Hypertension; Diabetes	CPAP, HFNC	IMCU	Duration: NR	SpO <sub>2</sub> ; FiO <sub>2</sub> ; RR	1 hour after initiated (prone)
<a href="#">Scaravilli et al./2015</a>	Single center, Monza, Italy	Retrospective cohort	AHRF patients with PF ratio <300 mmHg	15	10 (66%)	58.3±22.8	NR	PF ratio 127±49	COPD; Malignancy; Immunocompromised	Face mask, HFNC, helmet CPAP, NIV	ICU	Duration: 3±1.63 hours/session Frequency: 2±1.63 session/patient	PF ratio; PaO <sub>2</sub> ; RR	Last hour of PP (prone); 6 hour after finished (supine)
<a href="#">Silva Junior et al./2021</a>	Single center, Sao Paulo, Brazil	Prospective cohort	Covid-19 patients required any oxygen support	48	31 (65%)	59.4±12.6	30.1±8.1	PF ratio 153±7.41	Hypertension; Diabetes; CKD; Asthma; Other	Nasal cannula, NRM, HFNC, CPAP	Ward, ED	Duration: 1.9±0.9 hours/session	PF ratio; SF ratio; PaO <sub>2</sub> ; SaO <sub>2</sub> ; SpO <sub>2</sub> ; RR;	During first session (prone)
<a href="#">Solverson, Weathersd and Parhar/2021</a>	Multicenter, Calgary, Canada	Retrospective cohort	Covid-19 patients using ≥5L/min oxygen to maintain SpO <sub>2</sub> 90% or SF ratio ≤250	17	12 (71%)	55.3±13.0	Obese: 3 (18%)	SF ratio 158.5±37.8	Hypertension; CAD; Obstructive sleep apnea	Nasal cannula, HFNC	Ward, ICU	Duration: 2.75±2.08 hours/session Frequency: 2.75±1.39 session/day Given for: 2.5±1.67 days	SF ratio; SpO <sub>2</sub> ; RR	20 minutes after initiated (supine); 1-2 hours after finished (supine)
<a href="#">Sryma et al./2021</a>	Single center, Delhi, India	Quasi-experimental	Covid-19 patients with room air SpO <sub>2</sub> <94%	45 PP: 30 CG: 15	38 (84.4%) PP: 29 (96.7%) CG: 9 (60%)	52.6±11.4 PP: 50.1±10.1 CG: 57.5±12.2	Obese excluded	NR	Hypertension; Diabetes; Other	COT, NIV, HFNC	NR	Duration: 7.7±1.9 hours/day	SpO <sub>2</sub> ; ROX index; RR;	30 minutes after initiated (prone); 12 hours after initiated (supine)
<a href="#">Taylor et al./2021</a>	Single center, Charlotte, North Carolina	RCT	Covid-19 patients with room air SpO <sub>2</sub> <93%	40 PP: 13 CG: 27	27 (67.5%) PP: 7 (53.8%) CG: 20 (74%)	57.4±10.2 PP: 50.6±9.9 CG: 60.6±8.6	32.1±9.6 PP: 33±12.4 CG: 31.6±7.8	NR	Diabetes; Heart failure; CKD; CLD	Nasal cannula, MFNC, Bi-PAP	Ward	Duration: 10-120 minutes/day	SF ratio	2 days after initiated (NR)
<a href="#">Thompson et al./2020</a>	Single center, New York, USA	Prospective cohort	Covid-19 patients with SpO <sub>2</sub> ≤93% required nasal cannula (6 L/min) or NRM (15 L/min)	25	18 (72%)	65.1±9.4	29.5±6.3	NR	Hypertension; Diabetes; Hyperlipidemia; CAD; CLD; CKD	Nasal cannula, NRM	IMCU	Duration: 8.7±6.9 hours/day Given for: 2.2±0.9 days	SpO <sub>2</sub>	1 hour after initiated (NR)
<a href="#">Winearls et al./2020</a>	Single center, Bristol, UK	Retrospective cohort	Covid-19 patients required CPAP	24	15 (63%)	62±13	NR	PF ratio 201±70	Hypertension; Diabetes; Renal failure; Heart failure; Cancer; Immunocompromised	CPAP	IMCU	Duration: 8±5 hours/day Given for: 10±5 days	PF ratio; SpO <sub>2</sub> ; ROX index; RR	15 minutes after initiated (prone); 1 hour after finished (supine)
<a href="#">Wormser, Romanet and Philippart/2021</a>	Single center, Paris, France	Retrospective cohort	Covid-19 patients using any oxygen support ≥4 L/min	24	16 (59%)	70.6±14.8	28.7±5.8	SF ratio 189.3±42.8	Hypertension; COPD; Diabetes	COT	Ward	Duration: NR	SF ratio	During implementation in each session (prone); After finished in each session (supine)

Authors/ Year	Location	Design	Sample	N	Gender (Male, %)	Mean age (years)	BMI (kg/m <sup>2</sup> ) <sup>a</sup>	Mean baseline PF ratio/SF ratio	Comorbidities	Respiratory device	Setting	Actual duration and/or frequency of PP <sup>a</sup>	Oxygenation Parameters	Time to follow up (position)
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Definition of abbreviations: a Data presented as mean ± SD or otherwise stated; bolded text indicates the most common finding; PP, prone position; CG, control group; NR, not reported; PF ratio, arterial partial pressure of oxygen to inspired fraction of oxygen ratio; SF ratio, peripheral oxygen saturation to inspired fraction of oxygen ratio; ROX index, ratio of SF ratio to respiratory rate; PaO<sub>2</sub>, arterial pressure of oxygen; SaO<sub>2</sub>, oxygen saturation in arterial blood; SpO<sub>2</sub>, peripheral oxygen saturation; RR, respiratory rate; FiO<sub>2</sub>, inspired fraction of oxygen; COPD, chronic obstructive pulmonary disease; CKD, chronic kidney disease; CAD, coronary artery disease; CHF, congestive heart failure; CLD, chronic lung disease; HFNC, high flow nasal cannula; NIV, noninvasive ventilation; NRM, non-rebreathing mask; CPAP, continuous positive air pressure; NPPV, noninvasive positive-pressure ventilation; Bi-PAP, bi-level positive airway pressure; COT, conventional oxygen therapy; ICU, intensive care unit; IMCU, intermediate care unit; ED, emergency department.

Table 2. Subgroup analysis

Variable	PF ratio				SF ratio				Intubation rate				Mortality rate			
	n	SMD (95% CI)	p	I <sup>2</sup>	n	SMD (95% CI)	p	I <sup>2</sup>	n	RR (95% CI)	p	I <sup>2</sup>	n	RR (95% CI)	p	I <sup>2</sup>
<b>Age</b>			0.52	0			0.07	69.3			0.72	0			0.86	0
Adult (18-59 years)	15	0.74 (0.50, 0.97)			15	0.59 (0.40, 0.77)			9	0.62 (0.54, 0.73)			8	0.63 (0.41, 0.96)		
Elder (≥60 years)	7	0.61 (0.33, 0.90)			11	1.04 (0.58, 1.49)			5	0.56 (0.31, 1.00)			6	0.66 (0.45, 0.98)		
<b>Severity</b>			0.44	0			<b>0.001</b>	90.5			0.09	59			0.52	0
Mild	4	0.53 (0.00, 1.05)			3	0.24 (0.02, 0.46)			2	1.09 (0.46, 2.57)			2	0.74 (0.17, 3.18)		
Moderate	15	0.67 (0.47, 0.88)			23	0.82 (0.55, 1.08)			6	0.59 (0.42, 0.81)			7	0.69 (0.50, 0.95)		
Severe	3	0.99 (0.46, 1.52)							2	1.56 (0.60, 4.05)			1	0.94 (0.61, 1.45)		
<b>Respiratory device</b>			<b>0.02</b>	80.6			0.22	33.4			0.16	48.9			0.04	76.3
COT	8	0.43 (0.20, 0.67)			21	0.64 (0.45, 0.90)			9	0.53 (0.38, 0.75)			9	0.54 (0.44, 0.66)		
NIV	13	0.82 (0.59, 1.05)			5	1.03 (0.50, 1.56)			4	0.74 (0.54, 1.01)			4	0.78 (0.58, 1.05)		
<b>Setting</b>			0.10	63.5			0.06	72.1			0.63	0			0.10	63
ICU	10	0.57 (0.37, 0.78)			10	1.05 (0.60, 1.51)			7	0.69 (0.42, 1.12)			7	0.84 (0.70, 1.00)		
Non ICU	11	0.88 (0.58, 1.17)			16	0.58 (0.38, 0.77)			6	0.60 (0.48, 0.75)			6	0.55 (0.34, 0.88)		
<b>Body Mass Index</b>			0.13	57			0.11	61.8			0.94	0			0.59	0
Non obese (<30 kg/m <sup>2</sup> )	13	0.69 (0.45, 0.93)			20	0.87 (0.55, 1.20)			9	0.59 (0.43, 0.82)			10	0.63 (0.47, 0.84)		
Obese (≥30 kg/m <sup>2</sup> )	1	0.31 (-0.13, 0.74)			5	0.48 (0.13, 0.83)			3	0.61 (0.36, 1.03)			3	0.29 (0.02, 4.67)		
<b>Design</b>			0.64	0			0.79	0			<b>0.001</b>	81.6			0.001	81.4
RCT	2	0.32 (-0.34, 0.98)			5	0.86 (0.22, 1.50)			7	0.79 (0.69, 0.90)			6	0.88 (0.75, 1.04)		
Quasi-experimental	2	0.94 (0.17, 1.70)							2	0.33 (0.17, 0.62)			2	0.33 (0.18, 0.58)		
Prospective cohort	9	0.72 (0.45, 0.99)			8	0.66 (0.37, 0.95)			1	1.82 (0.68, 4.90)			1	0.94 (0.61, 1.45)		
Retrospective cohort	9	0.70 (0.38, 1.03)			13	0.78 (0.43, 1.14)			4	0.46 (0.31, 0.67)			5	0.51 (0.35, 0.76)		
<b>Time of admission to APP</b>			0.61	0			0.90	0			0.69	0			0.59	0
Less than 1 day					4	0.62 (0.34, 0.91)			4	0.70 (0.51, 0.97)			4	0.75 (0.51, 1.11)		
1-3 days	5	0.96 (0.46, 1.46)			9	0.58 (-0.07, 1.23)			2	0.59 (0.27, 1.29)			2	0.57 (0.23, 1.44)		

Variable	PF ratio				SF ratio				Intubation rate			Mortality rate				
	n	SMD (95% CI)	p	I <sup>2</sup>	n	SMD (95% CI)	p	I <sup>2</sup>	n	RR (95% CI)	p	I <sup>2</sup>	n	RR (95% CI)	p	I <sup>2</sup>
More than 3 days	4	0.77 (0.26, 1.29)														
<b>Detail of position</b>			0.44	0			0.51	0			0.04	78.3			0.11	61.5
Combined positions	5	0.58 (0.27, 0.90)			5	0.64 (0.31, 0.97)			1	2.44 (0.59, 10.04)			1	0.94 (0.61, 1.45)		
Only prone	17	0.74 (0.51, 0.96)			21	0.79 (0.50, 1.08)			13	0.55 (0.47, 0.64)			13	0.62 (0.46, 0.82)		
<b>Medication assistance</b>			0.38	0			0.10	63.6			0.03	80			0.38	0
Used	7	0.82 (0.45, 1.19)			5	1.29 (0.57, 2.02)			2	0.31 (0.17, 0.59)			3	0.46 (0.19, 1.16)		
Not used	15	0.64 (0.43, 0.84)			21	0.64 (0.36, 0.91)			13	0.67 (0.54, 0.84)			11	0.71 (0.55, 0.92)		
<b>Total duration<sup>d,e</sup></b>			0.12	52.3			0.004	82			0.05	73.5			0.51	0
Less than 1 hour	5	0.94 (0.60, 1.27)			2	0.17 (-0.28, 0.61)										
1-6 hours	9	0.49 (0.22, 0.76)			9	0.63 (0.18, 1.08)			5	0.72 (0.56, 0.94)			4	0.69 (0.45, 1.04)		
More than 6 hours	7	0.68 (0.49, 0.87)			9	1.15 (0.77, 1.53)			5	0.41 (0.25, 0.68)			6	0.55 (0.32, 0.92)		
<b>Position at follow-up</b>			0.02	82.5			0.94	0								
Prone	8	0.95 (0.70, 1.20)			8	0.74 (0.42, 1.06)										
Supine	14	0.56 (0.35, 0.76)			16	0.76 (0.41, 1.11)										
<b>Follow-up time</b>			0.03	78.1			0.23	29.8								
After initiation	11	0.87 (0.65, 1.09)			15	0.88 (0.61, 1.15)										
After finish	10	0.50 (0.25, 0.76)			11	0.56 (0.11, 1.02)										

Definition of abbreviations: PF ratio, partial pressure of oxygen to fraction of inspired oxygen ratio; SF ratio, oxygen saturation to fraction of inspired oxygen ratio; n, study size; SMD, standardized mean difference; RR, risk ratio; CI, confidence interval; APP, awake prone position; a, PF ratio 201-300 or SF ratio 285-323; b, PF ratio 100-200 or SF ratio <285; c, PF ratio <100; d, total duration per follow up for PF ratio and SF ratio; e, total duration per day for mortality rate and intubation rate.

Table 3. Meta-regression

Variable	PF ratio			SF ratio			Intubation rate			Mortality rate				
	n	SMD (95% CI)	p	n	SMD (95% CI)	p	n	RR (95% CI)	p	n	RR (95% CI)	p		
Sample size	22	-0.002 (-0.006, 0.002)		0.27	26	7.55e-4 (-0.001, 0.002)		0.38	14	1.0003 (1, 1.001)	0.24	14	1.0001 (1, 1.001)	0.58
Mean age	22	-0.016 (-0.059, 0.026)		0.44	26	0.019 (-0.017, 0.056)		0.29	14	0.978 (0.929, 1.029)	0.39	14	1.015 (0.962, 1.071)	0.57
Mean BMI	11	0.005 (-0.241, 0.252)		0.96	18	-0.228 (-0.414, -0.041)		0.01		Not estimable		10	0.983 (0.822, 1.174)	0.85
Mean severity	22	4.27e-4 (-0.003, 0.004)		0.81	26	-0.004 (-0.009, -0.001)		0.01		Not estimable			Not estimable	
Time of admission to APP (day)		Not estimable			12	-0.142 (-0.688, 0.405)		0.61		Not estimable			Not estimable	
Total duration per follow-up (hour)	20	-0.001 (-0.012, 0.009)		0.81	19	0.016 (0.005, 0.028)		0.005						
Follow up time after initiation (hour)	11	-0.002 (-0.005, 0.001)		0.24	10	0.003 (0.002, 0.005)		<0.001						
Follow up time after finish (hour)	10	-0.109 (-0.277, 0.060)		0.20	17	0.001 (-0.001, 0.003)		0.33						

Definition of abbreviations: PF ratio, partial pressure of oxygen to fraction of inspired oxygen ratio; SF ratio, oxygen saturation to fraction of inspired oxygen ratio; n, study size; SMD, standardized mean difference; RR, risk ratio; CI, confidence interval; BMI, body mass index; APP, awake prone position.

# Psychometric validation of the nursing professional values scale-revised: Vietnamese version

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## ABSTRACT

**Introduction:** The Nursing Professional Values Scale has been widely used to assess the professional values of practicing nurses, nursing students, and faculty members across different countries. With the global evolution of nursing education and practice standards, researchers have shown increasing interest in understanding nurses' professional values within developing nations. This study seeks to validate the psychometric properties of the Vietnamese version of the Nursing Professional Values Scale-Revised (NPVS-R).

**Methods:** A quantitative survey was conducted with the questionnaire of NPVS-R version which was converted from English to Vietnamese by three expert translators, followed by a back-translation by three bilingual experts, then three nursing scholars from different regions of Vietnam assessed the language and content validity. Data were collected from 669 nurses through the Vietnamese Nursing Association network and analyzed by using SPSS and AMOS software. The scale was evaluated based on validity of content and construct, and internal consistency.

**Results:** The Vietnamese NPVS-R scale comprises 25 items across four subscales: Caring, Activism, Trust, Professional, and Justice. Confirmatory factor analysis revealed factor loadings between 0.595 and 0.929, with a chi-square value of 955.303. Fit indices (CFI = 0.935, CMIN/DF = 3.605, RMSEA = 0.062) were satisfactory. Cronbach's alpha was good, ranging from 0.861 and 0.877, and item-to-total correlations spanned 0.501 to 0.775. There exist significant differences of nurses' perception on the subscales based on their gender, age, and working experience.

**Conclusions:** NPVS-R is a reliable instrument to measure the professional values of nurses in the distinct Vietnamese context and language. It can serve as a valuable tool for nursing care development and competency assessment across various care units in Vietnam and benefit international comparisons.

**Keywords:** nurse professional value, psychometric properties, scale assessment, vietnam

## Introduction

Core humanistic values remain central to nursing globally, though they manifest differently across contexts. Fostering values-practice alignment via supportive environments and education is key to advancing ethical nursing care worldwide. Nurses' professional values guide nursing practice and conduct. As nursing has evolved as a profession worldwide, there is growing research interest in delineating nurses' values

and how they shape ethical practice. Nurses' professional values are shaped by diverse factors. Nursing education stresses values such as compassion and integrity (Bang et al., [2011](#)). Exposure to role models and a supportive ethical climate reinforce values priorities (Sibandze & Scafide, [2018](#)). Workplace pressures can alter value expression, highlighting the need for continued support (Babamohamadi et al., [2021](#)). Experience level also impacts values, with novice

nurses focused more on competence while veterans emphasize holistic care (Weis & Schank, [2009](#)).

