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Effect of Safety Management Program on Perception of Safety Practice among Charge Nurses in Tertiary Hospitals

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ABSTRACT

This quasi-experimental research with pre-test and post-test two-group design aimed to compare safety management perception and safety performance perception of charge nurses between control and experimental groups. The sample consisted of 140 charge nurses in total (70 in control group and 70 in experimental group). The research was conducted over 18 months. There were two research instruments: a safety management program and a questionnaire on perception of safety practice. The quality of the instruments was validated with content validity index of 0.86, reliability of 0.89, and construct validity was verified using factor analysis with component loading weights ranging from 0.780.85, which met the established criteria. Quantitative data were analyzed using descriptive statistics, independent t-test, and exploratory and confirmatory factor analysis (EFA and CFA).

The research findings revealed that in the control group, safety management perception was at a moderate level (M = 3.33, SD = 0.62) and charge nurses' safety performance perception was at a low level (M = 2.45, SD = 0.62). In the experimental group, safety management perception was at a high level (M = 4.38, SD = 0.41) and charge nurses' safety performance perception was at a high level (M = 4.38, SD = 0.68). The safety management perception and safety performance perception of charge nurses in the experimental group were significantly higher than those in the control group ($p < .05$).

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KEYWORDS:

Safety management, safety performance perception, charge nurse

INTRODUCTION

Charge nurses play a crucial role in risk management and promoting patient safety. Wagner et al.(1) found that charge nurses with good risk management skills could reduce adverse event rates in patient wards by up to 30%. Xu et al.(2) demonstrated that charge nurses play a critical role in implementing safety policies and practices in actual work settings. Units with strict implementation of safety practices had adverse event rates 40% lower than those without such implementation.

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Patient safety is a critical issue in healthcare systems worldwide. Nurses are healthcare professionals who provide close and continuous patient care, particularly charge nurses who are responsible for supervising the nursing team and other personnel during their shifts. The perception and practice of safety by charge nurses is therefore crucial to the quality and safety of patient care. The World Health Organization (WHO) has declared patient safety a global priority, and the Healthcare Accreditation Institute (Public Organization) has established Hospital and Healthcare Service Standards, 4th Edition, emphasizing risk management and safety systems. However, statistics on adverse event reporting in healthcare facilities show that adverse events affecting patients continue to occur, some of which could be prevented with effective safety management. From reviewing the conceptual framework of Griffin and Neal,(3) it is proposed that perception of safety practice has

two important components: safety compliance and safety participation in health units. Safety management, environmental conditions, and organizational safety culture influence these components, which in turn affect safety performance. The development of safety management programs in healthcare systems has evolved from focusing on blaming individual perpetrators to a systems thinking approach that recognizes the complex interactions of various factors contributing to safety outcomes. The Institute for Healthcare Improvement and the Agency for Healthcare Research and Quality (AHRQ) guidelines emphasize key components including leadership commitment, staff engagement, systematic risk assessment, and continuous improvement processes.

Additionally, Melnyk and Fineout-Overholt(4) proposed the Evidence-Based Practice (EBP) framework, which consists of seven critical steps: 1) cultivating a spirit of inquiry, 2) formulating clinical questions in PICOT format, 3) searching for best evidence, 4) appraising the quality and relevance of evidence, 5) integrating evidence with clinical expertise and patient values, 6) evaluating outcomes from practice changes, and 7) disseminating results. Integrating the EBP concept with safety management helps charge nurses make evidence-based decisions, leading to the development of safer and more effective practices.

Given the above background, the research team recognized the importance of testing an effective safety management program for charge nurses. It is necessary to increase perception and practice of safety. This research focused on studying the effects of the safety management program on charge nurses' perception of safety practice related to safety, to lead to the development of sustainable safety systems in healthcare facilities.

Research Objectives

1. To study the level of safety management perception of charge nurses in control and experimental groups after participating in the safety management program.
2. To compare safety performance perception of charge nurses between control and experimental groups who participated in the safety management program.

