EFFECTS OF MOBILE APPLICATION-BASED INSTRUCTIONAL MODULE OF PHYSICAL RESTRAINT AMONG INTENSIVE CARE UNIT NURSES IN SHARJAH, UNITED ARAB EMIRATES

By

KAVUMPURATH JANISHA

Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in Fulfilment of the Requirements for the degree of Doctor of Philosophy

April 2023

FPSK(p) 2023 1

Abstract of thesis presented to the Senate of universiti putra malaysia in fulfilment of the requirement for the degree of Doctor of Philosophy

EFFECTS OF MOBILE APPLICATION-BASED INSTRUCTIONAL MODULE OF PHYSICAL RESTRAINT AMONG INTENSIVE CARE UNIT NURSES IN SHARJAH, UNITED ARAB EMIRATES

By

KAVUMPURATH JANISHA

April 2023

Chair : **Navin Kumar a/l Devaraj, MD, MMed**
Faculty : **Medicine and Health Sciences**

Introduction: Traditional Continuing Nursing Education (CNE) faces challenges in scheduling and attendance, leading to the exploration of online alternatives, especially during the pandemic. Online CNE enhances convenience and accessibility, providing a platform to improve nurses' knowledge and skills, particularly busy nurses in Intensive Care Units (ICUs), where procedures like physical restraint (PR) techniques are crucial for patient safety. This study assesses the impact of a mobile application-based instructional module on knowledge, attitude, and practice of PR among ICU nurses in Sharjah, United Arab Emirates.

Methodology: In a quantitative experimental study with a randomized control trial, ICU nurses from four ministry hospitals in Sharjah participated after obtaining Ethical approvals. After developing a knowledge questionnaire, attitude scale, self-reporting practice checklist, and the mobile application-based instructional module, expert validation ensured tool quality, followed by a pilot study. The tools' reliability was assessed using Cronbach's alpha. Sixty-four participants were randomly selected, with 32 in the experimental group (EG) receiving the mobile application-based educational program, while the remaining 32 comprised the Control group (CG) without the program.

Results and Conclusion: The assessment tool exhibited good internal consistency (Cronbach's alpha: EG Knowledge=0.77, Attitude=0.69, Practice=0.77; CG Knowledge=0.76, Attitude=0.83, Practice=0.62). Significant correlations were found with the sociodemographic variables. In the EG, knowledge correlated with gender and prior PR education, and attitude correlated with previous education. In the CG, practice correlated with clinical experience. Knowledge levels were grouped into four tiers: advanced (>15), proficient (>12 to 15), basic (>8–12), and poor (≤8). The EG significantly improved median knowledge scores (8 to 14, $p < 0.01$, mean difference = 5.03). Conversely, the CG showed a non-significant change in knowledge scores (12.5 to 12, $p = 0.08$, mean difference = 0.70). Crucially, a significant pre- and post-intervention knowledge score difference was observed between the EG and the CG (EG: 6, CG: 1, $p < 0.01$). Attitude categories included highly positive (>70), positive (>66 to 70), neutral (>61-66), and negative (≤61). In the EG, mean scores significantly increased post-intervention (68±7.72), up by 8.76±1.09 ($p < 0.01$). In the CG, pre- to post-test change was minimal (67.9±5.18), with a non-significant difference of 1.37±1.06 ($p = 0.20$). A significant difference in pre- and post-intervention attitude scores was observed between the EG and the CG (EG: 9, CG: 4, $p < 0.01$). Self-reported practice levels, proficient (>71), competent (>65 to 71), needing improvement (>60–65), and inadequate (≤60) exhibited a significant increase in the EG (from 59 to 72, $p < 0.01$, mean difference = 10.82). Conversely, the CG showed a non-significant change (from 63.5 to 63.5, $p = 0.16$, mean difference = 0.66). The observed difference in pre- and post-intervention practice scores between the EG and CG was highly statistically significant (EG: 13, CG: 2.5, $p < 0.01$). The mobile application-based education intervention significantly improved knowledge, attitude, and practice in PR for nurses. Integrating such education is crucial for promoting best practices and patient safety. Further research is needed to explore long-term knowledge retention and broader impacts on clinical performance.