Research consistently shows caring as the preeminent value endorsed by nurses globally (Kangasniemi et al., [2015](#); Lin et al., [2010](#)). The ability to express empathy, compassion, and respect for human dignity are viewed as essential. Accountability, trustworthiness, and ethical integrity also emerge as critical values (Kulju et al., [2016](#)). In 2000, Weis and Schank introduced a nurse professional value scale as a quantitative instrument to assess professional nursing values. Initially developed and tested in the United States, it comprised 44 Likert-scale items across five subscales: 'caring, activism, trust, professionalism, and justice.' In 2009, they revised that scale into NPVS-R version, reducing it to 26 items and updating terminology. The NPVS and its revised version remain prominent tools for measuring professional nursing values quantitatively. However, the emphasis on certain values, such as patient advocacy, can vary across cultures (Alfred et al., [2013](#)). While the NPVS/NPVS-R provides a widely used method for quantifying and comparing nursing values, it may benefit from a mixed-methods adaptation and more culturally-specific development to enhance its global applicability.

The NPVS-R is grounded in the Professional Values Development Theory, which emphasizes the dynamic process of value internalization during nursing education and practice (Weis & Schank, [2009](#)). This theoretical foundation recognizes that professional values are developed through formal education, clinical experiences, and ongoing professional socialization. The instrument's structure reflects the multidimensional nature of nursing values, incorporating cognitive understanding, affective commitment, and behavioral manifestation of professional ethics (Habeeb, [2022](#)). The developmental trajectory captured by the NPVS-R reflects the process of professional identity formation, from initial nursing education through continued practice (Duchscher, [2008](#)). This trajectory acknowledges the influence of educational preparation, clinical experience, and ongoing professional development on nurses' value systems. The instrument's methodological robustness, demonstrated through rigorous psychometric validation and careful translation processes, ensures reliable measurement across cultural contexts (Polit, D. F & Beck, C. T., [2017](#)).

The NPVS/NPVS-R has been utilized internationally to survey practicing nurses, nursing students, and faculty regarding their professional values. For instance, studies have examined how NPVS scores correlate with

ethics education (Kangasniemi et al., [2015](#)) and differ across generations (LeDuc & Kotzer, [2009](#)). The tool provides standardized quantitative data on values priorities. While deemed useful, critiques include that the scale was developed in the U.S., which limits its applicability to other cultures (Lin et al., [2010](#)). As nursing education and practice standards evolve globally, there has been growing interest in exploring nurses' professional values in developing countries using the NPVS-R. Much of the previous research has focused on translating and validating this NPVS-R for use in specific developing countries. Versions of the NPVS-R have been adapted for languages including Turkish (Hosseini et al., [2020](#)), Persian (Joolaei et al., [2011](#)), Italian (Gasperini et al., [2023](#)), Mandarin Chinese (Lin et al., [2010](#)), and Indonesian (Asiandi et al., [2021](#)). These studies assess the tool's reliability and construct validity and typically find strong psychometric properties are retained. Validated NPVS-R versions have been applied to compare nurses' professional values across developing nations. Some multi-country studies reinforce that some NPVS-R items like activism and patient advocacy may resonate differently based on the healthcare context (Alfred et al., [2013](#)).

In Vietnam, nursing education follows a structured pathway of 3-4 year diploma and bachelor's programs designed to develop comprehensive clinical competence and professional values (V. N. B. Nguyen et al., [2022](#)). The curriculum integrates theoretical learning with extensive practical training, emphasizing clinical skills, cultural sensitivity, and professional ethics. Educational institutions focus on preparing nurses who can provide holistic care while adhering to national healthcare standards. Meanwhile, Vietnamese hospital practice is characterized by a hierarchical healthcare system with centralized training. Public hospitals dominate healthcare infrastructure, with nurse-to-patient ratios typically ranging from 1:8 to 1:15, and there is an increasing emphasis on evidence-based practice (Dang et al., [2021](#)). Despite significant progress, Vietnamese nursing continues to face challenges, including limited advanced training opportunities, resource constraints, and the ongoing process of professionalization. The healthcare system is actively working to enhance nursing roles, improve clinical skills, and develop professional autonomy. This includes expanding specialized nursing roles and aligning educational standards with global best practices (V. N. B. Nguyen et al., [2022](#)). The overall purpose of this study is to evaluate the psychometric properties of the Vietnamese version of the Nurses Professional Values



Scale-Revised (NPVS-R). Specifically, the study will evaluate the construct validity of the Vietnamese NPVS-R by examining the factor structure of the five-concept model (caring, activism, trust, professionalism, and justice), conducting confirmatory factor analysis to verify the theoretical framework, and assessing convergent and discriminant validity. The study also assesses the reliability of the Vietnamese NPVS-R by analyzing internal consistency and reliability, and examine measurement invariance across key demographic and professional characteristics, including gender, age, working experience and hospital practice roles (staff nurse, nurse manager). This assessment aims to ensure the scale's effectiveness in measuring professional values among Vietnamese nurses throughout their caregiving careers.

## Materials and Methods

### Research design and sampling

The research followed a quantitative approach using a questionnaire survey. A strategic sampling plan was developed to ensure the inclusion of diverse respondent types. The study utilized purposive convenience sampling to select participants, encompassing both staff nurses and nurse supervisors employed in hospital settings. The questionnaire was distributed directly to respondents through the network of Vietnamese Nursing Association in Vietnam from May to September 2023 for both the pilot test (first stage) and final survey (final stage). An online platform for self-administered questionnaire was designed, and the links were sent out with a description of the research information to ensure that respondents understood and agreed to fill out the questionnaires. The target hospitals were level I and II, based on the classification of the Vietnam Ministry of Health. For the final survey, about one thousand respondents were reached, a total of 700 returned their answers, but 31 were invalid. Finally, 669 questionnaires were collected for the data analysis.

### Data collection measurement

#### *Nurse Demographic Information*

This questionnaire asked respondents to fill in their socio-demographic information, including age, gender, education, working position, etc.

#### *Nurse Professional Value Scale*

This study utilized the NPVS-R questionnaire developed by Weis and Schank (Weis & Schank, 2009) to access nurses' professional values. The NPVS-R version was upgraded from the original NPVS, aligning with the

American Nurses Association Code of Ethics, reflecting fundamental ethical commitments in nursing, and expanding roles. Twenty-six statements are included in this questionnaire measured by 5-point Likert scale, with each statement representing a specific code provision.

### *Translation and Adaptation*

After obtaining permission from the original authors, the NPVS-R was adapted for Vietnamese society. Three expert translators independently converted the scale from English to Vietnamese, followed by a back-translation by three bilingual experts who worked together to ensure clarity and accuracy in translation. Three nursing scholars from different regions of Vietnam (North, Middle and South due to some different of culture and language speaking pronunciation), proficient in English and experienced in nursing research, assessed the language and content validity. A pilot survey with ten eligible nurses confirmed the comprehensibility of each item, with no further modifications required.

### Data Collection

Nurses were approached via email, provided with explanations about this study, and then asked to complete the questionnaire independently after providing their consent.

### Data Analysis

This study used SPSS and AMOS to analyze the collected data (Ullman & Bentler, 2012). The mean and standard deviation of each item are illustrated in the descriptive statistics. The reliability of research factors was tested through factor analysis, item-to-total correlation, and internal consistency analysis.

### Ethical considerations

The study was approved by the research ethics committee of Hanoi University of Public Health (No.68/2023/YTCC-HD3). Informed consent was obtained from each participant before starting the survey.

Table 1. Demographic information of nurses

Nurse information		Frequency	Percent
Gender	Female	578	86.4
	Male	91	13.6
Age	20-30	141	21.1
	31-40	348	52.0
	41-50	157	23.5
	over 50	22	3.3
Working years	1-5 year	106	15.8
	6-10 year	151	22.6
	11-15 year	231	34.5
	16-20 year	101	15.1
Working Position	over 20 years	80	12.0
	Nurse	518	77.4
	Director of nursing	151	22.6

Table 2. Item means, validity and reliability test

Subscales	Items	Means	Standard Deviation	Corrected Item-to-total Correction	Factor loading	Cronbach alpha
Caring	CAR1	4.58	0.54	0.59	0.69	0.877
	CAR2	4.44	0.57	0.63	0.73	
	CAR3	4.12	0.67	0.63	0.72	
	CAR4	4.54	0.53	0.63	0.73	
	CAR5	4.26	0.61	0.64	0.74	
	CAR6	4.44	0.58	0.75	0.83	
	CAR7	3.97	0.69	0.58	0.67	
	CAR8	4.33	0.59	0.59	0.68	
	CAR9	4.26	0.66	0.50	0.59	
Activism	ACT1	4.20	0.67	0.72	0.83	0.871
	ACT2	4.07	0.66	0.73	0.84	
	ACT3	4.44	0.62	0.63	0.76	
	ACT4	4.24	0.68	0.77	0.87	
	ACT5	4.01	0.72	0.63	0.76	
Trust	TRU1	4.48	0.59	0.68	0.79	0.877
	TRU2	4.33	0.60	0.74	0.85	
	TRU3	4.26	0.60	0.76	0.86	
	TRU4	4.10	0.61	0.68	0.80	
	TRU5	4.24	0.63	0.67	0.79	
Professional	PRO1	4.24	0.65	0.71	0.84	0.862
	PRO2	4.17	0.63	0.71	0.84	
	PRO3	3.88	0.72	0.68	0.82	
	PRO4	4.16	0.67	0.74	0.86	
Justice	JUS1	4.20	0.64	0.77	0.91	0.861
	JUS1	4.33	0.62	0.74	0.91	

**Results**

Sample characteristics

The respondents of this study are nurses in Level I and II national hospitals in Vietnam. Based on the classification by the Vietnam Ministry of Health, Provincial-level hospitals (Level I hospitals) feature more complex nursing roles with advanced clinical

responsibilities. Nurses here engage in specialized patient care, comprehensive treatment management, and sophisticated clinical interventions. Their duties expand to include surgical support, intensive care nursing, complex diagnostic procedures, advanced chronic disease management, and patient counseling. These nurses demonstrate greater clinical autonomy, utilize more advanced medical technologies, and

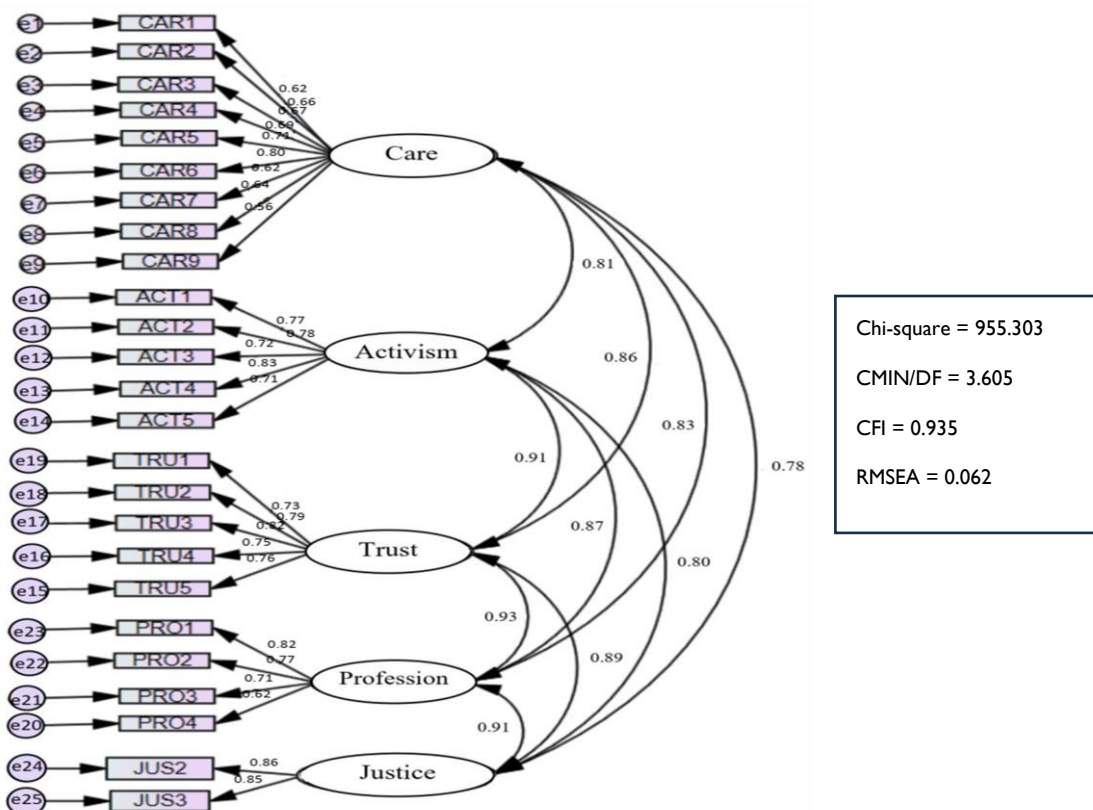


Figure 1. Confirmative Factor Analysis results

Table 3. Demographic and scale factors

Demographic Factor	N	Subscales				
		Caring	Activitism	Trust	Professional	Justice
<b>Gender</b>						
Male	91	4.331	4.187	4.281	4.165	4.216
Female	578	4.327	4.195	4.281	4.104	4.220
F-value		4.383	3.045	0.630	0.027	2.021
P-value		0.037	0.810	0.438	0.871	0.156
<b>Age (year old)</b>						
20-30	141	4.266	4.113	4.238	4.055	4.144
31-40	348	4.307	4.164	4.250	4.084	4.195
41-50	157	4.394	4.286	4.371	4.197	4.323
over 50	22	4.535	4.463	4.382	4.295	4.318
F-value		4.227	6.778	2.818	2.779	3.033
P-value		0.006	0.003	0.038	0.040	0.029
<b>Working experience (years)</b>						
1-5	106	4.266	4.111	4.258	4.064	4.151
6-10	151	4.291	4.198	4.253	4.117	4.218
11-15	231	4.280	4.106	4.214	4.046	4.164
16-20	101	4.453	4.299	4.400	4.193	4.323
over 20	80	4.454	4.410	4.410	4.259	4.342
F-value		5.546	6.402	4.077	2.913	2.742
P-value		0.000	0.000	0.003	0.021	0.028
<b>Working position</b>						
Nurse	518	4.292	4.157	4.253	4.084	4.197
Director of nursing	151	4.450	4.319	4.379	4.210	4.298
F-value		1.387	0.546	2.949	0.000	0.828
P-value		0.239	0.460	0.086	0.987	0.363

provide more specialized healthcare services (Tran et al., 2018).. At the commune and district levels (Level II Hospitals), nurses serve as primary healthcare providers with broad responsibilities. Their roles focus on fundamental patient care, preventive health services, and community health education. Nurses perform basic clinical interventions, including wound care, medication administration, patient screening, and initial triage. They are critical in delivering primary healthcare services, managing basic chronic conditions, and providing essential health screenings. The primary distinction between Level I and Level II nursing roles lies in the complexity of care, technological resources, and clinical intervention depth. Level II nurses focus on foundational healthcare delivery, while Level I nurses provide more specialized, technology-supported, and comprehensive healthcare services. Both levels emphasize patient-centered care, professional ethics, and community health improvement (A. T. H. Nguyen et al., 2022)

Most of the respondents are female (86%), and half of them are aged from 31 to 40 years (52%), following by those in the age range of 41-50 years (23.5%). The majority have been working as nurses more than 10 years (34.5% of 11-15 years, and 15.1% of 16-20 years), 151 nurses have worked for 6-10 years, 106 nurses have worked less than 5 years, and 80% more than 20 years working in clinical nursing field. These categories were determined by the data distribution with the purpose of allowing for balanced representation across different age and experience groups, providing a sufficient

sample size within each category, and facilitating comparative statistical analysis.

#### Content Validity and Reliability Assessment

The validity and reliability of the NPVS-R were assessed by conducting frequency and descriptive statistical analyses, calculating mean values and standard deviations. Subsequently, factor loading and reliability tests were performed to determine item-to-total correlations and internal consistency. Table 2 presents these findings, demonstrating that all items in the adapted NPVS-R questionnaire are reliable for measuring nurse professional values in the Vietnamese context.

In general, the mean scores for all items were quite high, ranging from 3.88 to 4.58 on a 5-point scale. This indicates that respondents rated the values as highly important overall. The standard deviations were moderate, showing there was a reasonable spread of scores. The corrected item-total correlations were strong, with all coefficients from 0.51 to 0.77. This suggests each item correlated strongly with the subscale it was designed to measure. Values above 0.30 are considered acceptable, so these item-total correlations confirm that each item was assessing its intended construct. The factor loadings were strong (0.59-0.91), which indicates that the items were strongly associated with the underlying factor (subscale) constructs. Factor loadings above 0.5 are considered good. This means each set of items accounted for a large portion of the variance in its respective scale. High values show the

items effectively measured the subscale content. Reliability was examined using Cronbach's alpha. Alphas for all subscales were between 0.861 and 0.877, indicating excellent internal consistency (Hooper et al., 2008).