Conceptual Framework

This research used the Safety Management in Healthcare Settings framework integrated with Griffin and Neal's(3) safety performance perception framework, consisting of key components according to The Institute for Healthcare Improvement and AHRQ guidelines, including: Safety Policy, Risk Assessment, Risk Management, Incident Reporting, Root Cause Analysis, and Evidence-Based Practice according to Melnyk and Fineout-Overholt's(4) concepts. Additionally, the framework integrated Evidence-Based Nursing Practice principles by Stillwell et al.(5) and Dang et al.,(6) which emphasize searching for, appraising, and applying scientific evidence in clinical decision-making, as well as safety culture development concepts by Reason(7) and Vincent and Amalberti,(8) which emphasize the importance of systems, processes, and organizational behavior in creating safe environments.

Research Hypotheses

1. Charge nurses' perception of safety management in the control and experimental groups differs significantly after participating in the safety management program.
2. Charge nurses' perception of safety performance between control and experimental groups who participated in the safety management program differs significantly.

METHODOLOGY RESEARCH DESIGN

This research was a quasi-experimental research with pre-test and post-test two-group design to study the effects of the safety management program on charge nurses' perception of safety practice in tertiary hospitals.

Population and Sample

The population in this research consisted of charge nurses working in healthcare facilities. The sample consisted of professional nurses in four secondary-level hospitals, both private and government. Using simple random sampling, one government hospital and one private hospital were obtained. Sample size was calculated using Cohen's(9) ready-made table for one-tailed hypothesis testing at alpha = .05, power = .70, effect size = .70 (Polit & Hungle(10)), yielding a total sample of 140 people, divided into experimental group of 70 people and control group of 70 people.

Inclusion criteria for the sample were: being a nurse with at least 1 year of experience as a charge nurse, assigned to be a charge nurse in an inpatient ward, and currently working in an inpatient ward.

Exclusion criteria were: subjects on sick leave, maternity leave, or transferring from the hospital during the research period.

Research Instruments

The research instruments consisted of 5 parts:

1. **Personal Information Questionnaire** consisting of age, gender, education level, work experience, charge nurse experience, and safety training experience.
2. **Safety Performance Perception Questionnaire** developed from Griffin and Neal's(3) framework and literature review on related topics, consisting of questions in 5 domains: safety policy, risk assessment, risk management, incident reporting, and evidence-based practice, totaling 20 items. Using a 5-point Likert scale (1 = very little to 5 = very much). Instrument quality had Content Validity

Index (CVI) of 0.82 and Cronbach's alpha coefficient reliability of 0.91.

Analysis of construct validity of the safety practice instrument showed the model fit well with empirical data (χ^2 = 2.63, df = 34, p-value = 1.00, RMSEA = 0.00). The instrument consisted of 2 main components: 1) safety compliance domain (4 indicators) and 2) safety participation domain (6 indicators). All indicators had component loading weights between 0.78-0.85, meeting the established criteria.

3. **Safety Management Program** developed using evidence-based principles and safety management concepts in healthcare facilities, consisting of 4 activity sections:
    - **Safety management training workshop (5 sessions)** integrating content from AHRQ Patient Safety Network,(11) Sammer et al.(12) on safety culture dimensions, and Weaver et al.(13) on promoting teamwork for patient safety. Training topics included: principles of safety management in organizations, creating safety culture, incident reporting and learning systems from errors, and safety communication.
    - **Root cause analysis and evidence-based practice skills training (3 sessions)** applying Peerally et al.'s(14) and Wu et al.'s(15) approaches for incident analysis, and practicing searching and appraising evidence quality according to the Johns Hopkins EvidenceBased Practice Model(6) and Fineout-Overholt et al.'s(16) guidelines for formulating clinical questions and searching for answers from academic databases.
    - **Small group activities to develop safety projects (6 sessions) using Plan-Do-Study-Act** (PDSA) cycle according to Institute for Healthcare Improvement(17) and integrating with Pronovost and Vohr's(18) principles in designing quality improvement projects focusing on patient safety (8 months).

Ethical Considerations

This research was approved by the Research Ethics Committee for Human Research, Christian University, on February 7, 2024, certificate number B.09/2566. The researcher met with participants, introduced themselves, explained research objectives and benefits, and detailed experimental activity procedures to participants. The researcher explained the right to decide whether to accept or practice participation in the research, and the right to withdraw at any time without giving reasons and without any impact on work. Confidentiality was assured, and participants were informed that data would not be disclosed to others and that research results would be reported as overall data. After data analysis, questionnaires would be destroyed to protect participants' rights and prevent any impact from research participation.

