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Bridging the Education Gap: Developing Clinical Judgement through an Unfolding Case Study

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Abstract

Background: Nursing education programs continue to face an immense amount of change over a short period of time. The introduction of the National Council of State Boards of Nursing (NCSBN) clinical judgement model (NCJMM), the Next Generation (NGN) version of the National Council Licensure Examination for Registered for Registered Nurses (NCLEX-RN), and *The Essentials: Core Competencies for Professional Nursing Education* from the American Association of Colleges of Nursing (AACN) have nursing programs quickly adjusting curriculum to meet national nursing education agency's recommendations for future nurses.

Methods: This paper provides reflection and interventions for nursing educators and leaders to consider as they navigate the post-pandemic healthcare demands of new graduate nurses. Implementing activities encouraging critical thinking to build clinical judgement is paramount for undergraduate nursing curriculum.

Conclusion: Curriculum must match the required knowledge and skills of their discipline. With the growing acuity of illness and diversity of those seeking healthcare, nursing knowledge does not merely represent textbook content, but a mindset which can analyze the full clinical picture and plan of care accordingly.

Key Words: AACN Essentials, Clinical Judgment, Undergraduate, Nursing Education, Unfolding Case Study, Nursing Students

Introduction and Background

Continuing in the post-pandemic world of nursing education is by no means an easy task for educators. Many programs are still in the process of rebuilding a "new normal" structure of traditional brick and mortar-based education programs, transitioning online courses back to ground based on program needs. Prelicensure registered nurse programs (associate and baccalaureate alike) face not only how to navigate the post-pandemic healthcare system, but a remapping of curriculum based on *The Essentials: Core Competencies for Professional Nursing Education,* set forth by the American Association of Colleges of Nursing (AACN) (2021).[1] In addition, programs are still reeling from the introduction of the Next Generation (NGN) version of the National Council Licensure Examination for Registered

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Nurses (NCLEX-RN) by the National Council of State Boards of Nursing (NCSBN) and the National Clinical Judgement Measurement Model (NCJMM) pre-pandemic, in which faculty found themselves rushing to adjust learning activities to match the framework for the NCLEX-RN exam changes slated to be implemented in 2023. Curricular changes must enable new graduates to employ clinical reasoning and judgment in all aspects of the patient plan of care.

What is known regarding clinical judgement, critical thinking, clinical reasoning, and application of knowledge to practice is not new: it is essential for nurses to employ for safe patient outcomes. In fact, they have been pioneered by leaders in the field of nursing such as Patricia Benner and Christine Tanner; even the *nursing process* serves as foundation for developing clinical judgement. However, in an industry such as healthcare, with its ever-expansive reach and diversity of acuity and needs of populations, nursing education is called to evolve further. The push for NCLEX-RN exam reform started as far back as 2012 when the NCSBN conducted a literature review of 200 manuscripts to find, indeed, nursing education was making changes, but more importantly, 50% of nurses were involved in errors in which 65% were attributed to poor clinical decision-making/judgement; in addition, 80% of employers were not satisfied with the decision-making skills of novice nurses.[2] The AACN has responded with the new *Essentials*(2021) in order to meet the demand for new graduates that are "*residency-ready*"; and produce generalist nurses prepared to practice in any setting.[3] While the aforementioned strategies to address novice nurse practice issues are relative to the United States, it is plausible to assume the concepts of clinical reasoning and judgement for safe practice extends beyond locality and geographic borders.

The question for educators may now be one of "*where to start?*" and "*what is the priority?*": the answer to which is not clearly discernable but can be managed by incorporating elements of the aforementioned. To state it plainly…use what we already know as nurses and educators; draw from personal practice experience and recreate situations as application-based learning for students. Referring to the KISS mnemonic (keep is simple stupid), create the activity to push the bar of student knowledge, but simplify the process for them to get to the right solution!

The Strategy in Real Life

During this author' stint in prelicensure nursing programs, and prior to introduction to the NGN and NCJMM, the hype in education was *application-based* and *active learning*. With a non-education-based master's degree, there was a lot of independent education under taken by this author to fully grasp these concepts. In the end though, it all made sense…teach what you know, using actual life experience as a registered nurse! Make the knowledge being brought to the table digestible and provide it through meaningful examples that can be remembered and recalled later. This is also where educators struggle, not so much lack of experience, but more of *how* to recreate a meaningful learning experience. As educators, we have been involved in plenty or training or educational activities which may have left us wanting more; this is the *meaningful* part of learning or lack-of-meaningfulness in some instances. Where do we draw the line between *fun* (which often is the substitute for active learning) in the classroom and *acquisition* of knowledge? Meaningfulness of application! The theory to knowledge gap can be bridged not just through clinical experiences in the field, but interactive classroom engagement and, this authors favorite, high-fidelity simulation (HFS).

Creating an Unfolding Case Study to Improve Clinical Judgement

The idea to create an unfolding case study came from the desire to incorporate course content and concepts students traditionally struggled with in the second medical surgical course taken senior year. Based on trending standardized testing scores on the Health Education Systems Incorporated (HESI) Medical-Surgical specialty exam and unit exams, the following themes emerged: concepts related to circulatory overload, distributive shock, complications related to neuro/spinal injuries, and acute respiratory deviations (mainly hypoxic failure and V/Q mismatch). During brain storming this author remember a patient assignment, from years back, fitting a lot of these concepts. From there the unfolding case study was built.

Ethical Determination of Participants

The author and simulation director worked together to create an application-based learning experience for the students. No data (identifiable or non-identifiable) was collected from students participating in this learning exercise. The simulation activities completed by students was part of their clinical experience and mandatory. As part of the standard debriefing process adopted by the nursing program, students were videotaped, and group performance was viewed by peers and the faculty leading the debriefing. Students signed a photo/ video release upon enrolment in the nursing program which was applicable to this student experience. It was determined there was no risk to confidentiality or anonymity of participants therefore no formal submission for review of human subjects research was submitted to an institutional review board (IRB).

Patient Scenario

Week 1 of the unfolding case study, students are introduced to their patient; a 24-year-old male involved in a motor vehicle accident (MVA). The patient was unrestrained and transported to the emergency department (ED) via ambulance with a cervical collar in place. Following testing and examination, the patient's diagnosis is complicated by a left lower leg fracture, facial lacerations, and 2 rib fractures. The remaining assessment upon admission to the ED is unremarkable and the patient is awaiting transfer to surgery for fixation of the left lower leg, then admission to the trauma step down unit. As the scenario progresses over the next 3 weeks, the patient decompensates quickly over a period of 36 hours (representing closely the patient scenario encountered in practice). The patient unfortunately suffers a pneumothorax following surgery, basilar skull fracture develops, chest tubes, central venous and arterial lines placed. The developssepsisthe last week or the scenario and remains on prolonged mechanical ventilation related to respiratory failure and ARDS.

Meaningful Learning Through Simulation

Students in the second medical surgical course completed a six-week clinical rotation (two 12-hour days). For the last 4 weeks, student spent 1 full day (12 hours) on an in patient nursing unit, and on the second day students are on the unit for 8 hours, then spent the remaining 4 hours in the simulation lab. During this time, they completed a pre-briefing, high-fidelity simulation, followed by debriefing. Each week the patient scenario continued to evolve into a more acute prognosis than the week before. Working with the simulation director, the HFS mannequin's appearance would change weekly as the scenario unfolded, making the pre-briefing activity match the simulation experience for that day.

In each session the students were introduced to that week's patient condition and engaged in a pre-briefing activity requiring them to work as a team to identify items which were to be included in the following categories and write them on a whiteboard: 1) Immediate patient concerns, 2) interventions to address each concern, and 3) potential complications related to the overall scenario. A fourth category, not on the whiteboard, was Socratic in methodology in which the pre-briefing facilitator asked students how the nurse would evaluate if interventions had been effective, or, if another intervention is indicated. Most clinical groups did not exceed 10 students, with the usual number of 8 students per rotation. Based on a 16-week semester, the entire class rotated through the simulation before finals week and HESI Medical-Surgical specialty exam testing.

Following the pre-briefing activity students divided into groups of 3 or 4 and completed a HFS based on the patient scenario for the week. Students were challenged to apply knowledge of the patient's status to the status in which they found the patient in the sim lab and respond to changes in status and orders received during their simulation. Each student group's simulation was catered to one aspect (concern) of the patient's status; however, students were not aware of the priority concern prior to entering the sim lab. If pre-briefing identified a change in neuro status, one of the groups would be given this aspect and required to plan care accordingly. If crackles were identified, and the concern was possible sepsis/ ARDS, students had to adjust priorities, and so on with each group. Student simulation groups were video recorded, and students signed release (photo and video) upon admission to the nursing program.

After all groups completed simulation, students would watch each groups performance via video recording and reflect on strengths and weaknesses.

The facilitator for debriefing had the task of walking the students through each separate scenario and point out which items were missed, which were addressed, and those which students ran out of time to complete (routine ordered tasks such as re-taping the endotracheal tube, hanging antibiotics, wound care, etc.). Having the ability to review personal performance, receive peer feedback, watch their peers' performances, and guidance from the facilitator, afforded them the ability to redesign the plan of care for the simulated scenario.

Application to Current Educational Endeavors

With the push for curriculum revision based on the *Essentials*, a shift in content delivery from the more "traditional" model of educators as the knowledge dealer, to the educator as a facilitator of learning, challenges programs to adopt concept-based learning as the new paradigm. This style of teaching is not new to education, but one which may not have been introduced to all finding themselves nestled in a faculty position; especially those without an education-focused master's or doctoral degree. Many programs have made, or are making, the shift to concept-based curriculum which encourages problem-solving, critical thinking, and affords nurses the ability to transfer and apply knowledge to the clinical situation. The ability to critically think and adjust the patient plan of care efficiently will assist in bridging the theory to practice gap problematic to new graduate nurses. Building clinical judgement and reasoning is essential for success in bedside practice at all educational levels and specialties of nursing, but it must have the foundations somewhere…and that place is undergraduate nursing education. Instead of "filling student's heads with facts" it would be more beneficial to teach students a consistent, systemic approach to understanding patient needs, planning care, and adjusting the plan of care as situations arise throughout the workday.[4] Waiting until a new graduate nurse enters practice, which can for many be an overwhelming experience, is not the optimal environment to build clinical reasoning and judgment.

Healthcare has always been complicated and peppered with obstacles to adapt to and overcome, but the post-pandemic world still seems unforgeable at times with many uncertainties looming overhead, and in the distance. A recently published article (2023) reports new graduate nurses often require additional education and mentoring clinically which may take up to six to nine months.[5] This additional training of new nurses is costly, timely, and further delays human resources (nurses) desperately needed at the bedside. Prolonging new graduate precepting, or steps in the residency process, to maximize clinical judgment and reasoning is not the end-all solution. A 2016 survey by the NCSBN noted while knowledge of the profession is essential it does not equate to clinical judgement equal to safe patient care, and elements of clinical judgment are stepwise and progressive.[2] Understanding the lag-time between research and its emergence mainstream; these results are already eight years behind! Therefore, implementing activities to build critical thinking and clinical judgement are imperative at the beginning of a nursing curriculum.

The NCJMM, designed to develop clinical judgement, is divided into 4 layers. Layer 3 represents 6 cognitive processes which are critical for clinical judgement. When looking at the specifics of each process, they closely resemble to the pre-briefing activities of the simulation exercise described above. Under layer 3, skills 1 (analyzing cues) and 2 (organizing clues) are like step 1 on the whiteboard (immediate concerns). Skills 3 (prioritizing hypotheses) and 4 (generating solutions) align with step 2 (identifying interventions for each concern), and steps 5 (take actions) and 6 (evaluation) cover step 3 (potential complications-prioritizing and differential diagnoses) and evaluation of effectiveness sought from the pre-briefing facilitator. The unfolding case study was created prior to the introduction of the NCJMM but goes to show how what we know as nurses and educators can be applied in a way to build student's clinical reasoning and judgment. Using guidance from the *Essentials*, and the NCJMM as the basis for clinical judgment, a curricular roadmap can be built to thread content throughout nursing curriculum in a stepwise fashion as identified by the NCSBN 2016 study.

The Next Step

What is known of the NGN NCLEX-RN is there has been a shift from traditional test question format (multiple choice, matching, multiple select) to one of which involves application of higher-level cognitive

skills involving multiple processes required of a nurse in practice. There are a minimum of three case studies along with a patient's health record, and six questions per case study using the six steps of the NCJMM Layer 3.[5] Unlike the traditional straight forward question writing of the NCLEX of old, new items include information in which the tester must decipher as critical or not to the patient's case. More so now is it ever important for educators to teach not just the knowledge of disease processes and interventions, but how to look at the overall patient picture and break it down into the sum of its parts. Analyzing trends in intake and output, labs, chest x-rays, etc. are all parts of the overall clinical picture.

Case studies can assist the student in determining the "*nice to know*" versus "*need to know*", expected versus unexpected findings, prioritizing interventions, and organizing the plan of care. Concept mapping is a way to help students organize symptomatology and the nursing process. Socratic method for questioning is a favorite of this author during classroom instruction. Seeking feedback from students about what is the next step in the plan of care, then if that intervention creates another situation…" *what should you as the nurse do now*?" The most exciting part of these activities is how the educator uses them; even combine concepts from multiple resources to develop an innovative activity for student achievement of clinical judgement. For clinical associated with the unfolding case study and simulation, this author created clinical paperwork using concept mapping of the patient's overall health status during their hospital stay. Included on a separate sheet were questions requiring the student to prioritize elements in the plan of care based on trending data and test results, scheduled testing, and potential complications related to the patient's health state.

The unfolding case study and revised clinical paperwork were implemented for three semesters; then the face of education was changed by COVID-19, halting all in-person activities. To continue with progress, some online class days were instructor-led case studies, but the hands-on application was lacking to fully facilitate learning clinical judgment. During the semesters, when unfolding case study activities were implemented, there was a substantial rise in scores on unit exams and increased participation during classroom discussion. HESI scores from the medical surgical specialty exam exceed the national mean for BSN students, in some instances by more than 100 points. While mean scores for the specialty HESI were usually at or above the national mean, the actual overall point increase was a welcomed finding. More so than any exam score, it was the confidence seen in students when hands went up in the air during class and the depth of discussion during lecture.

Future endeavors for this author will be to design a pilot study in which data will be collected by various modalities to evaluate the effectiveness of the unfolding case study and clinical activities related to perceptions of self-efficacy regarding clinical judgment capabilities of senior BSN nursing students. Additionally, as curriculum is revised to meet the AACN *Essentials*, the BSN program is planning a transition to competency-based evaluation in which the tenets of the NCJMM can be threaded throughout the curriculum, starting with first semester students. Redesigning nursing curriculum to incorporate activities focusing on identifying factors contributing to the overall clinical picture, versus symptomatology alone, allows for a comprehensive and multifaceted plan of care in which safety in ensured, and as a result, outcomes improve. While this author speaks to pre-licensure nursing programs in the United States, the tenants, like the nursing leaders before us, are universal to not just patient safety alone; but to help ensure the mental and physical wellness of future nurses as they enter practice facing the uncertainties of what the future holds and the anxieties remaining of a global pandemic.

Ethical Statement: The educational activity explained in the manuscript did not meet qualifications for human subjects research as it not seek to record data from participants, nor is any identifiable data included in the manuscript. Approval from an Institutional Review Board was not determined necessary.

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Relationship Between Complications and Readmissions in Type 2 Diabetes Mellitus Patients in Aceh, Indonesia

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Abstract

Introduction

Readmission refers to a condition where a person is readmitted five days after hospitalization[1.] Readmission is defined as an unplanned inpatient admission back to the hospital within 30 days from the previous discharge, unless the previous one apparently required readmission.Hospital readmission is when a patient who has been discharged is treated again, either in the same or a different hospital, within a certain period of time. Readmission periods commonly used for research include 30 days, 90 days, and 1 year. Approximately 30% of hospitalized diabetes mellitus patients experience two or more readmissions the following year and contribute to one of the 10 causes of readmissions worldwide[2.]

Readmission has a negative impact in many ways. A hospital readmission constitutes an indicator of service quality and represents the inadequacy of the health service system[3]. It is seen as highly irritating to health services. In Poland, the readmission rate is 19.2% and found in one in five hospitals. Readmissions oftentimes occur due to a lack of continuity of care between in-hospital- and post-hospital care. During hospitalization, patients often receive new medications, changes in therapeutic regimens, and lack effective guidance. Besides, readmission will affect changes in family functions and duties regarding patient care. It consequently requires family members to adjust to the readmission conditions the patient must undergo[1.]

Hospitals are pursuing various methods to prevent patient readmissions. A crucial action include improving coordination and communication between care providers, including nurses and educators. Nurses are responsible for providing intervention and education in preparation for the patient's discharge[1].

One illness that contributes to many patients experiencing readmissions is diabetes mellitus

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(DM). DM is a group of metabolic diseases characterized by increased levels of glucose in the blood (hyperglycemia) resulting from defects in insulin secretion, insulin action, or both[(1)]. Type 2 diabetes mellitus, previously known as NonInsulin Dependent Diabetes Mellitus(NIDDM)covers 90–95% of all diabetes mellituscases. This particular type is believed to begin from insulin resistance, causing the interaction between insulin and glucose to be less efficient which leads to abnormal insulinmetabolism[4.] Diabetes mellitus may lead to blood circulation problems, such as macrovascular and microvascular issues and need roles of health care providers to handle it[5].

From the perspective of the implementation of nursing care, every hospitalized DM patient should have received proper preparation for discharge planning. The preparation provided as nursing interventions to patients includes education on how to perfom home care, take medication, and self-inject insulin. However, the number of hospital readmissions cases remains high. The results of a systematic review on 2,528 articles encompassing a total of 1417 patients demonstrate that educational nursing interventions are correlated with patient readmissions[6].

When diabetes mellitus is not properly treated, it may cause various complications, both microvascular and macrovascular. Results of a study using a systematic review on 13.283 Type 2 DM patients aged over 20 years, originating from Asia, Africa, Oceania, South America, and the Caribbean, show that microvascular complications of DM include retinopathy, nephropathy, and neuropathy; while macrovascular ones include ischemic heart disease, peripheral arterial disease, and stroke. This aligns with a study using a retrospective cohort on 135,199 type 2 DM patients with a mean age of 58 years in California, discovering that. The most major DM complications include peripheral neuropathy, chronic kidney disease (CKD), and cardiovascular disease (CVD).

Uncontrolled DM cases can trigger serious complications for the heart, kidneys and eyes[3], resulting in blindness, kidney failure, heart failure, stroke, neurological disease, amputation and impotence[7]. Frequent health problems or complications experienced by patients with type 2 diabetes mellitus surround urinary incontinence, weight loss, weakness, hypoglycemia, peripheral neuropathy, peripheral vascular disease, diabetic retinopathy, hypertension, arthritis and Parkinson's disease[3,8].

Chronic hyperglycemia affecting people with DM causes damage to various organs and body systems as well as triggers different complications which may harm their quality of life. A number of studies have indicated hyperglycemia is correlated with mortality and morbidity in hospitalized patients[7]. A variety of worsening conditions and complications oftentimes have DM patients end up with readmission[9.]

Interestingly, in Aceh,a studyon 1,364 individuals with diabetes mellitus who have undergone treatments at the provincial hospital polyclinic in Banda Acehshow different findings. It is revealed that there is no relationship of patient age and previous nurses with the ability to detect hyperglycemia among diabetes mellitus patients. Especially in Lhokseumawe and North Aceh, research to identify factors linked to readmission in diabetes mellitus patients has never been conducted[10.]

According to the data obtained from the Cut Meutia Public Hospital, North Aceh Regency, which is the main referral hospital in the Lhokseumawe and North Aceh City areas, of the 989 type 2 diabetes mellitus patients hospitalized in 2023, 286 (28.9%) experienced readmissions. Interviews with 15 re-admitted patients in the internal medicine ward exhibit that 7 of them mention weakness and blood sugar levels remaining high as the complaints causing them to be re-admitted; while 6 are due to inability to control their diet; and 2 due to gangrene infected wounds that were difficult to heal.

Methods and Materials

A correlational study was utilized with a cross-sectional design. A total of 184 readmission patients with type 2 diabetes mellitus were selected as the sample using the accidental sampling technique. Data were collected through a questionnaire. The instruments consists of the Diabetes Early Readmission Risk Indicators (DERRI™) and the Readmission Questionnaire. The reliability test of the questionnaire used results in: DERRI™ with a reliability of 0.80 and validity of 0.36[11].

Data collection was undertaken via questionnaire distribution at the Cut Meutia Public Hospital, North Aceh, in several inpatient rooms including those for men's internal medicine (Shafa), women's internal medicine (Marwah), men's surgery (Arafah I), and women's surgery (Arafah II) as well as the VIP room (Muzdhalifah) from December 13th, 2023 to January 24th, 2024. The respondents were given a set of questionnaire with questions regarding diabetes mellitus complications and readmission time.

It is essential that the present research consider the recommendations of other parties, particularly in the forms of results of research ethics tests issued by the Ethics Committee of Nursing Research of the Faculty of Nursing,Universitas Syiah Kuala, with number: 112009161023; as well as permission from the agency/office where the research location took place, i.e. the Cut Meutia Public Hospital, as the researchers started conducting research after receiving the approval. All respondents were given the informed concern to be involved in this research.

Data analyses were carried out using a frequency distribution and Chi-square test.

Results

The results are presented in a table of demographic data and scores from statistical tests for each variable.

Table 1. Respondent Frequency Distribution Based on Demographic Data of Re-admitted Patients with Type 2 Diabetes Mellitus (n=184)

No	Category	f	%
1	Age (year): (Mean±SD)	57.30±10.294	
	25–37 (adult)	5	2.7
	38–49 (middle-adult)	40	21.7
	50–61 (late-adult)	70	38.0
	>61 (elderly)	69	37.5
2	Sex		
	Male	111	60.3
	Female	73	39.7
3	Education		
	None	57	31.0
	Elementary School/equivalent	99	53.8
	Junior High School/equivalent	20	10.9
	Senior High School/equivalent	7	3.8
	Higher education	1	0.5
4	Occupation		
	Unemployed	69	37.5
	Farmer/laborer/fisherman	102	55.4
	Civil servant/Army/Police officer	1	0.5
	Self-employed	12	6.5
5	Insulin Type		
	Apidra	4	2.2
	Humalog	67	36.4
	Humalog mix	10	5.4
	Humulin R	57	31.0
	Lantus	9	4.9
	Lispro	1	0.5
	Lovemir	22	12.0
	Novorapid	14	7.6

No	Category	f	%
	Readmission		
	2nd time	38	20.7
	3rd time	69	37.5
	4th time	58	31.5
	Above 4th time	19	10.3

From Table 4.1, the respondents' characteristics can firstly be seen by age groups, in which the majority are in late adulthood (50-61 years)totaling 70 individuals (38.0%) while the fewest are aged 25-37, categorized as the adult consisting of 5 (2.7%). Besides, there are 111 male respondents (60.3%). In terms of education levels, the majority of respondents are elementary school graduates, totaling 99 (53.8%). The most common occupation is farmer/laborer/ fisherman, undertaken by 102 respondents (55.4%). The type of insulin mostly used is Humalog, which is by 67 individuals (36.4%). Lastly, the highest number of readmissions is the third-time hospitalization, experienced by 69 respondents (37.5%).

Table 2. Frequency Distribution and Readmissions of Type 2 Diabetes Mellitus Patients at the Cut Meutia Public Hospital, North Aceh Regency (n=184)

No	Category	f	%
1	Complication		
	Present	105	57.1
	Absent	79	42.9
2	DM patient readmission		
	≤30 days	71	38.6
	>30–60 days	24	13.0
	>60–90 days	25	13.6
	>90 days	64	34.8

Based on Table 2, it can be seen that 105 respondents (57.1%) have disease complications. Moreover, 71 respondents (38.6%) experience readmission less that 30 days from the previous discharge.

Table 3. Relationship between Diabetes Mellitus Complications and Readmissions in Type 2 Diabetes Mellitus Patients (n = 184)

DM Complication	DM Patient Readmission										
	≤30 days		31–60 days		61–90 days		>90 days		Total		p
	n	%	n	%	n	%	n	%	n	%	
Present	59	56.2	19	18.1	21	20.0	6	5.7	105	100	0.000
Absent	12	15.2	5	6.3	4	5.1	58	73.4	79	100	
Total	71	38.6	24	13.0	25	13.6	64	34.8	184	100	

According to Table 3, it can be seen that the majority of respondents experiencing readmissions are those with complications, totaling 59 patients (56.2%), with the highest readmission interval, i.e. ≤ 30 days. Meanwhile, overall, the largest number of respondents undergoing readmissions comes from those with complications, totaling 105 (57.06%). The data analysis via the Chi-square test result in $p = 0.000 < \alpha = 0.05$, indicating that there is a relationship between diabetes mellitus complications and readmission of patients with type 2 diabetes mellitus.

Discussion

Based on the analysis and findings, it can be seen that the largest number of respondents experiencing readmissions are those who also have complications, with the highest readmission interval of ≤ 30 days, totaling 59 patients (56.2%). Meanwhile, the overall largest number of respondents who have undorgone readmissions is from those having complications, totaling 105 individuals (57.06%). The results from analysis using the Chi-square test show that $p = 0.000 < \alpha = 0.05$, meaning that there is a relationship between diabetes mellitus complications and readmission of patients with type 2 diabetes mellitus.

These findings align with previous research on acute diabetes complications as a predictor of rehospitalization and mortality associated with hospital admissions in diabetes mellitus patients. Chronic hyperglycemia in diabetes mellitus patients with poor control of blood sugar levels leads to the damage to various organs and body systems, increasing diabetes complications which eventually affect the patient's quality of life[7].

Complications are among the risk factors for hospital readmissions in patients with diabetes mellitus. Approximately 40% of rehospitalized patients have at least one diabetic microvascular complication; and approximately 50% have at least one macrovascular complication[12].

Likewise, a study discovers that comorbidities and complications become predictors of unplanned hospital readmissions in adult patients with diabetes mellitus within 30 days after discharge. Insulin resistance in diabetes patients causes hyperglycemia, triggerering atherosclerotic lesions and, therefore, becomes the major cause of cardiovascular disease[2].

In patients with type 2 diabetes mellitus, insulin production is inadequate to meet the need for glucose transport into cells. The condition ultimately results in various complications, some of which are acute, some chronic.

Although the types of diabetes mellitus complications are not specifically explored in the present research, a previous one[(15)] mentions that acute complications in patients with type 2 diabetes mellitus include diabetic ketoacidosis, diabetic coma, hypoglycemia, and hyperglycemia. Diabetic ketoacidosis is a harmful complication in which patients experience signs of dehydration, Kusmaul breathing and acetone aspiration, a gradual decrease in the level of consciousness, and (in severe cases) hypotension and circulatory shock, and ultimately diabetic coma. Hypoglycemia occurs when blood sugar levels are at an extremely low point. Hypoglycemia is a major complication in diabetes treatment, possibly caused by administering inappropriate insulin doses (high doses), excessive physical exercise, or lack of food or carbohydrate intake. Hyperglycemia occurs when blood sugar levels are very high. It is a serious and life-threatening diabetic complication. Hyperglycemia can occur due to not taking medication, insufficient dosage of medication, or excessive consumption of sweet foods without an appropriate treatment regimen, or infection. Diabetic can lead microvascular and macrovascular complications as a major cause of morbidity and mortality. Macrovascular complications include myocardial infarction, stroke, peripheral vascular disease and diabetic foot[13]. Meanwhile, chronic complications include macroangiopathy, retinopathy, nephropathy, neuropathy, diabetic foot, and increased susceptibility to infection[14].