In detail, the CARING factor has a high Cronbach alpha (0.877) with all variables' factor loading ranges from 0.595 to 0.832. The item-to-total correlation value range from 0.50 to 0.75, which proves the relevant content of all variables of the Caring factor. Better results were found for ACTIVISM (Cronbach alpha 0.871, factor loading 0.76 to 0.87, item-to-total correlation 0.63 to 0.77), TRUST (Cronbach alpha 0.877, factor loading 0.79 to 0.86, item-to-total correlation 0.67 to 0.77), PROFESSIONAL (Cronbach alpha 0.862, factor loading 0.83 to 0.86, item-to-total correlation 0.68 to 0.74) and JUSTICE (Cronbach alpha 0.861, factor loading 0.93, item-to-total correlation 0.74 to 0.77). One item of JUSTICE (JUS1 - Assume responsibility for meeting health needs of the culturally diverse population) was deleted due to the outlier and below the standard factor loading.

To confirm the validity of the variables in the completed model, a confirmatory factor analysis (CFA) was conducted with the support of AMOS software. All items were added to the completed model, and all unobserved variables were treated as exogenous or independent variables. Therefore, it is required to draw a covariance double-headed arrow between each unobservable construct in the model. [Figure 1](#) shows that the model fits with the current data (with the JUS1 item omitted). The results show that all the index values approximately fulfill the required criteria for absolute fitness, i.e. Chi-square = 955.303, CMIN/Df is 3.605 < 5, RMSEA is 0.062 < 0.10 (Hooper et al., 2008). Furthermore, for incremental fitness, CFI is 0.935 > 0.9. This also confirms that all variables (except JUS1) are valid in Vietnamese version and context.

#### Demographic and Scale factors

To explore further the assessment on NPVS-R among Vietnamese nurses, demographic factors were also tested to see if there were differences in their perceptions of the subscales of NPVS-R. After checking the data of demographic variables, the gender and working position were tested using an independent-sample t-test. Other variables were tested by ANOVA. The combined results are presented in [Table 3](#). It is evident that there are some significant differences of perceptions of CARING, ACTIVISTISM, TRUST, PROFESIONAL, JUSTICE based on different demographic variables. In details, firstly, male and female Vietnamese nurses showed a slight different perception on CARING

(F value = 4.383, P value = 0.037) in which male nurses show slight higher perception on CARING value. Age and working experience expressed different results on Vietnamese nurses' perception on all five subscales of NPVS-R. And interestingly, nurses with older ages and working experience have higher perception on all Caring, Activism, Trust, Professional, and Justice. However, nurses' working position does not result differences in their perception on their work value.

#### Discussions

The study evaluates the validity of adopted NPVS-R in an Asian developing country, Vietnam. The results show a good clue that NPVS-R is a reliable measurement tool to apply in the Vietnamese language and context. Currently, nursing in Vietnam is still in the process of developing and recognition by people with more requirements on learning and practice. Nursing ethical standard was created and revised, which is still required to upgrade. The NPVS-R Vietnamese version could be a valuable reference for that work.

One interesting point in this study is about the exemption of one item of Justice subscale ('Assume responsibility for meeting health needs of the culturally diverse population.'). This could be explained based on the current context of Vietnam, where there is not much cultural diversity. Although there are slight cultural differences among groups of the Vietnamese (North and South, Vietnamese and other ethnics), all healthcare units have the national standard in taking care and treating patients (Dang et al., 2021). Moreover, the participants in this study mostly work in Level I and II national hospitals, which are located in urban centers. As such, they may encounter fewer diverse groups of patients comparing to those working in rural or mountainous areas.

The NPVS-R has demonstrated strong psychometric properties of reliability and validity across multiple translated versions (Asiandi et al., 2021; Gasperini et al., 2023; Hosseini et al., 2020; Joolae et al., 2011; Lin et al., 2010). This indicates the universal nursing values measured translate effectively. The NPVS-R measures professional nursing values that align with the standards promoted in Vietnamese nursing education and practice. Vietnam emphasizes the development of compassion, integrity, clinical competence, and commitment to care in nursing students (Bang et al., 2011; V. N. B. Nguyen et al., 2022), which aligns with NPVS-R values like caring, activism, trust, and professionalism. Adaptation of imported nursing education models in Vietnam has proven effective when

aligned with cultural context. Vietnam has successfully adopted nursing educational frameworks, such as concept-based curricula from the US and Canada by integrating cultural relevance (A. T. H. Nguyen et al., 2022). This demonstrates Vietnamese nursing can adapt appropriately. Use of the NPVS-R allows comparison to international research on nursing values. Applying a widely used tool like the NPVS-R allows for the analysis of how Vietnamese nurses' values compare with regional and global data, giving international context. This benefits knowledge development. Therefore, given its strong psychometrics across translations, alignment with Vietnamese nursing values and benefits for international comparison. The evidence indicates that NPVS-R is a reliable instrument to measure professional values of nurses in the distinct Vietnamese context and language. Thoughtful translation and validation will help ensure local relevance and applicability.

This study expands the work of translating and testing NPVS-R to Vietnam. Thus, it is important not only to the psychometric development of the NPVS-R, but also to the Vietnamese nursing profession. The NPVS-R has demonstrated strong reliability and validity across multiple translated versions and indicates universal applicability of nursing values measurement. The NPVS-R is in alignment with the Vietnamese nursing context, measuring professional nursing values that match Vietnamese nursing education and practice standards. It is also consistent with Vietnam's emphasis on developing core nursing attributes like compassion, integrity, clinical competence, and commitment to care, aligning with specific values such as caring, activism, trust, and professionalism.

Understanding professional values in Vietnamese nursing represents a critical pathway for advancing healthcare quality and professional development. By systematically documenting the theoretical foundations of nursing identity, this research provides empirical insights into the cultural nuances of nursing practice in Vietnam (Bang et al., 2011). The knowledge generated offers a comprehensive framework for understanding how professional values shape patient care, clinical decision-making, and overall healthcare delivery. The strategic implications of this research extend beyond theoretical documentation. By identifying core values that drive compassionate patient care, the study supports targeted educational interventions and curriculum development (V. N. B. Nguyen et al., 2022). These insights enable nursing educators and healthcare administrators to align professional preparation with both international standards and local cultural contexts,

thereby enhancing the quality and relevance of nursing education.

Moreover, the research contributes to systemic improvements in healthcare by promoting evidence-based nursing practices and supporting professional autonomy. Understanding professional values facilitates more nuanced nurse-patient interactions, encourages critical reflection on care practices, and provides a mechanism for comparing Vietnamese nursing standards with international benchmarks. This comparative perspective is crucial for continuous professional development and quality improvement in the Vietnamese healthcare system. Ultimately, the comprehensive examination of nursing professional values serves as a strategic tool for transforming healthcare delivery. By illuminating the complex interplay between cultural values, professional identity, and clinical practice, this research advances the nursing profession's capacity to provide high-quality, patient-centered care that is both culturally sensitive and globally competitive.

This results also enable the comparison of Vietnamese nurses' values with regional and global data, supporting knowledge development through standardized measurement, and providing international context for understanding nursing professional values. However, the study only used quantitative survey for data collection to confirm the findings. Other factors that may relate to nurse professional value due to local cultural context or nursing practice, as well as national policy could be explored by qualitative method.

## Conclusion

The study findings demonstrated that the Vietnamese version of Nurse Professional Value Scale-Revised has good validity and reliability as a measurement tool. The scale can help nurses working in all healthcare units in determining their competency in providing care to patients. The scale can identify specific areas of value care where health professionals may lack competency, allowing them to plan necessary training for improvement. The NPVS-R Vietnamese version is the first instrument scale to be psychometrically validated for measuring nurse professional value in Vietnam, contributing to the expanding usage of NPVS-R to developing countries.

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## Conflict of Interest

The authors have no conflict of interest.

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# Parental support and influencing factors for school-age children's healthy movement behavior: a cross-sectional study

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## ABSTRACT

**Introduction:** Optimizing healthy lifestyles in children requires parental support for healthy movement behaviors. This study analyzed factors influencing parental support for school-age children's movement activities.

**Methods:** This study employed an analytic descriptive design with a cross-sectional approach, involving a sample of 355 mothers with school-age children. The independent variables included family, child, and environmental factors, whereas the dependent variable was parental support for healthy movement behaviors, as assessed through a questionnaire. Data analysis was performed using binary logistic regression with backward elimination.

**Results:** The factors that significantly influenced parental support for their children's engagement in light physical activities included the children's own level of participation in such activities (OR=2.52, 95% CI=0.76-6.67). Factors affecting support for moderate to vigorous activities were maternal exercise habits (OR=3.37; 95% CI=1.18-9.65), children's sports habits (OR=5.18; 95% CI=1.64-16.26), and the presence of personal gadgets (OR=0.45, 95% CI=0.23-0.86). Parental support for preventing sedentary behaviors was influenced by parental knowledge (OR=2.33; 95% CI=1.34-4.05), mother's sleep duration (OR=2.46; 95% CI=1.27-4.75), and gadgets (OR=0.55; 95% CI=0.31-0.95). Factors affecting support for adequate sleep included children's light activities (OR=3.42; 95% CI=1.27-9.23) and their ownership of personal gadgets (OR=0.44; 95% CI=0.24-0.79)

**Conclusions:** Parental support is influenced by the knowledge and physical activity habits of both mother and child, as well as gadget use and maternal sleep patterns. Pediatric nurses can enhance this support through health education focused on promoting healthy movement behaviors within families.

**Keywords:** healthy lifestyle, healthy movement behaviors, parental support, school-age children

## Introduction

The digital era and the COVID-19 pandemic have brought about significant changes in children and adolescents. For instance, many of them have sedentary lifestyles owing to technological advancements that have made all activities simple, instant, and practical.

The COVID-19 pandemic has also contributed to alterations in the movement patterns of children. Consequently, school-aged children no longer have the opportunity to engage in physical activity at school, play outside the home, exercise, or participate in school activities (Bates *et al.*, 2020; Guan *et al.*, 2020). In the post-pandemic period, this circumstance also affected

the everyday activity patterns of school-aged children. A decrease in physical activity, an increase in sedentary behavior, and insufficient sleep length are current issues among school-aged children (Bates *et al.*, 2020; Margaritis *et al.*, 2020)

The World Health Organization (WHO) has issued guidelines for physical activity, sedentary behavior, and adequate sleep duration in children (WHO, 2019). According to these guidelines, children aged 5 to 17 years should engage in at least 60 minutes of physical activity per day, spend no more than two hours in front of a screen, and sleep for 9 to 11 hours per night (Guan *et al.*, 2020). In reality, school-age children have a difficult time implementing it, and their physical activity has decreased drastically compared to before the pandemic (López-Bueno *et al.*, 2021). The study stated that the average physical activity of children is currently 1.29 hours per week, with an increase in screen time of almost 5 hours per day (Pietrobelli *et al.*, 2020). If people closest to the child are unable to regulate the child's activities properly, it is risky to cause adverse effects on children's health. In recent years, the prevalence of childhood obesity has dramatically increased (Ministry of Health, 2018).

In Indonesia, people hold false beliefs regarding the nutritional status of children; many parents believe that obese children are healthy (Yuarnistira *et al.*, 2019); parents tend to believe that physical activity and sedentary behavior are unimportant behaviors (Ulfiana, Rachmawati and Fadhilah, 2019). According to the 2018 Basic Health Research data in Indonesia, 20% of school-age children are overweight and obese (Ministry of Health, 2018). In addition, cases of type 2 diabetes mellitus in children have increased 70 times in 2023 due to changes in lifestyle, including nutritional problems and physical activity (Ministry of Health, 2023); however, if the pattern of parental regulation of children's movement activities is not appropriate, it can lead to long-term health problems in children. If parental support for adequate movement behavior in school-aged children is not ideal, it becomes challenging to reverse the decline in physical activity, increase sedentary behavior, and reduce sleep duration; this situation will increase the risk of obesity in children. This study focused on factors based on the framework of the Family Ecological Model (FEM), which explains family factors that can influence parenting patterns to adopt a healthy lifestyle, consisting of family characteristics, children, and the child's living environment (Davison, Jurkowski and Lawson, 2013). Parental support and factors that influence appropriate movement behavior,

including physical activity, sedentary behavior, and sleep needs, according to the characteristics in Indonesia have rarely been studied. Therefore, this study aimed to analyze the determinant factors that influence parental support in the healthy movement behavior of school-aged children using a family based approach.

## Materials and Methods

### Design

This study employed a descriptive analytical design and a cross-sectional approach. This study was conducted between June and August 2021. The respondents in this study were mothers of school-aged children aged 9–12 years in Surabaya, East Java, and were able to access the online questionnaires.

### Sample

The inclusion criteria for this study required participants to be mothers of school-aged children who provided daily care and possessed the ability to use smartphones. The sample size was calculated using Slovin's formula, resulting in 355 respondents. This study employed a multistage random sampling technique that targeted elementary schools across various districts. The researcher randomly selected four districts within the city, and subsequently one elementary school was randomly chosen from each district to serve as the research site. From the selected schools, mothers were sampled proportionately to participate as respondents. The researcher collaborated with the schools to distribute an online questionnaire to the chosen participants.

### Measurement tools

The independent variables were mother and family factors, including mother's age, mother's education, mother's occupation, mother's knowledge, number of children, family type, family income, mother's movement behavior characteristics, and child characteristics and characteristics of the child's environment. The dependent variable was parental support for children's healthy movement behavior.

Data were collected using questionnaires. Categorization of mothers' age was based on early adulthood (20-40 years), middle adulthood (41-60 years), and older adults (>60 years), and categorization of family income based on average minimum wage. A questionnaire to measure mothers' knowledge of healthy movement behavior was constructed by the researcher based on Bates *et al.* (2020). It consists of



eight multiple-choice questions, where each correct answer scored 1 point and incorrect answers received no points. The scores were categorized as good, sufficient, or poor. Mother's movement behavior

Table 1. The characteristics of Children, Their Mothers and Families (n=355)

Characteristics	f	%
<b>Mothers and Families Characteristics:</b>		
<b>Mother's Age</b>		
20-40 years old	238	67.0
41-60 years old	115	32.4
>60 years old	2	0.6
<b>Mother's Education</b>		
Junior High School	62	17.5
Senior High School	140	39.4
College	153	43.1
<b>Mother's Occupation</b>		
Employee	95	26.8
Entrepreneur	29	8.2
Housewife	231	65
<b>Mother's knowledge</b>		
Poor	113	31.8
Good	242	68.2
<b>Number of children</b>		
1 child	51	14.4
2 children	202	56.9
3 children	74	20.8
4 children	21	5.9
>4 children	7	1.97
<b>Family income</b>		
Low Income	232	65.3
High Income	123	34.6
<b>Family Type</b>		
Nuclear family	271	76.3
Extended Family	74	20.8
Single Parent	10	2.8
<b>Mother's movement behavior characteristics</b>		
<b>Sedentary behavior</b>		
Limit	263	74.1
No Limit	92	25.9
<b>Exercise habits (in the last 2 weeks)</b>		
>3 days a week	22	6.2
2-3 days a week	82	23.1
1 day a week	86	24.2
Never	165	46.5
<b>Sleep Habits (in the last 2 weeks)</b>		
>9 hours in a day	7	2
8-9 hours in a day	79	22.3
6-7 hours in a day	188	53
<6 hours in a day	81	22.8
<b>Child characteristics</b>		
<b>Child gender</b>		
Female	175	49.3
Male	180	50.7
<b>Moderate to vigorous activities</b>		
Never	103	29
1-2 days a week	160	45.1
3 days a week	41	11.5
>3 days a week	51	14.4
<b>Light physical activities</b>		
Never	21	5.9
1-3 days a week	92	25.9
Every day	242	68.2
<b>Children's sleep habits</b>		
<9 hours in a day	136	38.3
9-11 hours in a day	214	60.3
>9 hours in a day	5	1.4
<b>Have a habit of looking at gadgets before going to bed:</b>		
Not	179	50.4
Yes	176	49.6
<b>Personal gadgets</b>		
Have	184	51.4
Do not have	171	48.2
<b>Characteristics of the Child's Environment</b>		
<b>Availability of television or other electronic items in the child's room</b>		
Available	243	68.5
Not Available	112	31.5
<b>Availability of a safe play area in the home environment</b>		
Available	63	17.7
Not Available	292	82.3

characteristics including sedentary behavior, exercise habits, sleep habits; The characteristics of children refer to those of children aged 9-12 years, If a mother has more than one child within this age range, the oldest child will be selected for assessment. The child characteristics included gender, characteristics of the child's movement behavior (moderate to vigorous physical activity, light physical activity, and sleep duration), and personal gadgets. The questionnaire for children's movement behavior was developed based on WHO (2020) and Guan *et al.* (2020). It includes questions regarding the total time each day the child spent watching TV, using gadgets, and playing games outside. For moderate to vigorous physical activity, respondents were asked how many days in a week their child engaged in such activities for 60 minutes a day, with answer options of Never, 1-2 days a week, 3 days a week, and less than 3 days a week. For light physical activity, the question was how many days in a week the child participated in light activities for a certain number of hours per day, with answer options of Never, 1-3 days a week, or every day. Additionally, the questionnaire asked about the average duration of the child's deep sleep over 24 hours, with response options of < 9 hours per day, 9-11 hours per day, or > 11 hours per day.