Abstrak tesis yang dibentangkan kepada Senat Universiti Putra Malaysia bagi memenuhi keperluan ijazah Doktor Falsafah

KEBERKESANAN MODUL PENGAJARAN BERASASKAN APLIKASI MOBIL TERHADAP PENGURANGAN KEKERASAN FIZIKAL DI KALANGAN JURURAWAT UNIT RAWAT INTENSIF DI SHARJAH, EMIRIAH ARAB BERSATU

Oleh

KAVUMPURATH JANISHA

April 2023

Pengerusi   : Navin Kumar a/l Devaraj, MD, MMed
Fakulti   : Perubatan dan Sains Kesihatan

Pengenalan: Pendidikan Kejururawatan Berterusan Tradisional (CNE) menghadapi cabaran dalam penjadualan dan kehadiran, yang membawa kepada penerokaan dalam kaedah alternatif seperti dalam talian, terutamanya semasa kejadian wabak. CNE dalam talian meningkatkan kemudahan dan kebolehcapaian, menyediakan platform untuk meningkatkan pengetahuan dan kemahiran jururawat, terutamanya jururawat yang sibuk di Unit Rawatan Rapi (ICU), di mana prosedur seperti teknik menahan fizikal (PR) adalah penting untuk keselamatan pesakit. Kajian ini menilai kesan modul pengajaran berasaskan aplikasi mudah alih terhadap pengetahuan, sikap dan amalan PR dalam kalangan jururawat ICU di Sharjah, Emiriah Arab Bersatu.

Metodologi: Dalam kajian eksperimen kuantitatif dengan penyelidikan kawalan rawak, jururawat ICU dari empat hospital Kementerian di Sharjah mengambil bahagian selepas mendapat kelulusan Etika. Selepas pembangunan soal selidik pengetahuan, skala sikap, senarai semak amalan pelaporan kendiri, dan modul pengajaran berasaskan aplikasi mudah alih, pengesahan pakar memastikan kualiti alat, diikuti dengan kajian rintis. Kebolehpercayaan alat telah dinilai menggunakan alfa Cronbach. Enam puluh empat peserta telah dipilih secara rawak, dengan 32 dalam kumpulan eksperimen (EG) menerima program

iii

pendidikan berasaskan aplikasi mudah alih, manakala baki 32 terdiri daripada kumpulan Kawalan (CG) tanpa melalui progarm ini.

Keputusan dan Kesimpulan: Alat penilaian menunjukkan ketekalan dalaman yang baik (alfa Cronbach: EG Pengetahuan=0.77, Sikap=0.69, Amalan=0.77; Pengetahuan CG=0.76, Sikap=0.83, Amalan=0.62). Perkaitan yang ketara didapati dengan pembolehubah sosiodemografi. Dalam EG, pengetahuan dikaitkan dengan jantina dan pendidikan PR terdahulu, dan sikap dikaitkan dengan pendidikan terdahulu. Dalam CG, amalan berkorelasi dengan pengalaman klinikal. Tahap pengetahuan dikumpulkan kepada empat peringkat: lanjutan (>15), mahir (>12 hingga 15), asas (>8–12), dan lemah (≤8). EG meningkatkan skor pengetahuan median dengan ketara (8 hingga 14, p <0.01, perbezaan min = 5.03). Sebaliknya, CG menunjukkan perubahan tidak ketara dalam skor pengetahuan (12.5 hingga 12, p = 0.08, perbezaan min = 0.70). Yang penting, perbezaan skor pengetahuan pra dan pasca intervensi yang ketara diperhatikan antara EG dan CG (EG: 6, CG: 1, p <0.01). Kategori sikap termasuk sangat positif (>70), positif (>66 hingga 70), neutral (>61-66), dan negatif (≤61). Dalam EG, skor min meningkat dengan ketara selepas intervensi (68±7.72), meningkat sebanyak 8.76±1.09 (p <0.01). Dalam CG, perubahan pra hingga pasca ujian adalah minimum (67.9±5.18), dengan perbezaan tidak ketara sebanyak 1.37±1.06 (p = 0.20). Perbezaan ketara dalam skor sikap sebelum dan selepas intervensi diperhatikan antara EG dan CG (EG: 9, CG: 4, p <0.01). Tahap amalan yang dilaporkan sendiri, mahir (>71), cekap (>65 hingga 71), memerlukan penambahbaikan (>60-65), dan tidak mencukupi (≤60), menunjukkan peningkatan ketara dalam EG (dari 59 kepada 72, p < 0.01, perbezaan min = 10.82). Sebaliknya, CG menunjukkan perubahan tidak ketara (dari 63.5 kepada 63.5, p = 0.16, perbezaan min = 0.66). Perbezaan yang diperhatikan dalam skor amalan pra dan selepas intervensi antara EG dan CG adalah sangat signifikan secara statistik (EG: 13, CG: 2.5, p <0.01). Intervensi pendidikan berasaskan aplikasi mudah alih telah meningkatkan pengetahuan, sikap dan amalan dalam PR untuk jururawat dengan ketara. Mengintegrasikan pendidikan sedemikian adalah penting untuk mempromosikan amalan terbaik dan keselamatan pesakit. Penyelidikan lanjut diperlukan untuk meneroka pengekalan pengetahuan jangka panjang dan kesan yang lebih luas terhadap prestasi klinikal.