Complications caused by type 2 diabetes mellitus increase the rate of hospitalization, death, and disability. If uncontrolled and poorly treated, type 2 diabetes mellitus will lead to serious complications, raising blood coagulation, retinopathy, hypertension, chronic kidney disease, or leg ulcers. It also significantly reduces patient productivity and life expectancy[15].

Conclusion

Several factors can contribute to the hospital readmission of patients with type 2 diabetes mellitus, including imbalances in blood sugar levels, diet, physical activity, therapy compliance, disease complications, etc. More specifically, the present research discovers that disease complications are significantly associated with hospital readmissions of type 2 diabetes mellitus patients. Also, the findings indicate 57.1% of respondents such experiencing as hypoglycemia, hypertension, heart failure, kidney failure, diabetic wounds, and ketoacidosis.

Moreover, other factors also have positive correlation with diabetic readmission. the previous study mentioned that age, duration of diabetes and hospitalization costs were positively correlated with times ofhospitalization[16].

Recommendations:

It is recommended that the hospital re-evaluate and develop strategies for nursing services and nursing interventions by providing effective discharge planning in order to prevent complications or reduce readmissions in Type 2 Diabetes Mellitus patients.

Ethical Clearance: The research approval was given by the Ethics Committee of Nursing Research (KEPK) of Faculty of Nursing, Universitas Syiah Kuala, with Number 112009161023.

Conflict of interest: The authors declare no conflicts of interest in this study.

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Original Article

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Enhancing Nursing Staff Clinical Skills of Pain Assessment: Impact of the Educational Course

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Abstract

Objective: To assess the impact of a newly developed educational course in terms of improvement in post-test scores in clinical skills assessment of patients with patient-controlled intravenous analgesia (PCIA) and epidural analgesia using the Likert scale among nursing staff working in a tertiary care teaching hospital.

Introduction: Nurses require certain clinical skills to assess patient's pain adequately. This can be achieved through regular on-the-job training and educational workshops. This will enhance nurses' clinical practice regarding pain assessment and improve pain treatment and patient satisfaction.

Methods: After getting approval from the Institutional Review Committee an education course was developed and implemented. A total of 86 nursing staff attended the course. Teaching methodologies included online lectures, small group tutorials, and hands-on workshops using demonstrations of locally developed videos. Pain assessment skills were assessed at the start of the workshop and the end of the session using PCIA and Epidural Likert scale assessment forms on simulated patients in this experimental, pre-and post- (single-arm) study.

Results: Eighty-six participants completed the course, of which 50 (58.1%) were female. In the clinical skill assessment of patients using PCIA, the mean difference in PCIA assessment scores of participants before and after the workshop was 13.88 (90.79%), which was statistically significant (p=<0.001). In the epidural skills assessment, the mean difference in the score of participants before and after the workshop was 15.09 (79.47%), which was statistically significant (p=<0.001).

Conclusion: The educational course had a significant impact on increasing the understanding of pain assessment among nursing staff with statistically significant improvement in their clinical skills.

Keywords: Hybrid educational course fornursing staff, Pain assessment skills, Clinical assessment of patients with patient-controlled analgesia and Epidural analgesia.

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Introduction

Pain assessment is a significant issue in post-operative patients. Routinely, ward nurses are responsible for assessing and documenting patient's pain regularly. If a patient has moderate or severe pain, they provide pain medications as per the guidance of physicians. Inappropriate acute pain management results in various physiological and psychological alterations, and economic burdens to patients. Gaps have been identified regarding post operative pain management because of a lack of awareness, knowledge, and training of nursing staff about acute pain relief.

Nurses play a pivotal role in patient care as primary responders to various healthcare concerns. Within this context, ward nurses hold a crucial responsibility for assessing and promptly addressing pain as well as managing potential side effects associated with analgesics Therefore, they must have adequate knowledge and awareness regarding postoperative pain.[1,2] Sayed et al. in their study demonstrated that most nursing staff (93.8%) exhibit limited awareness regarding pain assessment and its treatment. The study recommends that nursing staff should have on-the-job training and regular refresher courses to enhance their knowledge and clinical skills to improve clinical practice and patient care.[3]Acute pain is a common issue and has multiple reasons, such as surgery, trauma, childbirth, burns, medical issues, natural disasters, etc. Patients' expectations for pain management are notably shaped by cultural influences and personal beliefs. In low- and middle-income countries (LMICs) healthcare staff frequently lack sufficient education on the significance of pain treatment, resulting in under utilization of available pain medications.[4] Our population data shows the frequency of moderate to severe pain between 51.4% to 66.8%.[5]

In adequate post operative pain management carries financial, physiological, psychological, and ethical repercussions.[6] Implementing regular in-service training and educational courses has the potential to enhance nurses' knowledge and practices leading to improvements in their overall clinical performance. Existing literature supports the favourable outcome of online education sessions on the learning ability of trainee nurses.[7] The presented hybrid pain education course represents a pioneering initiative in Pakistan, specifically tailored to improving nurses' clinical skills in pain assessment. The study's objectives were to evaluate the educational course's effectiveness in enhancing clinical skills related to pain assessment among nursing staff working in adult surgical and medical wards in a tertiary care teaching hospital.

Material and Methods

The authors developed an educational course focusing on pain assessment consisting of five hours of contact time. This course was conducted on five different occasions over three months (March to May 2022) at The Aga Khan University, a tertiary care teaching hospital in Karachi Pakistan. Ethical approval was granted by the Institution Ethics Review Committee (ERC# 2022-7077-20401) and permission was obtained from the chairs and nursing managers of the respective Departments. Written and informed consent was taken from all participants. Strict confidentiality measures were implemented, ensuring that participants, names, and identities were not disclosed at any time, and all collected information was kept confidential.

This study includes both male and female, clinical nursing instructors, registered nursing staff, nurse technicians, and healthcare assistants actively engaged in pain management at adult medical and surgical wards. Those participants who did not consent to participation, midwives working in the labour room, nurses working in out-patient units, and nurses working in the emergency department were excluded from this study. Sampling techniques were non-probability purposive sampling, and the study design was experimental, Pre and post- (single-arm).

Education Course

The hybrid education course was developed after the approval and then implemented.

Course Development

The faculty members of the Departments of Anaesthesiology and Educational Development collaborated to design a hybrid course tailored for the nursing staff working in the medical and surgical wards of the authors' hospital. The course had two components,

i. Online (web-based on virtual learning environment, VLE)

ii. Physical (hands-on workshop).

The online component on VLE lastedninety minutes while the physical hands-on workshop spanned approximately five hours. The course was designed by four anaesthesia faculty members involved in providing pain services, one registered pain nurse, and two faculty members from the Department of Education Development. All members of the course group have extensive experience in teaching and take regular sessions with medical and nursing students. The course group utilisedrecent literature in developing the content of the course. The online component (web-based on VLE) consisted of short (10 to 15 minutes) pre-recorded presentations by subject experts and two updated articles on pain assessment and management.

Teaching methodologies included online lectures (asynchronous, prerecorded lectures and reading materials), small group discussions, problem-specific interactive learning, case-based clinical scenarios, hands-on workshops, and locally developed video-based learning. For the skills assessment, two data collection tools were developed as follows,

i. Likert scale for the assessment of patients using PCIA.

ii. Likert scale for the assessment of patients receiving epidural infusion.

Epidural and PCIA infusion techniques are routinely used to provide pain relief to hospitalized patients. Standardized forms are routinelyutilized during pain management of patients receiving PCIA and Epidural infusion. To assess the course participants, these forms were modified to a five-point Likert scale. Initially, these modified forms underwent a pilot phase on nursing staff involved in the care of patients. After incorporating comments and suggestions from the experts, the forms were further modified and then used in this course.[8]

Implementation of the course

Communication was established with Department Chairs, and nursing managers of medical and surgical Departments/wards to disseminate information about this course. Emails were sent requesting to nominate nursing staff for this course. The participants were selected from the nominated candidates as per the inclusion criteria for the course. Selected participants received an email containing a registration link and the consent form from the Departmental staff. Participants were asked to register on VLE, once they agreed to take part in this educational course. Written and informed consent was taken from all course participants on the day of the workshop.

Educational courses were conducted by the faculty and staff members of the Department of Anaesthesiology and skills assessment was done by the pain consultants. To facilitate the online component/session, upload educational materials, and trouble shoot a staff member received training from the IT Department. Before commencing the workshop, all facilitators and assessors were briefed about the assessment process and clinical skills assessment tools used during the workshop. All registered participants were divided into five groups of 16 to 18 each with a mixed sample of participants. The IT Department staff uploaded all learning materials onto the Virtual Learning Environment (VLE) and closely monitored the course activities. Two weeks before the hands-on workshop, a password-protected Link for learning material (pre-recorded lectures and two recent articles) was shared with the participants online on VLE. Participants were asked to listen to the lectures and read two articles before attending the hands-on workshop. In this way, a total of five hybrid educational courses were conducted in three months (March to May 2022). Assessment of the clinical skills of all participants was done at the start of the workshop and the end of the session using PCIA and Epidural Likert scale forms on simulated patients. (attached as supplementary materials)

Statistical analysis

SPSS version 19.0 (Inc. Chicago, Ill, USA) was used to enter and analyze data. For both pre-course and post-course assessment classifying under different domains for the pain assessment, PCIA, and epidural skills assessment. Only those participants who completed both PCIA and epidural skills assessments were considered for analysis.

Mean and standard deviation were estimated for descriptive analysis for each domain as well as overall performance. The mean differences were then computed along with their 95% confidence intervals (CIs). The Shapiro-Wilk and Kolmogorov-Smirnov test was used to ensure that the distribution of all variables was normal. Based on the asymmetric distribution, the paired Wilcoxon signed rank-test was used to compare and determine whether there was a statistically significant difference in the pre-test and post-test scores. A P-value of 0.05 was considered the significant threshold. The data were analyzed using R Studio 4.1.2 (R Foundation for Statistical Computing).

Results

The reliability or internal consistency of the assessment tools, the 5-point Likert scale used for the assessment of patients using PCIA was excellent, that is 94% with Cronbach's alpha of 0.94 and 95% CI of 0.89 to 0.96. The reliability or internal consistency of the 5-point Likert scale used for the assessment of patients using epidural infusion was excellent, that is 93% with Cronbach's alpha of 0.93 and 95% CI of 0.88 to 0.96.

A total of one hundred and six (n=106) nursing staff were enrolled in this educational course and ninety-two (n=92) attended the online component of the courses. Eighty-six (n=86, 93.4%) out of 92 completed hands-on workshops of which 50 (58.1%) were female and 36 (41.9%) were male. Nursing staff included registered nurses, assistant head nurses, clinical nurse instructors, nurse technicians, and healthcare assistants. Clinical work areas, designations, and years of experience of the study participants are presented in Table 1.

Table 1: Clinical work areas, designations, and years of experience of the participants (86)

Variable	n (%)
Clinical work area	
Medical and allied ward	15 (17.4%)
Post anaesthesia care unit (PACU)	31 (36.0%)
Surgical and allied ward	40 (46.5%)
Designation	
Assistant head nurse/ Nurse instructor	6 (7.0%)
Health care assistant/ Nurse technician	17 (19.8%)
Registered nurse	63 (73.3%)
Work experience (years)	
Less than one	5 (5.8%)
One to five	46 (53.5%)
Five to ten	27 (31.4%)
More than ten	8 (9.3%)

Regarding PCIA skill assessment, the comparison of the mean PCIA step-by-step skills assessment score of participants before the workshop was 15.2 ± 8.05 and after the workshop was 29.0 ± 6.37 with a mean difference of 13.88 (90.79%), 95% CI of 12.27-15.50 which was statistically significant (p=<0.001) (Figure 1).

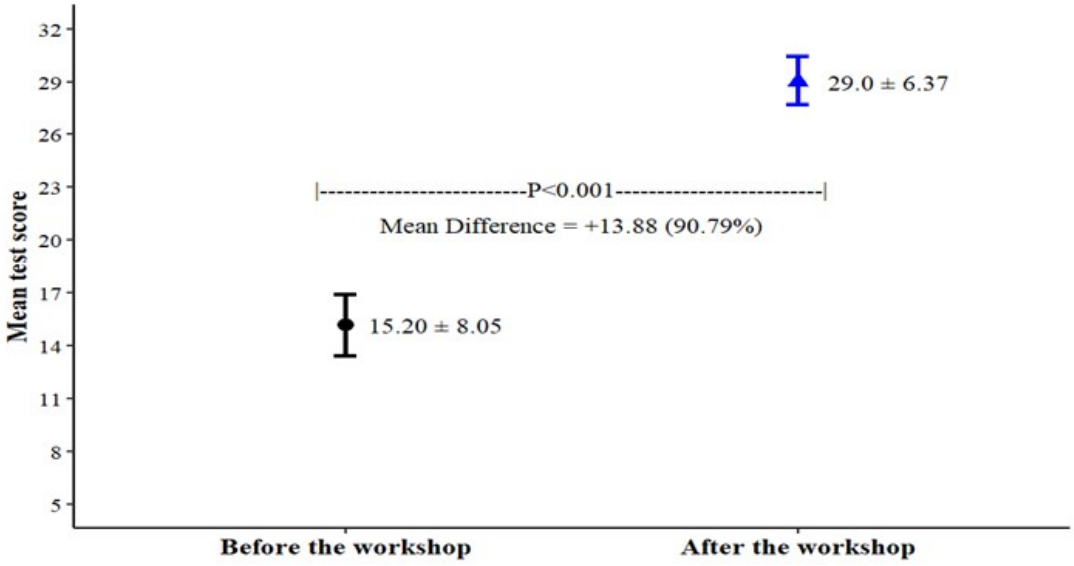

Figure 1: Overall comparison of mean PCIA skills assessment score of participants before and after the workshop (n=86)

The mean score of participants showing the overall ability to assess a patient using PCIA before the workshop was 2.20 ± 0.97 and after the workshop was 3.67 ± 0.69 with a mean difference of +1.48 (67.27%), 95% CI of 1.28 – 1.68, which was statistically significant (p=<0.001). Participants showed an overall 90.79% improvement in the skills of assessing patients using PCIA after attending the course.

Regarding epidural skill assessment, the comparison of the mean epidural step-by-step skills assessment score of participants before the workshop was 19.0 ± 8.98 and after the workshop, the score was 34.1 ± 6.27 with a mean difference of 15.09 (79.47%), and 95% CI of 13.50-16.68, which was statistically significant (p=<0.001) (Figure 2).

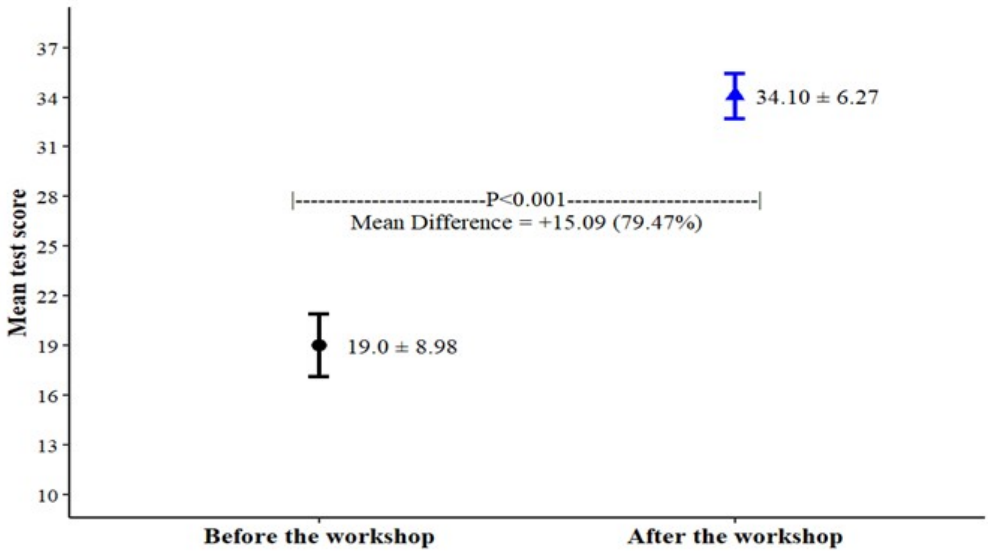

Figure 2: Overall comparison of mean epidural skills assessment score of participants before and after the workshop (n=86)

The mean score of participants showing the overall ability to assess a patient with epidural before the workshop was 2.67 ± 0.94 and after the workshop was 4.07 ± 0.59 with a mean difference of + 1.40 (52.43%), and 95% CI 1.21 – 1.58, which was statistically significant (p=<0.001). The participants showed an overall 79.47% improvement in the skills of assessing patients receiving epidural analgesia after attending the course.

Sub-group analysis showing the effect of different variables on PCIA skills assessment scores

In the univariate analysis of PCIA-related skills, the effect of educational courses was comparable in both male and female gender (p=0.845). Participants from the post-anaesthesia care unit (PACU) showed lesser improvement in skills as compared to the surgical and medical ward nurses, but this difference was not statistically significant (p=0.059). Nurse technicians and healthcare assistants showed greater improvement in skills as compared to the registered nurses, assistant head nurses, and clinical nurse instructors, but this difference was not statistically significant (p=0.948).

In the multivariate analysis of PCIA, the linear regression coefficient for participants from PACU showed lesser improvement in skills scores after the course as compared to those from the medical and surgical ward, but it was not statistically significant (p=0.070) (Table 2).

Table 2: Univariate and multivariable analysis showing the effect of different factors on pre and post-test skills scores for PCIA.

Variable	Univariate Models			Multivariable model		
	β(SE)	P-Value	95%CI	Adjusted β(SE)	P-Value	95%CI
Gender						
Female	Ref			Ref		
Male	0.04 (0.20)	0.845	-0.37 – 0.45	0.21 (0.22)	0.337	-0.23 – 0.65
Designation						
AHN/CNI	Ref			Ref		
RN	-0.04 (0.40)	0.922	-0.84 – 0.76	-0.14 (0.43)	0.751	-1.00 – 0.72
NT/HCA	0.03 (0.45)	0.948	-0.86 – 0.92	0.06 (0.49)	0.905	-0.93 – 1.04
Clinical area						
Surgery	Ref			Ref		
Medical	0.29 (0.27)	0.289	-0.25 – 0.84	0.40 (0.30)	0.184	-0.19 – 0.98
PACU	-0.41 (0.22)	0.059	-0.84 – 0.02	-0.43 (0.24)	0.070	-0.90 – 0.04
Experience (yrs)						-0.95 – 1.25
<1	0.43 (0.53)	0.429	-0.64 – 1.49	0.31 (0.55)	0.578	-0.76 – 0.83
1 – 5	0.17 (0.36)	0.640	- 0.55 – 0.88	0.03 (0.40)	0.934	-0.89 – 0.72
5 – 10	-0.04 (0.38)	0.912	-0.79 – 0.71	-0.08 (0.40)	0.840	
> 10	Ref			Ref		

Outcome = post-pre test change. Independent: Gender, Designation, Clinical working area and Experience. General linear model, PACU: Post-anaesthesia care unit (Recovery Room)

AHN/CNI: Assistant head nurse, and clinical nurse instructors

RN: Registered nurses, NT/HCA: Nurse technicians, and healthcare assistants

Sub-group analysis showing the effect of different variables on Epidural skills assessment scores

In the univariate analysis of epidural skills, the effect of the educational course was significantly higher in the participants from the surgical ward as compared to the participants from PACU (p=0.029). Participants who have more than 10 years of experience showed more improvement in skills as compared to those who have less experience, but this difference was not statistically significant (p=0.071). Nurse technicians, healthcare assistants and registered nurses showed less improvement in epidural skills as compared to the assistant head nurses, and clinical nurse instructors, but this difference was not statistically significant (p=0.514).

In the multivariate analysis, the linear regression coefficient for participants from the surgical ward showed significant improvement in epidural skills as compared to the participants from PACU (p=0.012).Participants who have more than 10 years of experience showed more improvement in skills as compared to those who have less experience, and the difference was statistically significant (p=0.007). (Table 3)

Table 3: Univariate and multivariable analysis showing the effect of different factors on pre and post-test scores of epidurals.

Variable	Univariate Models			Multivariable model		
	β(SE)	P-Value	95%CI	Adjusted β(SE)	P-Value	95%CI
Gender						
Female	Ref			Ref		
Male	0.08 (0.19)	0.650	-0.28 – 0.45	0.06 (0.20)	0.749	-0.32 – 0.45
Designation						
AHN/CNI	Ref			Ref		
RN	-0.07 (0.36)	0.845	-0.79 – 0.65	0.03 (0.38)	0.937	-0.73 – 0.79
NT/HCA	-0.26 (0.40)	0.514	-1.07 – 0.54	-0.37 (0.44)	0.401	-1.24 – 0.50
Clinical area						
Surgical	Ref			Ref		
Medical	-0.27 (0.25)	0.292	-0.77 – 0.23	-0.20 (0.27)	0.454	-0.73 – 0.33
PACU	-0.43 (0.20)	0.029	-0.83 – -0.04	-0.52 (0.21)	0.012	-0.94 – -0.11
Experience (yrs)						-1.51 – 0.43
<1	-0.28 (0.48)	0.568	-1.23 – 0.68	-0.54 (0.49)	0.273	-1.69 – -0.28
1 – 5	-0.60 (0.33)	0.071	-1.23 – 0.05	-0.99 (0.36)	0.007	-1.48 – -0.06
5 – 10	-0.47 (0.34)	0.171	-1.14 – 0.21	-0.77 (0.36)	0.034	
> 10	Ref			Ref		

Outcome = post-pre test change. Independent: Gender, Designation, Clinical working area and Experience. General linear model, PACU: Post-anaesthesia care unit (Recovery Room)

AHN/CNI: Assistant head nurse, and clinical nurse instructors

RN: Registered nurses, NT/HCA: Nurse technicians, and healthcare assistants

Discussion

A hybrid educational course focused on pain assessment was conducted for nursing staff at our tertiary care hospital. The course was conducted five times to accommodate 86 nursing staff. To the best of our knowledge and upon reviewing recent literature, this initiative marked the first of its kind for nursing staff pain assessment skills development courses in our country.

The effectiveness of the course was evident through a statistically significant increase in the clinical skills of the participants after attending the course (p=<0.001). This enhancement in the clinical skills of nurses will help them to apply their knowledge thereby improving patient care that will lead to better patient outcomes and heightened patient satisfaction. Despite extensive research, educational initiatives, the introduction of new delivery methods, potent analgesics, and adherence to clinical practice guidelines, appropriate treatment of postoperative pain is a challenge for physicians and nursing staff worldwide.[9]

In this study, the impact of the hybrid educational course was shown by an overall 79.47% improvement in the skills of assessing patients with epidural analgesia after attending the course using a 5-point Likert scale on simulated patient. Thus, improvement in pain management skills was achieved by the nurses, as evidenced by the improvement in skills scores after the workshop. Studies about the feasibility and effectiveness of simulation-based teaching for nurses demonstrated a marked improvement in acquired knowledge about epidural analgesia after the workshop, and a significant improvement in assessment of block and in relating the clinical findings and adverse effects of epidural analgesia.[10]

Kasahun et al. reported moderate to severe pain in 70%of adult patients after elective surgeries.[11] It is essential to treat the pain because insufficient pain relief results in various morbidities.[12] Sharma et al. recommended a routine approach to pain assessment and documentation with other vital signs as it may lead to better management of postoperative pain.[13]

In another study, Elshamy et al. demonstrated that following the introduction of a pain management program for nurses, there were statistically significant improvements in the nurses' knowledge. Post-intervention, nurses' responses improved substantially from 50.2% to 85.8%. They confirmed the impact of the pain management training program in increasing the knowledge of nurses and the quality of nursing care to patients with acute postoperative pain.[14]

Latina et al. found that Italian nurses across various clinical areas exhibited varying levels of knowledge and attitudes toward patients with pain. However, they observed a significant improvement in knowledge and practices for pain management after the training program.[15]In a study by Liu et al. from China, a pain management educational program resulted in a significant improvement in the knowledge of nurses, selected pain management practices, documentation, and patient satisfaction after the pain management educational program.[16] Similarly, Hong et al. reported that, after the implementation of a web-based educational program for nurses, the clinical knowledge of nursing staff and the quality of acute pain management of patients showed a significant improvement.[17] Aqel et al. demonstrated that the knowledge and attitude of nurses to patients with complex cancer pain improved after the implementation of the pain education program.[18]

In this study, the effectiveness of a hybrid educational course was shown by an overall 90.79% improvement in nurses' skills in assessing patients receiving PCIA after attending the course. This is like another study reported by Lucia et al. They evaluated knowledge of pain assessment and treatment in nurses trained via the online module (video-based). They showed that nurses' knowledge improved after the training session with significant improvement in clinical skills.[19] In our study, the online component of the course was developed on VLE containing video-recorded lectures and updated articles for reading, and during the course, a video-based teaching method was used to educate nurses about bedside clinical skills. A similar study by Nezar et al. conducted an in-service education program that consisted of several educational methods such as video-based

learning and case-based discussion and providing teaching and learning materials. They demonstrated an increase in knowledge and attitudes among nurses about pain after attending the program.[20]

Gareth Drake et al. highlighted the multidimensional role of nurses in pain management service and advocated for empowering nurses to conduct didactic teaching and clinical skills sessions related to the utilization of pain assessment tools.[21]Parvizy et al. observed that nurses are influenced by the patient's behaviour. They reported an increase in knowledge and attitude four hours after the teaching sessions. Their study findings indicated that 81% of nurses perceived patients to overexpress pain and assessments of ward nurses reflected a negative attitude towards pain assessment.[22] Chun-Hua Zhang et al. have also reported improvement in nurses' knowledge and attitudes regarding pain management of patients after the implementation of the Pain Education Program (PEP). The ability to use the Changhai Pain Scale to assess the intensity of pain was improved after the PEP.[23]

Germossa et al. have reported that nurses' knowledge and attitudes about pain management markedly improved after on-the-job training.[24] In another study, Lucia et al. conducted an E-Learning session for nurses on pain and showed high satisfaction of nurses with the training methodology, learning material, knowledge acquired, and the ability to apply knowledge to routine clinical practice.[19]Similar to our findings, other authors have reported improvement in skills after educational sessions using different educational strategies. Conducting hybrid educational courses and workshops is the start of a practice change in pain assessment training that will lead to effective pain treatment for admitted patients.

Strengths and limitations

This course enhances the basic knowledge, awareness, and clinical skills of nurses in pain assessment. The absence of a control group (without intervention) limits the ability to conclusively attribute the observed effect of the intervention. Secondly, due to logistical constraints, we did not assess retention of clinical skills. Testing clinical skills soon after the course may not ensure long-term retention of clinical skills. Furthermore, as this study was conducted at a single centre, the results may not be generalized. Since the participants, facilitators, and assessors belong to the same institution, the chance of bias in the clinical assessment of skills cannot be eliminated.

Conclusion

The educational course focusing on pain assessment showed statistically significant improvement in the clinical skills of the nursing staff after attending the course. There was an overall 90.79% improvement in the clinical skills of participants in assessing patients using PCIA and a 79.47% improvement in the clinical skills of participants in assessing patients using epidural infusion.