The environmental characteristics and instruments include the availability of electronic media, specifically television in the child's bedroom, with answer options of yes or no, as well as safe residential access and play areas, and the ownership of screen media based on Nurwitanti (2019). This is measured by the availability of safe play spaces for children with the following criteria: (1) the presence of a large area or field, (2) the presence of safe and sturdy play equipment, (3) the absence of objects or materials that pose injury risks, (4) supervision by an adult, and (5) a home environment with minimal vehicle traffic. The ownership of screen media consisted of questions about whether the child owned personal gadgets and the habit of playing with gadgets before bedtime, both with answer options of yes or no.

Parental support was assessed using the Parental Support of Children's Movement Behaviors Questionnaire (Rhodes *et al.*, 2019), this questionnaire consists of support for children's physical activity, support for preventing sedentary behavior, and support for meeting children's sleep needs. The questionnaire includes two questions regarding each parameter. The scoring for each question was as follows: never/rarely = 1, 1-2 times per week = 2, 3-4 times per week = 3; almost every day = 4; every day = 5.

The questionnaire was translated into Indonesian and subjected to validity and reliability testing. Each question item demonstrated a calculated r-value exceeding 0.361, indicating validity. Furthermore, the overall reliability of the questionnaires was confirmed, with reliability coefficients of greater than 0.61. Eligible mothers had access to both questions after providing informed consent online. After obtaining consent, the mother completed and submitted both the online questionnaires. The average time required for the responders to complete the questionnaire was 20 min.

#### Data Analysis

Multivariate analysis was performed with logistic regression tests using binary logistic regression tests with backward elimination procedures ( $p < 0.05$ ) to identify the independent factors that had the greatest impact on the dependent variable.

#### Ethical considerations

Ethical clearance was granted by the Health Research Ethics Committee of the Faculty of Nursing, Universitas Airlangga (grant number 2285-KEPK). This research strictly implements ethical principles, before filling out the questionnaire the researcher explains the aims and objectives of the research, respondent rights and research procedures. The questionnaires were accessed by eligible mothers after obtaining informed consent, contained in an online form. Once consent was obtained, the mothers completed and submitted both the questionnaires online. The time required for respondents to complete the questionnaires was approximately 20 min.

#### Results

##### The characteristics of children, their mothers and families

According to the characteristics of the mothers and families, the results of this study indicate that most families are nuclear families (76.3%,  $n=271$ ). The majority of the mothers held a college degree (43%,  $n=153$ ), good knowledge (68.2%,  $n= 242$ ), were housewives (65%,  $n=231$ ), between the ages of 20 and 40 years (67%,  $n=238$ ), most of them having a low income (65.3%,  $n=232$ ). More than half of the families had two children (56.9%,  $n=202$ ). Among the mothers, 74.1% reported limiting their sedentary time ( $n=263$ ), whereas 46.5 percent of these mothers reported never exercising ( $n=165$ ). More than half of mothers (53 %,  $n=188$ ) sleep 6-7 hours per day. On the other hand, 50.7 percent ( $n=180$ ) of the children in this study were boys and engaged in moderate to intense exercise 1-2 days

Table 2. Parental Support Behavior (n=355)

Parental Support Behavior	f	%	Mean	SD
<b>Moderate to vigorous activities</b>				
Not support	301	84.1	1.15	0.359
Support	54	15.1		
<b>Light Activity</b>				
Not support	141	39.4	1.60	0.49
Support	214	59.8		
<b>Good sleep habit</b>				
Not support	71	19.8	1.80	0.40
Support	284	79.3		
<b>Prevent sedentary behavior</b>				
Not support	76	21.2	1.78	0.41
Support	279	77.9		

per week (45.1%, n=120). The majority of them engaged in light activity daily (68.2%, n=242) and slept between 9 and 11 h per day (60.3%, n=214). The environment was mostly available with television or other electronic items in the bedroom, at 68.5% (n=243), while safe play areas, most were not available (82.3%, n=292). The characteristics of Children, their mothers and Families are detailed table 1.

**Parental support behavior**

Based on parental support behavior, the majority of mothers did not support moderate-to-heavy activities (84%, n=301); however majority supported light activity

59.8% (n=214), good sleep habits 79.3% (n=284), and prevented sedentary behavior 77.9% (n=279) in their children. Parental support behavior is detailed in table 2.

Multivariate analysis results of factors that influence parental support for school-age children's movement behavior

Table 3 presents the findings from the multivariate analysis conducted in this study. The analysis indicated that the child's individual engagement in light activities was the principal factor influencing parental support for such activities on a weekly basis. Mothers with children

Table 3. Multivariate analysis results of factors that influence parental support for school-age children's movement behavior (n=355)

Variable	B	OR	95% CI		p-value
			Lower	Upper	
<b>Support for children's light activities</b>					
Children's light activity per week					
Never	-	-	-	-	<0.001
1-3 days per week	-	-	-	-	0.14
Every day	0.81	2.25	0.76	6.67	0.00
	2.04	7.70	2.72	21.84	0.02
<b>Support for moderate to vigorous activities</b>					
Mother's exercise					0.03
Never	-	-	-	-	-
1 day per week	- 0.42	0.65	0.26	1.63	0.36
2-3 days per week	0.49	1.64	0.75	3.55	0.21
>3 days per week	1.21	3.37	1.18	9.65	0.02
Children's sports					0.03
Never	-	-	-	-	-
1 day per week	1.32	3.75	1.34	10.46	0.01
2-3 days per week	1.06	2.89	0.79	10.55	0.10
>3 days per week	1.64	5.18	1.64	16.26	<0.001
Personal gadgets					
Do not have	-	-	-	-	-
Have	- 0.79	0.45	0.23	0.86	0.01
<b>Support preventing sedentary behaviors</b>					
Knowledge					
Poor	-	-	-	-	-
Good	0.85	2.33	1.34	4.05	<0.001
Mother's sleep duration					0.02
<6 hours	-	-	-	-	-
6-7 hours	0.89	2.46	1.27	4.75	0.00
8-9 hours	0.15	1.17	0.56	2.41	0.67
>9 hours	- 0.10	0.89	0.17	4.82	0.89
Personal gadgets					
Do not have	-	-	-	-	-
Have	-0.60	0.55	0.31	0.958	0.03
<b>Support for adequate and regular sleep</b>					
Children's light activities					0.03
Never	-	-	-	-	-
1-3 days	0.73	2.08	0.73	5.96	0.16
Every day	1.23	3.42	1.27	9.23	0.01
Personal gadgets					
Do not have	-	-	-	-	-
Have	-0.83	0.44	0.24	0.79	<0.001

who engaged in light activities one to three days per week were 2.25 times more likely to support light activities than mothers with children who never engaged in light activities per week (OR=2.25, 95% CI= 0.76-6.67). The mother's support for the child's moderate-to-vigorous activity was influenced by the mother's and children's own exercise activities, as well as the children's gadget ownership. Mothers who exercised more than three days per week were 3.37 times more likely to support moderate-to-heavy activities for school-aged children compared to mothers who never exercised in one week (OR= 3.37; 95%CI= 1.18-9.65). Mothers whose children regularly exercised more than three days per week will be 5.18 times more supportive of moderate to vigorous activities, compared to mothers whose children never exercised (OR=5.18; 95% CI= 1.65-16.26), whereas mothers whose children regularly exercised once per week will be 3.75 times more supportive of moderate to vigorous activities than mothers whose children never exercised. Mothers with children who have gadgets will be 0.45 times less likely to support moderate to vigorous activities than mothers with children who do not have personal gadgets (OR=0.45, 95% CI= 0.23-0.86).

Mothers' support for preventing school-aged children's sedentary behavior was influenced by factors such as their knowledge, sleep duration, and gadget ownership. Mothers who have good knowledge were 2.33 times more supportive of appropriate screen time activities, compared to mothers who have sufficient knowledge (OR=2.33; 95% CI= 1.34-4.05). Mothers who have adequate and regular sleep time were 2.46 times more likely to support healthy screen time than mothers who do not have adequate and regular sleep (OR=2.46; 95% CI=1.27-4.75). Mothers with children who have personal gadgets will be 0.55 times less likely to support preventing sedentary activities compared to mothers with children who do not have personal gadgets (OR=0.54; 95% CI= 0.31-0.95).

It was found that children's light activity and ownership of personal gadgets had a relationship with support for adequate and regular sleep. Children's daily light activity had a significant relationship with a p-value of 0.015 ( $\alpha < 0.05$ ). Mothers with children who had light activity every day were 3.42 times more likely to support adequate and regular sleep time than children who never did light activity for one week (OR: 3.42; 95% CI: 1.27-9.23). Mothers with children who had personal gadgets were 0.44 times less likely to support adequate and regular sleep activities, compared to mothers with

children who did not have personal gadgets (OR: 0.44; 95%CI= 0.24-0.79).

## Discussions

Mothers who are active in exercising more than three days a week will be more supportive of their children's moderate-to-vigorous activities. Parental mothers are role models for their children (Coto *et al.*, 2019). According to a study by Neshteruk (Neshteruk *et al.*, 2020), parents who support their children's activities have the highest score in motivating their children to participate in sports and other activities. Additionally, this type of parent can effectively manage how long a child spends focusing on a screen (Kaehler, Jacobs and Jones, 2016). According to Vaughn's study (Vaughn, Hales and Ward, 2013), parental assessment of children's sports activities is also related to children's activities, which can enhance their children's motivation to engage in sports by exemplifying positive sportsmanship, providing opportunities for their children to observe them exercising, encouraging discussions about sports, participating in physical activities together, and fostering enjoyment in these shared experiences. Furthermore, mothers' encouragement, such as verbal praise, practical assistance, family activities, and explicit modelling, can help boost children's desire to be physically active. In a different study, it was also stated that the motivation of parents to engage in physical exercise was linked to the motivation of children to engage in physical activity, as well as the intensity of activity (Lucas *et al.*, 2021). In contrast to mothers who do not engage in physical exercise, this study indicates that some mothers do not support moderate-to-vigorous activities. This may be due to the difficulties faced by mothers who do not exercise while serving as role models and motivating their children to participate in physical activities. Although the majority of mothers in this study were highly educated, factors such as time constraints and the demands of their professional commitments may have contributed to this lack of support (Al Yazeedi *et al.*, 2021).

Good maternal knowledge is more supportive in preventing sedentary behavior in children. Those who are knowledgeable about appropriate screen time limits are more effective in managing their children's engagement in sedentary activities, while others who possess knowledge about healthy lifestyles tend to exhibit healthy habits in their daily lives (Marciano, Petrocchi and Camerini, 2020). This is consistent with our findings, which showed that mothers who obtain

sufficient sleep are more likely to control their children's sedentary activities. Previous research indicates that children's activity levels are influenced by their parents' sleep habits, particularly those of their mothers (Zhang *et al.*, 2010), and sedentary behavior is related to adequate sleep duration (Souza *et al.*, 2022). Children who experience insufficient sleep are often affected by their parents' lack of sleep as parents serve as role models for their children at home. Parental lifestyle significantly impacts daily habits within the family, including both sedentary lifestyles and sleep adequacy (Coto *et al.*, 2019). However, children's personal gadget ownership reduces parental support in preventing sedentary activity. Children of mothers who are permissive to screentime are more sedentary than those of mothers who participate in sports (Neshteruk *et al.*, 2020). Parents who facilitate their children's use of personal devices provide opportunities to engage in activities such as watching videos and playing games (Chang and Lei, 2021). This behavior increases sedentary activity, characterized by prolonged sitting or lying down, and decreases children's movement behavior (Hanifah, Nasrulloh and Sufyan, 2023). Previous research has found that some parents justify facilitating their children's use of gadgets for purposes such as completing school assignments, keeping their children indoors, encouraging them to eat, and other reasons that allow parents to have time for themselves (Koirala *et al.*, 2021).

Mothers with children who engage in light activities every day are more supportive of adequate and regular sleep time than mothers with children who never engage in light activities for one week. In line with previous research, there was a relationship between sleep duration and physical activity in children (Williams *et al.*, 2014). This study indicates that active children who engage in high levels of physical activity throughout the day tend to have shorter sleep durations than their inactive peers. However, further investigation is needed to determine whether reduced sleep duration is correlated with lower sleep quality. These findings align with other studies suggesting that a higher proportion of vigorous physical activity during the day may disrupt sleep patterns (Ekstedt *et al.*, 2013). This is contrary to the phenomenon post the pandemic and the current digital era that brings new habits, where there is a decrease in physical activity accompanied by a decrease in sleep duration (Margaritis *et al.*, 2020), which is related to the use of digital media, which is difficult to let go of. The study findings indicate that personal gadget ownership is related to mothers' support in

preventing children's sedentary activities. Children who have personal gadgets tend to have longer screen times than children who do not have personal gadgets (Koirala *et al.*, 2021). A long screen time has an impact on the child's sleep duration, which will decrease and be poor in quality. These results are consistent with the meta-analysis results conducted by Jansen (Janssen *et al.*, 2020) that *screen time* has an adverse relationship with children's sleep patterns. It has been reported that short-range light waves (blue/green light) emitted from the screen suppress pineal melatonin secretion, which can affect the circadian cycle (via supra-chiasmatic nucleus signals) and sleep onset (via the hypothalamic ventrolateral pre-optic nucleus) (Higuchi *et al.*, 2014) (Chang *et al.*, 2014). Children who allocate more time to screens often participate in more social and educational activities. However, excessive and unrestricted screen time can negatively impact cognitive development and disrupt sleep (Lucas *et al.*, 2021); which is also in line with (Hale and Guan, 2015). Screen time, such as gaming and watching videos, negatively affects sleep duration, particularly when screens are viewed shortly before bedtime, and each hour of screen time reduces sleep duration by three minutes (Chang and Lei, 2021).

The limitations of this research include challenges in adjusting the distribution of respondents during the sample recruitment process, which resulted in the predominance of mothers with higher educational levels. Additionally, there was a limitation associated with the use of the backward elimination procedure, as the authors were unable to report all variables that were excluded during the regression process.

## Conclusion

Parental support for children's movement behavior is influenced by the characteristics of both mothers and children. Daily light activities performed by children influence maternal support for these activities as well as the adequacy and consistency of the children's sleep patterns. Additionally, children who possess personal gadgets impact parental support for moderate-to-vigorous activities, sedentary behavior, and sleep adequacy and regularity. Another finding of this study indicates that the duration of the mother's sleep affects her support for the child's sedentary activities. Furthermore, both the mother's and child's exercise habits, when practiced more than three days a week, significantly influenced the mother's support for the child's moderate-to-vigorous activities.

Excessive or insufficient physical activity disrupts the balance between the proportion of sleep and children's

daily activities. The implementation of nursing practices related to parental support in the physical activities of children should focus on optimizing parental knowledge, good habits, and their roles as role models. Additionally, more research is needed to expand our understanding of movement behaviors in children and parents in the Asian context.

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### Conflict of Interest

The authors declare that we do not have any conflict of interest.

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## The dementia certified nurse process for acquiring knowledge for care of older adult patients with dementia in acute care hospitals: a qualitative descriptive study

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### ABSTRACT

**Introduction:** Older adult patients with dementia experience unique physical and psychological problems. These conditions pose a challenge for nurses. Training and education have been developed to help DCNs face problems related to older adult patients with dementia. However, even with training and education, some DCNs may still struggle to effectively care for older adult patients with dementia because of the unpredictable nature of the disease and the individualized needs of each patient. This study aimed to explore DCNs' perceived knowledge acquisition in older adult patients with dementia in acute-care hospitals.

**Methods:** The study used qualitative methods, with 14 Japanese DCNs involved in the snowball sampling method. Face-to-face interviews were conducted between June and December 2016 by the principal investigator. A qualitative content analysis was used in this study. The study results were divided into nine categories and 31 sub-categories.

**Results:** This study highlights the process through which DCNs in acute-care hospitals acquire expertise in caring for older adults with dementia. Initially, DCNs faced dilemmas between patients' resistance to treatment and their professional priorities, leading to emotional and cognitive shifts that motivated them to seek specialized knowledge and refine their care methods. By reflecting on their experiences, integrating patient-centered approaches, and sharing insights with team members, DCNs deepened their understanding, adapted care strategies, and enhanced their clinical capacity to meet patients' needs effectively.

**Conclusions:** Nurses should provide appropriate training before taking care of the patients. Knowledge should be combined with patient's problems and behavior. Thus, nurses become more flexible in adapting to patients with dementia. These findings emphasize the importance of fostering reflective practices and educational interventions to enhance DCNs' expertise, enabling them to provide patient-centered care and improve outcomes for older adults with dementia.

**Keywords:** dementia, descriptive qualitative, learning, older adults, stress

### Introduction

In Japan, a 'super-aging society,' the number of people with dementia will have reached around

7,000,000 by 2025 (Ministry of Health, [2015](#)). As the percentage of dementia increases with age, the number of treatments for dementia patients with other chronic





illnesses and older adults receiving inpatient treatment to eliminate pain due to physical illnesses (Harashima et al., [2013](#)). Therefore, the Comprehensive Strategy of Promoting Dementia Measure (New Orange Plan), formulated in 2015, provides appropriate medical and long-term treatment according to the condition of dementia and the intervention of multidisciplinary teams to increase the quality of care (Juanamasta et al., [2021](#); Ministry of Health, [2015](#)). This underscores the critical need for healthcare professionals to possess comprehensive knowledge and skills in dementia care to ensure effective, compassionate, and holistic treatment of this growing population.