Data Analysis

1. Personal information and level of safety practice perception were analyzed using descriptive statistics including frequency, percentage, mean, and standard deviation.
2. Comparison of safety management perception and safety performance perception of charge nurses between experimental and control groups using independent t-test and exploratory and confirmatory factor analysis (EFA and CFA).

Results General Information of Participants

The 140 charge nurse participants were divided into control group of 70 people and experimental group of 70 people. Most were female (93.6%) with average age of 35.7 years (SD = 6.8), bachelor's degree education (88.2%), average work experience of 12.3 years (SD = 5.4), and average charge nurse experience of 4.6 years (SD = 3.2). Both control and experimental groups had no statistically significant differences in demographic characteristics ($p > .05$).

Research findings showed that before participating in the program, charge nurses in the experimental group had overall moderate level safety management perception (M = 3.45, SD = 0.62). By domain, safety policy had the highest mean (M = 3.68, SD = 0.59), followed by incident reporting (M = 3.54, SD = 0.65), risk assessment (M = 3.41, SD = 0.58), risk management (M = 3.35, SD = 0.62), and evidence-based practice had the lowest mean (M = 3.25, SD = 0.69).

After participating in the program, charge nurses in the experimental group had overall high level safety practice perception (M = 4.38, SD = 0.41). By domain, incident reporting had the highest mean (M = 4.56, SD = 0.38), followed by safety policy (M = 4.52, SD = 0.35), risk assessment (M = 4.35, SD = 0.42), risk management (M = 4.32, SD = 0.44), and evidence-based practice (M = 4.15, SD = 0.48).

Comparison of Safety Practice Perception Before and After Participating in the Program

Comparison results of charge nurses' safety practice perception between control and experimental groups after participating in the program showed that the experimental group had significantly higher overall mean safety practice perception than the control group ($p < .001$), as shown in Table 1.

Table 1 Comparison of mean safety management perception of charge nurses between control and experimental groups after participating in the program (n_1=70 and n_2=70)

Safety Management Domains	Control Group		Experimental Group	p-value
	M	SD	M	
1. Safety policy	3.72	0.58	4.52	
2. Risk assessment	3.48	0.54	4.35	
3. Risk management	3.39	0.61	4.32	
4. Incident reporting	3.65	0.62	4.56	
5. Evidence-based practice	3.29	0.68	4.15	
Total	**3.33**	**0.59**	**4.38**	

When comparing mean safety practice perception before and after participating in the program in the experimental group, it was found that after participating in the program, the experimental group had significantly higher mean safety management perception than before participating in the program in all domains ($p < .001$).

Table 2 Comparison of safety performance perception of charge nurses between control and experimental groups after participating in the safety management program

Group	$\bar{X}$	SD	Interpretation	P value
Control group	2.45	.62	Low	.03
Experimental group	4.38	.68	High	

From Table 2, the experimental group had higher charge nurses' safety performance perception in healthcare facilities than the control group after participating in the program. Charge nurses in the experimental group had high level safety practice perception, significantly higher than the control group.

DISCUSSION

Research results showed that the safety management program affected increased levels of charge nurses' safety practice perception in healthcare facilities. After participating in the program, charge nurses in the experimental group had high level safety practice perception, significantly higher than the control group. These research findings align with Wang et al.'s(19) study, which found that effective safety management programs must include knowledge provision, skill training, and support for applying knowledge in actual practice. The program in this research comprehensively included these components.

The effectiveness of the safety management program in this research in significantly increasing safety practice perception levels may be due to several important factors:

The program was developed by integrating the Safety Management in Healthcare Settings framework with Griffin and Neal's safety practice perception framework, resulting in comprehensive content and activities covering important components of safety practice. The combination of diverse learning methods - the program consisted of practical training workshops, skills practice, and small group activities using evidence-based analysis - helped charge nurses learn both theory and practice, consistent with adult learning principles emphasizing experiential learning and hands-on practice, aligning with Knowles et al.'s(20) concept of Andragogy, which emphasizes the importance of direct experience and application in real situations.