iv

ACKNOWLEDGEMENTS

First and foremost, I would like to express my sincere gratitude to all of my supervisors, especially to Dr. Navin Kumar A/L Devaraj, Dr. Kulanthayan A/L K.C. Mani, and Dr. Fatma Refaat Abdel Fattah Ahmed, for their invaluable advice, continuous support, and patience during my PhD study. I am grateful for the insightful comments offered by the experts who evaluated the research tool. I also appreciate all the support I received from nurses in conducting this study. Finally, I'd like to thank my family, including my husband, parents, children, and friends. Without their wonderful support and understanding throughout the previous few years, I would not have been able to finish my studies.

v

This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Doctor of Philosophy. The members of the Supervisory Committee were as follows:

Navin Kumar A/L Devaraj, MD, MMed
Medical Lecturer
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Chairman)

Kulanthayan a/l K.C. Mani @ Subramanian, PhD
Professor
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Member)

Aneesa binti Abdul Rashid, MBBCh BAO, MMed
Associate Professor (Medical)
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Member)

Noor Airini binti Ibrahim, MBBS, MMed
Medical Lecturer
Faculty of Medicine and Health Sciences
Universiti Putra Malaysia
(Member)

Fatma Refaat Abdel Fattah Ahmed, PhD
Assistant Professor
College of Health Sciences
University of Sharjah
United Arab Emirates
(Member)

_____
ZALILAH MOHD SHARIFF, PhD
Professor and Dean
School of Graduate Studies
Universiti Putra Malaysia

Date: 14 December 2023

vii

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

ANCOVA   Analysis Of Covariance

CASP   Critical Appraisal Skills Programme

CAUTI   Catheter-Associated Urinary Tract Infections

CCN   Critical Care Nurse

CCU   Coronary Care Unit

CE   Continuing Education

CG   Control Group

CMS   Centers For Medicare & Medicaid Services

CNE   Continuing Nursing Eductaion

CONSORT   Consolidated Standards of Reporting Trials.

CVR   Content Validity Ratio

EG   Experimental Group

EN   Enrolled Nurses

ICU   Intensive Care Unit

F   F-statistic (F-test)

IQR   Interquartile Range

JBI   Joanna Briggs Institute

JCI   Joint Commission International

KAP   Knowledge, Attitude, and Practice

KASA   Knowledge, Attitude, Skills, and Aspirations

M   Mean Score (in the context of statistical analysis)

PR	Physical Restraint
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
Q	Question
R^2	R-squared (coefficient of determination)
RCT	Randomized Controlled Trial
RN	Registered Nurses
SD	Standard Deviation
SE	Standard Error
Sig.	Significance Level (in the context of statistical analysis)
SPSS	Statistical Package for the Social Sciences
TICU	Trauma Intensive Care Unit
UAE	United Arab Emirates

CHAPTER 1

INTRODUCTION

As the advantages of accessibility, convenience, and a positive learning environment became increasingly evident, online Continuing Education (CE) gained popularity. The COVID-19 pandemic has necessitated mandatory e-learning in Continuing Nursing Education (CNE). In the United Arab Emirates (UAE), a culturally diverse and developed country, the need for such a shift was well-prepared. However, amidst this transition, one key strategy, 'learner engagement', involving self-directed and autonomous participation remains an unexplored frontier. At this crucial juncture, we embark on an exploration of the effectiveness of a mobile application-based teaching module for nurses in the Intensive Care Unit (ICU). Within the dynamic environment of the ICU, which is characterized by high patient care demands and complex requirements, the use of restrictive practices and interventions has emerged as a significant concern for nursing staff (Dickinson & Clark, 2020).

In ICUs, the use of Physical Restraint (PR) is a common intervention aimed at maintaining patient safety, managing agitated patients, and preventing the inadvertent removal of vital medical equipment (Salehi et al., 2020). Taha & Zeinab (2013) suggest that intensive care nurses who have undergone training in PR tend to use it less frequently. This decrease in the use of PR has been linked to fewer negative consequences for patients in terms of complications.

Various risks are associated with physically restraining patients, including lactic acidosis, incontinence, bone fractures, loss of mobility, pressure sores, circulatory problems in pressured areas and limbs, dehydration, deep vein thrombosis, thromboembolic incidents, stress cardiomyopathy, respiratory depression, aspiration, choking, asphyxia, and even death (Ziei et al., 2018). Periodic and continuous evaluations are essential to prevent these issues (Muir-Cochrane et al., 2020) . Patients who experience PRs may suffer from issues such as fear of the ICU, depression, anger, aggression, restlessness, agitation, and anxiety (Luk et al., 2015).