Furthermore, the addition of dementia care was included in the revision of the Medical Services Fee for dementia care for nursing jobs in acute care hospitals (Ministry of Health, [2015](#)). However, from the point of view of treatment priority or safety management, physical restraint or use of psychotropic drugs to reduce behavioral and psychological symptoms or delirium in older adult dementia patients are still practiced in acute care hospitals (Aunguroch et al., [2024](#); Kabaya et al., [2023](#)). It is difficult to judge the physical symptoms of older adult dementia patients, and it is challenging to observe practiced nursing care evaluations and results. These conditions lead nurses to accumulate stress and exhaustion (Senda & Mizuno, [2014](#)).

The study conducted by Fukuda et al. ([2015](#)) found that it is essential to prevent problematic behavior and protect the safety of hospitalized patients with dementia in Japan. Consequently, issues develop when patients' problematic conduct is repeated in the absence of family assistance, not to mention the shortage of qualified dementia nurses, which adds to the challenge for DCNs. DCNs are also caught in a bind because of the lack of time to speak with patients. Thus, it is important to solve these problems using DCNs in acute-care hospitals.

Training and education programs for dementia nursing have been developed overseas in domestic acute care hospitals, and there are initiatives to develop a self-assessment index for nursing practice in acute care hospitals (Ueno & Suzuki, [2016](#)). However, it is in the trial-and-error phase owing to a lack of education, research, and support systems for DCNs, which remains a challenge (Cowdell, [2010](#)). Moreover, DCNs in acute care hospitals were unable to understand and apply the meaning of dementia nursing that they experienced. Thus, they could not perform personalized nursing care by leveraging their experience, even though they had the time and mindset to do it (Eguchi et al., [2012](#)).

In other words, care for physically and psychologically complicated older adult dementia patients must be personalized. The method is sufficient for a patient but does not always give a similar result when applied to other patients, so DCNs have considered themselves unable to accumulate and make sense of their experience in finding the best care method during practice. By accumulating experience, DCNs can combine their theoretical and practical knowledge to enhance their overall clinical knowledge (Benner et al., [2011](#)). They can acquire expertise in proficiency by learning from their experiences to gain practical knowledge (Kanai & Kusumi, [2012](#)). Thus, to improve their practical skills, DCNs must gain practical knowledge that can be developed and used in various circumstances.

Competent DCNs can repeatedly analyze care methods that are deemed to sustain the continuity of secure medical treatment and a comfortable recuperation period afterward (Amagi et al., [2014](#)). DCNs are largely responsible for managing incidents related to dementia care in specialized facilities, requiring them to perform various roles as educators, coordinators, and advisors (Taneichi & Rokkaku, [2020](#)). For example, they can develop educational programs, lead staff training sessions, and oversee discharge planning from patient admission to discharge. Additionally, some DCNs contribute as members of their hospital's Psychiatric Liaison Team. Their work involves collaboration with patients with dementia, caregivers, and healthcare professionals, including nurses and non-specialists. As their responsibilities continue to grow across hospital and community settings, DCNs are positioned to take on even more diverse opportunities for dementia care. It can be inferred that they possess the appropriate knowledge of older adult dementia care. However, how they acquired and grasped their practical knowledge has not been clarified. Therefore, this study aimed to explore how DCNs in acute care hospitals acquire practical knowledge of the care of older adult dementia patients.

#### Literature Review

Acute care hospitals provide treatment for exacerbation of acute or chronic disease and provide 24-hours medical treatment for severely ill patients, offering physical therapy such as hospitalization, surgery, and examination for all disease stages, aiming for a complete recovery. However, hospitals do not provide psychiatric hospitalization care due to physical therapy or acute exacerbation of behavioral and

psychological symptoms in older adults with dementia. This makes it difficult for DCNs to manage them.

A previous study from the UK found that nurses were confused about how to take care of older adult dementia patients with delirium (Lin et al., 2012). Moreover, older adults with dementia have complex problems, including problematic patient behaviors, recurrent problems, and problems affecting many people equally (Fukuda et al., 2015). Nurses try to provide pharmacological and non-pharmacological support for taking care; however, there are conflicting principles due to care priorities and limited time in acute-care hospitals (Yous et al., 2019). These problems led the authors to consider how to provide appropriate care for them.

Meanwhile, practical knowledge is the knowledge gained while habitually using skills and putting them into practice (Benner et al., 2011). According to Jeffries (2020), knowledge used by nurses in their practice, while based on theoretical knowledge, has been adopted in some ways by combining it with experience and transforming it into an appropriate form according to circumstances at that time. Therefore, this study defines 'practical knowledge of older adult dementia patients' care' as knowledge and skills that generate appropriate practice by combining empirical knowledge gained in practice with theoretical knowledge.

Psychiatric dementia nurses in long-term care facilities face significant challenges in managing patients with dementia as they must navigate physically demanding workloads and often stressful work environments. These conditions frequently lead to heightened stress responses such as irritability and anxiety, which are more pronounced in this group than in other psychiatric nurses (Yada et al., 2014). The need to balance the emotional and psychological demands of caregiving, along with the physical toll, highlights the considerable difficulty of their role in providing consistent, patient-centered care for individuals with dementia over extended periods.

## Materials and Methods

### Research Design

This study used a qualitative method with a descriptive approach (Colorafi & Evans, 2016). Qualitative descriptive studies frequently draw on naturalistic inquiry, which advocates examining anything in its natural state to the extent possible within the confines of the research arena (Sandelowski, 2010). This strategy prevents the researcher from walking far away from or into the data. In addition, it employs a

categorical approach for interpretation (Lambert & Lambert, 2012). The real situations that DCNs experience while caring for older adults with dementia and solving patients' problems are important to describe the process of obtaining knowledge. The authors wanted to discover and understand the experiential learning process of gaining practical knowledge from DCNs who take care of older adults with dementia.

### Research Participants

The participants were 14 DCNs. In Japan, DCN (refers to a nurse who can practice high-level nursing for people in need everywhere by using professional nursing skills and knowledge in the field of dementia nursing. A DCN is required to have more than five years of appropriate work experience (including more than three years in the field of dementia nursing), undergo training at a designated educational institution, and pass the certification examination after obtaining a nursing license in Japan. A renewal review is obligatory every five years.

For convenience, five to six DCNs with appropriate requirements were obtained from a list of registered nurses published by the Japanese Nursing Association. The first author sent an email to contact them directly. In the email, the first author explained the purpose of the study and the plan for the interview. Two nurses gave a good response and made appointments to meet in the hospital where they were working. Each participant stayed at a different hospital. Before beginning the interviews, the author described the purpose of the research and provided informed consent. The DCNs who agreed to participate in the study signed an informed consent form. Furthermore, a snowball sampling method was employed, in which current participants were asked to recommend other potential participants from different acute care hospitals before their participation could be confirmed.

There were three male participants and 11 female participants, all of whom worked at different hospitals. Eight DCNs worked in private hospitals and the rest worked in public hospitals. One nurse was a head nurse, two DCNs were assistant head nurses, and the others were regular nurses. Ten participants were assigned to the hospital ward and four to the outpatient department. Average nurse experience was 18.7 years ( $SD\pm 6.9$ ), and average working experience was 18.0 years ( $SD\pm 6.0$ ). Additionally, the average working experience after obtaining a DCN qualification was 3.4 years ( $SD\pm 1.6$ ).

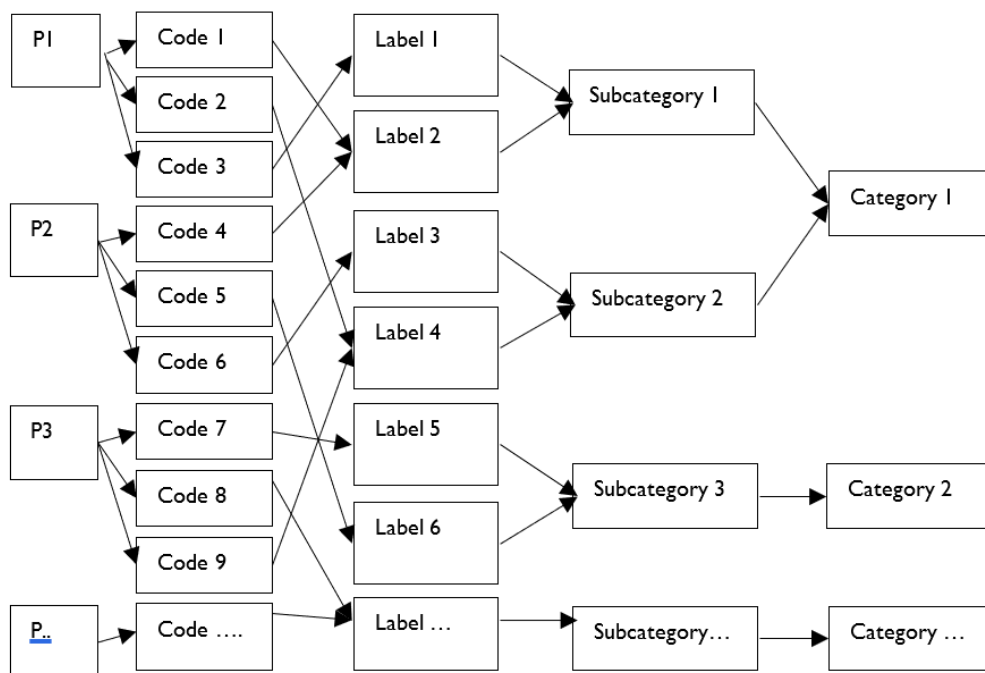


Figure 1. The process of data analyses from coding into category

### Data Collection

The data collection method used face-to-face interviews to understand the certified dementia nurses' experience concerning the acquisition of their knowledge (Doyle et al., 2019). The interviews were conducted from June to December 2016 and were recorded using a voice recorder. Two recorders were prepared to back up if there was a problem with the first recorder during the interviews. The Japanese Language was used for the interviews. The majority of the interviews were conducted in the hospital's ward meeting room in the afternoon after the participants' shifts ended. The first author interviewed each person individually for almost an hour, while the second and third authors examined the data saturation. Each participant was interviewed once. An interview guide was used to conduct semi-structured interviews to collect data for this study. The interview rules covered the demographics of the interviewees and the most important questions pertaining to the experience required for gaining expertise. Participants were asked to explain what kind of improvement they did (individual care and specialized care), what kind of experience could make them think of such improvement, and things that the participants realized through their experience. Information was collected from the perspective of the kind of process that led them to acquire practical knowledge.

### Data Analysis

Qualitative content analysis was used in this study (Yamamoto-Mitani et al., 2018). This approach was selected to summarize information content based on verbal and visual data (Sandelowski, 2000). Data analysis was performed in January 2017. Beginning with the time when nurses intended to earn certification, the researchers began collecting data on how and why they learned on-the-job skills. Word-for-word transcripts of the conversations were created and information from each interviewee was compiled. Ambiguity in meaning was confirmed by participants via phone. Several coding chunks were created using the appropriate data (Colorafi & Evans, 2016). Subsequently, each code was compared with the others. The identical information was merged and recoded into fewer categories. The association between codes was then used to sketch a network diagram depicting the connections between all participants.

Subcategories were then derived by continuously comparing and analyzing the codes provided by each participant. The process of interpreting and summarizing the linkages between subcategories led to the establishment of a correlation (Doyle et al., 2019). All procedures were recorded in Microsoft Excel to ensure confirmability and dependability. Anonymous descriptions of the participants were included to help demonstrate their context and to increase the generalizability (Cope, 2014). Additionally, a summary and diagram of the procedure was emailed to three study participants, and nurses were checked to ensure

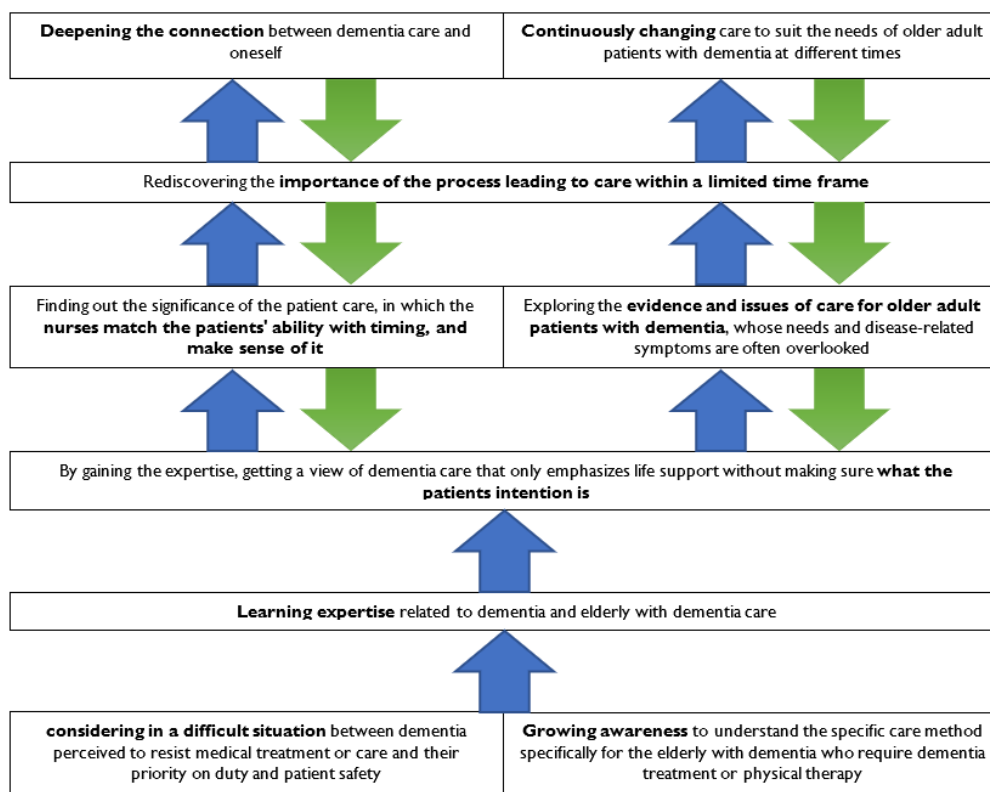


Figure 2. The process of acquiring practical knowledge regarding the care of older adult patients with dementia

the reliability of the research (Colorafi & Evans, 2016). Constant consultation with experts in qualitative descriptive research and geriatric nursing allowed us to refine the methods and produce more reliable results (Colorafi & Evans, 2016; Guba, 1981).

### Ethical Consideration

This study was conducted after receiving approval from the Research Ethics Committee of the Graduate School of Nursing (Ref. number 2016–002). Participants completed a consent form indicating that they understood the study's aim, objective, and methodology after hearing the details given to them both in writing and orally. It was made clear to the participants that their involvement was entirely optional and that they might stop at any time, even after giving their agreement. For reasons of confidentiality, the names of the participants or the institutions where the study was conducted were not disclosed. The information gleaned from the interviews would be kept strictly confidential and utilized only for the purpose of this study.

### Results

#### The Process of Acquiring Practical Knowledge in Older adult Dementia Patient Care at Acute Care Hospital

Acquiring practical knowledge in older adult dementia patient care by skilled DCNs at acute-care

hospitals was extracted into nine categories (Figure 1). Participants were anonymously numbered N1, N2, and so on to help the narration become more understandable.

#### DCNs' consideration

Both patients and DCNs were in difficult situations and wanted to do something about caring for older adult dementia patients. This was the beginning stage, which was a prerequisite for acquiring the practical knowledge of older adults with dementia. In acute care hospitals, disease treatment and the protection of the lives of patients are top priorities. Busy DCNs feel frustrated and exhausted by the behavior of older adult dementia patients who resist treatment and nursing care. The DCNs talked about their situation and were bewildered by the behavior of older adult dementia patients who refused treatment and nursing care and wanted to know what they should do. This sentiment factor became the triggered them to seek a breakthrough from the current situation.

*"Patients, who were admitted to the facility (nursing homes), were used to being independent, or how should I say it, they could normally go to the restroom. Nevertheless, while they were hospitalized, they wondered why they had to be restricted even for something as ordinary as going to the restroom" (N3)*

The nurse was confronted by a situation that subjectively challenged their view of nursing, felt doubts, and became their motivation for consideration. DCNs want to do something more about dementia care than just physical restraint or drug treatment.

#### Growing awareness

This topic category is in line with category one. The initial stage was a prerequisite for acquiring practical knowledge of older adult dementia patient care. Instead of practicing care that is believed to be 'sufficient' based on their own experience, by learning the basics of the care, DCNs wanted it to become care which satisfies the patients ethically considered needs.

*"Of course, when I was there or if there were other persons, it was allowed to take off (the physical restraint), and there were many occasions when I was dealing with a patient, and it could be taken off. However, I could not explain to the staff logically"* (N1)

#### Learning expertise

In addition to learning about the characteristics of dementia pathology and symptoms, DCNs also acquire expertise. This includes learning the way of thinking towards dementia care in general, and points of attitude when facing older adult dementia patients, through participating in training, self-learning through books or literature, in order to learn basic knowledge regarding dementia pathology and symptoms. Two DCNs stated:

*'Ethics and dignity, in the end, older adults care is about those. I feel that I was often made to think about that (during training to obtain C.N. qualification)'* (N4);

*'During CN training, there were teachers who taught me not to rush when solving problems'* (N11).

The DCNs talked about their situation when their learning led them to the 'core' part of appropriate care and its attitude, for practicing care for older adult dementia patients.

#### Patients' intention

By learning the expertise, the DCNs realized that there were many one-sided interactions without making sure of the patients' intentions. This disrupted the patients' natural pace to become skeptical of their conventional care, in which they focused only on life support.