The emphasis on application in real contexts - the program provided opportunities for charge nurses to apply knowledge and skills to developing safety projects and R2R research in their own unit contexts, leading to meaningful and sustainable learning, consistent with Transfer of Learning concepts by Baldwin et al.(21) and Grossman and Salas,(22) which emphasize the importance of practicing in environments similar to real situations.

Additionally, continuous support throughout the program period with ongoing follow-up and consultation enabled charge nurses to solve problems and obstacles during implementation, consistent with studies by Bates and Holton(23) and Grossman and Salas,(22) which found that continuous support is an important factor affecting learning transfer success.

Regarding research findings on safety management perception and safety performance perception between control and experimental groups, charge nurses had moderate level safety practice perception, showing that charge nurses were aware of the importance of safety in practice to some extent, but there was still room for development, especially in evidence-based practice, which had the lowest mean. This aligns with Smith et al.'s(24) study, which found that applying evidence-based practice to nursing practice still has limitations in several areas, such as database access, evidence quality appraisal skills, and applying evidence in different contexts. Additionally, Melnyk et al.(25) and Saunders and Vehviläinen-Julkunen(26) pointed out that important barriers to implementing EBP in nursing practice include: lack of time, lack of knowledge and skills in searching and appraising evidence, lack of organizational support, and attitudes not conducive to change.

After participating in the program, charge nurses had increased safety practice perception in all domains, especially incident reporting, which had the highest mean, showing that the safety management program helped promote a safety

culture emphasizing learning from errors (Learning from Errors) and non-punitive incident reporting systems, consistent with research by Johnson et al.(27) and Khatri et al.,(28) which found that creating a positive safety culture increased incident reporting rates and led to continuous safety system development. Additionally, Edmondson(29) and Nembhard and Edmondson(30) emphasized the importance of "Psychological Safety" in the workplace, which is an important factor enabling personnel to dare to report errors and participate in safety system development.

Evidence-based practice, although showing significant increase after participating in the program, still had lower values than other domains, reflecting challenges in applying evidence-based practice to actual work. The program integrated training in searching, appraising, and applying evidence-based practice according to Melnyk and Fineout-Overholt,(4) Stillwell et al.,(5) and Dang et al.'s(6) approaches, helping charge nurses gain more confidence and capability in using evidence-based practice. However, there still needs to be continuous development and support, such as providing academic databases, in-depth training, and creating Communities of Practice according to Wenger's(31) and Li et al.'s(32) concepts.

RECOMMENDATIONS FOR APPLYING RESEARCH RESULTS

1. **Nursing Administration:** Nursing administrators should promote implementing the safety management program to develop charge nurses' capabilities by allocating resources and creating supportive environments for the development of safety management in hospitals. Emphasis should be on providing knowledge about the importance of safety in nursing practice by integrating EBP, and providing opportunities for skills development by using evidence-based practice, with emphasis on continuous improvement.
2. **Nursing Practice:** Charge nurses should apply knowledge and skills received from the program to developing safety systems in their units, especially using evidence-based practice and R2R research to solve safety problems found in units, and should share knowledge and experience with colleagues through mechanisms such as Journal Clubs, Case Conferences, and Quality Improvement Projects according to Newhouse et al.'s(33) and Tucker and Edmondson's(34) approaches.
3. **Nursing Education:** Nursing educational institutions should integrate content on safety management and R2R research into nursing curricula and training to create safety culture from the education level, emphasizing Active Learning and Problem-Based Learning methods that allow learners to practice searching, analyzing, and applying evidence-based practice in simulated situations, according to Fineout-Overholt and Melnyk's(35) and Kyrkjebø et al.'s(36) approaches.

RECOMMENDATIONS FOR FUTURE RESEARCH

There should be longitudinal studies to assess sustainability of changes occurring after participating in the program, or studies on effects of the safety management program on patient safety indicators, such as adverse event rates, preventable complication rates, and patient satisfaction with care quality and safety, according to Donabedian's(37) approach emphasizing evaluation of structure, process, and outcomes. Additionally, there should be comparative studies of program effectiveness in different contexts, such as hospitals of different sizes or primary healthcare facilities, to increase ability to broadly apply research results. Factors affecting success in implementing the program should be studied, such as leadership roles, organizational culture, and available resources, according to Damschroder et al.'s(38) Consolidated Framework for Implementation Research (CFIR).

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