Regular pain assessment is needed for optimal care and a better outcome for patients. Such educational courses should be regularly conducted for a better understanding and implementation of pain assessment tools. Such educational courses should be conducted in all tertiary care and teaching hospitals and be included as part of the orientation session for nursing staff so that pain management and patient satisfaction can be improved.

This manuscript adheres to the SQUIRE 2.0 Guidelines for Quality Improvement Studies.[25]

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Availability of data and materials

The data is available from the corresponding author upon request.

Ethical Clearance: Ethical approval was granted by the Institution Ethics Review Committee (ERC# 2022-7077-20401) and permission was obtained from the chairs and nursing managers of the respective Departments. Written and informed consent was taken from all participants. Strict confidentiality

measures were implemented, ensuring that participants, names, and identities were not disclosed at any time, and all collected information was kept confidential.

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Original Article

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Effect of Comprehensive Nursing Intervention on Anxiety and Quality of Life in Postoperative Patients with Oral Cancer

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Abstract

Purpose: Surgery has a negative effect on the mental, physical, and functional health of patients with oral cancer, which affects their quality of life (QOL). The study aimed to assess the effect of comprehensive nursing intervention on anxiety and QOL in postoperative patients with oral cancer.

Methods: We investigated the level of anxiety and QOL of 200 postoperative oral cancer patients. After the comprehensive nursing intervention, the Beck Anxiety Inventory scale and European Organization for Research and Treatment of Cancer tools were used to assess the level of anxiety and QOL, respectively.

Results: There was a statistically significant difference in terms of educational status ($p=0.02$), monthly income ($p<0.01$), cancer stage ($p<0.01$), and tumor metastasis ($p=0.02$). The experimental group experienced a significant decrease in anxiety ($p=0.04$), and their QOL was significantly higher ($p=0.05$) than that of the control group.

Conclusion: Our study indicates that a comprehensive nursing intervention can lower the risk of surgical complications, enhance patients' psychological state by reducing anxiety, and enhance their QOL in patients with oral cancer.

Keywords: Oral cancer, postoperative patients, comprehensive nursing intervention, anxiety, quality of life.

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Introduction

Oral squamous cell carcinoma (OSCC) is a frequent head and neck cancer that arises in the oral mucosa. Oral Cancer (OC) is a disease that can be treated with a variety of therapeutic approaches, including surgery, radiation, and chemotherapy. For most oral malignancies, surgery is the most reliable and early final treatment option. The patient and the tumor are the two main aspects that influence the therapy option. A surgical strategy is determined by several parameters, including the primary site's location, size, closeness to bone, and depth of infiltration.[1] In addition to the physical symptoms, patients also exhibit psychological symptoms like anxiety due to concerns about their prognosis and course of therapy.[2] Distress, anxiety, or depression has a detrimental effect on the quality of life (QOL) of OC patients. Health-related QOL refers to how patients feel about their physical, emotional, social, and mental abilities and conveys how they feel about their lives at any given point along the course of their disease.[3]

As far as we are aware, this is the first study of its kind in India to evaluate the effect of comprehensive nursing intervention in this particular patient population following surgery. The study aimed to evaluate the impact of comprehensive nursing intervention in improving anxiety and quality of life in postoperative patients with oral cancer.

Materials and Methods

Study design and setting

A total of 200 patients with stage 1 to stage 4 that underwent oral surgery were included in this study (July 2022 to February 2024). The study was approved by (Desh Bhagat University's) Institutional Review Board (DBU/RC/2023/2338 ethical number). The study was conducted at (Atal Bihari Vajpayee Regional Cancer Centre, Agartala, Tripura, India.)**.** The study employed an interventional methodology to evaluate the level of anxiety, and QOL in patients with post-operative OC. The flowchart for the patient enrollment selection procedure is showed in **Figure 1**.

Comprehensive nursing intervention

In addition to providing educational support on the use of thyme honey, dental care, and counselling among postoperative patients with OC, comprehensive nursing intervention also involves helping with relaxation techniques, mouth opening exercises, active and passive range of motion, stretching exercises, maintaining good posture, chin tucks, and shoulder blade squeezes by research personnel. This is done through the use of a PowerPoint presentation and video on the experimental group. The control group was asked to follow the hospital's standard treatment, while the nursing intervention was given for 10-15 minutes and the educational intervention for 30 minutes. It was followed 9–10 times a day for 5 days in a row, and the patient practiced exercise when it was necessary. Standard treatment included giving all patients scheduled nurse interventions and administering medications in accordance with the doctor's directions.

Assessment of anxiety

The level of anxiety symptoms among the patients who were enrolled was measured using the beck anxiety inventory (BAI) Scale.

Assessment of QOL

The QOL was measured using questionnaires created by the European Organization for Research and Treatment of Cancer (EORTC QLQ-C30) Quality of Life Group.

Statistical Analyses

Statistical Package for Social Sciences (SPSS) version 25 was used for data analysis. A p-value below 0.05 was considered statistically significant for all analyses.

Results

Out of 200 participants, 61% (n =122, 95% CI: 53.8 – 67.7) and 39% (n =78, 95% CI: 32.2 – 46.1) were male and female for each group, respectively, resulting in a male-to-female ratio of 1.56:1. The demographic and clinical characteristics of the experimental and control groups are shown in **Table 1. Table 2 and Table 3** summarize the mean and standard deviation of the pre-and post-test levels of anxiety and QOL

among postoperative patients with OC respectively. After the nursing intervention, the experimental group experienced a significant decrease in anxiety ($p<0.04$), and their quality of life was significantly higher ($p<0.05$) than that of the control group.

Table 1: Socio-demographic and clinical characteristics of the participants (n=200).

Variables	Characteristics	Experimental group (n=100) n (%)	Control group (n=100) n (%)	p-value
Age (Years)	21-30	0	1 (1)	0.11
	31-40	8 (8)	13 (13)	
	41-50	38 (38)	22 (22)	
	51-60	28 (28)	31 (31)	
	61-70	26 (26)	33 (33)	
Gender	Male	58 (58)	64 (64)	0.38
	Female	42 (42)	36 (36)	
Religion	Hindu	82 (82)	85 (85)	0.17
	Muslim	9 (9)	7 (7)	
	Christian	5 (5)	8 (8)	
	Others	4 (4)	0	
Educational status	No formal education	20 (20)	27 (27)	0.02*
	Primary	48 (48)	36 (36)	
	Secondary	32 (32)	30 (30)	
	Higher secondary	0	7 (7)	
	Graduate and above	0	0	
Occupation	Govt	2 (2)	0	0.054
	Private	13 (13)	9 (9)	
	Self employed	22 (22)	33 (33)	
	Daily wager	18 (18)	27 (27)	
	Unemployed	45 (45)	31 (31)	
Monthly income (Rs)	≤Rs.10, 000	50 (50)	24 (24)	<0.01*
	10, 001-15,000	44 (44)	53 (53)	
	15, 001-20,000	4 (4)	21 (21)	
	>20,000	2 (2)	2 (2)	
Marital status	Single	5 (5)	4 (4)	0.34
	Married	87 (87)	93 (93)	
	Widow	6 (6)	3 (3)	
	Divorced	2 (2)	0	

Continue.....

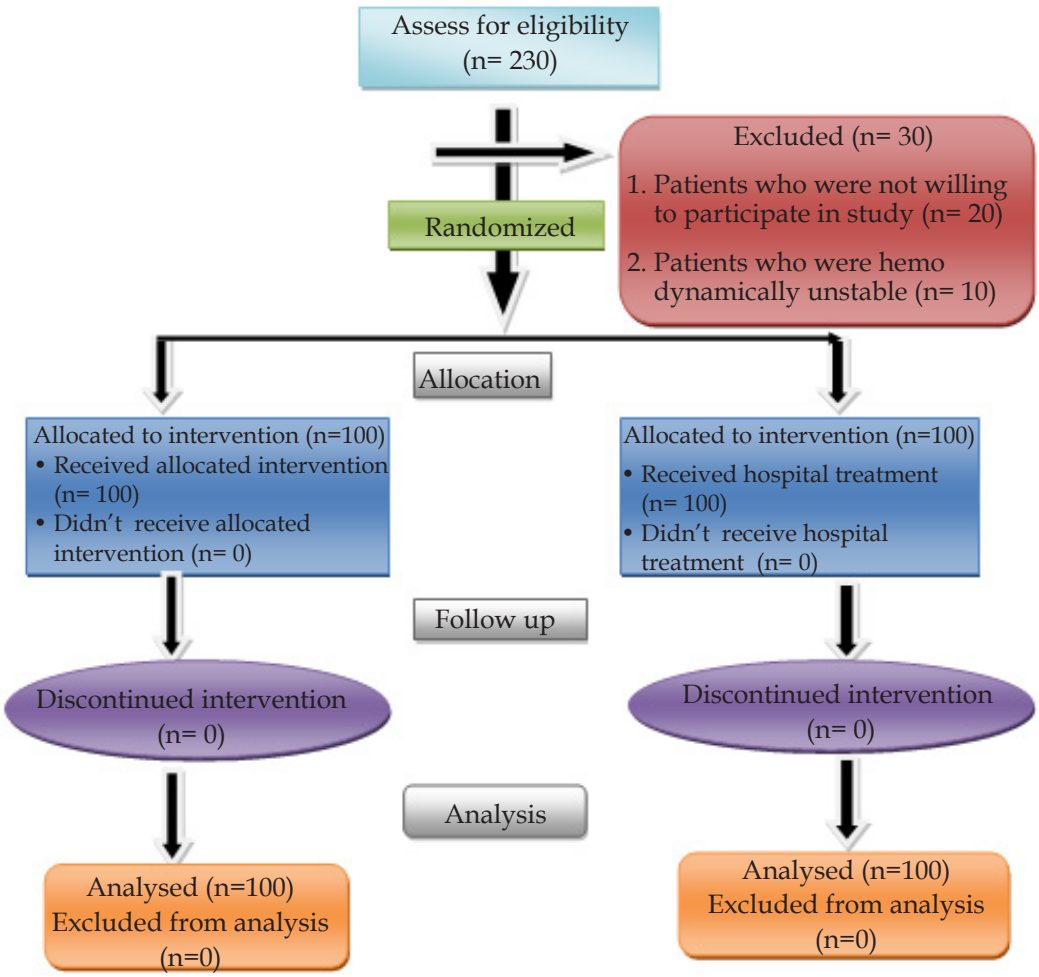
Types of surgery	Tumor Resection	6 (6)	3 (3)	0.55
	Micrographic surgery	3 (3)	2 (2)	
	Glossectomy surgery	17 (17)	22 (22)	
	Mandibulectomy surgery	50 (50)	57 (57)	
	Maxillectomy surgery	22 (22)	15 (15)	
	Neck Dissection	2 (2)	1 (1)	
Cancer Stage	I	24 (24)	53 (53)	<0.01*
	II	27 (27)	28 (28)	
	III	31 (31)	10 (10)	
	IV	18 (18)	9 (9)	
Tumor metastasis	Yes	41 (41)	26 (26)	0.02*
	No	59 (59)	74 (74)	
Primary site	Lip	8 (8)	5 (5)	0.30
	Buccal Side	65 (65)	51 (51)	
	Hard Palate	3 (3)	5 (5)	
	Posterior molar Region	2 (2)	4 (4)	
	Tongue	12 (12)	18 (18)	
	Floor of mouth	1 (1)	4 (4)	
	Angle of mouth	4 (4)	1 (1)	
	Submandibular gland	1 (1)	2 (2)	
	Base of tongue	3 (3)	4 (4)	
	Maxilla	0	1 (1)	
	Cheek	0	2 (2)	
	Alveolus	1 (1)	3 (3)	

Table 2: Mean and SD of pre test and post test levels of anxiety among postoperative patients with oral cancer (n=200).

Sl. no.	Groups	Max score	Pre test	Post test	Wilcoxon's Test	
			Mean ± SD	Mean ± SD	Z value	P-value
1	Experimental Group (n=100)	63	27.7 ± 7.4	26.5 ± 6.5	-2.2	0.04*
2	Control Group (n=100)	63	30.7 ± 6.4	30.3 ± 6.9	-1.4	0.17

Table 3: Mean and SD of pre and post-test level of quality of life among postoperative patients with oral cancer (n=200).

	Dimension Of Quality of life	Max score	Pre test	Post test	Wilcoxon's Test	
			Mean ± SD	Mean ± SD	Z value	P value
Experimental (n=100)	Functional Scale	20	12.7 ± 4.3	11.1 ± 4.1	-2.7	0.01*
	Role Function	8	5.7 ± 1.7	5.4 ± 1.5	-1.6	0.10
	General Symptoms	48	24.3 ± 7.8	23.0 ± 7.2	-2.1	0.05*
	Cognitive Function	8	5.7 ± 1.7	5.5 ± 1.8	-1.0	0.28
	Emotional Status	16	10.8 ± 3.5	9.4 ± 4.1	-2.5	0.04*
	Social Functioning	12	7.5 ± 3.2	6.3 ± 3.3	-2.2	0.05*
	Over All	112	66.9 ± 16.1	62.2 ± 15.9	-2.4	0.05*
	Over All Global Health Status	14	8.0 ± 2.1	8.3 ± 1.7	-2.0	0.04*
Control (n=100)	Functional Scale	20	16.4 ± 2.9	15.9 ± 3.3	-1.9	0.05*
	Role Function	8	6.3 ± 1.5	6.5 ± 1.3	-1.1	0.25
	General Symptoms	48	26.3 ± 3.8	25.7 ± 3.9	-0.3	0.32
	Cognitive Function	8	6.6 ± 1.7	6.7 ± 1.4	-1.5	0.11
	Emotional Status	16	13.1 ± 2.8	12.6 ± 2.7	-1.4	0.15
	Social Functioning	12	10.3 ± 1.7	10.6 ± 2.4	-1.7	0.14
	Over All	112	78.4 ± 12.2	78.1 ± 12.9	-1.6	0.18
	Over All Global Health Status	14	7.2 ± 1.5	7.0 ± 1.6	-1.5	0.16



Figure

Discussion

Treatment for HNC tumors may have a detrimental effect on patients' health- related QOL, which is now widely regarded as a crucial secondary outcome of treatment. Reliable assessment tests are therefore essential to comprehend the rationale behind the selection and customization of particular medical therapies based on patient needs.[4] The questionnaire scales known as BAI and EORTC QLQ-C30, which are frequently used to measure anxiety and QOL in oncological settings, were utilized in this investigation. In earlier studies these scales have been shown to be valid and reliable instruments for assessing anxiety[5] and QOL respectively.[6] Patients have increased fatigue following increasingly complicated surgical operations, which affects their QOL and increases their risk of developing mental disorders including depression and anxiety. The reasons behind these postoperative physical and psychological problems are surgical wounds, the stress of the sickness, and the interventions.[7]

Our study supports the results of the earlier research, which showed that adults over 40 are the most likely age group to be affected by OSCC.[8] We found that the incidence increased after the age of 40. The age ranges 41–50 in both the experimental and control groups showed the highest incidence, followed by the 41–50 and 61–70 age groups. According to our research, men appear to be affected by oral cancer almost twice as much as women, with the first group having higher rates of mortality from alcohol and tobacco use, as was also observed in the previous study.[9] The previous Indian study also indicated that Hindus had a higher risk of oral cancer than people from other religious backgrounds, and our research yielded the same results.[10]

Based on the observation of most OC patients in primary schools, our study indicated a relationship between a lower educational level and a higher risk of OC. The dearth of knowledge regarding OC in general, including diagnosis and treatment, may account for some of this correlation. Our findings are corroborated by a prior study that showed those with only a primary school were more likely than those with a higher or university degree to have a poor outcome related to OC.[11] Regarding occupation, our research showed that those without jobs (unemployed) had a higher risk of developing OC. This finding may be attributed to the fact that unemployed individuals may find it more difficult to make ends meet financially and may have less access to healthcare. As the previous study also pointed out, unemployment can lead to stress and psychological malaise as well as unhealthy behaviors that are known to be risk factors for illnesses, accidents, and fatalities.[12] Another study supported our findings, which showed a correlation between OC and low individual or household income because most of our patients were from lower-income households.[13]

In terms of marital status, we found that, like in the earlier study, married people were at a higher risk of developing OC. This conclusion might have resulted from the fact that single persons are frequently younger, their diagnosis is often made later, or they are not at the typical age at which OC is diagnosed.[14] Among the patients with OC who were enrolled, mandibulectomy was the most frequently performed surgical procedure. The previous study also showed similar outcomes in addition to the internal repair and open reduction.[15]

Patients with stage I oral cancer should seek therapy as soon as possible because it is highly curable. In our analysis, stage I cancer was more common than all other stages (stages I–IV). Since most of the patients in our study could be categorized as stage I due to the lack of tumor metastases, this was related to tumor metastasis. The buccal mucosa is where OSCC is most frequently seen in Southeast Asia. This could be because smokeless tobacco products like areca nuts and betel quid are becoming more and more popular in this area.[16] As buccal mucosa cancer accounted for the majority of the recruited patients, our research confirms their findings.

For patients with postoperative OC, comprehensive nursing intervention involvement is a useful therapeutic alternative that reduces fatigue and anxiety and improves the patients' QOL, mood, and satisfaction with the course of therapy. In our study, we found that following comprehensive nursing intervention, the experimental group experienced a significant decrease in anxiety and their QOL was significantly higher than that of the control group. Earlier studies also confirmed that nursing intervention have a positive impact to reduce anxiety

[17] and to increase the QOL.[18] Patients with OC must cope with the subsequent detrimental effects on their confidence and self-esteem in all spheres since they are unable to conceal functional alterations that occur after surgery.

However our study has some limitations. Only one center was used for the research. There was a five-day follow-up period, which might have affected the results. Furthermore, it is recommended that the current study be performed in various parts of the nation because patient QOL and anxiety may vary based on lifestyle and support alternatives.

In conclusion, according to this study, the comprehensive nursing intervention was significantly connected with patients' anxiety and QOL, and it will help greatly lower anxiety and enhance QOL for postoperative OC patients. Consequently, it is important to implement this nonpharmacologic intervention in clinical practice to alleviate post-surgical anxiety and enhance patients' QOL and the unfavorable outcomes associated with OC and its treatment. It is necessary to conduct additional research to investigate the relationship between comprehensive nursing interventions with anxiety and QOL for various ethnic groups and diseases. A comprehensive nursing intervention can be utilized in routine practice to reduce functional impairments following surgery, which in turn can enhance the QOL in postoperative OC patients.

Ethical Clearance/Statement of Ethics: The study was conducted in accordance with the Declaration of Helsinki, and this research was approved by Desh BhagatUniversity's Institutional Review Board (Date: 03/05/2023 Number:DBU/RC/2023/2338).

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Original Article

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Study to Assess the Effectiveness of Live Demonstration on Knowledge Regarding Surgical Management of Inguinal Hernia Repair among Nursing Students in Selected College of Nursing, Hubli

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Abstract

Introduction: Teaching skills are essential for learning needs of the students, the teaching is aided by the various technique of teaching. Live demonstration is a technique of educating students in actual scenario with demonstration of the content of topic, here the teacher performs the in presence of the students the topic of discussion. In the present study the technique of live demonstration practiced to improve the knowledge of nursing students in surgical management of inguinal hernia repair included pre, intra and post operative management of surgery.

Objectives: the study designed to assess the effectiveness of live demonstration on knowledge regarding surgical management of inguinal hernia among nursing students.

Methodology: one group pretest posttest design used for 156 nursing students selected by simple random sampling technique, a structured knowledge questionnaire was designed having content validity of 0.89 and reliability of 0.92 used to collect and assess knowledge of nursing students on surgical management of inguinal hernia repair, pretest was conducted following which a live demonstration on periopertive management of inguinal hernia repair was demonstration in class room and by live video visuals from operation theater while performing surgery following which the post operative care was demonstrated till the stabilization of the patient. The posttest was conducted to assess the gained knowledge using same questionnaire used in pretest. The collected data was analyzed using SPSS 16.0 version statistical analysis and the findings were tabulated and computed.

Results: The findings of the study revealed that, the pretest knowledge of the nursing students regarding surgical management of inguinal hernia repair was inadequate, out of 156 nursing students, assessed 145 students had inadequate knowledge, and following live demonstration the knowledge, improved to adequate to almost all the students signifying that live demonstration is effective method of teaching learning activity. The t value was 69.56 for 0.05 level of significance.

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Conclusion: teaching is an art, which include the colors of various techniques to make classroom live and living. Live demonstration is the best method, which bring in the actual experience and spot learning of the students and the retention of the content discussed in live demonstration is high along with ability to compare, judge and reason the care and outcome of the learning. The study recommends that the nursing education should be equipped with live in demonstration, which brings students out of imagination of content and picture memorization from books and articles. Live demonstration should be included in teaching learning activity of the student's class learning.

Keywords: inguinal hernia; hernia repair; live demonstration; surgical management

Introduction

Human abdomen is the hallow space protecting vital organs of digestion, metabolism and excretion, the abdomen is guarded by the abdominal muscles which prevent the structure of abdomen from bulging during straining and bearding down activities.[1,2] When the muscles of the abdomen are weak the guarding of abdomen by abdominal muscle get breached leading to protrusion or bulging of the abdomen structures lead to a condition called hernia. Hernia occurs due to a weak spots or a hole in the surrounding muscles or connective tissue lead to squeezing of the organs, intestine or fatty tissues, the pressure from inside the abdomen pushes the lining of the abdominal wall, the peritoneum causes bulge under the skin. Hernia starts with small lump, becomes apparent on standing and straining activities like cough. Medically hernia treatment focus on pain management and prevention of the gastric complication precipitate due to hernia. The golden rule of management is surgical intervention where in the hernia are repaired by surgical correction and management.[4,5] Hernias are various types the most common and prevalent cause is inguinal hernia. The incidences of the inguinal hernia are most common among population due to staining activities and weakness of abdominal muscles. Hernioplasty is the surgical procedure performed to manage the hernia in most inguinal hernia, repair is done by synthetic mess, bioresorbable mess, biological graft.[6] The surgical management skill and learning is essential need for better understanding of the management of hernia cases. Students should develop the ability to manage hernia to achieve good learning skill; various teaching learning methods are used of these live demonstrations brings in the actual live experience of the surgical management.[10] The present study is designed to assess the effectiveness of live demonstration on knowledge regarding surgical management of inguinal hernia repair among nursing students.

Methodology

The present study used evaluator approach using one group pretest posttest design used for 156 nursing students selected by simple random sampling technique, a structured knowledge questionnaire was designed having content validity index of 0.89 and reliability of 0.92 used to collect and assess knowledge of nursing students on surgical management of inguinal hernia repair, pretest was conducted after obtaining consent from participants, following which a live demonstration on periopertive management of inguinal hernia repair was demonstration in class room and by live video visuals from operation theater while performing surgery following which the post operative care was demonstrated till the stabilization of the patient. The posttest was conducted to assess the gained knowledge using same questionnaire used in pretest. The collected data was analyzed using SPSS 16.0 version statistical analysis and the findings were tabulated and computed.

Results

Table 1. Findings related to demographic variables of nursing students

Demographic variables	Response categories	Frequency	Percentage
Age (years)	18-20	125	80.12
	21-23	31	19.87
Gender	Male	67	42.94
	Female	89	57.05
Religion	Hindu	115	73.71
	Muslim	23	14.74
	Christian	18	11.53
Family monthly income	Less than `40000	105	67.30
	More than `40001	51	32.69
Type of family	Joint	68	43.58
	Nuclear	88	56.41
Source of information	Electronic media	132	84.61
	Non-electronic media	24	15.38

Table 1: Describe the distribution of demographic variables under study, the variable age had 125 (80.12%) aged 18 to 20 years, 31 (19.87%) aged 21 to 23 years. 67(42.94%) were males and 89 (57.05%) were females. Religion distribution had 115(73.71%) of Hindus, 23 (14.74%) were Muslims and 18 (11.53%) were Christians. 105 (67.30%) of family had monthly income of less than 40000/- and 51 (32.69%) were with more than 40001/- monthly income of family. 88 (56.41%) families were living in nuclear family and 68 (43.58%) were living in joint family. 132 (84.61%) nursing students got source of information through electronic media and 24 (15.38%) gather information through non electronic media.

Table 2. Finding related to the overall pretest Mean% and posttest Mean% on knowledge regarding surgical management of inguinal hernia repair

Knowledge score	Max score	Pretest			posttest			Mean% Knowledge enhancement
		Mean	Standard Deviation	Mean %	Mean	Standard Deviation	Mean %	
	30	11.08	1.24	36.34	27.38	1.22	91.27	54.93

Table 2: Describes the comparison and overall pretest and posttest mean%, for maximum score of 30 the Mean% pretest was 36.34 and posttest Mean % was 91.27 the difference of pretest and posttest Mean% was 54.93, signifying the enhancement of knowledge and implicating that live demonstration was effective in improving knowledge of the nursing students.

Table 3. Findings related to effectiveness of live demonstration on knowledge regarding surgical management of inguinal hernia repair

ASPECT	PRETEST		POSTTEST		t value	df	p value	INTERFERENCE
	MEAN	STANDARD DEVIATION	MEAN	STANDARD DEVIATION				
KNOWLEDGE SCORES	11.08	1.24	27.38	1.22	69.56	155	≤0.001	SIGNIFICANT

Table 3: Describes the effectiveness of live demonstration on surgical management of inguinal hernia repair among nursing students, the study findings revealed that live demonstration was significant at 69.56 for 155 degrees of freedom at p values ≤0.001

Table 4. Findings related to level of knowledge of nursing students on knowledge regarding surgical management of inguinal hernia repair

KNOWLEDGE LEVEL CATEGORIZATION	PRETEST SCORES		POSTTEST SCORES	
	FREQUENCY	PERCENTAGE	FREQUENCY	PERCENTAGE
INADEQUATE (≤50%)	145	92.94	NIL	0.00
MODERATE (51%-74%)	11	7.05	06	3.84
ADEQUATE (≥75%-100%)	NIL	0.00	150	96.15

Table 4: Describes the knowledge level of nursing students in pretest and posttest, out of 156 nursing students 145 (92.94%) of them had inadequate knowledge in pretest, 11 (7.05%) had moderate knowledge level and none of them were having adequate knowledge level. In posttest, 150 (96.15%) of nursing students improved knowledge on surgical management of inguinal hernia repair and six (3.84%) had moderate knowledge and none of them were left with inadequate knowledge level signifying that live demonstration was effective teaching method to retain the learning to nursing students.

Discussion

The present study is designed to assess the effectiveness of live demonstration on knowledge regarding surgical management of inguinal hernia repair in this regards the findings related to socio

demographic, mean%, significance and level of knowledge are discussed as follows:

- **Findings related to socio demographic variables**

Age of the nursing students showed that 125 (80.12%) aged 18 to 20 years, 31 (19.87%) aged 21 to 23 years. 67(42.94%) were males and 89 (57.05%) were females these findings were similar to finding of study Rutkow[3] showed that in their study majority of samples were in 18 to 20years of age. Religion distribution had 115(73.71%) of Hindus, 23 (14.74%) were Muslims and 18 (11.53%) were Christians these findings were similar to study finding of Rutkow[3]. 105 (67.30%) of family had monthly income of less than 40000/- and 51 (32.69%) were with more than 40001/- monthly income of family. 88 (56.41%) families were living in nuclear family and 68 (43.58%) were living in joint family. 132 (84.61%) nursing students got source of information through electronic media and 24 (15.38%) gather information through non electronic media.