*"There was a patient over 100 years old., who was hospitalized. When the patient could not eat anymore, at first, we put in the nasal feeding tube, but the patient*

*may pull the tube out, so we put the mitten on the patients' hand or other things to prevent that. However, is that what the patient really wants? Absolutely no, and I wonder with the current state of that 100 years old. patient, kept alive while being tied up, is it really, okay?"* (N12)

DCNs match the patients' ability with timing, and make sense of it.

By observing good reactions towards implemented patient care by observing older adult dementia patients' expression or receiving a fair assessment from others, the DCNs can increase their repertoire of care methods. This enabled them to match the patients' ability and timing, and this led to the accumulation of successful cases based on the expertise learned and effective care methods.

*"I ask other hospital staff about what I did. Furthermore, I ask the patients, too, like "I did this to you, how do you feel about that?" I ask, "How was the nurse who has tended to you recently?" and they answer, "Oh, she treated me gently." I also asked the doctor in charge, "How is the patient? I feel that he is getting a little bit calmer, what do you think?" If "the patient has become calmer and can communicate properly" it is written in the record, and I reckoned that my care worked well"* (N15)

#### Rationale and issues of care for older adult dementia patients

Exploring the rationale and issues of care approaches by looking at care experiences that caused confusion in older adult dementia patients or did not alleviate symptoms such as pain, the DCNs clarified the rationale and issues of their care. As DCNs did not have previous experience under similar conditions, they had difficulties in dealing with the patient with only their care methods repertoire, and after experiencing cases where patients were confused because of their trial-and-error care method, they improved from using the knowledge they had previously learned.

*"...I wrote about things that went well in my memo book for my motivation, but I wrote things that did not go well in the clinical record. I wrote things that I overlooked so that I will not forget it the next time..."* (N5)

*'I often met previous classmates during conferences where we would talk about things there, and I used that as my reference'* (N13).

*'When I looked back, I thought, "Therefore, it meant this as written in the textbook" I read the books, I felt that what is written in the books is accurate, and with my own words, I summarized and elaborated on it, while I was doing that'* (N15).

The importance of the process leading to care in a limited amount of time

This category started with the transformation of the perception and care attitudes of older adult patients with dementia. While understanding that patients need special dementia care, they interact with the same attitude as other adult patients and value their primary care. A deep understanding of the rediscovery process of memory is essential process of care. DCNs said:

*'I think that, after all, the patients are normal people before having dementia. I want the patients to see that I am interacting with them as adults, the same as adults with dementia'* (N11).

*"I think it is important to have respite, or rather, have the ability not to rush in solving the problem. I have to be quick in observing whether there is a physical disease that's making mischief in patients' bodies, but on the other hand, I need to wait for the patient's reaction slowly. I guess that is the critical thinking..."* (N7).

Deepening the connection

DCNs obtain an opportunity to experience the feelings and position of older adult dementia patients through role-playing, receiving advice, and encouragement from others. Furthermore, challenging and delightful aspects, such as older adult dementia patients' personalities, will help them to understand the subject.

*"So, the dementia patient has this side of them, the humorous side. When I interact with them, for example, "I will change the blanket sheets, here you hold this side, hold the corner, let us do it together ok?" and the patient replied, "ok, let us do that," and then the patient pulled the blanket sheets and started to dance. I felt the humor, it is enjoyable, and I felt that this kind of nursing intervention, interacting with patients, also has its fun part. Each patient is different from the others, and I guess there is one with a sense of humor"* (N13)

Continuing to change

The change category refers to changing the care method according to the physical condition that changes

due to the course of treatment and the condition and ability of dementia, while simultaneously devising care that is appropriate to the feelings and wishes of older adult dementia patients. While comprehensively assessing the patient's background, including physical environment, psychosocial environment, life history such as upbringing and occupation, medical history, and underlying disease, the DCNs practiced the care adapted to the situation while groping their way and at times continued to apply the methods selected from their various pieces of knowledge of care methods to suit the patient at that time.

*"The patient also values his family member's participation, or talking together, discussing how we should do something. Using that experience, if there is another patient with a similar cognitive function, I will use the experience when a patient with the same cognitive function is hospitalized. I can only imagine how hard it is to learn new things as you age. However, after all, I thought that I had to firmly support the patient if s/he wants to do it, even if s/he loses his temper..."* (N13)

As expressed above, rather than providing uniform care, which is deemed necessary, thinking about older adult dementia patients' situation and putting themselves in the patients' shoes led to improved caring that was closer to the feelings of older adult dementia patients' individuality.

## Discussions

The narratives of DCNs working in acute care hospitals were qualitatively and inductively analyzed to clarify the process of acquiring practical knowledge of older adult dementia patient care in acute care hospitals (Figure 2). As a result, nine categories were selected for practical knowledge acquisition. The use of a qualitative and inductive approach ensured in-depth exploration of the unique experiences and perspectives of DCNs, capturing the nuanced and context-specific processes of knowledge acquisition. This methodology underscores the originality of the study by providing rich, detailed insights into how training and real-world practices intersect to shape the expertise of DCNs, offering a comprehensive understanding that quantitative methods alone may not reveal.

The Growing Awareness That Leads to The Learning of Expertise

This study explored the process by which DCNs in acute care hospitals acquired practical knowledge of care. The DCNs started to acquire a sense of care when

they experienced dilemmas between patients' resistance to perceived medical treatment and nurses' priority of duty and patients' safety. The DCNs thought both of them were in a difficult situation and wanted to do something about it (Nopita Wati et al., [2023](#)). DCNs have increased awareness of care methods for older adult patients with dementia. Rational and emotional consciousness met simultaneously, which led DCNs to learn the expertise of older adults with dementia.

Both consciousnesses' simultaneous existence was thought to increase the motivation to acquire practical knowledge of older adult dementia patient care. There is cognition before expressed emotions and actions, and it is perceived that cognition influences emotions and actions (Araújo et al., 2020; Steward et al., 2020). DCNs and their patients have unconsciously acquired practical knowledge of techniques to deepen their contact. In this state, DCNs' cognition changed their emotions and behaviors that encouraged 'positive perception' to perceive terminal care practices that would support the nurses involved in terminal care (Bakanic et al., [2016](#); Jeong et al., [2020](#); Kang & Choi, [2020](#)).

In this study, DCNs talked about situations where they had negative emotions such as confusion about the behavior of older adult dementia patients who interfered with treatment and nursing work at an early stage and had doubts about their care or others'. However, DCNs shifted to the positive feelings of 'I want to do something' and 'I want to know more' rather than increasing negative emotions and continuing to worry. The desire for a sense of care to acquire specialized knowledge skills was the start of acquiring practical knowledge. The cognitive model states that humans are motivated to solve the problems they face by themselves (Deci & Moller, [2005](#)). Hebbecker et al. ([2019](#)) stated that external sources of feedback and goals are significant intrinsic motivation factors. Thus, it is crucial to encourage DCNs who have negative emotions and are worried about caring for older adults with dementia to motivate them to acquire positive awareness and specialized knowledge skills through educational intervention.

#### Integration of Expertise and Care Experience in Practice

The DCNs received a new viewpoint on older adult dementia patient care that only emphasized life support without ensuring their intention. The DCNs ignored the psychology-social-spiritual aspects before they learned expertise. Therefore, to find an effective care method that significantly impacts patient care, the DCNs matched the patient's ability with timing. Moreover, DCNs made sense of it and explored the rationale and

issues of care for older adult dementia patients whose needs and disease-related symptoms are often overlooked. Through this process, the DCNs were able to rediscover the importance of the process leading to care within a limited amount of time.

To 'make sense of experience' is an interpretive activity that consists of the individual events that occur to oneself or occur in various ways as a whole to be meaningful to oneself and gives meaning to each event as a part of it (Fatania et al., [2019](#)). Older adult dementia care in acute care hospitals included changes in the symptoms of dementia patients regardless of the care content, such as when the pain caused by the underlying disease is alleviated as the treatment progresses, resulting in good changes, which may lead to 'self-satisfying care' for the DCNs. However, DCNs valued successful cases, found the significance of care, and at the same time seriously confronted the cases that did not work and searched for the rationale and issues of their care. Nagoshi and Kakehashi ([2005](#)) clarified that nurses' experiences with terminal cancer patients are a core experience of self-reflection, broadening horizons, and improving nurses' clinical ability. For DCNs who make sense of this experience, it is believed that by approving their nursing and sharing information with team members, meaning will be reinforced, and team nursing will be enhanced (Fatania et al., [2019](#); Pennbrant et al., [2020](#)). Moreover, DCNs acquire knowledge from their experiences and share experiences with team members.

The 'make sense of experience' process included self-introspection of when there was a bad response from a dementia patient, so reviewing the care that had been provided and searching for the cause of physical and psychological symptoms, the awareness of new perspectives and standpoint of caring for older adult dementia patients, and clarification of the rationale and issues of the patient care broadened horizons while sharing care experience with others that would lead to improved clinical performance. Thus, as a result of circulating in both phases, the DCNs continued to change their care according to the physical condition and behavior of older adult dementia patients during treatment progression. The DCNs explored patients' emotions and deepened the connection between older adult dementia patients and nurses (Fatania et al., [2019](#)).

Deepening the means and improving the clinical capacity of nursing care advancements can be used for further care by reflecting on the treatment of older adult dementia patients. Reflecting included determining the

importance of patient care that would match the patients' timing and make sense of it. After transforming it into progress in nursing care, exploring the rationale and issues of care creates awareness of the process that leads to the method of care. The entire phase can form a cycle that is the process of rediscovering significant care in a limited amount of time. The transformation is similar to how the nursing perspective or caring behavior is reassessed by giving meaning to the experience.

Feedback causes changes to subsequent experiences and leads to the development of nursing care behavior (Brown et al., 2019; Lobchuk et al., 2016). This phase developed the deepening of the relationship between older adult patients with dementia and DCNs, and the adaptation of appropriate care to the physical condition and behavior of older adult patients with dementia and their emotions. In addition, DCNs learn the ability to transform practical knowledge into an appropriate form. This depended on the existing situation through which the repeated deepening of each phase provided more meaning to experience.

Future research should focus on developing and testing targeted educational interventions that guide DCNs from negative emotions such as confusion or doubt to positive motivation for acquiring specialized care skills. Studies could explore the cognitive-emotional interaction in expertise acquisition, emphasizing reflective practices, team-based learning, and the integration of intrinsic and extrinsic motivators, such as feedback. Additionally, research should evaluate the "make sense of experience" framework across various care settings, assess the dynamics of patient-nurse interactions, and explore culturally sensitive approaches to training. Integrating the psychological, social, and spiritual dimensions into care models could improve patient outcomes, deepen nurse-patient connections, and enhance job satisfaction while driving advancements in dementia care.

The acquisition of practical knowledge by qualified nurses is a reflection that clarifies the issues and rationale of care through a flashback of experiences of care at case study meetings and conferences, and sharing the experience of care with others. Reflection is an essential process of thinking in practical learning on how to understand and make sense of the experience itself in practical learning (Suzuki, 2015). Reflection is a deliberate thinking process that allows us to broaden and change our perspectives on a situation and create new nursing practices by recalling and carefully examining our experiences (Tamura, 2014).

In current acute care education, which is characterized by the fact that there is not always a role model for older adult dementia care, it has been suggested to develop a method with facilitators at each stage to ensure that individual nurses can effectively reflect upon their older adult dementia care patients. Furthermore, simulation practice has the advantages of enabling students to experience reality and moderate tension, motivating learning, and providing feedback from the patient's perspective (Shin et al., 2015; Tamaki et al., 2019).

## Conclusion

In this research, the feelings and positions of older adults with dementia were experienced, which were then included in the process of acquiring practical knowledge. Increasing simulation practices and role-playing in current education can stimulate a sense of care. Furthermore, this will provide an opportunity to receive feedback from the perspective of dementia patients and help individual DCNs acquire practical knowledge in older adult dementia patients' care.

There is a possibility that the interpretation of the data might be biased, and the generalizability and transferability might limit acute-care hospitals in Japan. In the future, our challenge will be to expand the subject to nurses other than DCNs, clarify how the awareness of the sense of care to acquire practical knowledge grows, accumulate data on the details of the process, and consider specific educational support methods that will lead to step-ups from each phase.

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# A systematic review and meta-analysis of sleep hygiene implementation and its effect on sleep quality and fatigue in patients undergoing hemodialysis

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## ABSTRACT

**Introduction:** The prevalence of patients undergoing hemodialysis who experience sleep disturbances and fatigue is high. Pharmacologic management has consequences and adverse effects, therefore, integrative intervention is important to be investigated. Sleep hygiene is one such integrative intervention that improves comfort including enhancing sleep quality and reducing fatigue. However, none have synthesized the effect of sleep hygiene intervention, particularly in the hemodialysis setting. This systematic review aims to synthesize the effectiveness of sleep hygiene in improving sleep quality and fatigue in patients undergoing hemodialysis.

**Methods:** This is a systematic review and meta-analysis of randomized controlled trials and quasi-experimental studies. Relevant studies were gathered by searching five databases from 2008-2023 using several keywords, such as sleep hygiene, sleep quality and fatigue. Quality assessment was conducted using relevant tools from the Joanna Briggs Institutes (JBI). Following that, synthesis of research findings was conducted using Review Manager version 5.4.

**Results:** Seven studies of 3,633 screened were included, with one high-quality study (88%) and six studies of moderate quality (61-76%). The review indicated a significant difference in sleep quality (MD = -2.36; 95% CI = -4.28, -0.44; p=0.016). However, there was no significant difference in fatigue (SMD = -0.08; 95% CI = -0.40, 0.24; p=0.61).

**Conclusions:** The evidence supports that sleep hygiene is effective in enhancing sleep quality. This systematic review contributes evidence to support the inclusion of sleep hygiene into holistic nursing to assist patients in improving sleep quality and reducing fatigue.

**Keywords:** fatigue, hemodialysis, sleep hygiene, sleep quality

## Introduction

Chronic kidney disease (CKD) is considered one of the major public health issues worldwide, and its incidence continues to rise (Kovesdy, 2022). This disease affects more than 800 million people (Kovesdy, 2022). The global prevalence of CKD stands at 13.4% (11.7-15.1%), with patients requiring kidney replacement therapy for end-stage CKD estimated to be between 4.9-7.1 million (Lv and Zhang, 2019).

Patients suffering from chronic kidney disease experience a loss of more than 90% of their kidney function, disrupting the body's balance in maintaining fluid and electrolyte equilibrium. This condition necessitates kidney replacement therapy for individuals with CKD. Hemodialysis is the most widely used kidney replacement therapy, and its numbers continue to increase annually (Himmelfarb et al., 2020). Hemodialysis involves filtering metabolic waste using a

membrane that functions as an artificial kidney, commonly known as a dialyzer. Most patients require 12 to 15 hours weekly for hemodialysis, divided into two or three sessions lasting 3 to 6 hours each (Majlessi et al., 2022).

Patients undergoing hemodialysis frequently encounter various issues, including chronic fatigue, anxiety, depression, and a decline in sleep quality, all of which impact their well-being, health, and their quality of life (Al Naamani et al., 2021). It is estimated that approximately 8%-36% of patients with early-stage CKD and 50%-75% of patients with end-stage CKD requiring hemodialysis experience insomnia, reduced sleep quality, and chronic fatigue (Tan et al., 2022). These physical discomforts are the concern to holistic nursing.

Understanding the holistic processes that lead to a patient's well-being is important. Pharmacological and non-pharmacological therapies can manage sleep disturbances and fatigue in hemodialysis patients. Pharmacological therapy involves drugs such as melatonin supplementation and benzodiazepines or non-benzodiazepine receptor agonists, which appear to be effective in improving sleep quality and reducing patient fatigue (Asghar et al., 2020; Cukor et al., 2021; Fatemeh et al., 2022). However, these pharmaceuticals come with several consequences and adverse effects such as drug dependence, renal clearance issues, and a higher risk of death (Asghar et al., 2020). Therefore, non-pharmacological therapies are an alternative and may be more beneficial for patients with CKD (Li et al., 2021). Non-pharmacological therapies include foot reflexology, back massage, acupressure, and sleep hygiene. Although there are several non-pharmacological therapies for improving sleep quality and reducing fatigue in patients undergoing hemodialysis, sleep hygiene might be the primary choice due to its simplicity and ease of application compared to other non-pharmacological interventions (Ebrahimi et al., 2023).

Sleep hygiene is an integrative intervention suitable for hemodialysis patients (Natale, 2018). Sleep hygiene has been used to address sleep disorders in the dialysis context since 2008 (Chen et al., 2008). Sleep hygiene can be conducted as a stand-alone intervention or as part of Cognitive Behavior Therapy (CBT). When it is part of CBT, sleep hygiene encompasses a set of behavioral programs that address behavior patterns, environmental improvements, and other sleep factors tailored as therapy to enhance sleep quality and reduce fatigue (Haynes et al., 2018; Herscher et al., 2021). According to recent research by Ebrahimi et al. (2023), implementing sleep hygiene significantly enhances

sleep quality, reduces fatigue levels, and decreases the risk of depression in hemodialysis patients (Ebrahimi et al., 2023). Despite this, the full implementation of sleep hygiene practices has not been maximized in holistic nursing practice.

The provision of holistic communication and a therapeutic environment is one of the core values of holistic nursing (Mariano, 2019). Sleep hygiene can be considered as an intervention that aligns with these values. Sleep hygiene comprises a modification of internal and external environments, including physical, emotional, environmental, and spiritual components. Providing sleep hygiene education could enhance holistic nursing practice to serve patients in their physical environment of healing.