- **Findings related to pretest and posttest Mean% scores**

The comparison and overall pretest and posttest mean%, for maximum score of 30 the Mean% pretest was 36.34 and posttest Mean % was 91.27 the difference of pretest and posttest Mean% was 54.93, signifying the enhancement of knowledge and implicating that live demonstration was effective in improving knowledge of the nursing students. These findings were similar to finding of the study Robert et al[7] where in study conducted with aim of improving teaching learning skill showed that demonstration as best method of teaching learning method showed difference in mean knowledge improvement from pretest to posttest.

- **Findings relating to the effectiveness of live demonstration**

The effectiveness of live demonstration on surgical management of inguinal hernia repair among nursing students, the study findings revealed that live demonstration was significant at 69.56 for 155 degrees of freedom at p values ≤0.001 These findings were similar to finding of the study Barry Mann D et al[8] where in study conducted three dimensional teaching showed significant improvement in student learning and demonstration.

- **Findings relating to the level of knowledge**

Out of 156 nursing students 145 (92.94%) of them had inadequate knowledge in pretest, 11 (7.05%) had moderate knowledge level and none of them were having adequate knowledge level this knowledge level was changed to 150 (96.15%) of nursing students had adequate knowledge on surgical management of inguinal hernia repair and six (3.84%) had moderate knowledge and none of them were left with inadequate knowledge in posttest score signifying that live demonstration was effective teaching method to retain the learning of nursing students.

Conclusion

The present study is aimed to assess the knowledge of nursing students on surgical management of inguinal hernia repair, study showed poor knowledge level of nursing students in pretest, a live demonstration used as teaching learning method to bring in live experience of perioperative care of inguinal hernia repair included preoperative, intraoperative and postoperative medical, surgical and nursing care. The surgical procedure was also live demonstrated from preparation of patients to incision in operation room, repair of inguinal hernia and suturing skin layer, this method gave nursing students clear concept of surgical management of inguinal hernia repair, which was reflected, in posttest score of nursing students. The present study recommends that live demonstration using technical assistance, or electrical gadgets, or standardized patients, or actual hands – on demonstration imparts significant memory retention and gives best experience to nursing students, hence live demonstration is very effective method of teaching learning skills. Similar method of live demonstrations can be adopted to complex learning of surgical management of other disease conditions like coronary bypass, liver transplant, kidney transplant, ostomy procedures or orthopedic fixation or replacement procedures for comprehensive learning of nursing students.

Ethical clearance

Ethical approval was obtained by respective heads of the selected colleges, and the participants written consent obtained prior to conduction of study. No.Ethical/comm/24/2022-23 dated: 02.09.2023

Conflict of interest: The present study has NIL conflict of interest

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Original Article

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The Relationship between Organizational Culture and Patient Safety Culture in Hospitals in Aceh Province

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Abstract

Background: A lack of patient safety culture among nurses can lead to unexpected events for patients as recipients of nursing services. Organizational culture is believed to be related to a good patient safety culture among nurses. The research aims to identify the relationship between organizational culture and the implementation of patient safety culture in hospitals in Aceh Province.

Methods: This study used a cross-sectional research design. Data analysis was performed using the person product moment test. The number of samples was as many as 219 nurses (total sampling).

Results: The study showed that there was a relationship between organizational culture and the culture of patient safety($p = .000$, $r^2 = .659$).

Conclusion: High organizational culture will increase the culture of patient safety by nurses in hospital wards.

Keywords: Organization, Culture, Safety, Patient

Background

Among the key components of maintaining healthcare delivery is the patient safety culture, which is increasingly vital on a global scale[1]. According to the World Health Organization (WHO), approximately 10% of patients are harmed during medical care and more than 3 million deaths occur annually because of substandard care. As many as four out of 100 deaths in low- and middle-income countries are due to substandard health services[2].

More than half of harm (one in every 20 patients) is preventable, and half of it is derived from medications[3]. Hodkinson and Tyler[4] suggest that common adverse events which can lead to patient harm encompass medication errors, unsafe surgical procedures, healthcare-related infections, diagnostic errors, patient falls, pressure ulcers, patient misidentification, unsafe blood transfusion, and venous thromboembolism.

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In Indonesia, data on unexpected events during hospitalization on a national scale remain unknown. According to the Indonesian Ministry of Health (2018), 189 Patient Safety Incidents (PSI) were recorded out of 289 reports in 2015, 588 PSI of 668 reports in 2016, and 1647 PSI reports were received in 2017[5]. On a provincial scale, the highest proportion of PSI was reported in Jakarta (37.9%), followed by Central Java (15.9%), Yogyakarta (13.8%), East Java (11.7%), Aceh (10.7%),South Sumatra (6.9%), West Java (2.8%), Bali (1.4%), and South Sulawesi 0.7%[6].

As a public health service facility, hospitals are responsible for maintaining high service standards in order to meet community expectations, especially regarding patient safety. Therefore, a hospital care system that offers a safer environment for patient care is known as patient safety. Preventing and reducing patient safety incidents in health services constitutes one of the primary goals of implementing a patient safety system in hospitals. Hospitals, employees, and patients in particular will suffer from safety incidents when occurring to patients as health service users. This might consequently result in reduced public trust in healthcare services[5].

A key element affecting patient safety and culture is the work environment, especially for nurses. According to recent research, nurses' work environments hazard patient safety; also, their high workload and low job satisfaction result in lowered standards of care and service delivery[7].

Abuosi and Akologo[8] in a study on determinants of patient safety culture among health care providers, find that significant predictors of overall patient safety culture include interunit teamwork ($\beta = 126$, $p = .04$), organizational learning ($\beta = .112$, $p = .05$), and management support for patient safety

Gunawan and Hariyati[9] have conducted a study to summarize the implementation of patient safety culture in nursing practice in hospitals. The findings exhibit three categories, which are: strengths, weaknesses, and predictors of patient safety culture in nursing practice. The strengths include four dimensions: (1) teamwork within units; (2) organizational learning and continuous improvement; (3) hospital administration's commitment to patient safety; and (4) frequency of reported events. Contrarily, the weaknesses cover: (1) assumptions on overall patient safety; (2) handover and transfer; (3) transparent communication; (4) staffing; (5) nonpunitive response to errors; and (6) collaboration across entire hospital departments.

Tanjung and Girsang[10] in their qualitative research reveal several obstacles faced in implementing the patient safety program, one of which is ineffective communication owing to instruction providers failing to reconfirm their instructions given to executive nurses. Moreover, officers cannot recall the location of drugs to be wary of, and some even neglect to wash their hands. Also, collaboration and communication between staff and patient families are found to be ineffective to prevent the risk of falls. The most basic thing to be immediately addressed is the adequacy of human resources so that a lower workload can optimize the performance of officers in implementing a patient safety culture. Additionally, increasing understanding can be done by providing continuous education and training to health workers. The most fundamental issue that needs to be immediately resolved is human resources adequacy for this will minimize the workload and maximize officers' performance in establishing the culture of patient safety. Further, health personnel can be continuously educated and trained to increase their understanding.

Furthermore, research conducted by Setyowati[5] explores the factors affecting the implementation of patient safety culture by nurses. The results indicate that 60.5% of nurses have good patient safety knowledge; 57.5% of them are highly motivated to implement the patient safety culture; and 51.2% claim they have implemented the patient safety culture. Additionally, the analyses denote a significant relationship between nurses' knowledge, desire to protect patients, and leader behavior and the implementation of patient safety culture ($p < .05$).

Lee and Huang[11] conducted longitudinal research on the implementation of patient safety culture by nurses. It is shown that nurses with different demographic variables have different perceptions of patient safety from year to year. Supervisors/managers are discovered as the most vital variable to influence patient safety culture.

Afework and Tamene[12] investigate the status and factors affecting patient safety culture. The research aims to explore the healthcare professionals' perception and attitude associated with patient safety, leadership commitment to patient safety, staff education and training, communication between healthcare professionals, patient engagement and reporting, and learning from adverse events. The findings exhibit that the overall positive patient safety culture response rate is 37%. Teamwork within hospital units is the highest (75.3%), whereas frequency of event reporting is the lowest (20.7%). Moreover, several factors affecting patient safety culture, particularly at organizational and individual level, include poor attitude of health professionals, poor documentation practice and poor cooperation by clients, lack of continuous training and education, lack of standard operating procedure, staff shortages, and high work load.

Afework and Tamene[12] investigate the status and factors affecting patient safety culture. The research aims to explore the healthcare professionals' perception and attitude associated with patient safety, leadership commitment to patient safety, staff education and training, communication between healthcare professionals, patient engagement and reporting, and learning from adverse events. The findings exhibit that the overall positive patient safety culture response rate is 37%. Teamwork within hospital units is the highest (75.3%), whereas frequency of event reporting is the lowest (20.7%). Moreover, several factors affecting patient safety culture particularly at organizational and individual level include poor attitude of health professionals, poor documentation practice and poor cooperation by clients, lack of continuous training and education, lack of standard operating procedure, staff shortage, and high work load.

Telaumbanua and Dachi[13] examined the aspects influencing patient safety culture and found that the availability of facilities, length of service (p=.048), cooperation between units (p = .000), open communication (p = .022), and cooperation within units (p = .002) affect the patient safety culture. Cooperation within departments is the most essential aspect influencing patient safety culture in hospitals.

Data on patient safety culture in the form of patient safety incidents in a hospital in Aceh Province have not been found to date. However, a few studies regarding the implementation of patient safety have been carried out there. Mentari[15], through her research at one of the hospitals in Aceh, mentions that there is a relationship between nurses' knowledge about patient safety and medication administration errors (p = .048).

Referring to previous studies, it is known that several factors are associated with the implementation of patient safety culture in hospitals by nurses. The present researchers classify these factors into patient safety culture and patient safety regulations. Thus, they constitute the research variables.

Aim of the study

The study aims to identify the relationship between organizational culture and the implementation of patient safety culture in hospitals in Aceh Province.

Methods

A quantitative study was employed with a cross-sectional study approach. All the 219 nurses enrolled in the inpatient rooms were selected as the sample (total sampling). The instruments utilized include the Organizational Culture Assessment Instrument (OCAI) for measuring organizational culture, and the Hospital Survey on Patient Safety for patient safety culture. The data analysis were conducted using the Pearson correlation

Results

Table 1 shows that of 219 nurses on duty at a public regional hospital in Aceh Province, the mean age is 39.10 years old (SD = 5.545), the mean length of service is 7.94 years (SD = 5.142), the majority are female(68.5%), acquired the latest education of a diploma in nursing (49.3%), hold the Government Employee with Agreements status (49,3%), and have been involved in patient safety training (82.2%).

Table 1: Respondent Characteristics

No	Demographics	Frequency	Percentage(%)
Age: Mean =39.10; SD = 5.545			
Length of service: Mean = 7.94; SD = 5.142			
Sex			
1	Male	69	31.5
2	Female	150	68.5
Latest Education			
1	Nursing profession	86	39.3
2	Bachelor-nursing	25	11.4
3	Diploma-nursing	108	49.3
Employment status			
1	Civil Servants	25	11.4
2	Government Employees with Agreements (PPPK)	108	49.3
3	Contract personnel	86	39.3
Involvement in Patient Safety Training			
1	Yes	180	82.2
2	No	39	17.8

Table 2 describes that the nurses enrolled at this hospital embed organizational culture with a mean score of 5.01 (SD = 2,952). and patient safety culture 144.76 (SD = 26.016).

Table 2: Description of Organizational Culture and Patient Safety Culture among Nurses

No	Variable	Mean	Standard Deviation	Min.	Max.
1	Organizational culture	5.05	2.952	0	10
2	Patient safety culture	144.76	26.016	88	176

The partial relationship between organizational culture and patient safety culture was analyzed using the Pearson Product Moment test to determine the strength of the relationship between the variables. The results of the test are presented in Table 3.

Table 3: Partial Relationship of Organizational Culture with Patient Safety Culture

No	Variable	r^2	P-value
1	Organizational culture	0.659	0.000

Table 3 shows a partial relationship between organizational culture and patient safety culture. There is a positive (p =.000) and strong (r^2 =.66) relationship between organizational culture and patient safety culture.

Discussion

Organizational culture refers to the collection of beliefs, values, and methods of interaction that establish the environment of an organization. It encompasses basic values of an organization. Also, it reflects the organization's hopes and philosophy as well as experiences gained by the staff and leaders, which often determine the group's future direction[16].

Accordingly, the findingsof this study (Table 3) indicate a relationship between organizational culture and patient safety culture. It is shown that there is a positive (p =.000) and strong (r^2 = 0.66) relationship between organizational culture and patient safety culture. This represents that nurses enrolled at the Aceh hospital possess good integrity, performance, professionalism, and teamwork regarding the implementation of patient safety culture.

The results align with Iriviranty and Ayuningtyas[17] suggesting that teamwork within units is the strongest dimension of patient safety culture (91.7%), while staffing and non-punitive responses to errors remain the weakest (22.7%). Besides, clan culture is found to be the dominant type of organizational culture in the hospital being studied. This culture has become a guide for changes in health care organizations, especially in developing a patient safety culture. It can be concluded that health service providers tend to have a positive attitude towards patient safety culture in hospitals. Therefore, action plans are designed through consensus decision-making and are considered effective in articulating patient safety within the hospital's vision and mission.

Aulia and Arbianti[18], through their study on the evaluation of organizational culture as a measure to improve patient safety, discover that clan culture has the highest mean score for any type of organizational culture, with current and expected means of 26.51 and 28.67, respectively. Clan culture has the same characteristics as a family, which can possibly be handled cooperatively. The characteristics include organizational learning, communication and feedback on errors, growth of human resources, and the use of non-punitive responses when errors occur. Organizational culture constitutes an ultimate tool to achieve goals and fulfill patient safety in hospitals.

Another study conducted by Hariyanti and Setyawan[19] shows that organizational culture plays a crucial and significant role in encouraging the expansion of nursing services. The research strongly suggests that teamwork in care units is the most important aspect of patient safety culture in hospitals. On the other hand, aspects requiring improvement include staffing, handover and transition. The development of nursing services is significantly and positively influenced by a strong safety culture.

Key elements of organizational culture related to a safety culture include primarily effective leadership, good teamwork, a culture of learning, as well as fairness and encouraging patient-centered care. A broader aspect of a systems approach is needed to improve quality and safety with particular reference to clinical governance, human factors and ergonomic principles and methods[21].

An important metric for assessing the quality of medical services is patient safety. Regarding patient safety, an organization's culture, vision, mission, goals, and leadership style undoubtedly influence nurses' behavior. However, research conducted by Sinurat and Simanullang[21] shows different results. It is found that nurses' organizational culture influences hospital service standards; and nurses can use organizational performance culture to reflect their own professional identity. More than 50% of them express a lack of organizational culture; and more than 50% demonstrate substandard behavior in implementing patient safety. Based on the Spearman's correlation test, there is no clear relationship between corporate culture and nurses' implementation of patient safety practices. Through the head nurse or team leader, hospital administration can offer coaching in the areas of socialization, training, guidance, and supervision.

Further, Tan and Pang[22] state that an organizational culture in which healthcare professionals strive to implement a strong patient safety management system requires firm leadership that prioritizes safety above financial and operational goals; promotes identification, communication, and resolution of patient safety issues; and provide appropriate resources, structure, and accountability to maintain an effective patient safety system. This requires establishing organizational strategies and joint development of professional educational frameworks to enhance patient safety capabilities and capacities.

Moreover, regarding the nursing theory suggested by Imogene King, the organizational culture of nurses in hospitals is reflected in nurses-patients, nurses-other health teams, and nurses-colleagues interactions. These relationships will form a communication pattern which enables transactions in fulfilling patient safety needs. A relevant study was conducted by Noviyanti and Ahsan[23] discovering that there is a significant relationship between nurse communication satisfaction with the quality of patient safety culture. Further, the higher the level of nurse communication satisfaction, the better the quality of the patient safety culture being implemented ($r = 0.338$).

Based on the results of the present study, it can be concluded that the patient safety culture implemented by nurses in hospitals in Aceh Province will grow and develop if an excellent organizational culture is created. This requires high leadership support and reliable organizational management strategies.

Conclusion

The conclusion that can be drawn from the results of this study is that patient safety culture can be implemented effectively by nurses when there is a good organizational culture, such as effective leadership and the implementation of monitoring and supervision functions.

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Ethical Considerations: The research ethics review was conducted at one of the Hospital Ethics Committees in the Province of Aceh with number 070/363/2024 dated April 30, 2024.

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Original Article

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Positive Impact on Critical Care Knowledge Acquisition and Skills of Vietnamese Nurses through an Online Standardized Training Program

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Abstract

Background: Improved access to healthcare, increasing elderly population, growing incidence of chronic diseases, combined with the high prevalence of accidents and infectious diseases are driving the demand for critical care services in acute hospitals. However, low and middle-income countries not only have a shortage of critical care nurses, but there are also gaps in their graduate, post-graduate, and specialized training as well as in their continuing education to support them in their role.

Methods: This quality improvement project aimed to assess the effect of a web-based group study program on knowledge acquisition and skills and competency development of critical care nurses at seven private,not-for-profit hospital sites within a hospital system in Vietnam. The Essentials of Critical Care Orientation 4.0 course from the American Association of Critical Care Nurses was delivered to two cohorts of ICU nurses who worked in critical care. Course content was translated in Vietnamese. The program leveraged a preceptor-facilitator-learner model that depended on group discussions and self-learning. Program effectiveness was evaluated using quantitative pre- and post-test design, combined with a post-program survey.

Results: Average post-test scores of the first cohort increased by 34.0% over pre-test while those of the second cohort increased by an average 41.0%. Post-program survey revealed that all learners were satisfied with the quality of content, the web-based delivery system, content translation and the overall teaching methodology. Learners also demonstrated greater confidence in delivering safe, proactive patient care.

Conclusion: The utilization of an online, standardized western education program, translated to Vietnamese, delivered through a facilitator-group learning model is successful in increasing the knowledge level of Vietnamize critical care nurses.

Keywords: Critical care, nursing, Vietnam, Continuing Professional Development

Introduction

Demand for healthcare services is rapidly increasing across low-to-middle income countries due to the burden of chronic and infectious diseases, better access to and spending on healthcare, and a growing elderly population. As a result, demand

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for critical care services is also expected to increase in these countries; however, dearth of trained and specialized critical care teams is a key reason for poor patient outcomes. The global burden of critical care is estimated based on morbidity and mortality in the Intensive Care Unit (ICU)[1]. Sepsis is a common complication in the ICU and southeast Asian countries have a relatively higher burden of it. Also, patients from low and lower-middle income countries have a higher risk of in-hospital death compared to high-income countries[1,2]. Nurses are a crucial component of the critical care team. Research covering various hospital departments across 9 European countries indicates a strong inverse correlation between patient mortality and optimum nurse staffing and education, with the outcome for a hospital significantly improving with a greater number of nurses with a bachelor's degree[3].In comparison, a scoping review by Macey et. al. suggested that middle-income countries had limited critical care nurses (CCNs) with post-basic training, while low-income countries had none[4]. The study observed that nurses from various other specialties including pre-registration student nurses supported critical care in low- and middle-income countries. Shortage of trained nurses creates the need forcontinuing professional education (CPD) to develop knowledge and skills to support critical care.

In Vietnam nursing was established as a professional practice as recently as 1990[5]. Literature describing organized training for CCNs in Vietnam is sparse. To the best of the author's knowledge, bulk of the training comprises on-the-job learning, shadowing, experiential learning, and yearly reviews of a few CCN competencies created by individuals or specific groups within hospitals. Consequently, CPD is vital for CCNs to provide safe, standardized, and effective patient care[6]. Traditional CPD methods, such as, attending conferences and workshops, are expensive, time consuming and logistically complex[7]. Vietnam has the added language barrier whereof very few nurses speak and understand English. CPD courses need to be developed and delivered in Vietnamese to cater to the local nurses. As with any health system, Vietnamese nurses are overworked and have little time to invest in their learning and development during work hours.

Online CPD programs address these challenges by allowing nurses the flexibility to learn in their own time and pace while relieving cost and resource pressures associated with delivering these programs in person[7]. Online programs are also easier to scale up and can support access outside the work environment and on multiple devices, including personal computers and smartphones. Language, however, persists as an unaddressed challenge as the courses are usually offered in English.

Research shows that educational programs focused on the adult learners that are engaging, relatable, active, shared and learner-owned result in better learning outcomes[8]. We hypothesized that using online, self-paced programs and their application in daily practice, delivered through a group-learning model in local language will help improve knowledge retention for the nurses. Group learning and concomitant on-the-job application could help develop critical thinking, articulation, self-management, and leadership skills as well.

The AACN Essentials of Critical Care Orientation 4.0 (ECCO 4.0) from the American Association of Critical-Care Nurses (AACN)[9]is an internationally certified program that offers a comprehensive curriculum to equip nurses with the essential skills and knowledge needed to provide optimal care in critical care settings. It contains 18 modules covering 72 lessons. Course content is delivered over the Elsevier Performance Management (EPM) software platform.

In this quality improvement program, a private Vietnamese hospital group with 7 sites invited a US-based CCN consultant to address nurse knowledge and skills development by implementing sustainable strategies to improve overall critical care knowledge. The purpose of the quality improvement project was to determine the feasibility and effectiveness of a western-oriented, online critical care learning course with primarily non-English speaking CCNs at the hospital system; and establish the effectiveness of this learning methodology on the nurses' learning outcomes.

Methodology

Pilot: To evaluate the feasibility of the program, we selected 5 lessons from Cardiovascular Part 1 of AACN ECCO 4.0 for 5 nurses to review. The nurse with the highest score in the International English Language Testing System (IELTS) exam was designated as the facilitator while the remaining 4 nurses were designated as learners. Th facilitator was coached by the consultant. Facilitator coaching focused on ensuring complete engagement between the nurses and the content. By the fourth lesson, coaching was not required.

AACN ECCO 4.0 content was translated by the facilitator with support from a learner with strong English skills. The translated lesson was sent to the remaining learners to review on their own for 1 week via the EPM and then test their knowledge through the platform itself. After approximately 1 week, a group lesson was conducted by the facilitator and coached by the consultant.

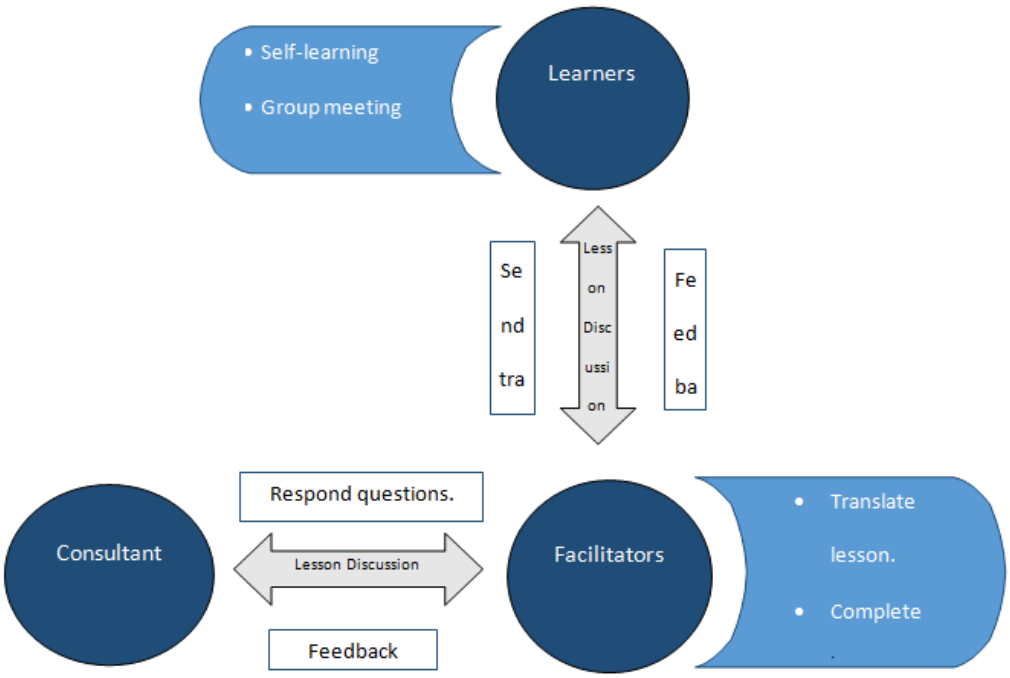
Pilot nurses' post test scores averaged 85%, which was above the target score of 80%, along with favorable feedback on the system. The successful pilot led to organizational commitment to launch the program with 50 nurses.

Cohort 1: Executed from January 2022 to January 2023, the program started with a pre-test of a hundred multiple-choice questions on basic knowledge in critical careby50 critical care nurses from across the hospital system. A test blueprint was created to ensure questions covered all areas of critical care nursing. A selection of 17 modules covering70 lessons from AACN ECCO 4.0 was chosen to match the learning needs and practice requirements for critical care in the health system based on the pre-test results. Because the largest hospital in the system performed cardiac surgery, nurses at that facility were assigned an additional module containing three lessons to coverc are of the cardiac surgery patient. The cohort of 50 nurses was divided into 10 groups, each with 4 learners and 1 facilitator. Facilitator nurses were selected based on their pre-test scores, willingness to participate and English skills. All the nurses were given a virtual tour of EPM so that they could easily access and complete the lessons assigned to them in their personal accounts.

A full-year calendar outlined the schedule for lesson translation, facilitators-consultant group meetings, facilitator-learner group discussions for each group, and lesson completion (See figure 1). The facilitators received a 2-hour education session on adult learning and group learning strategies by the consultant. Facilitators with good English skills were paired with facilitators with lessor English skills to translate the lessons. The consultant met with the facilitators weekly to review the upcoming lesson, and to address any concerns, ensure clarity, share cases, and impart any additional knowledge to improve understanding of the lesson and unit practice. The facilitators' role, in turn, was to support learners with lesson completion, answer their questions and conduct virtual group discussions to further reinforce and/or enhance the learnings. The process occurred as follow:

- Key learnings from the lessons and some of the lesson content were translated by the facilitators.
- The translated lessons were sent to the learners one week at a time to review on their own and test their knowledge within EPM.
- The consultant met with the facilitators virtually to discuss and debate the content before the latters' group meetings.
- The facilitators then conducted group discussions via Microsoft TEAMS with learners in their groups approximately1 week after the learners had received their lesson.

At the end of 16 modules 37 learners and 10 facilitators took the post-test. They were also sent a program feedback survey and 47 nurses responded to it. 3 learners did not complete the program as they left the health system.



Cohort 2 –Executed in the same format as Cohort 1 from May 2023 to April 2024, cohort 2 included 42 learners and 8 facilitators returning from cohort 1, divided into 8 groups. The overall teaching methodology was the same as cohort 1. However, cohort 2 was assigned 16 modules containing 64 lessons to better match the precise knowledge needs of the health system. Nurses involved in the care of cardiac surgery patients had the additional module as before. Pre- and post-test were conducted as before. A program feedback survey was also rolled out, but the questions and the platform used were different from cohort 1.

Results

Cohort 1 –37 nurse learners, guided by 10 facilitators, completed the program covering 17 modules, which included 70 lessons, over 13 months. A summary of pre- and post-test scores was tabulated as per Table 1 and indicateda 34%increase in average group score after completing the course. Also, the range of scores consolidated and the median score improved from 55.5% in pre-test to 85.50% in post-test. Cohort 1 was also prescribed a repeat test in the same format 1 year after program completion. Group average test score in the repeat test was 86.6%.