Sleep hygiene has been tested in various settings (Irish et al., 2015). We note an existing systematic review that examined the potential effectiveness of sleep hygiene in patients with insomnia in general practice (Chung et al., 2018). However, available evidence of the effectiveness of sleep hygiene hemodialysis setting is still limited. Available review focus on the effectiveness of non-pharmacological therapies to improve patient's sleep quality (Natale, 2018). Further literature reveals no reviews on the effectiveness of sleep hygiene in the hemodialysis setting. Therefore, a systematic review that aims to synthesize the effectiveness of sleep hygiene on patient's sleep quality and fatigue is required.

## Materials and Methods

### Review design

This is a systematic review and meta-analysis. The Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines were followed in preparing this review (Page et al., 2021). This study has been registered with the International Prospective Register of Systematic Reviews (PROSPERO) with the registration number CRD42023486804 on 7 December 2023.

### Search Strategy

The literature search was conducted from November to December 2023 across five databases: Scopus, Google Scholar, ProQuest, PubMed, and ScienceDirect. The search began after the publication of a study on sleep hygiene in dialysis patients in 2008 (Chen et al., 2008).

Several keywords were used in the search process: (Sleep Hygiene) OR (Cognitive Behavioral Therapy) AND (sleep quality) AND (fatigue) AND (Hemodialysis), with

language and year filters applied. We employed the term ‘cognitive behavioral therapy’ because sleep hygiene is a part of it (Natale, 2018). The complete list of terms used in the search is detailed in [Table 1](#).

**Inclusion and exclusion criteria**

The PICO framework was adopted for literature selection (Richardson et al., 1995): 1) Population: patients aged >18 years undergoing maintenance hemodialysis, 2) Intervention: sleep hygiene, 3) Comparison: standard care or usual care for hemodialysis patient or routine training offered at the hemodialysis unit, 4) Outcome: sleep quality and fatigue. These characteristics specified studies were seeking to obtain.

Beyond the PICO framework, additional inclusion criteria included: (i) being an empirical study that is either a randomized controlled trial, studies with pre-post intervention analyses and control groups, or quasi-experimental studies, (ii) studies published between 2008 when a study on sleep hygiene in patients undergoing dialysis was published until 2023, and (iii) studies reported in the English language.

Exclusion criteria included systematic or narrative reviews, protocols, meta-analyses, and concept analyses. Two reviewers independently and simultaneously conducted the filtering process, which involved screening titles, abstracts, and full texts.

**Study selection and data extraction.**

In the initial search process, all identified studies from various databases were exported to Rayyan, a free, semi-automated web-based program used to check for duplicate articles and to preliminary screen titles and abstracts (Ouzzani et al., 2016).

Two reviewers independently screened in blinded mode. Titles and abstracts were filtered based on inclusion criteria. The initial screening results were reviewed after deactivating the blinded mode. Discrepancies between the two reviewers were resolved through discussion.

In the next step, full-text articles were retrieved from the included studies after the initial screening. We obtained restricted access articles by contacting study authors through ResearchGate and requesting permission to access full-text articles. Then, we read all included articles to determine their relevance. The relevance of the article is adjusted to the inclusion and exclusion criteria that we set. Differences of opinion were resolved through deliberation until a consensus was reached. Data extraction was conducted using Microsoft Excel (Version 365). We extracted data that encompassed authors, year and country, study design, participants, disease type, intervention, control group, measurement instrument, and outcomes.

Table 1. Literature Search

Database	Search statement	Result
Google Scholar	<b>Technique 1: Without Limiters</b> Effectiveness OR Influence AND Sleep Hygiene OR Cognitive Behavioral Therapy AND Sleep Quality AND Fatigue AND Hemodialysis	5,950
	<b>Technique 2: With Limiters: Year of publication</b> Effectiveness OR Influence AND Sleep Hygiene OR Cognitive Behavioral Therapy AND Sleep Quality AND Fatigue AND Hemodialysis <b>Filters:</b> from 2008-2023.	426
PubMed	<b>Technique 1: Using MESH without Limiters</b> (((Sleep Hygiene) OR (Cognitive Behavioral Therapy)) AND (sleep quality)) AND (fatigue) AND (Hemodialysis)	11
	<b>Technique 2: Using MESH with Limiters: text availability, article type, year of publication, and language.</b> (((Sleep Hygiene) OR (Cognitive Behavioral Therapy)) AND (sleep quality)) AND (fatigue) AND (Hemodialysis) <b>Filters:</b> Full text, Randomized controlled trial, from 2008-2023, English language.	5
ProQuest	<b>Technique 1: Without Limiters</b> Sleep Hygiene OR cognitive behavioral therapy AND sleep quality AND fatigue AND Hemodialysis	111,265
	<b>Technique 2: With Limiters: text availability, source type, year of publication, subject, document type, and language.</b> Sleep Hygiene OR sunnah of sleep OR cognitive behavioral therapy AND sleep quality AND fatigue AND Hemodialysis <b>Filters:</b> Full text, scholarly journal, from 2008-2023, sleep and patients, article, English language.	528
Science Direct	<b>Technique 1: Without Limiters</b> “Sleep Hygiene” OR “cognitive behavioral therapy” AND “sleep quality” AND fatigue AND Hemodialysis	8,165
	<b>Technique 2: With Limiters: Year of publication, article type, language</b> “Sleep Hygiene” OR “cognitive behavioral therapy” AND “sleep quality” AND fatigue AND Hemodialysis <b>Filters:</b> from 2008-2023, research articles, English language.	2,670
Scopus	<b>Technique 1: Without Limiters</b> “Sleep Hygiene” AND “Cognitive Behavioral Therapy” AND hemodialysis	8
	<b>Technique 2: With Limiters: Year of publication, document type, and Language.</b> “Sleep Hygiene” OR “Cognitive Behavioral Therapy” AND hemodialysis <b>Filters:</b> from 2008-2023, articles, English language.	4
<b>TOTAL</b>		3,633

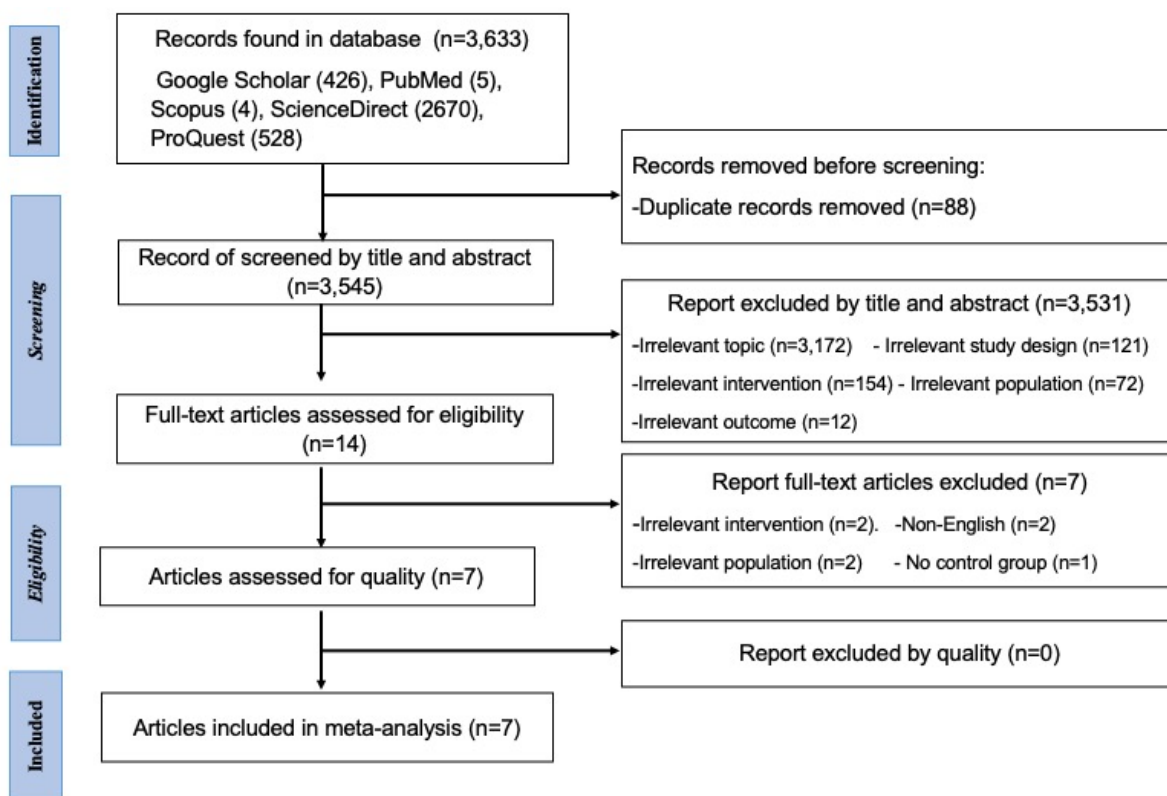


Figure 1. PRISMA flowchart

Appraisal of risk of bias

Critical appraisal was conducted using the Joanna Briggs Institute (JBI) Appraisal Tools, tailored to the study designs, including randomized controlled trials (13 questions) and quasi-experimental studies (9 questions). The appraisal was independently performed by two reviewers. Articles were categorized based on quality, with overall scores calculated as the percentage of “yes” responses from the critical appraisal tools. Scores above 80% are considered high quality, 60%–80% are moderate, and less than 60% are considered low quality (Munn et al., 2020). Any discrepancies in the

assessment process were resolved through discussion. We only included high and medium-quality studies in this review.

Data synthesis and analysis

The statistical software Review Manager version 5.4 was utilized to perform a meta-analysis following Cochrane recommendations (Higgins et al., 2023). The analysis involved inputting study data, including the mean post-intervention values, standard deviations, and sample sizes for each group. A random-effects model was employed, utilizing Standard Mean Difference (SMD) and Mean Difference (MD) to report continuous

Table 3a. Assessment of methodological quality of included studies (randomized controlled trial)

	Chen et al., (2011)	Hou et al., (2014)	Muz et al., (2021)	Saeedi et al., (2014)	Shareh et al., (2022)	Soleimani et al., (2016)
Q1	N	Y	Y	Y	Y	Y
Q2	N	N	Y	N	N	N
Q3	Y	Y	N	Y	N	N
Q4	N	N	Y	N	N	N
Q5	N	N	N	N	N	N
Q6	Y	N	N	N	N	N
Q7	N	Y	Y	Y	Y	Y
Q8	Y	Y	Y	N	Y	Y
Q9	Y	Y	Y	Y	Y	Y
Q10	Y	Y	Y	Y	Y	Y
Q11	Y	Y	Y	Y	Y	Y
Q12	Y	Y	Y	Y	Y	Y
Q13	Y	Y	Y	Y	Y	Y
	61%	69%	76%	61%	61%	61%
	<b>M</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>M</b>	<b>M</b>

Q1. true randomization used for participant’s assignment Q2. Concealment of allocation to treatment groups, Q3. Similar baseline of treatment groups, Q4. Blinding of participants to treatment assignment, Q5. Blind of those delivering treatment assignment, Q6. Blind of outcomes assessors, Q7. Identical treatment of groups, Q8. Adequate description and analysis of follow up, Q9. Participants was analyzed in the groups to which they were randomized, Q10. Similar outcomes measured in treatment group, Q11. Reliable outcomes measurement, Q12. Appropriate statistical analysis, Q13. deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?

Table 3b. Assessment of methodological quality of included studies (Quasi-experiment)

Ebrahimi et al., (2023)	
Q1	Y
Q2	Y
Q3	Y
Q4	Y
Q5	Y
Q6	N
Q7	Y
Q8	Y
Q9	Y
<b>Percentage Category</b>	<b>88% H</b>

Q1. The clarity of cause and effect in the study, Q2. Similar comparison of included participants, Q3. Similar treatment to the participants, Q4. Availability of control group, Q5. Multiple measurements of the outcome both pre and post the intervention/exposure, Q6. Adequate description and analysis of follow up, Q7. Similar outcome measurement of participant, Q8. Reliable outcome measurement, Q9. appropriate statistical analysis used.

**Notes:** The quality assessment outcomes were determined using the Joanna Briggs Institute Critical Appraisal Checklist. Responses marked as “Y” indicate “yes,” while “N” denotes “no.” Total score > 80% is categorized high quality, between 60% and 80% denote moderate quality, and < 60% indicates low quality. The category marked as “H” signifies “High,” and “M” refers to “Medium”.

data within a 95% confidence interval. MD was used when all data were scaled consistently across collected studies, while SMD was used when inputted data were measured using different tools (Higgins et al., 2023). Heterogeneity was calculated using the Higgins I<sup>2</sup> statistic: low (<25%), moderate (25-75%), and high (>75%) (Crombie & Davies, 2009). A fixed-effect model was applied if heterogeneity was low (I<sup>2</sup><50%), whereas a random-effects model was used for high heterogeneity was high (I<sup>2</sup>>50%) (Higgins et al., 2023). Effect sizes with p-value<0.05 were considered statistically significant in this systematic review (Higgins et al., 2023).

In this review, sleep quality was analyzed using the Random-Effects model with MD, as variable being scaled with the same measurement tool, yielding an I<sup>2</sup>=94%. Conversely, for the fatigue variable, the fixed-effects

model with SMD was employed as this variable was scaled with differing measurement tools, resulting in an I<sup>2</sup> value of 0%.

## Results

### Study Selection

Figure 1 presents the PRISMA flowchart for study selection. A comprehensive search across five electronic databases identified 3,633 studies. Eighty-eight were removed due to duplication. After eliminating duplicates, the remaining 3,545 articles underwent screening based on title and abstract, with 3,531 excluded as did not meet the eligibility criteria. A total of 14 full-text articles were collected and being reviewed. Seven of 14 articles were excluded due to these reasons: two were non-English articles, two encompassed irrelevant interventions, two involved irrelevant participants, and one lacked a control group. The remaining seven articles underwent quality assessment. Ultimately, seven articles of moderate to high quality were included in the review.

### Characteristics of the included studies

Table 2 provides the characteristics of the included studies. The studies included in this review were published between 2011 to 2023. The seven included studies were conducted across four countries: Iran (n=4), China (n=1), Taiwan (n=1), and Turkey (n=1). Six were RCTs (n=6) and one quasi-experimental (n=1), encompassing 611 participants, with n=307 in the intervention group and n=304 in the control group.

All included studies examined sleep hygiene interventions derived from CBT for Insomnia (CBT-i) (Haynes et al., 2018; Jang et al., 2013; Morin, 2004). Therefore, three studies referred to sleep hygiene as a component of CBT, three labelled it a sleep hygiene training program, and one termed it sleeps health education. Sleep hygiene was administered by trained

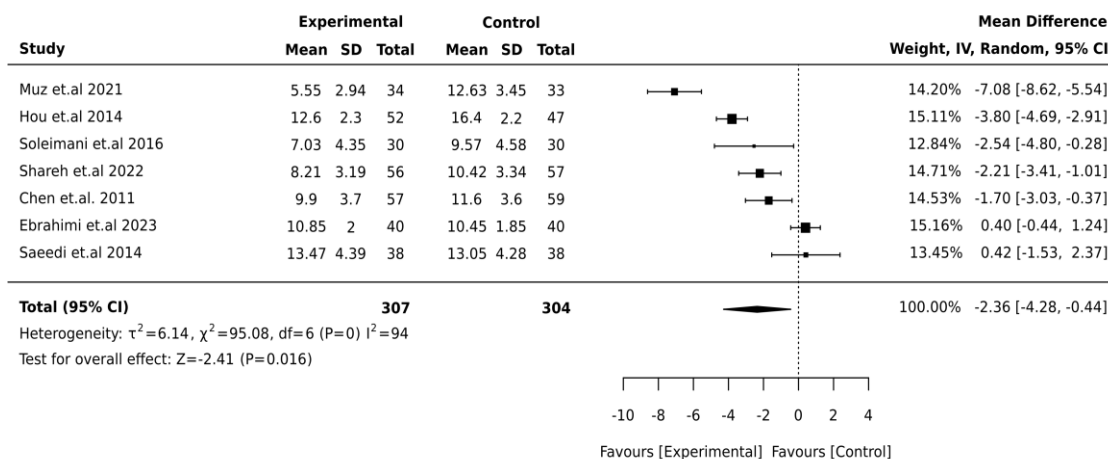


Figure 2. Synthesis of sleep hygiene on sleep quality

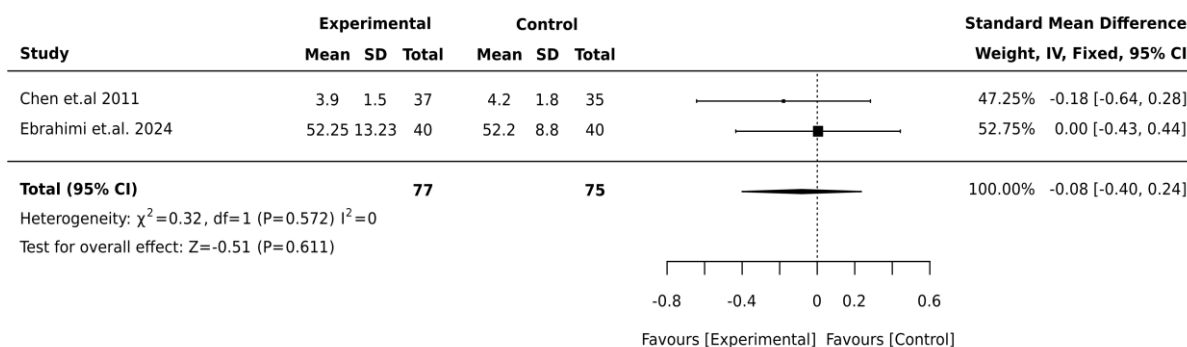


Figure 3. Synthesis of sleep hygiene on fatigue

healthcare professionals such as nurses. The delivery of sleep hygiene occurred in multiple sessions, including one session (n=2), two sessions (n=1), three sessions (n=2), six sessions (n=1), and nine sessions (n=1). On average, sleep hygiene was provided for durations of 30 minutes (n=3), 20 minutes (n=2), 40-60 minutes (n=1), and 90 minutes (n=1). Sleep hygiene was administered to the intervention group, while the control group obtained usual care (n=3) or standard care (n=2) and routine training for hemodialysis units (n=2).