Table 1: Summary of pre-, post- and repeat test scores of cohort 1

	Pre-Test n=50	**Post-Test n=47**	**Repeat Test n=44**
Range of Scores	20% - 91%	75% - 96%	76% - 100%
Group Average	63.1%	85.0%	86.6%

All respondents of the program feedback survey were satisfied with the quality, depth and range of content provided under the AACN ECCO 4.0 course. They were also satisfied with the tests included within the lesson content. Respondents rated the ability to access content and the ability to review it in their own time favorably.

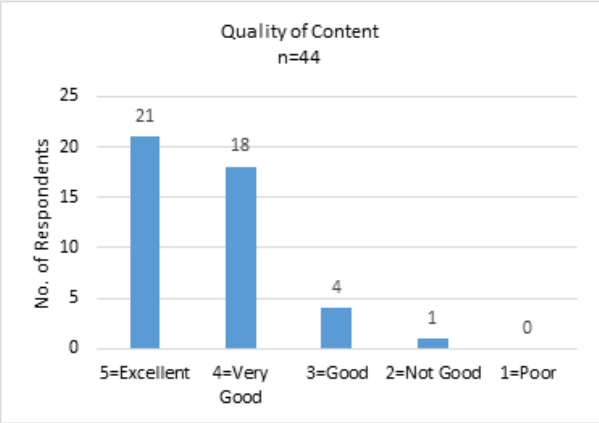


Figure 2: Cohort 1 feedback on quality of content

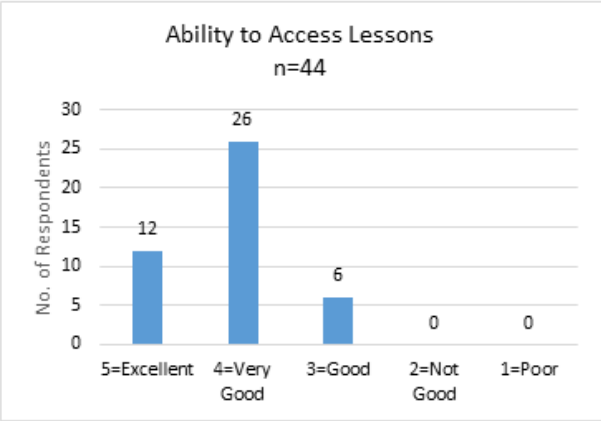


Figure 3: Cohort 1 feedback on the ability to access the lessons

Majority of the respondents found the English-to-Vietnamese lesson translation helpful in understanding and learning the concepts better. All respondents stated that the group discussions and their participation in the discussions positively impacted their understanding and learning.

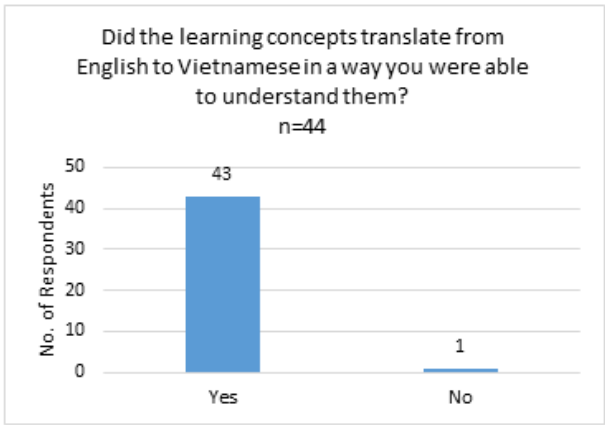


Figure 4: Cohort 1 feedback on language translation

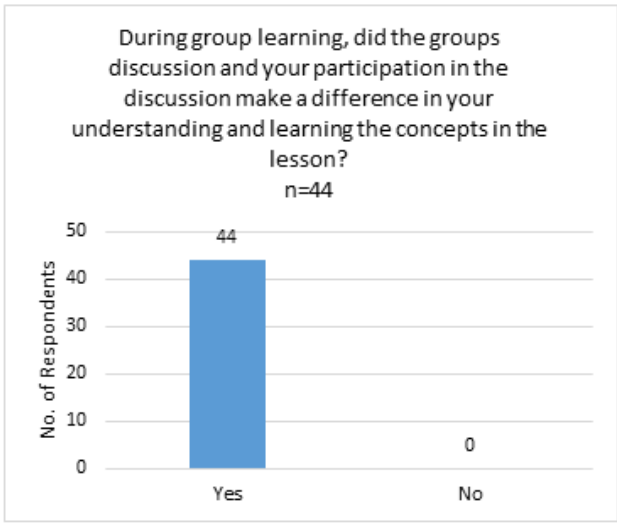


Figure 5: Cohort 1 feedback on group discussions

The feedback survey included questions on the respondent's perceptions of the impact on their day-to-day practice. On a 5-point scale, 33 respondents rated the probability of them recognizing a change in their patient's condition as "Very High" or "High" while 31 rated the probability of intervening appropriately in response to a change in the patient's condition as "Very High" or "High". 31 respondents rated the probability of advocating on the patient's behalf to the care team as "Very High" or "High". 35 respondents rated the probability of being able to provide safe patient care as "Very High or High".

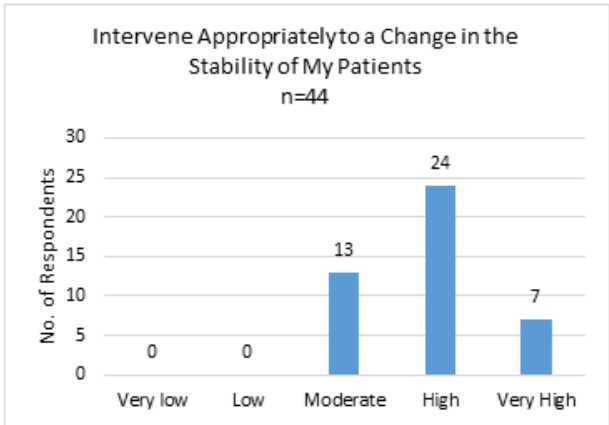


Figure 6: Cohort 1 feedback on the course impact on appropriately intervening in response to changes in patient condition

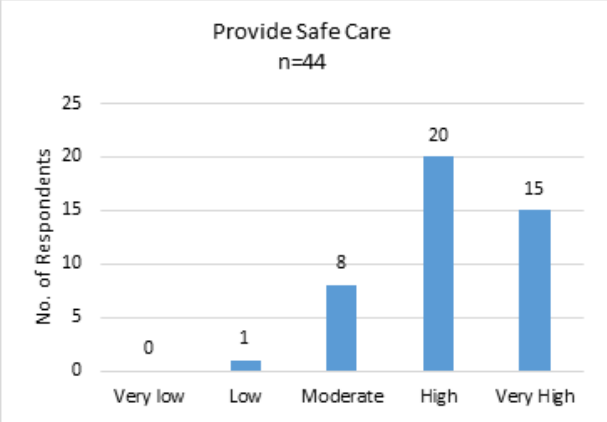


Figure 7: Cohort 1 feedback on the course impact on the nurses' confidence in providing safe patient care

Cohort 2–The program was completed by 41 learners and 8 facilitators over 12 months.1 learner dropped out from the program. The learners completed 16 modules, covering 64 lessons. Cohort 2 pre-test scores averaged 60.6% while post-test score averaged 85.6%, a 41.0% increase. The program feedback survey was modified and disseminated over a different platform for cohort 2.37 nurse learners and 2 facilitators responded to the program feedback survey. All 39 respondents were satisfied with the course content and EPM. The majority of nurses in cohort 2 rated accessibility and ease of review of lessons as "Excellent" or "Good". 38 respondents found the course content appropriate for their learning needs and practice. 30 nurses found it convenient to continue learning in their own time and place. 35 respondents perceived their interventions were more suitable for their patients after going through the course while 38 respondents felt more confident about providing safer care.

Discussion

Critical care services in Vietnam suffer from a shortage of trained, specialized nurses. Continuous professional development of nurses in practice is crucial to ensure high quality, evidence-based patient care. Our aim was to demonstrate the impact of a web-based western-oriented learning program, delivered through a preceptor-facilitator-group learning model, on the knowledge and skills of Vietnamese critical care nurses. The increase in average test scores in pre- and post-tests of 34.0% for cohort 1 and 41.0% for cohort 2 demonstrates the positive impact on nurses' knowledge and skills from the AACN ECCO 4.0 course. Moreover, group average test score of 86.6% in the repeat test for cohort 1 indicates knowledge retention over a period of time.

Prior to this initiative the healthcare system with the 7 hospitals had no organized critical care orientation or education process to develop the knowledge and skills of CCNs. It depended on experienced CCNs with a few years in practice to provide teaching at the bedside and basic competency assessments conducted sometimes with difficulty due to manpower crunch. There was no didactic component to CCN orientation or education. Moreover, education was provided without testing or application strategies. Most nurses had an IELTS scores less than 4.5. Therefore, language created barriers to using didactic education from English speaking experts and this was also recognized as an unsustainable model from experience.

Sari et. al pointed to several challenges associated with CPD that can be addressed through online platforms, such as, time, resources and costs tied into a CPD program, accessibility of the program to all nurses, time required by nurses to complete the learning, and language barriers[7]. Our teaching methodology addressed all these challenges as reflected in the survey feedback. The EPM system allows the preceptor and facilitator to customize the structure and pace of the program to the nurses' needs. Through EPM, learners were able to access lessons digitally from a setting of their choice and were able to complete the lessons through self-learning. Vietnamese translation of the content is effective as it helps improve lesson understanding while the facilitator-led group discussions further augment nurses' understanding and learning of the concepts. Delivering an internationally recognized, peer-reviewed course like AACN ECCO 4.0 helps elevate the hospital's reputation as a care provider that meets global standards and practices evidence-based healthcare.

Hamill et. al demonstrate that a standardized professional development course in critical care conducted for multidisciplinary teams comprising nurses, clinicians and other healthcare professionals improves the participants' confidence in identification and management of critical illnesses[10]. Our study

shows similar results wherein nurses felt they were able to recognize better and intervene more appropriately to a change in a patient's condition after completing the course; they were more confident about advocating on behalf of their patients to other care team members and felt more confident about providing safe patient care.

Success of the first cohort of nurses who completed the AACN ECCO 4.0 course delivered over EPM led the management of the health system to approve investment in the second cohort. The second cohort was an opportunity for the team to refine the lesson selection and the calendar so that learners could be more efficient and targeted in their learning. The teaching methodology created in this study, whereby, an international consultant, proficient in English and well-versed in globally recognized critical care best practices and the AACN ECCO 4.0 course trains facilitators, who in turn conduct translation, training and group discussions to support local nurses depends significantly on people's availability and willingness. In our study, 3 learners from the first cohort and 1 from the second cohort voluntarily dropped out of the program due to changes in their work and/or personal environment. All nurses along with the management documented their commitment to the program at the initiation of each cohort. These are important considerations when selecting a CPD program and its participants. Without firm commitment from the learners, facilitators and the hospital management, neither could our CPD program have been completed, nor would it have generated the positive learning outcomes observed here.

An indirect outcome of the first cohort was that a few of the facilitators went on to become unit-based educators for the intensive care units (ICUs). They are currently assisting in developing an ICU orientation program, offering continuing growth and development for the ICU nurses. Institutionalizing evidence-based practice and improving patient outcomes is the key reason for investment in healthcare workforce training and development. Our sustainable model of nurse CPD ensures continuity of workforce training and development.

Limitations

The study demonstrates increased subject knowledge, and greater confidence in practice for nurses, however, we do not have sufficient data to correlate this with direct improvements in patient outcomes. Post-program feedback survey questions and the survey dissemination platform were different between the two cohorts. There were also leadership changes at the hospital group between the execution of cohort 1 and cohort 2, which may have indirectly impacted nurses' willingness to participate, learning journey and outcomes. As a result, we cannot provide a direct comparison of the feedback from the nurses across the cohorts, even though the feedback remains similar at a high level.

Other motivations for private hospitals to invest in nurse training and development include staff retention, healthier working environment, preparing future nurse leaders and/or improvements in patient experience. Public hospitals, on the other hand, may not be able to prioritize these over cost-optimization and large volumes of patient care. Nonetheless, the study indicates that significant improvements can be made in nurse training and development in an efficient and effective manner through web-based western learning programs. Also, investment in nurse CPD might help improve staff efficiency in a delicate and vital area of care delivery such as critical care where trained resources are already constrained.

Conclusion

A standardized, evidence-based online learning course in critical care, developed in a western country, delivered via a preceptor-facilitator-learner model augmented by translation, group discussions and practical application helps improve nurses' subject knowledge and skills. It also gives them more confidence in practice and enables them to provide perceived safer care to patients.

Source of funding: No external source of funding. Project self-funded by the leadership of Vinmec Health System. Quality Improvement project approval granted by Vinmec Leaderboard January 2022.

Ethical Clearance: This project was approved as a Quality Improvement project by the Leadership

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Conflict of interest: There are no conflicts of interest.

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Original Article

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Activity and Effectiveness of Online Learning among Nursing Students in Nigeria

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Abstract

Introduction: Understanding the activity levels and effectiveness of online learning among nursing students is essential for informing curriculum development, instructional design, and pedagogical practices in nursing education.

Method: The study adopted prospective web-based cross-sectional descriptive design. Multistage sampling technique was used for selection of the 429 participants that completed the Google driven data, which was analyzed using Statistical Package for the Social Sciences (SPSS) Version 22, and results were presented in tables.

Results: Majority 258(60.2%) of the respondents were aged between 21-25 years as at their last birthdays. married 392(91.4%), maily Christian 377(87.9%) and all were undergraduate. Anambra, Imo, Kwara, Ondo and Enugu were the modal states of origin 110(25.6%), 57(13.3%), 45(10.5%), 44(10.3%) and 21(4.9%) respectively. On activity levels of the students, 69(16%) the students reported extremely active, 117(27.3%) were active while 40(9.3%) were inactive. On effectiveness of online learning, Majority of the respondents had the opinion that online learning was effective 355(82.8%) while 74(17.2%) said that online learning was ineffective.

Conclusion: The utilization of online mode of learning has not been without challenges especially in area of engagement, network hitches, attention and standardization of the contents delivered. Curriculum planners and teachers utilizing the online method should make sure that students progress through ; Concrete Experience, Reflective Observation, Abstract Conceptualization and Active Experimentation to enhance effectiveness and encourage more students engagements.

Keywords: Activity, Effectiveness, Online Learning, Nursing Students, Nigeria

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Introduction

E-learning also known as online learning has transformed the healthcare education system by providing healthcare professionals with training and development opportunities, regardless of their location [1]. The emergence of e-learning or online learning programs has transformed the traditional learning approach worldwide, including school and university education, adult education, and other health supplementary learning programs[2,3]. As a result, it is critical to rethink and revolutionize the creation of learning programs that are functional and beneficial in response to these technological advancements [4,5]. Online learning is a form of learning free from spatial and temporal constraints, using information and communications technology[6].In contemporary nursing education, the integration of online learning has become increasingly prevalent, offering both challenges and opportunities for educators and students alike [7]. The incorporation of online learning into nursing education is a response to the evolving needs of both learners and the healthcare industry [8]. Asynchronous and synchronous online learning modalities offer students the flexibility to access course materials at their convenience, facilitating a self-paced learning environment that accommodates diverse learning styles and schedules. Since nursing curriculum is not designed to have a complete distance education [9], the pedagogical transition from traditional to online learning posed major challenges in nursing education [10].

The American Association of Colleges of Nursing (AACN) has emphasized the importance of integrating informatics and technology-enhanced learning environments into nursing curricula to prepare students for the complexities of modern healthcare settings [11]. With the proliferation of electronic health records, telehealth initiatives, and healthcare informatics systems, nurses are required to possess proficiency in digital literacy and information management skills. Online learning provides an opportunity for nursing students to develop these competencies, along with critical thinking, problem-solving, and communication skills essential for effective nursing practice.

Despite the potential benefits of online learning, challenges exist in ensuring its effectiveness and relevance to nursing education. Concerns regarding the quality of online instruction, the adequacy of student support services, and the authenticity of clinical simulations have been raised within the nursing education community [12]. The primary reasons behind adopting these technologies In nursing education include to better prepare nursing students for the workforce, to improve student nurse confidence and competence, particularly in the areas of problem solving, critical thinking and decision making, to provide students with variety in the types of clinical cases they are exposed to due to the reduction in the quantity and quality of available clinical sites, to meet changes in the technology being used in practice and to serve the way incoming students learn.

Understanding the activity levels and effectiveness of online learning among nursing students is essential for informing curriculum development, instructional design, and pedagogical practices in nursing education. By identifying effective strategies and best practices in online learning, educators can optimize the educational experiences of nursing students, enhance their clinical competence, and prepare them for the demands of contemporary healthcare practice.

Materials and Methods

The study adopted prospective web-based cross-sectional descriptive design. Multistage sampling technique was used for selection of the participants. Simple random sampling method was used in selecting, three regions out of six regions in Nigeria. South West, South East and North Central. Simple random sampling was also used to select four nursing institutions from the three regions including Department of nursing science university of Lagos, School of Nursing university of Ilorin Teaching Hospital, Department of Nursing Nnamdi Azikiwe University and Department of adult and psychiatric mental health nursing University of medical sciences Ondo state. Convenient sampling was used to select participants for the study. The sample size for the study was 429, 42 from Unilag, 205 from Unizik, 128 from Uniondo and 54 from SON UITH using proportionate method. The instruments for data collection was researchers designed questionnaire which was validated and tested for reliability. The

Socio-demographic variables and objectives were analyzed using descriptive statistics (Percentage, Frequencies, Mean, Median, Standard Deviation and Tables. Ethical approval was obtained from Health Research Ethics Committee, Lagos University Teaching Hospital for the study with approval Number ADM/DCST/HREC/APP/4220. Electronic informed consent was obtained from the participants before completing the study instrument. Data analysis was done using SPSS version 24 and results were presented in tables.

Results

Table 1: Socio-demographics of the respondents

Variables	Frequency	Percentage
Age		
16 – 20	86	20.0
21 – 25	258	60.2
26 – 30	66	15.4
31 and above	19	4.4
Institution		
NAUTH	205	47.8
UNILAG	42	9.8
UNIONDO	128	29.8
SON UITH	54	12.6
Marital Status		
Single	392	91.4
Married	37	8.6
Religion		
Islam	51	11.9
Christianity	377	87.9
Others	1	.2
State		
Anambra	110	25.6
Imo	57	13.3
Kwara	45	10.5
Ondo	44	10.3
Others	173	40.3
Level of Education		
Undergraduate	429	100

Table 1 shows majority 258(60.2%) of the respondents were aged between 21-25 years as at their last birthdays. Majority of the students were married 392(91.4%), 377(87.9%) of them were Christians and allwere undergraduate. Anambra, Imo, Kwara, Ondo and Enugu were the modal states of origin 110(25.6%), 57(13.3%), 45(10.5%), 44(10.3%) and 21(4.9%) respectively.

Table 2: Activity During Online Learning

Variables	Frequency	Percentage
Describe your activity during e-learning		
Extremely inactive	40	9.3
Inactive	66	15.4
Not sure	137	32.0
Active	117	27.3
Extremely active	69	16.0

Table 2 shows 69(16%) the students reported extremely active, 117(27.3%) were active while 137(32%) were not sure either active or inactive and only 40(9.3%) were inactive.

Table 3: Effectiveness of online-learning

Variables	Frequency	Percentage
Rate the effectiveness of e-learning in terms of increasing knowledge		
Extremely ineffective	40	9.3
Ineffective	45	10.6
Not sure	150	35.0
Effective	102	23.7
Extremely effective	92	21.4
Rate the effectiveness of e-learning in terms of increasing clinical skills		
Extremely ineffective	137	31.9
Ineffective	108	25.2
Not sure	78	18.2
Effective	60	14.0
Extremely effective	46	10.7
Rate the effectiveness of online learning in terms of increasing social competences		
Extremely ineffective	78	18.2
Ineffective	88	20.6
Not sure	103	24.0
Effective	85	19.8

Continue.....

Extremely effective	75	17.4
Rate the effectiveness of traditional face-to-face learning in terms of increasing knowledge		
Extremely ineffective	30	7.0
Ineffective	37	8.6
Not sure	74	17.2
Effective	128	29.8
Extremely effective	160	37.4
Rate the effectiveness of traditional face-to-face learning in terms of increasing clinical skills		
Extremely ineffective	44	10.3
Ineffective	42	9.8
Not sure	56	13.1
Effective	71	16.5
Extremely effective	216	50.3
Rate the effectiveness of traditional face-to-face learning in terms of increasing social competences		
Extremely ineffective	24	5.6
Ineffective	54	12.6
Not sure	74	17.2
Effective	117	27.2
Extremely effective	160	37.4

Figure 1: Effectiveness of online-learning

Table 3 shows the Effectiveness of e-learning among the respondents. A 5-point Likert scale was employed to measure the respondents' opinions toward the effectiveness of online learning. Six items scored in ascending order 1-5 were used to assess the effectiveness of online learning. The average score was graded to give the level of effectiveness; those that scored >2.5 were graded as effective while a score of < 2.5 showed the opinion that online learning is not effective.

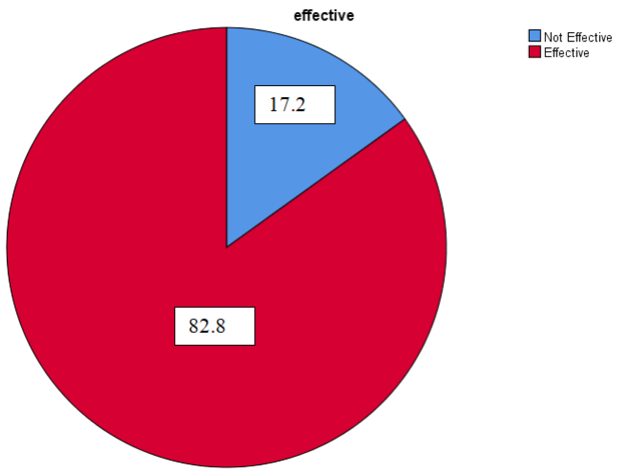

Figure 1: Majority of the respondents had the opinion that online learning was effective 355(82.8%) while 74(17.2%) said it was ineffective.

Discussion of findings

On activity levels during online learning among nursing students. Results shows that the students reported extremely active and active to a greater percentage. About a quarter percentage neither active or inactive and a few of the students reported to be inactive. Active learning strategies in nursing education is all about empowering students to *actually* remember the large amount of information they face throughout nursing school. This view was supported by Maria-Pilar et al,[13] who stated in their report that Faculty have an opportunity to address student stressors and design remote courses in such a way to facilitate student engagement and community building. The benefits of using active learning strategies in nursing education Simply presenting course material may provide short-term value, but physical practicing, experiencing, and learning through active engagement helps the roots of that material grab hold. Those that reported inactive signifies a preference for face-to-face learning hence there is suggestions for optimising remote learning include an emphasis on synchronous live sessions rather than asynchronous learning, incentivised learning, and a focus on ongoing formative informal assessment to maintain engagement. Specific challenges related to poor retention, difficulty remaining motivated, academic role stress and maintaining focus on content and learning outcomes [14] may also be a source of inactivity for the

participants. It is important to note that activities to encourage active learning among students include; Pre-class assignments, role play, concept map, nursing simulation, gallery work, what if scenarios, may not be possible with online learning hence the preference for face to face or traditional learning method by this students. While online learning is reported by some authors as causing social isolation, lack of motivation and difficulties in communicating with the instructors and peers [15,16], was a factor that affect online learning as a large number of students in the current study reported the opposite as the result showed majority of the students reported to be active during online learning. In a study by O'Doherty et al[16], the students considered online learning to be a safe space for engagement that enhanced active participation. They also noted that it forced them to reflect on their pre-existing knowledge before learning new information and ultimately enhanced their understanding of the learning material. The findings of this research suggest that online platforms can support nursing students' learning engagement, although not specific to behavioural engagement, cognitive and affective engagement as well[17,18] .

On the effectiveness of online learning among the students, majority of the participants had the opinion that online learning was effective while a few of them said that online learning was ineffective. For any learning method to be judged effective, it must cover Kolb's experiential learning cycle which defines four stages that a learner should progress including Concrete Experience, Reflective Observation, Abstract Conceptualization and Active Experimentation[19]. For the majority of the students that reported online learning to be effective showed they are satisfied in these four domains hence the acquired knowledge can be applied in future situations, resulting in new experiences.

The real case online learning provides a different atmosphere including more interesting class, interactive interaction with the patients directly and providing positive experience for the students in the form of seeing the real cases online. The facilities (internet availability and stability) are important factors in the online learning process to aid its effectiveness[13].

There are various obstacles in the online learning that cause the learning process to be less than optimal. Some studies reported that the internet connection and facilities owned by the students and, also tutors were the important factors that become a "barrier" in online learning thereby impeding it's effectiveness[20,21]. Supporting the effectiveness of online learning, a meta-analysis study found that, on average, students in online learning conditions performed modestly better, had significant positive effect on students' knowledge and attitude than those receiving face-to-face instruction.[22]

Contrary to the report in the current study, Tiwari & Srivastava[3] in their own study revealed that majority of the nursing students had poor overall self-efficacy scores in online learning, which highlights the need for urgent identification of possible predictors. Although some degree of agreement regarding focus in lectures, interactions and summative online assessments was found between students and faculties[3]. Internet speed and technical issues were revealed to be the main constraints of this format, whereas flexibility, availability of content for revision, and fewer distractions were the positive features. Frequent summative and formative assessments was seen as vital to draw attention, help with retention and address the issues relating to learning and teaching[23] and should be utilized appropriately in online learning to enhance effectiveness.

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Ethical approval

Ethical approval was obtained from Health Research Ethics Committee, Lagos University Teaching Hospital for the study with approval Number ADM/DCST/HREC/APP/4220. Electronic informed consent was gotten from the participants before completing the study instrument.

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Authors' contributions: All authors contributed to every aspect of the study from its inception to the end.

Conclusion

The study showed students were active and saw online learning to be effective. It is important to note that understanding the activity levels and effectiveness of online learning among nursing students is essential for informing curriculum development, instructional design, and pedagogical practices in nursing education. By identifying effective strategies and best practices in online learning, educators can optimize the educational experiences of nursing students in all ramifications.

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Original Article

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Subjective Well-Being of Female Adolescents with Disability in Indonesia

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Abstract

Background: Subjective well-beingis vital for individuals with physical and intellectual disabilities to possess because it affects their future life development. Adolescents with physical disabilities are one of the groupsconsidered to have low levels of Subjective Well Being.

Materials and Methods: A cross-sectional study was conducted among139female adolescents with disability in Indonesia. The data were collected by directly interviewing the students based on the questionnaire guide and reviewing the participant information through secondary data. The data collection instruments cover the socio-demographic data questionnaire and Satisfaction with Life Scale.

Results: The majority of the female adolescent with disability satisfy with their life (70.5%). Their satisfaction was associated with their family type and their age ($p < 0.05$), but not associated with age, parent occupation and their grade ($p > 0.05$).

Conclusion: Students from nuclear family seems to have better support to the disabled adolescent, so that they have better lafe satisfaction compared to their peer living in an extended family.

Keywords: Affect, Life Satisfaction, Subjective Well-Being, Adolescent, Disabilities

Introduction

Subjective well-being (SWB) is an essential concept for adolescents with intellectual disabilities, considering the health disparities emerging in the population. Despite variation in estimates of the prevalence of disability, recent estimates suggest that 15-19% of the world's population has disabilities[1]financial hardship, social support, subjective well-being. The United Nations (UN) Convention on the Rights of Persons with Disabilities states that "persons with disabilities have the right to the highest attainable standard of health without discrimination on the basis of disability"[2].

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Although the UN Convention on the Rights of Persons with Disabilities has been ratified by 185 States (United Nations, 2022), individuals with disabilities still experience major health inequalities across a range of indicators, including reported poorer physical health[3], poorer mental health[4] where some require psychosocial support. However, evidence is limited for whether existing interventions for this adolescent group reduce social or appearance-related distress. We therefore conducted a parallel-group, randomised control trial to evaluate the effectiveness of Young Person's Face IT, a self-guided web-based psychosocial intervention developed for adolescents with a visible difference who experience distress. Adolescents (N = 189, aged 11–18,and significantly increasing health problems in those with disabilities during chronic physical conditions[5].

SWB refers to an assessment of one's life satisfaction and affective (positive and negative affects). It is vital that people with physical and intellectual disabilities possess SWB since it affects their future life development. An individual with high SWB will find it easier to establish good social relationships[6]. SWB is often used as an indicator to measure the level of adjustment in individuals with disabilities[7]and there is a lack of regional representative data. Therefore, this study aimed to estimate the pooled prevalence of good menstrual hygiene practices and associated factors among adolescent girls in sub-Saharan Africa. Methods: In this study, the Preferred Reporting Items for Systematic Reviews and Meta-Analysis guidelines were used to develop the review manuscript. Online electronic databases, such as PubMed/Medline, Google Scholar, and CINAHL, were searched to retrieve available studies. The database search was conducted from January 1 to May 17, 2022. The selection, quality assessment, and data extraction of the studies were performed. Quality assessment of the studies was performed using the Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument. Subgroup analysis and meta-regression were performed based on country, study area, and sample size. Publication bias was examined by funnel plots and Egger's test. The statistical analysis was conducted using STATA version 14 software and RevMan software, and statistical significance was declared at a p value of less than 0.05. Protocol registration number: CRD42020165628. Results: A total of 229 studies were retrieved, and 14 studies were included in the final meta-analysis. The pooled prevalence of good menstrual hygiene practices was 45% (95% CI, (37, 53.Adolescents with physical disabilities are one of the groups considered to have low levels of SWB[6].

Many factors influence SWB in adolescents. They include the ones that support or inhibit SWB. Certain demographics can enhance SWB, depending on one's values and goals, personality, and culture. The influence of demographic factors on SWB consists of income, marriage and family, age and gender, occupation, education, race and religion[8]. Age and gender are associated with SWB, but they provide small effects, depending on the SWB component being measured[9].

Adolescents with physical disabilities who possess high self-esteem consider physical appearance not a measure of self-perception. Also, research exhibits that self-esteem significantly influences SWB[7]and there is a lack of regional representative data. Therefore, this study aimed to estimate the pooled prevalence of good menstrual hygiene practices and associated factors among adolescent girls in sub-Saharan Africa. Methods: In this study, the Preferred Reporting Items for Systematic Reviews and Meta-Analysis guidelines were used to develop the review manuscript. Online electronic databases, such as PubMed/Medline, Google Scholar, and CINAHL, were searched to retrieve available studies. The database search was conducted from January 1 to May 17, 2022. The selection, quality assessment, and data extraction of the studies were performed. Quality assessment of the studies was performed using the Joanna Briggs Institute Meta-Analysis of Statistics Assessment and Review Instrument. Subgroup analysis and meta-regression were performed based on country, study area, and sample size. Publication bias was examined by funnel plots and Egger's test. The statistical analysis was conducted using STATA version 14 software and RevMan software, and statistical significance was declared at a p value of less than 0.05. Protocol registration number: CRD42020165628. Results: A total of 229 studies were retrieved, and 14 studies were included in the final meta-analysis. The pooled prevalence

of good menstrual hygiene practices was 45% (95% CI, (37, 53. Furthermore, another factor influencing the high and low SWB of adolescents with physical disabilities is social support[10]as well as their most important risk factors have been described, hardly anything is known about potential protective factors. Resilience refers to the maintenance of mental health despite adversity. To gain mechanistic insights about the relationship between described psycho-social resilience factors and resilience specifically in the current crisis, we assessed resilience factors, exposure to Corona crisis-specific and general stressors, as well as internalizing symptoms in a cross-sectional online survey conducted in 24 languages during the most intense phase of the lockdown in Europe (22 March to 19 April.

Social support and optimism are related to SWB in adolescents with physical disabilities. Social support is an essential component for SWB of individuals with physical disabilities. There is a significantly positive relationship between social support and SWB in students with physical disabilities. Based on the phenomenon, the researchers were driven to conduct a study regarding the gender, education level, family type, type of disability, and social support determinants on SWB measures of life satisfaction of adolescents with disabilities in Banda Aceh City. Based on the information gained from the Education Offices (Banda Aceh City and Aceh Besar Regency Regional Offices) in 2023, there were 240 adolescents with disabilities in Banda Aceh.

Material and Methods

Across-sectional study was conducted in a school for disabled children in Indonesia. Using a convenience sampling methods, data collection was conducted from January to March 2024. The data collection was undertaken after the students' parents/representatives had completed filling out the informed consent provided by the researchers. Data was collected directly by interviewing the students based on the questionnaire guide and reviewing the participant information through secondary data. The data collection instruments include the socio-demographic data questionnaire, and Satisfaction with Life Scale (SWLS). The data collection was undertaken after obtaining an ethical permit recommendation from the Nursing Research Ethics Commission, Faculty of Nursing, Syiah Kuala University.

Results

Among 139 adolescents participated in this study, the mean of age was 15 years old, the majority was at seventh grade (41%), comes from nuclear family (85.6%), father work as laborer (51%), mother work as housewife (79%), and had deaf disability (67%). Regarding the disability that the respondent has, the majority were deaf (66.9%). Lastly, most of them satisfy with their life (70.5%).Detail of respondent characteristics is presented in Table 1.

Table 1: Respondent Characteristics and Frequency

Characteristic	Frequency	Percentage
Grade		
a. Elementary	114	82
b. Junior-High	25	18
Family Type		
a. Nuclear Family	119	85.6
b. Extended Family	20	14.4
Disability Type		
a. Physically Disabled	12	8.6
b. Mentally Disabled	13	9.4
c. Blind	21	15.1
d. Deaf	93	66.9

Further analysis suggests that their satisfaction with their life was associated with type of family ($x^2 = 14.2$, $p = 0.001$), age of the adolescents ($U = 1373$, $p = 0.001$), but not associated with the grade, type of disability and family income ($p > 0.05$). Those who come from nuclear family were six time more likely to satisfy with their life compared to those from extended family. Also, those with younger age tend to satisfy more with their life than the older age group.

Discussion

The results show that there is a relationship between family types and SWB of life satisfaction and affective in adolescents with disabilities in this population. This aligns with previous research stating that there is a relationship as well between

family types and SWB of life satisfaction and affective in adolescents with disabilities[11].According to Botha & Booysen (2014),a well-functioning family can provide support, monitor, and facilities related to adolescents' needs. In this case, intimacy from each family member plays a significant role in one's life satisfaction. Contrarily, dysfunctional families lead to a much lower level of satisfaction. Positive relationships between parents result in positive development in children's emotional, social, and cognitive aspects; and this positivity leads to a more positive and satisfying picture of their life. However, growing up in an unstable family atmosphere will result in an individual's lack of self-confidence, unfriendliness, negative thinking of life, and, therefore, life dissatisfaction.

In general, an individual's SWB tends to reflect positive affect[12]. Pavot & Diener (2004) elaborate that positive affect represents one's SWB being at a high level. Individuals are classified as having high SWB when they often feel happy, rarely sad, and feel satisfied with their life; otherwise, those with low SWB are less satisfied with their life, rarely happy, and often feel emotional. This aligns with the caring theory suggested by Swanson, mentioning that nurses need to be both physically and emotionally present in providing valuable care for patients. According to Swanson, nurses need to "be with", including being there personally, conveying availability and sharing feelings without burdening the client. It is needed that nurses be present to maintain confidence in other individuals regarding their capacity to overcome events or transitions and face a meaningful future, uphold themselves, maintain a hopeful attitude, offer realistic optimism, and help find meaning regardless of the situation.

Conclusion

Our research findings indicate that a majority of disabled female adolescents report life satisfaction. This satisfaction is significantly influenced by both family structure and age. Specifically, individuals from nuclear families exhibit a sixfold higher likelihood of life satisfaction compared to those from extended families. Additionally, younger age groups tend to experience greater life satisfaction than their older counterparts.

Ethical Clearance: The research approval was given by the Ethics Committee of Nursing Research (KEPK), Faculty of Nursing, Universitas Syiah Kuala, with Number 112002201123, on 28th December, 2023.

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Original Article

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Hierarchical Regression of Diabetes Self-Management and Health Related Quality of Life among Older Adults Patients with Type 2 Diabetes Mellitus

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Abstract

Introduction: The global elderly population is experiencing a rising prevalence of diabetes mellitus (DM).As a chronic and noncommunicable disease(NCD), diabetes requires strict daily self-management, significantly affecting the health-related quality of life (HRQOL). We investigated the association between diabetes self-management behaviors and HRQOL in a population of older adults diagnosed with type 2 diabetes mellitus (T2DM).

Methods: This cross-sectional study was conducted between March 2022 and August 2022 at Phramongkutklao Hospital, Bangkok, Thailand. Participants completed questionnaires measuring sociodemographic factors, we utilized the Diabetes Self-Management Questionnaire (DSMQ) and the Diabetes-39 Questionnaire (D-39). Hierarchical linear regression analysis was then employed to investigate the association between diabetes self-management and HRQOL.

Results: A total of 252 participants with a mean age of 68.96 years (SD = 6.64) were included. Our findings revealed a statistically significant positive association between cardiovascular disease (CVD) and HRQOL ($\beta = 0.233$, $P < 0.001$). This indicates that individuals with CVD reported lower HRQOL compared to those without the condition. Similarly, a significant positive association emerged between acute pancreatitis (AP) and HRQOL ($\beta = 0.132$, $P < 0.05$), suggesting a negative impact of this acute illness on HRQOL. Conversely, diabetes self-management demonstrated a significant negative association with HRQOL ($\beta = -0.376$, $P < 0.001$).

Conclusion: This implies that better self-management practices among diabetic patients were linked to improved HRQOL. These findings highlight the crucial role of understanding patient perspectives on diabetes self-management. Nurses and healthcare providers should prioritize investigating these perspectives to develop and implement interventions that deliver effective diabetes self-management education. Such targeted interventions have the potential to significantly enhance the HRQOL of patients living with diabetes.

Keywords: Type 2 diabetes mellitus, Older adult, Nurse and healthcare providers, Health-related quality of life, Diabetes self-management, Exercises, Cardiovascular disease, Acute pancreatitis

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Introduction

Diabetes mellitus (DM) has become a growing public health concern due to its escalating global prevalence, impacting over 537 million individuals in 2021.[1]Projections indicate a concerning rise in this number, with estimates suggesting an increase to 643 million by 2030 and potentially reaching 783 million by 2045.[1] In Thailand, the prevalence of diabetes has shown a steady increase, moving from 7.7% in 2004 to 8.9% in 2014,[2] and reaching 9.7% in 2021.[3,4]The increasing prevalence of T2DM currently poses substantial challenges for global health.[5]

One of the most significant demographic trends of the 21st century is the accelerating growth of the global aging population. Projections indicate that by 2030, one in six individuals worldwide will be aged 60 or over, representing a substantial increase from the estimated 1 billion people in this age group in 2020. This trend is expected to continue, with forecasts suggesting a staggering rise to 2.1 billion individuals aged 60 and above by 2050. Notably, the population segment aged 80 and older is projected to experience a particularly rapid increase, tripling to an estimated 426 million during this same period.[4]Thailand, like many other countries, is experiencing a rapid growth in its older adult population. This trend suggests a potential transition to a completely aged society by 2025 and a super-aged society by 2030.[6,7]

Age is a significant risk factor associated with an increased prevalence of T2DM. This is evident in the observation that individuals over 65 years of age constitute approximately half of all diagnosed cases of T2DM. By 2045, the number of people aged 65 and above diagnosed with diabetes is predicted to increase to 253 million, a significant rise from the estimated 122 million in 2017.[8,9]

T2DM is frequently accompanied by a range of comorbid conditions, which can significantly worsen overall health outcomes. These comorbidities include chronic kidney disease (CKD, CVD, hyperlipidemia, obesity, non-alcoholic fatty liver disease (NAFLD), and pancreatitis.[10, 11]

The primary indicator of T2DM management is glycemic control, typically monitored through the percentage of glycated hemoglobin (HbA1c) levels in the blood.[12] Several studies have suggested that adequate health education and effective diabetes self-management behaviors are associated with improved blood glucose control and better diabetes outcomes.[3, 12-14] Given the large number of cases with inadequate glycemic control, the increasing prevalence of disease complications, and the continuous negative economic impacts on individuals and the healthcare system, T2DM has become one of the major contributors to healthcare costs and has negatively impacted the healthcare system, include nursing productivity, in Thailand.[3]

HRQOL is a specific dimension that contributes significantly to overall quality of life (QOL). Besides, HRQOL serves as a valuable tool for T2DM to self-assess the outcomes of their diabetes care and treatment regimens.[15, 16] Investigating the factors that influence HRQOL in patients with T2DM is essential for developing patient-centered treatment strategies and optimizing nursing care and treatment outcomes.

Effective self-management is a cornerstone of optimal healthcare for patients with chronic diseases, such as T2DM, reducing disease complications, and assisting nurse and healthcare providers in their duties.[17, 18] Stronger self-management skills are associated with a significant improvement in HRQOL among individuals with diabetes, as evidenced by research.[19]

Several sociodemographic characteristics and comorbidities have been identified as influencing HRQOL among T2DM.[15, 20, 21] Age is a significant factor, as the natural aging process in older adults is often accompanied by physiological changes that can negatively impact HRQOL. As life expectancy continues to rise, understanding these factors influencing HRQOL becomes increasingly important to optimize well-being and QOL for individuals living longer with T2DM.

In Thailand, some studies have indicated that understanding the factors influencing HRQOL inT2DM is crucial.[22, 23] However, the literature on the factors affecting HRQOL, especially among older adults with T2DM, remains limited within the Thai context. Given the established association between various factors and HRQOL among T2DMindividuals, particularly older adults, a deeper understanding of these influences is crucial. Therefore, this study

investigates the factors influencing HRQOL in older adults with T2DM, with a specific focus on the association between diabetes self-management behaviors and HRQOL.

Materials and Methods

Participants and Setting

This study was a cross-sectional design. Data were collected from 252 participants recruited at the Out Patient Department of Endocrinology and Diabetes Disease, Phramongkutklao Hospital, Bangkok, Thailand. Patients were eligible if they: 1) had a diagnosis of T2DM, 2) were aged 60 years or older, 3) could communicate in Thai, and 4) were willing to participate. Individuals with sepsis, psychosis, or cognitive impairment were excluded. This research obtained approval from the Institutional Review Board of the Royal Thai Army Medical Department (IRBRTA 1654/2564). All participants were provided informed consent documents outlining the study's objectives by the nurse at the study site. This research adhered to the Declaration of Helsinki and the Belmont Report's ethical principles.[24]

Measurements

Sociodemographic Variables

This study incorporated a range of sociodemographic variables to understand the characteristics of the participants. The variables covered gender, age, marital status, educational attainment, income level, hypertension, CVD, CKD, dyslipidemia, AP, exercise and the duration of living with T2DM as a relevant factor.

The Impact of Diabetes Self-management Questionnaire (DSMQ)

To evaluate self-management behaviours related to glycemic control, this study utilized DSMQ developed by Thojampa and Mawn.[25] This 16-item questionnaire aligns with the framework proposed by Schmitt et al.[26] Participants responded using a four-point Likert scale, ranging from 0 ("does not apply to me") to 3 ("applies to me very much"). Higher total scoresindicated greater self-management practices related to diabetes. The DSMQdemonstrated excellent internal consistency in this study, with a Cronbach's alpha coefficient of 0.90.

The Diabetes-39 Questionnaire(D-39)

We employed the Thai version of the D-39 developed by Songraksa and Lerkiatbundit[27]to evaluate HRQOL of the participants. The D-39 is a comprehensive tool encompassing 39 items. Participants responded using a seven-point Likert scale ranging from 1 ("not affected at all") to 7 ("extremely affected"), with higher scores indicating a lower HRQOL. The D-39 demonstrated excellent internal consistency in our study, with a Cronbach's alpha coefficient of 0.98.

Statistical analysis

Data were analyzed using SPSS 28.0. Descriptive characteristics of the older adults with T2DM were determined. Hierarchical linear regression analysis was performed to investigate factors influencing HRQOL. HRQOL served as the dependent variable. Three models were constructed with increasing levels of complexity. Model 1 included sociodemographic characteristics (age, gender, education, income, and exercise). Model 2 added comorbidities (hypertension, CVD, CKD, dyslipidemia, and AP) as predictors. Model 3 further incorporated diabetes self-management. Standardized beta coefficients (β) were used to assess the impact of each variable on HRQOL while controlling for other factors in the model. A significance level of $p < 0.05$ was applied.

Results

Demographic Characteristics of the participants

The study recruited 252 older adults diagnosed with T2DM. Participants' ages ranged from 60 to 90 years, with an average age of 68.96 years (SD ± 6.64). The majority of participants were aged 60-69 years (57.0%), female (59.9%), married (81.0%), with an undergraduate education (56.7%), and had an income lower than or equal to 40,000 baht (76.6%). A significant portion did not engage in exercise (54.4%). Regarding comorbidities, hypertension (82.1%), dyslipidemia (77.0%), CVD (27.8%), CKD (19.4%), and AP (1.2%) were prevalent among the participants (Table 1).

Table 1 Demographic Characteristics of the participants (n = 252)

Individual characteristics	n	%
Gender		
Female	108	42.9
Male	144	57.1
Age		
60 – 69 years	151	59.9
70 – 79 years	82	32.5
≥ 80 years	19	7.5
Rage	60 - 90	
Mean ± SD	68.96 ± 6.64	
Marital status		
Single	18	7.1
Married	204	81.0
Widowed	25	9.9
Divorced	5	2.0
Education		
Undergraduate	143	56.7
Bachelor- Postgraduate	109	43.3
Income		
≤ 40,000 baths	193	76.6
>40,000 baths	59	23.4
Exercise		
No	137	54.4
Yes	115	45.6
Hypertension		
No	45	17.9
Yes	207	82.1
Cardiovascular Disease		
No	182	72.2
Yes	70	27.8
Chronic Kidney Disease		
No	203	80.6
Yes	49	19.4
Dyslipidemia		
No	58	23.0
Yes	194	77.0
Acute pancreatitis		
No	249	98.8
Yes	3	1.2

Simple linear regression analysis

Table 2 Hierarchical Linear Regression Analysis for Predicting HRQOL

Variable	Simple Linear Regression		Hierarchical Regression		
	Standardized Beta	R^2	Standardized Beta		
			Model 1	Model 2	Model 3
Characteristic					
Age	0.007	0.000	-0.025	-0.048	-0.040
Gender	0.019	0.000	-0.004	0.019	-0.018
Education level	-0.034	0.001	-0.048	-0.020	-0.006
Income	0.043	0.002	0.051	0.053	0.019
Exercise	-0.209***	0.044	-0.207**	-0.191**	-0.027
Comorbidity					
Hypertension	0.023	0.001		0.022	0.007
Cardio Vascular Disease	0.230***	0.053		0.230***	0.233***
Chronic kidney Disease	-0.028	0.001		-0.021	-0.045
Dyslipidemia	-0.101	0.010		-0.069	-0.008
Acute Pancreatitis	0.198**	0.039		0.165	0.132*
Diabetes Self-Management	-0.391***	0.153			-0.376***
R^2			0.047	0.137	0.243
Note:* p<0.05,** p<0.01,*** p<0.001					

The study performed Simple linear regression analysis to explore the association between individual variables and HRQOL. CVD emerged as the strongest predictor of HRQOL, with a standardized beta coefficient (β) of 0.230 (R^2 = 0.053). This indicates a positive association, suggesting that participants with CVD reported lower HRQOL scores. Additionally, negative correlations were observed between HRQOL and both exercise (β = -0.209, R^2 = 0.044) and diabetes self-management (β = -0.391, R^2 = 0.153). These findings imply that more frequent exercise and better diabetes self-management practices are associated with higher HRQOL scores in older adults with T2DM (Table 2).

Hierarchical linear regression analysis

Hierarchical linear regression analysis was conducted to explore the combined effects of different factors on HRQOL in older adults with T2DM (Table 2). This analysis involved building the model in three steps, with each step adding a new block of predictors. The final model (Model 3) revealed several key findings. First, CVD emerged as a significant and positive predictor of HRQOL (standardized β = 0.233, P < 0.001). This suggests that individuals with CVD reported lower HRQOL compared to those without the condition. Additionally, AP was also significantly and positively associated with lower HRQOL (standardized β = 0.132, P < 0.05), highlighting its negative impact on overall well-being. Notably, diabetes self-management demonstrated a significant negative association with HRQOL (standardized β = -0.376, P < 0.001).

Discussion

It was found that T2DM is a highly prevalent chronic health condition that significantly affects older adults.[1] Beyond the physiological consequences, T2DM can substantially impact a patient's HRQOL.

In the current healthcare paradigm, nurses and healthcare providers focus not only on extending life expectancy on enhancing QOL as a metric to evaluate the effectiveness of medical interventions.[28]HRQOL is a well-established concept that centers on the impact of illness and, more specifically, the influence of treatment on a patient's overall well-being.[29, 30] Given the multidimensional and dynamic concept of HRQOL,[30]understanding the factors that affect HRQOL is crucial.

Our hierarchical regression analysis revealed that diabetes self-management emerged as a significant predictor of HRQOL. This recommends that older adults with T2DM who practiced better self-management behaviours reported higher HRQOL, suggesting that effectiveness in self-management is a key role in improving HRQOL for older adults with T2DM. The study also identified associations between certain health conditions and HRQOL. Specifically, CVD and AP were associated with lower HRQOL, highlighting their negative impact on overall well-being.

Our study found that 27.8% of older adults with T2DM reported having CVD, while 72.2% did not. This translates to a roughly 1:3 ratio of patients with versus without CVD, which aligns with findings from global prevalence surveys.[31]HRQOL serves as a well-established, multidimensional metric for assessing the influence of disease and treatment on a patient's overall functioning and well-being.[32]According to the literature, the relationship between cardiovascular health and HRQOL has been demonstrated and indicated that it may also worsen the QOL.[33-35]

Early detection strategies and prevention of CVD as a complication of T2DM is crucial. The important role of nurse as a healthcare team is increasingly being used for CVD assessment tools. Currently, to reflect the effects of various interventions, CVD risk assessment tools, such as the Framingham Risk Score (FRS) and the Systematic Coronary Risk Evaluation (SCORE), are increasingly used in clinical practice to identify or predict the risk in individuals.[36, 37] Consideration for further improvement in modifiable CVD risk assessment in T2DM patients and the management of HRQOL in people with T2DM should be given more importance.

Our study also identified acute pancreatitis as another significant comorbidity in older adults with T2DM. Specifically, 3 (1.2%) of the participants reported a history of AP. The observation regarding the increased risk of AP in older adults with T2DM aligns with previous research by Lai et al.[38] Their Asian population-based cohort study reported a twofold higher incidence of AP among diabetic patients compared to non-diabetics.

Acute pancreatitis, a condition known to disrupt blood glucose control,[39] is associated with high morbidity and mortality.[40] Moreover, patients with diabetes appear to have a higher risk of death and readmission compared to those without diabetes.[40]

Our study has shown that T2DM patients with AP reported lower HRQOL. Patients with pancreatitis experience a reduced QOL[41] and may face a decrease in life expectancy.[42, 43] Although most cases of AP can be fully recovered after standard treatment, a subset of patients may suffer from recurrent episodes.[41] Early diagnosis of AP, especially in older adults with T2DM, is vital for timely standard treatment.

Effective management of diabetes mellitus by patients requires a comprehensive set of self-management behaviors. In practice, diabetes self-management is health-related quality of life's key determinant.[44] Patients with T2DM and complications experienced a substantial decline in HRQOL which implied that improved diabetes management are crucial to prevent diabetic complications and related HRQOL.[45, 46] In essence, a strong commitment to diabetes self-management can lead to a better HRQOL.[47]

Our finding aligns with previous studies, which have provided evidence that diabetes self-management is strongly associated with HRQOL in patients with T2DM.[48]

To our best knowledge, the diabetes self-management on HRQOL's impact in T2DM is not uniform across all age groups.[49] The HRQOL is seen as a predictor of people's ability to maintain long-term health, well-being, and productivity.[50,51] Furthermore, given the significance of aging-related diseases and their complications,[52] improving the QOL among people with T2DM, including older adults, is essential.

In Thailand, nurses function as the primary healthcare providers for many patients. This proximity positions them to collaborate on usual care, deliver health education, and guide lifestyle modifications for diabetic patients. Investigating patient perspectives on these interventions is crucial for developing and implementing targeted strategies that promote effective diabetes self-management education. Such tailored interventions have the potential to significantly improve the HRQOL for individuals living with diabetes.

Strength and Limitation

Admittedly, our study has inherent limitations. Firstly, the reliance on self-reported data for collection. While this approach offers valuable insights from participants themselves, it can introduce information bias. Secondly, the study's cross-sectional design prevents us from establishing causal relationships between diabetes self-management and HRQOL. We can identify associations, but this design cannot definitively prove that better self-management leads to improved HRQOL.

Despite the limitations, this study offers key findings. First, we employed scales validated in the Thai context, ensuring the cultural relevance of our findings for the target population of older adults with T2DM in Thailand. Second, our study design explored the associations between HRQOL and various factors in this specific population. This information is particularly crucial for Thailand, considering its rapidly aging society.

Conclusions

This implies that older adults with T2DM who engaged in more consistent self-management behaviors reported higher HRQOL. These findings hold significant value for nurses and healthcare professionals in Thailand. They can utilize this knowledge to develop targeted interventions aimed at improving HRQOL in older adult patients with T2DM. Our study paves the way for future research on intervention methods tailored to address the identified predictors of HRQOL in this population group. Furthermore, considering the substantial variations observed among individuals, it reinforces the recommendation to incorporate routine assessments of self-rated HRQOL into standard healthcare practices.

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Original Article

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Quality of Life of Post-Stroke Patients in Aceh, Indonesia

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Abstract

Introduction: The quality of life of stroke survivors is a major concern for healthcare providers due to the physical, psychological, and social issues caused by stroke. This study aims to identify the quality of life of post-stroke patients undergoing outpatient treatment at the neurology clinic of the General Hospital of South Aceh Regency, Indonesia.