In this systematic review, we aimed to synthesize the effects of sleep hygiene on patient’s sleep quality and level of fatigue. All seven studies employed the PSQI to evaluate individual’s sleep quality (Chen et al., 2011; Ebrahimi et al., 2023; Hou et al., 2014; Muz et al., 2021; Saeedi et al., 2014; Shareh et al., 2022; Soleimani et al., 2016). Two instruments were utilized to measure fatigue: the Multidimensional Fatigue Inventory (MFI) (Ebrahimi et al., 2023) and the Fatigue Severity Scale (FSS) (Chen et al., 2011)

**Risk of bias of methodology**

Each study’s quality and risk of bias were evaluated. The critical assessment was categorized into two types based on the study designs: 6 RCTs and 1 quasi-experimental study. The assessment was conducted using the JBI critical assessment tool, with the quality scores of the seven included studies ranging from >60% to a maximum scale of 100%. One study was categorized as high quality, with an overall score of 88%, and six studies were categorized as moderate quality, with overall scores ranging between 61% and 76%. Table 3a and 3b displays the quality assessment of the seven included studies.

**Effectiveness of interventions**

*Sleep Quality*

Seven studies evaluated the effects of sleep hygiene on sleep quality were further synthesized (Chen et al., 2011; Ebrahimi et al., 2023; Hou et al., 2014; Muz et al.,

2021; Saeedi et al., 2014; Shareh et al., 2022; Soleimani et al., 2016). These studies included 611 participants and assessed sleep quality using the 9-item PSQI. The meta-analysis (Figure 2) showed a significant improvement in sleep quality in the intervention group compared to the control group (MD = -2.36; 95% CI = -4.28, -0.44; p = 0.016).

*Fatigue*

Two out of seven studies, involving 152 participants, assessed the effectiveness of sleep hygiene on fatigue (Chen et al., 2011; Ebrahimi et al., 2023). The meta-analysis results (Figure 3) found no significant changes in fatigue compared to the control group, as measured by the MFI and FSS (SMD = -0.08; 95% CI = -0.40, 0.24; p = 0.61).

**Discussions**

**Summary and interpretation of findings**

This systematic review aimed to identify and synthesize the effectiveness of sleep hygiene interventions on sleep quality and fatigue levels among hemodialysis patients. The analysis and synthesis were performed on six RCTs and one quasi-experimental study. From these various findings, we consolidated results from different study designs into a meta-analysis. Such integration allows for generalizability and yields more accurate results (Nestoriuc et al., 2008; Parker et al., 2013). The meta-analysis aimed to evaluate the impact of sleep hygiene interventions on fatigue and sleep quality among hemodialysis patients. The analysis focused on immediate post-intervention measurement outcomes.

The meta-analysis revealed patients’ sleep quality improved significantly following the intervention. The seven included studies demonstrated positive outcomes in enhancing sleep quality post-intervention (Chen et al., 2011; Ebrahimi et al., 2023; Hou et al., 2014; Muz et al., 2021; Saeedi et al., 2014; Shareh et al., 2022; Soleimani et al., 2016). The sleep hygiene interventions



incorporated training, behavioral strategies related to sleep hygiene, behavioral strategies to enhance sleep hygiene, sleep restriction, and sleep-related behavioral modifications, aiming to support better sleep quality improvements in patients. These findings align with studies conducted on chemotherapy patients, which also reported improvements in the intervention groups following sleep hygiene interventions (Bean et al., 2020; Elmetwaly et al., 2019; Zengin and Aylaz, 2019). Previous study demonstrates positive effect of sleep hygiene for patients with heart disease (Redeker et al., 2022). These five studies included indicate that sleep hygiene enhances sleep quality over time in patients with chronic diseases. Herscher et al, (2021) also proves that sleep hygiene interventions are proven to be effective in enhancing sleep quality for hospitalized patients (Herscher et al., 2021). Additionally, a previous systematic review indicated that while sleep hygiene aids in improving sleep quality (Chung et al., 2018).

Our review shows that fatigue levels exhibited no significant changes in patients' post-intervention. Two studies reported negative outcomes in reducing fatigue levels following sleep hygiene interventions among hemodialysis patients (Chen et al., 2011; Ebrahimi et al., 2023). Despite slight differences, these studies indicated no improvement in the mean post-test scores in the intervention groups after receiving sleep hygiene. These findings differ from several studies involving cancer patients undergoing chemotherapy, which showed higher mean post-test score changes between groups after sleep hygiene interventions (Bean et al., 2020; Zengin and Aylaz, 2019). These differing findings might be attributed to several reasons.

The first reason for these differing outcomes might be attributed to the relatively shorter duration of sleep hygiene intervention compared to studies involving chemotherapy patients. We believe an extended intervention duration could yield a more optimal effect, resulting in more significant changes in post-test mean values. The second reason for differing outcomes might be physiological factors, specifically the severity levels of the two diseases. Conversely, hemodialysis is typically employed end-stage renal disease (ESRD) (Kalantar-Zadeh et al., 2021). Therefore, patients undergoing hemodialysis tend to experience more physiological challenges than those undergoing chemotherapy, potentially exacerbating their fatigue. For instance, individuals with chronic kidney failure have elevated levels of urea and creatinine. Increased urea levels inhibit the production of erythropoietin hormone, leading to a decreased red blood cell count. Reduced red

blood cell production or count decrease the blood's capacity to circulate oxygen to patient's body tissues, resulting in chronic fatigue (Gregg et al., 2021).

The third reason behind these differing findings could be the use of different measurement tools to evaluate the intervention. Our meta-analysis results indicate that different measurement scales contribute to non-significant effect sizes. Hence, further studies are recommended to employ standardized measurement tools to assess the impact of sleep hygiene on fatigue in patients undergoing hemodialysis.

This systematic review has several limitations. The primary constraint this study is the limited number of studies available for meta-analysis, which the scarcity of RCTs or quasi-experimental studies investigating the effectiveness of sleep hygiene despite employing specific keywords in the search across databases. This limitation results in a lack of comprehensive exploration regarding the impact of sleep hygiene on patients undergoing hemodialysis. Secondly, our critical assessment of the methodology in our systematic review reveals that among the seven included studies, only one was of high quality, with the remaining six being of moderate quality. Therefore, future studies particularly in RCTs should be improved by considering blinding techniques, notably double-blind and triple-blind methodologies, to enhance quality and minimize biases to a greater extent. Thirdly, our review is confined to patients undergoing hemodialysis and does not represent individuals with other chronic diseases. Consequently, it remains necessary to ascertain the suitability and efficacy of sleep hygiene for various chronic conditions.

This systematic review and meta-analysis provide valuable insights into the effectiveness of sleep hygiene interventions on sleep quality and fatigue levels in hemodialysis patients. The findings indicate that implementing sleep hygiene interventions enhances sleep quality in these patients. These outcomes underscore the significance of integrating sleep hygiene into clinical practice as a routine aspect of nursing care for individuals undergoing hemodialysis. Including diverse research designs and varying quality levels in the study enables a comprehensive understanding of sleep hygiene interventions.

Despite variations in measurement tools, administration methods, intervention durations, and outcomes, the review provide valuable evidence for healthcare professionals to evaluate specific outcomes of sleep hygiene interventions that could significantly impact the quality of life for hemodialysis patients. Thus,

healthcare providers should prioritize healthcare professional training, especially for hemodialysis unit nurses, who predominantly dedicate their time to patient care during hemodialysis sessions (Hill et al., 2023). This approach could enhance the capacity of healthcare providers, thereby improving the visibility and accessibility of sleep hygiene interventions for patients.

Future research on sleep hygiene for hemodialysis patients requires attention to some key points. Subsequent studies should utilize the standardized measurement tools in assessing the impact of sleep hygiene, especially on sleep quality and fatigue. Additionally, future research should contemplate the duration of intervention delivery to attain more optimal and significant outcomes. Furthermore, prioritizing enhancements and improvements in the quality of experimental research, notably RCTs, which are the gold standard in clinical trials, should be a focus. It could involve considering blinding techniques, especially double-blind and triple-blind methodologies, to minimize biases to a greater extent (Webber and Prouse, 2018).

## Conclusion

This review demonstrates the effectiveness of sleep hygiene in improving sleep quality among hemodialysis patients. However, meta-analysis indicates no significant decrease in the fatigue levels of patients. Therefore, we argue that the differing findings in the effectiveness of sleep hygiene may stem from variations in the duration of intervention, physiological factors, and differences in measurement tools across all included studies. Healthcare providers should consider sleep hygiene interventions as standalone interventions or as part of CBT that can assist patients in enhancing sleep quality and reducing fatigue.

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Table 2. Characteristics of the included studies.

Author (year), country	Design	Participant		Intervention		Control group	Measurement Tools*	Outcome
		Number, TOTAL E/C	Mean age, total, E/C	Method	Duration			
Ebrahimi et al., (2023) Iran	Quasi-Experimental	80 participants (40/40)	37,05/42,55	The intervention group received both direct (face-to-face) and indirect (via instructional booklets) sleep hygiene education. <ul style="list-style-type: none"> <li>• Explain the study's aims, sleep physiology and biology, factors that increase or degrade sleep quality, and characteristics of good and bad sleep.</li> <li>• Various types of sleep problems and recommendations to manage</li> <li>• Teaching relaxation and meditation methods</li> </ul>	3 sessions and each session took 40 - 60 minutes.	The routine training offered at the hemodialysis unit.	PSQI is used to measure sleep quality, MFI is used to assess fatigue.	There was a statistically significant difference between the two groups in terms of total quality of sleep (p = 0.001) and fatigue (p=0.001).
Chen et al., (2011) Taiwan	RCT	72 participants (37/35)	E/C= 57/59	CBT programs video assisted during HD sessions, as well as group discussions and education. Sleep hygiene includes sleep restriction, stimulus control and relaxation training.	CBT treatment sessions are 30 minutes long for three weeks and sleep hygiene education during 6-week period.	standard care routine hemodialysis unit.	PSQI to measure sleep quality, FSS to measure fatigue.	<ul style="list-style-type: none"> <li>• PSQI scores in the intervention group reduced significantly</li> <li>• FSS scores did not reduced significantly between group</li> </ul>
Hou et al., (2014) China	RCT	99 participants (52/47)	E/C= 54,5/52,4	Sleep-related modifications to behavior and progressive muscular relaxation were part of the cognitive behavioral therapy.	±20-min interval of training for 3 months.	Usual treatment for hemodialysis patients.	PSQI to evaluate sleep quality.	After treatment, the overall scores and scores for each category were lower between group (P<0.01).
Muz et al., (2021) Turkish	RCT	67 participants (34/33)	E/C= 59,41/60,60	During the training session, all participants get sleep hygiene training recommendations. After the training is completed, the patient were asked every week about sleep issues and changes due education.	Once a week for 3 weeks, each session for 20 minutes.	Standard care for hemodialysis patients.	PSQI is used to measure sleep quality	After intermediate and final follow-up, the intervention group's PSQI became significantly more than the control group (p<0.05).
Saeedi et al., (2014) Iran	RCT	76 participants (38/38)	E/C= 52,27/57,87	The direct sleep hygiene training program consists: <ul style="list-style-type: none"> <li>• Session 1: Introduction, explanation on objectives of the study and sleep physiology</li> <li>• Session 2: Exploring successful sleep factors as well as various forms of sleep difficulties.</li> </ul>	6 sessions weekly for half an hour.	Standard care not specified	PSQI is used to measure sleep quality.	There were no significant differences in global mean scores or sleep quality component scores between the two groups.

Author (year), country	Design	Participant		Intervention		Control group	Measurement Tools*	Outcome
		Number, TOTAL E/C	Mean age, total, E/C	Method	Duration			
Shareh et al., (2022) Iran	RCT	113 participants (56/57)	E/C= 43,7/46,4	<ul style="list-style-type: none"> <li>The session 3: A review of the guidelines for sleep hygiene education.</li> <li>The sessions 4 and 5: Behavioral Intervention Training.</li> <li>The session 6: Review sessions, feedback evaluations, and the delivery of an educational brochure.</li> </ul>		Usual treatment for hemodialysis patients but not specific.	PSQI to assess sleep quality.	There was a significant improvement of sleep quality between groups ( $p < 0.001$ ).
Soleimani et al., (2016) Iran	RCT	60 participants (30/30)	The mean age is not specifically explained	<p>The protocol for sleep health education:</p> <ul style="list-style-type: none"> <li>The first parts explored the sleep process and its importance, as well as its influence on daily activities and the importance of the sleep environment.</li> <li>The second section focused on sleep-related health behaviors.</li> </ul>	For one hour with each part lasting 30 minutes	Usual treatment not specified	PSQI	Mean of PSQI scores changed significantly between groups ( $p = 0.034$ ).

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## I. DESCRIPTION

Jurnal Ners provides a forum for original research and scholarships relevant to nursing and other health-related professions. Jurnal Ners is a scientific peer-reviewed nursing journal that is published biannually (April and October) by the Faculty of Nursing Universitas Airlangga, Indonesia, in collaboration with the Central Board of the Indonesian National Nurses Association.

The journal particularly welcomes studies that aim to evaluate and understand the complex nursing care interventions which employ the most rigorous designs and methods appropriate for the research question of interest. The journal has been publishing original peer-reviewed articles of interest to the international nursing community since 2006, making it one of the longest standing repositories of scholarship in this field.

Jurnal Ners offers authors the benefits of (1) A highly respected journal in the nursing field; (2) Indexed in major databases, such as [SCOPUS](#), Science and Technology Index (SINTA); Directory of Open Access Journal (DOAJ); (3) Rapid initial screening for suitability and editorial interest.

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The scope of this journal includes studies that intend to examine and understand nursing health care interventions and health policies which utilize advanced nursing research from the Asian perspective. Jurnal Ners publishes research related to clinical settings, community, and health policy in Asia from comparative and international views.

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Table 1. Effects of plant growth regulator types and concentrations on embryogenic callus induction from leaf tip explants of *D. lowii* cultured in 1/2 MS medium supplemented with 2.0 % (w/v) sucrose under continuous darkness at temperature of 25 ± 2 °C after 60 days of culture

Table 3. Maternal and child health care-seeking behaviour for the last pregnancy in women aged 15 – 45 years old

Type of care	Age Groups (Years)							
	<30		30 - 39		40 - 45		All Age	
	n	%	n	%	n	%	n	%
<b>Place for antenatal care</b>								
Village level service (Posyandu, Polindes or Poskesdes)	1	9.1	1	4.6	1	3.5	3	4.8
District Level service (Puskesmas/Pustu)	2	18.2	7	31.8	1	3.5	10	16.1
Hospital, Clinics, Private Doctor or OBGYN	1	9.1	4	18.2	2	6.9	7	11.3
Private Midwife	7	63.6	10	45.5	25	86.2	42	67.7
<b>Place of Birth</b>								
Hospital	5	50.0	5	22.7	4	13.8	14	23.0
Birth Clinic/Clinic/Private health professional	5	50.0	15	68.2	21	72.4	41	67.2
Puskesmas or Pustu	0	0.0	2	9.1	0	0	2	3.3
Home or other place	0	0.0	0	0	4	13.8	4	6.6
<b>Ever breastmilk</b>								
No	1	9.1	1	4.6	1	3.5	3	4.8
Yes	10	90.9	21	95.5	28	96.6	59	95.2
<b>Exclusive breastfeeding</b>								
No	4	36.4	10	45.5	18	62.1	32	51.6
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Reference to a Book:

de Virgilio, C. & Grigorian, A. 2019, 'Surgery: A case based clinical review' in *Surgery: A Case Based Clinical Review*, pp. 1-689.

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Harper, M.S. 2021, 'Mental health and mental health services' in *Services to the Aging and Aged: Public Policies and Programs*, pp. 283-297.

Reference to a Website:

WHO (2021) *WHO Coronavirus Disease (COVID-19) Dashboard: Situation by Country, Territory & Area*.

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Yuarnistira, Nursalam, N., Rachmawati, P.D., Efendi, F., Pradanie, R. & Hidayati, L. 2019, 'Factors Influencing the Feeding Pattern of Under-Five Children in Coastal Areas', IOP Conference Series: Earth and Environmental Science.

Reference in Statute:

Pemerintah RI (2014) *Undang-Undang Republik Indonesia Nomor 38 Tahun 2014 Tentang Keperawatan*. Indonesia. Available at: <https://peraturan.go.id/common/dokumen/ln/2014/uu38-2014bt.pdf>.

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