Methods: This research uses a cross-sectional study design with a sample of 120 respondents. All post-stroke patients undergoing treatment at the clinic were included in the study. Data were collected through face-to-face interviews at the specialized stroke clinic from January to March 2024. The research instrument used was the Indonesian version of the Stroke-Specific Quality of Life (SS-QoL) questionnaire, which has been validated. The reliability test of the SS-QoL resulted in a Cronbach's Alpha value of 0.920. Data analysis was conducted using a descriptive approach, including frequency distribution, percentage, standard deviation, and SS-QoL scale score distribution.

Results: The study found that the majority of stroke patients' quality of life was in the good category, amounting to 77.5%. The quality of life domain indicated that personality was the worst dimension (mean=3.13, SD=0.762), while family role, social role, mood, and energy were the best domains (mean=4.13, SD=0.766).

Conclusion: The quality of life of stroke patients undergoing outpatient treatment at the Neurology Clinic of South Aceh General Hospital is predominantly in the good category. Interventions focusing on personality aspects need to be enhanced to further improve patients' quality of life.

Keywords: Quality of Life, Stroke Patients, Stroke-Specific Quality of Life.

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Introduction

Stroke is a leading cause of disability and death worldwide.[1] It is one of the primary reasons for acute medical hospitalizations and a major contributor to mortality and poor health outcomes.[2] The impact of stroke on individuals' lives poses a significant challenge to society. The sudden occurrence of a stroke affects both individuals and their families, who are generally unprepared for the rehabilitation process or disabilities resulting from the condition. Consequently, many individuals are unable to work and require financial assistance following a stroke.[3]

Stroke can affect patients' lives in various aspects (physical, emotional, psychological, cognitive, and social). The level of physical and mental disability in post-stroke patients can influence their quality of life. Stroke is also a leading cause of functional impairment, with 20% of survivors still requiring institutional care after three months, and 15-30% of them experiencing permanent disabilities. In Indonesia, 55-60% of people with stroke symptoms suffer from moderate to severe disabilities, 25% die, and 10-15% survive. The functional impairments lead to a loss of productivity and substantial costs for rehabilitation care.[4]

According to the American Heart Association, in 2019, stroke accounted for about 1 in every 19 deaths in the United States. On average, in 2019, someone in the United States died of a stroke every 3 minutes and 30 seconds. Separate from other cardiovascular diseases, stroke ranked fifth among all causes of death in the United States, causing 150,005 deaths in 2019. In 2019, the age-adjusted US stroke mortality rate was 37.0 per 100,000, a 66% decrease from 2009, while the actual number of stroke deaths increased by 164% during the same period. In 2020, there were 7.08 million deaths from cerebrovascular diseases worldwide (3.48 million from ischemic stroke, 3.25 million from intracerebral hemorrhage, and 0.35 million from subarachnoid hemorrhage).[5]

The Worldwide, 12.2 million new strokes occur annually, equating to one stroke every 3 seconds, with 101 million people living with stroke—a figure that has nearly doubled over the last 30 years. One in four people will experience a stroke, a 50% increase over the past 17 years. In 2019, 63% of strokes occurred in people under the age of 70. Stroke is no longer a disease only affecting the elderly.[6]

Stroke cannot be completely cured. However, good management can alleviate the burden on patients, minimize disabilities, and reduce dependence on others. One way to manage stroke patients is by improving their self-management. Self-management includes several critical components such as the availability of information, treatment, problem-solving, and support[7].

Quality of life is the individual's perception of their position in life, in the context of the culture and value systems where they live, and in relation to their goals, expectations, standards, and concerns. It encompasses several aspects including physical, psychological, social, and environmental conditions in daily life. Issues encompassing quality of life are broad and complex, including physical health problems, psychological status, level of independence, social relationships, and the environment.[8]

Health-related quality of life for stroke survivors is low in the first six months, slightly improving at 12 months post-stroke.[1] Additionally, more severe stroke diagnoses and impaired body functions are associated with poorer quality of life.[3] Lower education levels are significantly linked to poorer health perceptions, one of the QoL domains, and this is the most influential QoL factor for post-stroke patients.[9] There is a correlation between respondents' age and evaluations of communication, ADL, mobility, manual skills, and social contact domains on quality of life.[10]

Quality of life also influences recovery rates. Poor quality of life affects the healing process, as quality of life is intrinsic to the individual. Conversely, better quality of life can expedite recovery and minimize the risk of recurrent strokes. Quality of life can be understood from the perspective of the individual's perceived position within the cultural or value system context and its relationship to their environment, cultural context, or value system. Personal goals, expectations, and other issues such as mobility, pain, psychology, distress, and anxiety significantly impact quality of life. These aspects can be measured and described as healthy conditions.[11]

Clinical manifestations can emerge from physical,

psychological, and social aspects, necessitating prompt and appropriate management during the rehabilitation phase, which impacts quality of life. Stroke patients with physical, cognitive, and social limitations may experience decreased quality of life. Assessing quality of life in post-stroke patients is crucial in clinical practice, research, clinical health policy, and program evaluation.[12]

Based on the literature review, this study aims to determine the quality of life among post-stroke patients at the Aceh Selatan Regional General Hospital, Indonesia.

Methods and Materials

This study is a descriptive research project. The sample size includes all post-stroke patients receiving outpatient care at the Neurology Clinic of RSUD dr. H. Yuliddin Away, Tapaktuan, South Aceh Regency, Indonesia, totaling 120 respondents. The quality of life measurement tool for stroke patients used in this study is the Indonesian version of the Stroke-Specific Quality of Life (SS-QoL-49 item) questionnaire. The SS-QoL questionnaire includes 12 domains: self-care (5 questions), mobility (6 questions), upper limb function (5 questions), language (5 questions), vision (3 questions), work/productivity (3 questions), thinking (3 questions), family role (3 questions), social role (5 questions), personality (3 questions), mood (5 questions), and energy (3 questions). The first six domains measure physical aspects, while the next six domains measure psychosocial aspects, with SS-QoL scores ranging from 49 to 245. A quality of life score is considered good if >156.87 (>63%) and poor if ≤156.87 (≤63%). The questionnaire's validity was tested using Spearman correlation, and the reliability test of the SS-QoL resulted in a Cronbach's Alpha value of 0.920.

Data collection was conducted using face-to-face interview methods at the specialized stroke clinic from January 30 to March 8, 2024. Respondents were interviewed personally using Indonesian and Acehnese languages. If respondents did not understand the questions, the researcher only clarified the questions without providing any information about the answers to each question. The entire research procedure adhered to applicable ethical research principles and received ethical clearance from the Universitas Syiah Kuala Research Ethics Committee with Number: 112004121223 before the research began. All respondents provided written informed consent.

Statistical analysis in this study was performed using a descriptive approach, analyzing frequency distribution values, percentages, and standard deviation of SS-QoL scale scores.

Results

The results of the study are presented in the following tables, highlighting the demographic characteristics of the respondents, the overall quality of life of stroke patients, and the dimensions of quality of life based on the SS-QoL questionnaire.

Table 1- Frequency Distribution of Respondent Characteristics (n=120)

Characteristic	Frequency	Percentage
Age		
Adult (18-45 years)	2	1,7
Pre-elderly (46-59 years)	65	54,2
Elderly (>60 years)	53	44,2
Gender		
Male	78	65,0
Female	42	35,0
Education		
Elementary School	51	42,5
Middle School	44	36,7
Higher Education	25	20,8
Occupation		
Civil Servant	6	5,0
Self-Employed	58	48,3
Fisherman	3	2,5
Farmer	10	8,3
Housewife	37	30,8
Unemployed	6	5,0

Based on the data in Table 1, it can be observed that among 120 respondents, the majority are pre-elderly (54.2%), with most respondents being male

(65.0%). The highest education level for the majority of respondents is elementary school (42.5%), and most respondents are Self-Employed(48.3%).

Table 2-Frequency Distribution of Stroke Patients' Quality of Life (n=120)

Quality of Life	Frequency	Percentage
Good Quality of Life	93	77,5
Poor Quality of Life	27	22,5

As shown in Table 2, the majority of the 120 respondents have a good quality of life (77.5%), while 22.5% have a poor quality of life.

Table 3: Descriptive Items of the SS-QOL Questionnaire

No	Quality of Life	Mean	SD	Min	Max
1	Self-care	4,01	0,680	3	5
2	Mobility	3,99	0,704	3	5
3	Upper Extremity Function	4,01	,692	3	5
4	Language	3,88	0,712	3	5
5	Vision	3,83	0,752	3	5
6	Work	3,99	0,704	3	5
7	Thinking	4,06	0,725	3	5
8	Family Role	4,13	0,766	3	5
9	Social Role	4,13	0,766	4	5
10	Personality	3,13	0,762	2	4
11	Mood	4,13	0,766	3	5
12	Energy	4,13	0,766	4	5
Total Score		47,42	8,795	37	59

Table 3 indicates that the personality domain is the worst dimension of quality of life (mean = 3.13, SD = 0.762), while family role, social role, mood, and energy are the best domains (mean = 4.13, SD = 0.766).

Discussion

Stroke is a cerebrovascular disorder that can cause loss of function in limbs, affecting patients' lives.[13] Quality of life encompasses physical health, psychology, freedom levels, social relationships, and environmental factors.[8]

Based on the results of the study, 77.5% of respondents have a good quality of life, with the dimensions of family roles, social roles, mood, and energy being the best experienced, with an average score of 4.13.

The findings in the dimensions of family roles, social roles, mood, and energy show better scores. This is due to strong family support, which provides patients with a sense of security and self-worth. Effective and continuous rehabilitation programs help patients develop new skills and enhance their physical and mental capabilities, contributing to better mood and energy levels. Adherence to medication and therapy plays an important role in managing symptoms and post-stroke complications, improving patients mood and energy levels.

Meanwhile, 22.5% of respondents have a poorer quality of life. According to the SS-QOL domain, the personality dimension is the worst experienced dimension of quality of life for stroke patients, with an average score of 3.13.

This can be explained by the fact that the impact of a poor personality can lead to individual changes affecting mood, anxiety, depression, and other emotional disturbances. Additionally, dependence

on others for daily activities post-stroke can result in feelings of helplessness and low self-esteem, further deteriorating the quality of personality. Social stigma and lack of support from family and friends also exacerbate the psychological condition of patients, leading to a decline in quality of life in the personality dimension.

The quality of life of people who have experienced a stroke significantly impacts various dimensions of their lives, including physical, psychological, social, role, and spiritual aspects. After experiencing a stroke, many patients face challenges in mobility and the ability to perform daily activities, which lowers their physical quality of life.[14] The quality of life of stroke patients can be measured using the 12 domains of the Stroke-Specific Quality of Life Scale (SS-QOL).[15]

Based on these findings, it can be seen that the quality of life of post-stroke patients is generally good. This suggests that patients with stroke issues can achieve a good quality of life as long as they live positively and have a strong belief in their efforts to improve their health. Thus, quality of life is an individual's perception of their position in life in the context of the culture and value systems in which they live and how it relates to their life goals, expectations, standards, and concerns. This includes several aspects such as physical, psychological, social, and environmental conditions in daily life. In this context, it can be stated that each individual has a different quality of life, depending on how they perceive it, whether positively or negatively.

A study conducted by West et al. in 2018 showed that patients with high trust or confidence in healthcare professionals, such as doctors and nurses, can increase their adherence to treatment, while low trust in healthcare professionals leads to non-compliance with treatment, thereby affecting their quality of life.[16] Individuals with good quality of life demonstrate a sense of confidence that their health depends on themselves. When they fall ill, they tend to blame themselves and strive to recover. Such individuals usually lead a healthy lifestyle and have high adherence to the treatment process, making health an important and responsible matter. Patients with high trust or confidence in healthcare professionals, such as doctors and nurses, can improve their adherence to treatment, while low trust in healthcare professionals leads to non-compliance with treatment, thus affecting their quality of life. High quality of life in each domain correlates with better daily physical activity levels. However, physical health and general health quality of life domains are significantly influenced by daily physical activity.[5]

Nurses play a critical role in the recovery process of stroke patients, particularly in the subacute phase, which spans from two weeks to six months post-stroke. During this phase, patients experience neurological and functional recovery. Nurses primary intervention goals include providing education and physical rehabilitation interventions to enhance independence, prevent complications, reduce stroke recurrence, and improve quality of life. Additionally, nurses offer education to patients and families, focusing on the importance of physical, psychological, emotional, cognitive, spiritual, and social care.

This study has several limitations that need to be considered. First, the study was conducted in only one hospital, limiting the generalizability of the findings to the population of stroke patients who may have different characteristics elsewhere. Second, the sample respondents included post-stroke patients from various age groups, genders, education levels, occupations, sociodemographic statuses, and diverse health conditions, making it difficult to achieve homogeneity in data analysis. Third, data collection was done through self-report methods, which may introduce subjectivity in the questionnaire responses from the respondents.

Conclusion

This study found that the majority of respondents have a good quality of life (77.5%), while 22.5% have a poor quality of life. Among the 12 domains of SS-QOL, personality is the worst dimension (mean = 3.13, SD = 0.762), whereas family role, social role, mood, and energy are the best (mean = 4.13, SD = 0.766).

Recommendations: This study recommends that stroke rehabilitation programs include emotional support such as counseling and support groups to improve physical and mental health. Future

research should explore the most effective types of family support. Additionally, it is important to involve respondents from various hospitals for more generalizable results.

Ethical Clearance: The research approval was given by the etchic committee of Nursing research (KEPK) Faculty of Nursing, Universitas Syiah Kuala with Number 112004121223.

Conflict of interest: The authors declare no conflicts of interest in this study

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Original Article

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Quality of Life and Work-life balance among Nurse Educators in the Schools of Nursing in Sri Lanka

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Abstract

Objective: The study aimed to assess the quality of life (QOL) and work-life balance (WLB) among Nurse Educators in the Schools of Nursing in Sri Lanka.

Material and Methods: A descriptive cross-sectional study was conducted among 257 Nurse educators in all schools of Nursing in Sri Lanka. Data were collected by using validated and pretested self-administered questionnaires which include Socio-demographic details, a validated quality of life questionnaire (WHO QOL – BREF), and a Work Life Balance assessment scale. Data were analyzed using descriptive and inferential statistics.

Results: The overall mean perceived QOL and health of the participants were 3.82 (±0.66) and 3.82 (±0.69) respectively. Participants obtained a high score for the social relationship domain (98.83/100) and a low score for the environmental domain (19.96/100) of the QOL. Findings of the work=life balance revealed an overall mean of 2.87 (SD=1.5) which indicates neither agree nor disagree with work-life interference with personal life and an overall mean of 2.53 (SD=0.96) which indicates neither agree nor disagree with personal life interference with work (PLIW).

Conclusions: Nurse educators perceive a moderate level of personal life interference with work, but overall, they acknowledge work/personal life enhancement. These results highlight the complex and multifaceted nature of work-life balance among nurse educators.

Keywords: Work-life balance, Quality of life, Nurse Educator

Introduction

Quality of life (QOL) refers to an individual's total well-being, including all emotional, social, and physical aspects of the individual's life. It reflects the difference, the gap between the hopes and expectations of a person and their present experience.[1] Research has shown a significant association between

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QOL and various factors, including marital status, age, gender, monthly income, area of work, working hours, total years of experience, job satisfaction, and work-life balance (WLB).[2-4] It has been found that individuals who prioritize family over work tend to have a better QOL, followed by those who maintain a balance between work and family, and finally, those who prioritize work over family.[5,6] However, there is limited research that focuses on both the impact of work and family on QOL.

Pocock (2005) states that employees who experience a positive WLB are more likely to be contented parents, valuable members of the community, and efficient workers within their organization.[7] Additionally, a healthy WLB can enhance job satisfaction and engagement, leading to increased productivity and public contributions. In essence, a balanced work-life approach contributes to overall social well-being by promoting individual productivity, public service, and the well-being of employees and their families.

It is crucial to understand the satisfaction and QOL of Nurse Educators, along with the factors influencing their QOL. In the context of Sri Lanka, there is minimal awareness and understanding among employees regarding work-life balance, especially when compared to Western countries. Academics in Sri Lanka face similar challenges, receiving limited or no family-friendly support from universities as they grapple with maintaining a balance between work and family due to their demanding workloads.[8]

In Sri Lanka, nursing students primarily receive education from nurse educators and occasionally from other qualified medical professionals. Nurse educators play a crucial role in preparing the future generation of nurses to meet the increasing healthcare service demands.[9] They significantly influence the nursing profession by advocating holistic patient care, emphasizing illness prevention, and promoting community health. Nurse educators serve as faculty members in nursing schools and teaching hospitals, imparting their valuable knowledge, experience, and skills to students who will become the next generation of nurses.[10]

Thus, the study was aimed to evaluate the quality of life and work-life balance of Nurse Educators in the Schools of Nursing in Sri Lanka, as well as identify the factors that influence WLB. The findings of this study will contribute to understanding the factors associated with work-life balance and the relationship between a nurse educator's quality of life and their ability to balance work and personal life, providing valuable insights to prevent nurse educator dissatisfaction.

Methodology

The descriptive cross-sectional study design was used to assess the Quality of Life and WLB among Nurse Educators in all schools of Nursing (17) and the Post-basic College of Nursing (PBCN) which are under the Ministry of Health, Sri Lanka. The three-year Nursing Diploma program and one-year Midwifery Diploma program are offered by the Schools of Nursing. Both male and female Nurse Educators were included and those who were working in Military Schools of Nursing and on maternity leave or study leave were excluded. A total of 315 nurse educators were included in the study.

Data were collected using a self-administered questionnaire which consisted of socio-demographic and employment characteristics, quality of life questionnaire (WHO QOL - BREF), and a work-life balance assessment scale. WHO QOL –BREF questionnaire is a generic tool to assess QoL which has been already validated in Sri Lanka.[11] The WHO, QOL- BREF covers four domains of QOL as Physiology domain, the Psychology domain, the social relationship domain, and the Environmental domain. A work-life balance assessment scale was used to measure the extent of work-life balance among participants.[12] The work-life balance assessment scale consisted of three dimensions; Work Interference with Personal Life (WIPL), Personal Life Interference with Work (PLIW), and Work / Personal Life enhancement (WPLE). The questionnaire was pretested for acceptability, comprehension and to assess the clarity and suitability of the words used, among 20 nursing academics from the Faculty of Nursing, University of Colombo Sri Lanka.

Data collection was carried out online using a Google form due to the prevailing situation of the COVID-19 pandemic, after obtaining permission from Principals of all Schools of Nursing. First, the

email addresses of nurse educators were obtained from the principals of the schools, and then the objectives and the purposes of the study were explained using an information sheet via email to each participant. In addition, honest responses and voluntary participation were emphasized to all of them and requested them to reply with their willingness to participate in the study. Based on their willingness to participate in the study, informed consent was obtained. Then, the questionnaire was sent individually via Google form and the participant was instructed to fill the questionnaire during their free time without disturbing their routine academic work. Also, they were instructed to contact the principal investigator via mobile phone for any clarification.

Data were analyzed using SPSS version 25. Descriptive statistics are applied to obtain percentages and means with SD of the continuous variables and relevant inferential statistics are performed to interpret the findings. QOL was assessed based on four domains of the WHOQOL-BREF scale and the mean score in each domain indicates individuals' perception of their satisfaction in every aspect of their lives regarding their QOL. The higher the score the better the perception. The mean score is utilized to determine the extent of WLB as to the three dimensions. Independent sample t-test or ANOVA was used to determine the mean differences between the WLB of nurse educators with their age, marital status, and number of children. The relationship between scores of QOL and WLB and influencing factors analyzed by multiple regression models and statistically significant level was set at 0.05.

Ethical approval was obtained from the Ethics Review Committee, KATTSU International University, Sri Lanka (KIU/ERC/21/42, on 30. 06. 2021).

Results

Among all study participants (315), only 257 participants were responded. The response rate was 81.6%.

Table 1: Socio-demographic and employment details of the participants

Characteristics	Responses	Male n (%)	Female n (%)	Total n (%)
Gender		31(12.1)	226 (87.9)	257 (100.0)
Age (years)	31 - 40	3 (9.7)	52 (23.0)	55 (21.4)
	41 - 50	7(22.6)	120(53.1)	127 (49.4)
	Above 50	21(67.7)	54(23.9)	75 (29.2)
Marital status	Married	30 (96.8)	193(85.4)	223 (86.8)
	Unmarried	1 (3.2)	29 (12.8)	30 (11.7)
	Living together	0 (0.0)	4 (1.8)	4 (1.6)
Family type	Nuclear	22(71.0)	142(62.8)	164 (63.8)
	Extended	9(29.0)	84(37.2)	93 (36.2)
Any dependent	Have dependent	27 (87.1)	177 (78.3)	204 (79.4)
	No dependent	4 (12.9)	49 (21.7)	53 (20.6)
Suffering from any chronic illness	Yes	7 (22.6)	60 (26.5)	67 (26.1)
	No	24 (77.4)	166 (73.5)	190 (73.9)
Monthly Income in Rupees	<50,000	0 (0.0)	1(0.4)	1 (0.4)
	50,000 - 75,000	6(19.4)	74(32.7)	80 (31.1)
	75,001 - 100,000	14(45.2)	119(52.7)	133 (51.8)
	>100,000	11(35.5)	32(14.2)	43 (16.7)

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Designation	Principal	3 (9.7)	3 (1.3)	6 (2.3)
	Special Grade Nursing Tutor	20 (64.5)	78 (34.5)	98 (38.1)
	Grade 1 Nursing tutor	8 (25.8)	141(62.4)	149 (58.0)
	Others	0 (0.0)	4(1.8)	4 (1.6)
Highest educational qualification	Dip.in Teaching &Supervi	6 (19.4)	22 (9.7)	28 (10.9)
	BScN	15 (48.4)	144 (63.7)	159 (61.9)
	MSc	9 (29.0)	58 (25.7)	67 (26.1)
	PhD (Reading)	1 (3.2)	00 (0.0)	1 (0.4)
	Other	0 (0.0)	02 (0.9)	2 (0.8)
Year of teaching experience	≤ 5.0	7 (22.6)	103 (45.6)	110 (42.8)
	5.1-10.0	0(0.0)	11 (4.9)	11 (4.3)
	10.1-15.0	7 (22.6)	61 (27.0)	68 (26.5)
	>15	17 (54.8)	51 (22.6)	68 (26.5)
Expertise area of teaching	Fundamentals of Nursing	11 (35.5)	73 (32.3)	84 (32.7)
	Adult Nursing	15 (48.4)	56 (24.8)	71 (27.6)
	Maternal and child Nursing	0 (0.0)	76 (33.6)	76 (29.6)
	Others	5 (16.1)	21 (9.3)	26 (10.1)
Daily working hours	< 7.5	4 (12.9)	24 (10.6)	28 (10.9)
	7.5-9	15 (48.4)	121 (53.5)	136 (52.9)
	> 9	12 (38.7)	81 (35.8)	93 (36.2)

The majority of the participants (88%) were females, and nearly of the participants were age between 41-50 years. Nearly 62% of them had completed BSc Nursing Degree and 43% of the participants had ≤5-year experience as nurse educators. In addition, 53% of the participants work between 7.5 to 9 hours per day.

Table 2: Participants' satisfaction about various aspects of their life

Question	Very dissatisfied n (%)	Dissatisfied n (%)	Neither satisfied nor dissatisfied n (%)	Satisfied n (%)	Very satisfied n (%)
How satisfied are you with your health?	-	16 (6.2)	42 (16.3)	172 (66.9)	27 (10.5)
How satisfied are you with your sleep?	01 (0.4)	65 (25.3)	60 (23.3)	105 (40.9)	26 (10.1)
How satisfied are you with your ability to perform your daily living activities?	-	22 (8.6)	69 (26.8)	148 (57.6)	18 (7.0)
How satisfied are you with your capacity for work?	01 (0.4)	13 (5.1)	55 (21.4)	151 (58.8)	37 (14.4)

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How satisfied are you with yourself?	02 (0.8)	04 (1.6)	54 (21.0)	164 (63.8)	33 (12.8)
How satisfied are you with your personal relationships?	02 (0.8)	11 (4.3)	63 (24.5)	142 (55.3)	39 (15.2)
How satisfied are you with your sex life? (n=227, 88.3%)	07(2.7)	08(3.1)	65(25.3)	117(45.5)	30(11.7)
How satisfied are you with the support you get from your friends?	05(1.9)	07(2.7)	106(41.2)	115 (44.7)	24 (9.3)
How satisfied are you with the conditions of your living place?	02(0.8)	32 (12.5)	57(22.2)	128 (49.8)	38 (14.8)
How satisfied are you with your access to health services?	03 (1.2)	17 (6.6)	83(32.3)	120 (46.7)	34 (13.2)
How satisfied are you with your transport?	18 (7.0)	58 (22.6)	61 (23.7)	80 (31.1)	40 (15.6)

Most of the participants (66.9%) were satisfied with their overall health and 40% of the participants were satisfied with their sleep, ability to perform their daily living activities, work capacity, personal relationships, sex life, support they get from their friends, conditions of their living place, access to health services, and transport.

Table 3: Participants' experience on certain things in the last four weeks (n=257)

Question	**An extreme amount n (%)**	**Very much n (%)**	**A moderate amount n (%)**	**A little n (%)**	**Not at all n (%)**
To what extent do you feel that physical pain prevents you from doing what you need to do?	06 (2.3)	41 (16.0)	68 (26.5)	102 (39.7)	40 (15.6)
How much do you need any medical treatment to function in your daily life?	14 (5.4)	19 (7.4)	43 (16.7)	92 (35.8)	89 (34.6)
Question	**Not at all n (%)**	**A little n (%)**	**A moderate amount n (%)**	**Very much n (%)**	**An extreme amount n (%)**
How much do you enjoy life?	01 (0.4)	15 (5.8)	120 (46.7)	109 (42.4)	12 (4.7)
To what extent do you feel your life to be meaningful?	--	09 (3.5)	71 (27.6)	149 (58.0)	28 (10.9)
How well are you able to concentrate?	01 (0.4)	07 (2.7)	79 (30.7)	146 (56.8)	24 (9.3)
How safe do you feel in your daily life?	01 (0.4)	30 (11.7)	96 (37.4)	117 (45.5)	13 (5.1)
How healthy is your physical environment?	02 (0.8)	14 (5.4)	100 (38.9)	126 (49.0)	15 (5.8)

Regarding the experience of physical pain, an extreme amount of physical pain was experienced by 2.3%of participants and 40% of the participant experienced a small amount of physical pain. Nearly 35% of them accepted that they did not need any treatment and 42% of participants, experienced a very much enjoy life, they felt that their life is a meaningful one.

Table 4: Domain-wise means of transformed score of the Quality of life of nurse Educators

Domains	Mean	SD	Transformed score (4-20)	Transformed score (0-100)
Physical	14.53	2.17	08.30	25.94
Psychological	14.62	1.88	09.39	32.37
Social	14.72	2.59	19.97	98.83
Environmental	13.66	2.26	07.30	19.96

According to the raw score of quality of life of nurse educators based on the WHOQOL-BREF scale, the social domain obtained the highest score of 14.72 (SD=2.59) and the environmental domain obtained the lowest score of 13.66 (SD= 2.26).

Table 5: Work-life Balance among nurse Educators

Statement	Strongly disagree	Disagree	Neither agree nor disagree	Agree	Strongly agree	Mean (SD)	Interpretation
Work life interference with personal life (WIPL)							
My personal life suffered because of work.	23(8.9)	109(42.4)	56(21.8)	56(21.8)	13(5.1)	2.72 (1.06)	Neither agree nor disagree
My job made personal life difficult	21(8.2)	98(38.1)	61(23.7)	65(25.3)	12(4.7)	2.80 (1.05)	Neither agree nor disagree
I neglected personal needs because of work	17(6.6)	105(40.9)	63(24.5)	63(24.5)	09(3.5)	2.77 (1.01)	Neither agree nor disagree
I put personal life on hold for work	13(5.1)	85(33.1)	67(26.1)	79(30.7)	13(5.1)	2.98 (1.02)	Neither agree nor disagree
I missed my personal activities because of work	12(4.7)	85(33.1)	67(26.1)	79(30.7)	14(5.4)	2.99 (1.02)	Neither agree nor disagree
I struggled to juggle work and non-work (personal work)	14(5.4)	71(27.6)	95(37.0)	68(26.5)	09(3.5)	2.95 (0.95)	Neither agree nor disagree
Overall mean						2.94 (0.96)	Neither agree nor disagree
Personal life interference with work (PLIW)							
My personal life drained me of energy for work	13(5.1)	47(18.3)	78(30.4)	105(40.9)	14(5.4)	3.23 (0.98)	Agree
I am too tired to be effective at work	19(7.4)	109(42.4)	64(24.9)	60(23.3)	05(1.9)	2.70 (0.97)	Neither agree nor disagree
My work suffered because of my personal life	52(20.2)	147(57.2)	35(13.6)	21(08.2)	02(0.8)	2.12 (0.85)	Disagree

Continue.....

I find it hard to work because of personal matters	54(21.0)	148(57.6)	39(15.2)	14(05.4)	02(0.8)	2.07 (0.80)	Disagree
Overall mean						2.53 (0.96)	Neither agree nor disagree
Work/Personal Life Enhancement (WPLE)							
My personal life gave me energy for my job	02(0.8)	10(3.9)	49(10.1)	156(60.7)	40(15.6)	3.86 (0.74)	Agree
My job gave me energy to pursue personal activities	04(1.6)	33(12.8)	70(27.2)	130(50.6)	20(07.8)	3.50 (0.87)	Agree
I am at a better mood at work because of my personal life	02(0.8)	10(3.9)	51(19.8)	147(57.2)	47(18.3)	3.88 (0.77)	Agree
I am at better mood because of my job.	06(2.3)	33(12.8)	74(28.8)	118(45.9)	26(10.1)	3.49 (0.92)	Agree
Overall mean						3.68 (0.93)	Agree

Nearly one-third of participants disagreed with the statements of their personal life suffered because of work and that their job made personal life difficult and an overall mean of 2.87(SD=1.5) which indicates neither agree nor disagree with work-life interference with personal life. Nearly 41% of participants agreed that their personal life drained them of energy for work and nearly two-thirds of them disagreed with the statement that they were too tired to be effective at work. An overall mean of 2.53 (SD=0.96) which indicates neither agree nor disagree with personal life interference with work (PLIW).

Discussions

The findings revealed that a majority of nurse educators (66.9%) reported that they were satisfied with their overall health. This suggests that nurse educators in our sample generally perceive themselves as being in good health. These results are consistent with a similar study conducted by Smith et al. (2018), which found a high level of self-rated health satisfaction among nurse educators in the United States.[13]Further, 10.5% of the participants expressed being very satisfied with their health, indicating a higher level of contentment. These finding highlights that a subset of nurse educators experiences exceptional levels of physical and mental well-being. Although it is worth mentioning that a considerable proportion of participants did not report complete satisfaction regarding their health, further exploration is required to better understand the underlying reasons for any dissatisfaction.

Further, a majority of nurse educators mentioned that they were satisfied with these aspects, indicating favorable subjective experiences in these areas. These positive findings align with previous research. A study conducted by Jones and colleagues (2017) found that nurse educators reported good sleep quality and were satisfied with their sleep patterns.[14] Similarly, another study by Taylor et al. (2016) reported that nurse educators perceived their work capacity to be adequate and were satisfied with their ability to perform daily living activities.[15]

Moreover, the social domain received the highest raw score of 14.72 (SD=2.59), suggesting that nurse educators generally perceive their social relationships and interactions as positive and fulfilling. This aligns with previous research by Johnson et al. (2019), which found that nurse educators reported a high level of satisfaction with their social support and social connections within their work and personal lives.[16]In contrast, the environmental domain received the lowest raw score of 13.66 (SD=2.26), indicating potential areas of dissatisfaction related to the physical environment in which nurse educators work

and live. These environmental factors may negatively impact the overall quality of life experienced by nurse educators. The physical and psychological domain scores were relatively low, with scores of 25.94 out of 100 and 32.37 out of 100, respectively. These results suggest that nurse educators may face challenges related to their physical health and psychological well-being. This finding is consistent with a study by Roberts et al. (2018), which highlighted challenges faced by nurse educators, such as limited resources and inadequate physical infrastructure.[17] Similar findings were observed in a study by Wang et al. (2017), which reported low scores in the physical and psychological domains among nurse educators.[18]These aspects of quality of life should be further investigated and addressed to ensure a healthier and more balanced life for nurse educators.

The overall mean score of work-life balance assessment was2.87 (SD=1.5) suggests that nurse educators neither strongly agree nor strongly disagree with the idea of work-life interference. This indicates a relatively neutral perception of the impact of work on their personal lives. These results align with previous research which also found a moderate level of work-life interference among healthcare professionals, including nurse educators.[19]It is worth noting that approximately 41% of participants agreed that their personal life drained them of energy for work. This finding raises concerns regarding the potential negative effects of personal life demands on the energy and motivation of nurse educators in their work roles. Similar findings were reported by Clark and Baird (2016),[20] who identified energy depletion resulting from personal life demands as a significant factor contributing to work-life imbalance among educators.

However, two-thirds of the participants disagreed that they were too tired to be effective at work. This suggests that despite personal life demands, nurse educators can maintain their effectiveness and productivity in their work roles. These findings are consistent with a study found that nurse educators reported a high level of adaptability and resilience in balancing their personal and work responsibilities.[21] In terms of personal life interference with work (PLIW), the overall mean score of 2.53 (SD=0.96) indicates that nurse educators neither strongly agree nor strongly disagree with the notion of their personal life interfering with their work responsibilities. This suggests that the impact of personal life demands on their work is perceived to be relatively moderate.

Limitations

There is a little reduction in response rate (82%) as the study has been conducted online (Google Form). The majority of the statements of the questionnaire concerned the experience or perceptions of the participants on certain things in the last four weeks. Due to the COVID-19 pandemic nursing schools were closed and nurse educators worked at home.

Conclusions

Overall, these findings suggest a relatively positive perception of health and well-being among nurse educators. Further, it highlights the importance of considering the different domains of quality of life among nurse educators. While social interactions appear to be a source of satisfaction and fulfillment, attention should be directed towards improving the physical environment, as well as addressing the physical and psychological well-being of nurse educators. In addition, Nurse educators perceive a moderate level of personal life interference with work. Further research is needed to explore individual factors and coping mechanisms that contribute to these perceptions and to develop strategies to promote a healthier and more balanced work-life integration for nurse educators.

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Original Article

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Indoor Air Quality and Sick Building Syndrome among Caretakers in Childcare Centers

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Abstract

Sick Building Syndrome (SBS) refers to the health-related symptoms of exposure to an unhealthy microenvironment, especially poor indoor air quality This study investigated the associations of indoor air quality including particulate matter (PM10 and PM2 5), Carbon Dioxide (CO2), Carbon Monoxide (CO), Total Volatile Organic Compounds (TVOCs), and childcare center environment with SBS symptoms among caretakers. SBS was assessed using a self-reported questionnaire The prevalence of SBS was 77 78% among caretakers PM10 negatively correlated with CO2 (r=0 -558; p<0 01) PM10 levels were associated with any reported symptoms of SBS (OR=7 38; 95%CI 1 98 - 27 53), and upper respiratory symptoms (OR= 12 00; 95%CI 1 46 – 98 08) PM2 5 showed no association with SBS Using air refresher was associated with upper respiratory symptoms (OR=5 10; 95%CI 1 46 – 13 59), lower respiratory symptoms (OR=3 64; ; 95%CI 1.22 - 10.82).

Keywords: Childcare center, Indoor air quality, Sick building syndrome, Caretaker

Introduction

The World Health Organization (WHO) reported that indoor air pollution can cause the deaths of 3.8 million people annually.[1] especially, developing countries which suffered from the largest effect of air pollution. Nonetheless, few studies reported on health impacts of indoor air pollution in Asian developing countries.[2] Approximately, 2.2 million of Asian people have been affected due to air pollution[3], Thailand was reported about 50,000 fatalities caused by air pollution[4].

In many areas of Thailand was reported that the air quality was worse than its standards, especially in urban areas [5]. Not only the particle matters [6, 7] but also Volatile Organic Compounds (VOCs) were considered as air pollution problem in Thailand.[8] Moreover, some studies found that air pollution was related to hospital admission.[9, 10] Furthermore,

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numerous studies linked indoor air pollution to Sick Building Syndrome (SBS).[11-13] Up to 88 percent of people reported their illness because of building' air quality.[14] In addition, a study was revealed a prevalence of SBS of about 76.9% among preschool children in Shanghai .[15]

However, there are very little research on sick building syndrome in Thailand. This study investigated the associations of indoor air quality including particulate matter (PM_{10} and $PM_{2.5}$), Carbon Dioxide (CO_2), Carbon Monoxide (CO), Total Volatile Organic Compounds (TVOCs), and childcare center environment with SBS symptoms among caretakers. The aim of this study was to investigate the associations of indoor air quality including particulate matter (PM_{10} and $PM_{2.5}$), Carbon Dioxide (CO_2), Carbon Monoxide (CO), Total Volatile Organic Compounds (TVOCs), and childcare center environment with SBS symptoms among caretakers.

Materials and methods

Study design

A cross-sectional study was conducted in November – December 2020 to investigate the relationships between indoor air quality and childcare center environment with SBS symptoms among caretakers. 10 public childcare centers in central regions of Thailand were invited to participate in the study. Before collecting the data, an online meeting was held to explain the procedure of data collection and answer to related questions. The dates were scheduled after getting confirmation from the head of public childcare centers. In each childcare center, all caretakers were invited to participate. From 10 centers, 81 caretakers including teachers, health volunteers, and practical nurses were recruited. The data collection was separated into 2 parts : self-reported questionnaire from caretakers, and indoor air quality measurement. This study was conducted in accordance with the Declaration of Helsinki guidelines and approved by The Research Ethics Review Committee for Research Involving Human Research Participants Chulalongkorn University Thailand (COA No. 133/2564). All respondents read and sign the consent form before participating.

Questionnaire

81 caretakers in 10 childcare centers completed the self-reported questionnaire. The questionnaire consists of 3 parts: demographic of caretaker, working environment, and SBS. The demographic of caretakers included age (<40 and >= 40 years), gender (male and female), body mass index (normal and abnormal), smoking (yes and no), underlying disease including asthma (yes and no), and working hour per day (>8 and <=8 hours). Body mass index (BMI) was calculated by a person's weight in kilograms divided by height in meters squared. The normal BMI ranged between 18.5 – 24.9 kg/m2. The working environment was also collected by self-reported from caretakers. Presence of carpet (yes/no), presence of printer (yes/no), presence of xerox machine (yes/no), applying air refresher (yes/no), and applying mosquito repellent (yes/no) were asked.

Sick Building Syndrome (SBS) was reported by caretakers. The definition of SBS was informed before the questionnaire was distributed. The evaluation questions for SBS symptoms were developed from Gary's questionnaire[16] and translated into Thai language. Translate and back-translate were performed. SBS consisted of 4 sub-categories: general symptoms(7 symptoms), upper respiratory symptoms (4 symptoms), lower respiratory symptoms (3 symptoms), and skin symptoms (3 symptoms). General Symptoms consisted Headache, Unusual tiredness, Tension, Difficulty in concentrating or remembering things, Dizziness, Feeling depressed, and Nausea. Upper respiratory symptoms included Sore or dry throat, Sinus congestion, Coughing, and Sneezing. Lower respiratory symptoms were Wheezing, Chest tightness, and Shortness of breath. Skin symptoms were Dryness, Itching, and Irritation of the skin. The analyses of outcomes defined as symptoms experienced in the childcare center and improved when leave the childcare center at least 1 day per week in the last 4 weeks.

Indoor air parameter measurement

Indoor air pollution was analyzed in each childcare center according to indoor air quality guidelines of Bureau of Environmental Health, Thailand[17]. The instruments and methods that used to assess including particulate matter (PM), Carbon

Dioxide (CO_2), Carbon Monoxide (CO), Total Volatile Organic Compounds (TVOCs), Total Fungal Count, Total Bacteria Count were shown in Table 1.

The assessment of PM_{10},$PM_{2.5}$,CO_2,CO,TVOCs was conducted for eight hours as working duration of caretakers. Two sampling points of Total Fungal Count and Total Bacterial Count Total Fungal Count and Total Bacterial Count were considered the position of respondents (middle of the room) and far from doors or windows. After collection, the samples for Total Fungal Count and Total Bacterial Count were stored in a cooler box at approximately 4 °C before being transported to the laboratory of the College of Public Health Sciences at Chulalongkorn University.

Statistical analysis

The relationship between general characteristics and sick-building syndrome was evaluated using data from 81 childcare takers in 10 childcare centers who self-reported their characteristics. The categorical variables were reported as a percentage of frequency. The continuous variables were presented in the range of data with the standard deviation (SD) for parametric data and the median value for nonparametric data.

All statistical analyses were performed using the Statistical Package for the Social Sciences for Windows (SPSS) version 28. Spearman's correlation was utilized to determine the relationship between two air pollution parameters as the rank values of the variables. The correlation coefficient was classified as 5 levels including negligible correlation, weak correlation, moderate correlation, strong correlation, and very strong correlation. [18,19] The linear regression was determined for each factor associated with SBS. Throughout the statistical analysis, a p-value of 0.05 was used to identify the significance of all tests.

Results

The prevalence of sick-building syndrome among childcare workers in the central region of Thailand was 77.78% of participants as shown in Table 2SBS symptoms were divided into four categories: general symptoms (72.84%), upper respiratory symptoms (45.68%), lower respiratory symptoms (22.22%), and skin symptoms (23.46%). The body mass index (BMI) as demographic characteristic was found significant relationship with SBS symptoms($p < 0.05$)

The relationship between indoor concentrations of two factors was shown in, Table 3. $PM_{2.5}$ was found significantly strong correlated with PM_{10}. TVOC was found moderate significantly correlated with relative humidity and temperature, meanwhile a significant negative correlation with CO_2 and CO. PM_{10} has a strong correlation with TVOC but showed negatively correlated with CO_2, and CO. A strong negative correlation was found between CO_2 with TVOC and Relative Humidity. In addition, CO was showed a weak negative correlation with temperature. While, a moderate correlation between TVOC and temperature was reported, there was a strong correlation between TVOC and relative humidity.

Table 4 shows the association between indoor air pollutions and SBS symptoms among childcare workers. Any Symptoms were associated with PM_{10} levels (OR 7.38, CI 1.98 - 27.53). According to the General Symptoms, PM_{10} was also associated with OR 5.04 (CI 1.398–18.169). While, Upper Respiratory Symptoms were associated to PM_{10} levels(OR 12.00, CI 1.46 - 98.08). On the other hand, CO_2 levels were found to lower the risk of SBS symptoms since the percentage of any symptoms, general symptoms, and upper respiratory symptoms among childcare workers by 87, 81, and 92 percent were lower than the median, respectively workers. Finally, Table 5 showed the association between the workplace environment and SBS. This present study found that room air fresheners could affect upper respiratory symptoms (OR 5.10, CI 1.92 - 13.59), lower respiratory symptoms (OR 3.64 ;95% CI 1.22 - 10.82), and skin symptoms(OR 8.05;CI 2.50 - 25.91).

Table 1 Sampling methods and measuring instruments for indoor air pollution analyzes

Indoor air pollution	Instrument's	Sensor	Accuracy
PM_{10}	Met One Aerocet -531S	Laser Diode	± 10%
$PM_{2.5}$	Met One Aerocet -531S	Laser Diode	± 10%
CO_2	AQ expert	NDIR	±2% Rdg. ±10 ppm
CO	AQ expert	NDIR	±1 ppm Rdg. ±0.2 ppm
TVOCs	AQ expert	PID	10 % Rdg. ± 20 ppb

Table 2: Self-reported Sick-Building Syndrome of childcare takers by demographic characteristic

Variable	Total (n=81)	Any Symptoms (77.78%)		General Symptoms (72.84%)		Upper Respiratory Symptoms (45.68%)		Lower Respiratory Symptoms (22.22%)		Skin Symptoms (23.46%)	
	n=81	n= 63	p-value	n=59	p-value	n=37	p-value	n=18	p-value	n=19	p-value
Age											
< 40 years	36	29	0.591	27	0.696	17	0.803	7	0.591	10	0.412
>= 40 years	45	34		32		20		11		9	
Gender											
Female	79	62	0.339	58	0.462	36	0.901	18	0.603[a]	18	0.370
Male	2	1		1		1		0		1	
Body Mass Index											
Normal	44	29	0.561	27	0.590	25	0.043*	6	0.289	6	0.194
Abnormal	37	34		32		12		12		13	
Smoking											
Yes	1	0	0.222[a]	0	0.272[a]	0	0.543[a]	0	0.778[a]	0	0.765[a]
No	80	63		59		37		18		19	
Underlying Disease											
Yes	64	14	0.610	13	0.770	7	0.675	6	0.190	6	0.195
No	17	49		46		30		12		13	
Working hour per day											
<=8	24	19	0.845	18	0.777	12	0.612	6	0.696	7	0.431
>8	57	44		41		25		12		12	

[a] Fisher's exact test, * Significance level with p-value < 0.05

Table 3: Concentration of indoor air pollution

	Total (N=19)		Spearman Rank Correlation					
	Mean	SD	PM_{10}	CO_2	CO	TVOC	Temperature	Relative Humidity
$PM_{2.5}(ug/m^3)$	13.15	6.06	0.803**	-0.842**	-0.260*	0.871**	0.511**	0.692**
$PM_{10}(ug/m^3)$	99.44	46.72		-0.558**	-0.180	0.741**	0.017	0.574**
CO_2 (ppb)	634.86	269.30			0.102	-.837**	-.543**	-.786**
CO (ppm)	0.28	0.54				0.170	-.293**	0.203
TVOC (ppm)	0.32	0.28					.413**	.726**
Temperature (°C)	26.57	2.27						0.176
Relative Humidity (%)	49.69	8.03						1.000

**Significance level with p-value < 0.01

Table 4 Percentage of indoor air pollution comparing with those medians correlated with SBS symptoms (n=81)

SBS symptom group	n(%) of caretakers reporting symptoms	$PM_{2.5}$			PM_{10}			CO_2		
		<=Median	>Median	OR (95%CI)	<=Median	>Median	OR (95%CI)	<=Median	>Median	OR (95%CI)
		n (%)	n (%)		n (%)	n (%)		n (%)	n (%)	
Any SBS Symptoms	63 (77.78)	56 (88.89)	7(11.11)	1.00 (0.189-5.295)	5 (7.94)	58 (92.06)	7.38 (1.98 - 27.53) *	58(92.06)	5 (7.94)	0.13 (0.036 - 0505) *
General Symptoms	59 (64.20)	52 (88.14)	7 (11.86)	1.34 (0.258 - 7.037)	5 (8.4)	54 (91.53)	5.04 (1.398 - 18.169) *	54 (91.53)	5(8.47)	0.19 (0.055 - 0.715) *
Upper Respiratory Symptoms	37 (45.68)	32(86.49)	5(13.51)	1.56 (0.387 - 6.302)	1 (2.70)	36 (97.30)	12.00 (1.46 - 98.08) *	36 (97.30)	1 (2.70)	0.08 (0.010 - 0.681) *
Lower Respiratory Symptoms	18(22.22)	15 (83.33)	3 (16.67)	1.90 (0.425 - 8.499)	0	18(100)	N/A	18 (100)	0	N/A
Skin Symptoms	19(23.46)	15(78.95)	4(21.05)	3.04 (0.726 - 12.735)	0	19(100)	N/A	19 (100)	0	N/A

Table 5 Relationship between workplace environment and symptoms of SBS

SBS Symptom Group	n(%) of caretakers reporting symptoms	Carpet		Printer		Xerox machine		Air refresher		Mosquito repellent	
		Yes	OR (95%CI)	Yes	OR (95%CI)	Yes	OR (95%CI)	Yes	OR (95%CI)	Yes	OR (95%CI)
		n (%)		n (%)		n (%)		n (%)		n (%)	
Any Symptoms	63 (77.78)	7 (11.11)	2.12 (0.24-18.50)	39 (61.90)	1.62 (0.57 - 4.67)	35 (55.56)	1.56 (0.54 - 4.48)	38 (60.32)	1.71 (0.53- 5.39)	29 (46.03)	1.71 (0.57 - 5.12)
General Symptoms	59 (72.84)	6 (10.17)	1.13 (0.21 - 6.08)	35 (59.32)	1.01 (0.37 - 2.73)	31 (52.54)	0.92 (0.35 - 2.46)	36 (61.02)	1.37 (0.48 - 3.87)	28 (47.46)	1.94 (0.69 - 5.43)
Upper Respiratory Symptoms	37 (45.68)	5 (13.51)	2.13 (0.47 - 9.61)	21 (56.76)	0.83 (0.34 - 2.01)	20 (54.05)	1.07 (0.45 - 2.58)	21 (56.76)	5.10 (1.92 - 13.59) *	21 (56.76)	2.81 (1.13 - 6.98)
Lower Respiratory Symptoms	18 (22.22)	2 (11.11)	1.19 (0.22 - 6.46)	12 (66.67)	1.50 (0.05 - 4.50)	11 (61.11)	1.52 (0.52 - 4.43)	13 (72.22)	3.64 (1.22 - 10.82) *	8 (44.44)	1.07 (0.37 - 3.06)
Skin Symptoms	19 (23.46)	3 (15.79)	2.14 (0.46 - 9.92)	12 (63.16)	1.24 (0.43 - 3.57)	13 (68.42)	2.31 (0.78 - 6.86)	13 (68.42)	8.05 (2.50 - 25.91) *	10 (53.63)	1.64 (0.58 - 4.62)

Discussion

The present study found a higher prevalence of SBS among caretakers in Central Thailand, at 77.78%, than other studies, which found lower prevalence percentages. In a study that estimated the prevalence of SBS in aboveground and subterranean workplaces among multiethnic Asian employees, the prevalence of SBS was estimated to be 17.9%. In addition, it was discovered that increasing air quality and temperature comfort in workplaces can decrease the incidence of sick building syndrome.[14] In addition, Hong Kong had the highest prevalence of sick building syndrome-specific survey symptoms: 72% had fatigue symptoms, 34% had eye symptoms, and the study found that nasal irritation was the most prevalent home-related SBS symptom, with noise being the most significant. Residents perceive an issue with local environmental quality.[20] This finding is consistent with a study that determined the prevalence of sick building syndrome among healthcare workers to be between 64.7% and 74.1% in hospitals.[21] In the study of general hospitals in Slovenia, the surgical ward had the highest prevalence of Sick Building Syndrome, at 67.6%, while the Anesthesiology and Reanimation Services Department did not report any cases.[22] Furthermore, calibrated sensors were used to measure CO_2, CO, temperature, and humidity levels, and dosimeter tubes were utilized to measure SO_2, H_2S, and NO_2 levels in a study on Sick Building Syndrome among university laboratory workers in Nigeria. The study found that 38.46% of participants reported skin-related symptoms, 28.32% reported general-related symptoms, 19.23% reported mucosal-related symptoms, and 13.99% reported respiratory-related symptoms.[23] In the study that had been conducted before this one, the prevalence of Sick Building Syndrome (SBS) was far lower than it was in this study.

The data show that the prevalence of SBS in Thailand's childcare centers is high, and there is an urgent need to improve indoor air quality to reduce its effects. Studies have emphasized the importance of addressing SBS in childcare centers and the urgent need to improve indoor air quality. This is important.

Furthermore, our study and other studies show a possible relationship between PM and TVOC. The relationship has also been found in other studies. For example, the research utilized a multilevel path model for the purpose of evaluating the association between the levels of PM and TVOC that were observed in a school building, student-reported symptoms, and students' subjective assessments of indoor air quality (IAQ). According to the findings of the study, levels of PM and TVOC are related.[24]

The study evaluated the concentrations of particulate matter and volatile organic compounds in an underground parking garage and evaluated the associated health risks. Furthermore, the impact of ventilation and traffic volume on these pollutants, as well as indoor/outdoor ratios and PM deposition, were investigated. While TVOC concentrations were found to be higher in the summer, there were no significant differences between ventilation types in any of the three parking areas [26]. However, the study found that a room with low CO2 levels was related to elevated levels of PM10 and PM2.5, most likely as a result of outside air going into the room. This finding is related to the study on developing and implementing effective strategies to improve indoor air quality and reduce exposure to harmful pollutants in schools, which found a correlation between CO2 levels and outdoor ventilation.[25] Therefore, it is necessary to purify the air approaching the classroom to help reduce CO2, PM2.5, and PM10 levels.

In addition, our study revealed a correlation between PM10 and CO2 levels and sick building syndrome (SBS) in childcare centers' caretakers., especially PM_{10} levels. Similar to Cuong et al.[26]significantly found the correlation of room temperature, dust, and stale, stale air and SBS symptoms.[27] In addition, a study in Malaysia found indoor relative humidity, visible dampness, mold, and dust in classrooms affected SBS and occupational health[11]. Similarly, reported a positive correlation between the presence of fine dust in the classroom and SBS diseases was reported[28]. A study in China showed an association between SBS symptoms and school dust colony-forming in the units per gram [11]. Apart from PM_{10}, the study in Iran reported that indoor air pollutants (NO_2, PM_{10}, $PM_{2.5}$, and CO) from open fireplaces and gas stoves were associated with SBS symptoms [7]. In addition, the results of an Indonesian study showed that PM_{10}, $PM_{2.5}$, and humidity levels on building floors impacted on SBS

symptoms [29]. Meanwhile, no correlation between $PM_{2.5}$ with the prevalence of SBS symptoms was reported as same as these other studies in China, Thailand and Turkey[12, 30, 31]. In order to reduce the risk from indoor air exposure, a Swedish research recommended that the installation of modern ventilation systems can improve school indoor air quality by increasing individual air flow and air exchange rate. [32]

Conclusion

The prevalence of SBS symptoms among childcare workers in the Central of Thailand was 77.78%, and the correlation between PM_{10} and air fresheners with childcare workers were investigated. In addition, a strong correlation between $PM_{2.5}$ and TVOC was found, while a strong correlation between TVOC and relative humidity was also discovered. Consequently, the decreasing risk of a variety of SBS symptoms should be conducted by using air filtration and dehumidification at the childcare center. Caretakers, including teachers, health volunteers, and practical nurses, can play a crucial role in mitigating SBS in childcare centers. Practical nurses, in particular, can be instrumental by engaging in SBS education, promoting health and wellness, and developing prevention plans.

Ethical Clearance: This study was conducted in accordance with the Declaration of Helsinki guidelines and approved by The Research Ethics Review Committee for Research Involving Human Research Participants Chulalongkorn University Thailand (COA No. 133/2564). All respondents read and sign the consent form before participating.

Conflict of Interest & Source of Funding Statement

The authors declare no conflict of interest.

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