Nursing specialties create practice and performance standards tailored to their respective fields or patient populations. These standards, coupled with regulatory changes, advancements in clinical techniques, technological

1

upgrades, and organizational mandates, play a vital role in defining the essential competencies for nurses to ensure safe and current practices. To maintain their competency, most nurses participate in continuous education, which encompasses various methods such as clinical updates, competency evaluations, e-learning modules, webinars, workshops, conferences, and specialty certifications (Bindon, 2017).

Sheen et al.(2008) suggested that the use of e-learning methods in CNE is widely acceptable and that it could be extended to all levels of the nursing clinical ladder system, given its highly beneficial outcomes. According to Harper et al., (2017) lifelong learning and the acquisition of knowledge and skills are intentional pursuits throughout a nurse's career. This active process enables nurses to prepare themselves for new or evolving roles and to effectively respond to the inevitable changes in the practice environment. Lifelong learning can take place through formal or informal means, whether within the workplace or beyond it (Harper et al., 2017).

1.1 Background of the study

PR is frequently applied in ICUs to manage agitated patients and prevent the accidental removal of essential medical equipment, all with the primary aim of ensuring the safety of patients. However, it is crucial to acknowledge that the use of PR raises ethical questions and poses potential physical and psychological risks to patients, which need to be carefully considered to maintain a high standard of patient safety.

In accordance with The Joint Commission, proactive healthcare leaders committed to enhancing the quality of care and patient safety align their strategies with the Commission's mission and its patient safety standards. Within this context, hospital leaders and staff play a pivotal role in establishing effective patient safety systems, particularly in the training of nurses. This training is instrumental in reducing adverse events that may pose risks to patients and in mitigating unsafe conditions, serving as a foundational element in the development of a comprehensive patient safety system. Furthermore, leaders and staff cultivate a culture of learning and advocate for an equitable safety culture. They promote transparency by openly sharing quality metrics and incidents of patient harm. Additionally, they set a model of professional conduct, address any behaviors that could compromise safety, and allocate essential resources and training to support improvement initiatives (Patient

2

Safety Systems Chapter | The Joint Commission, 2021). Training, especially regarding PR, is essential for ensuring patient protection and safety in healthcare settings, making it a crucial component of these safety systems.

The UAE, including the city of Sharjah, has witnessed significant advancements in healthcare infrastructure and services. The ICU nurses in Sharjah play a critical role in providing high-quality care to critically ill patients. In the UAE healthcare sector, the majority of nurses are expatriates from various low-, middle-, and high-income countries. This diversity in training backgrounds, skills, and experience may have an impact on patient-related outcomes, hospital performance, and overall health system performance (Paulo et al., 2019). Nurses come from a variety of educational backgrounds and work in a variety of contexts, competency may also be rather complex (Schneider & Good, 2018). Hence to maintain proficiency, CE is required. Competency is most simply characterized as the application of skills and knowledge for proper nursing practice. CE and staff development are essential aspects of working as a professional nurse (Schneider & Good, 2018; Summers, 2015). The number of respondents considered CE as vital to deliver safe, up-to-date patient care, according to a study that employed focused interviews to establish clinical nurses' attitudes of CE (Govranos & Newton, 2014).

Elliott & Dillon (2012) emphasize the challenges associated with traditional CE and mandatory employee classes. These challenges include scheduling difficulties leading to low attendance and compliance rates. Staff educators confront challenges such as offering cost-effective, accessible, and convenient orientation, professional growth and development, and annual requirement education. Although the traditional live inservice model satisfies the needs of clinical staffs who are used to passive learning, younger generations are seeking active learner-centered experiences. To address clinical staff's' educational demands, innovative, flexible, and accessible educational programs are required. Staff happiness, compliance, and cost savings have all improved since the use of online learning (Elliott & Dillon, 2012). The study conducted by Kong et al. (2021) in South Korea provides valuable insights into the effectiveness of remote educational approaches for PR reduction. Their use of a web-based educational program with nursing students resulted in a notable improvement in both knowledge and perceptions related to PR, despite the absence of hands-on, in-person training. These findings underscore the potential effect of digital methods in educating healthcare professionals about PR management. This research contributes to the growing body of evidence supporting the advantages of online education. The research indicates that web-based distance education is likely to have similar or potentially better outcomes in terms of improving

3

participants' knowledge and skills performance in nursing compared to face to face method. Additionally, it has been demonstrated to enhance self-efficacy in the execution of nursing skills (Kang & Seomun, 2017).

The Statistics and Research Center at the Ministry of Health and Community, UAE understands the importance of embracing innovation and creative thinking as a way of life to ensure preparedness for the future. Their first goal is to provide comprehensive and integrated healthcare in innovative and sustainable ways, with a focus on safeguarding the community from diseases (UAE Statistical Annual Report, Statistics and Research Center Ministry of Health and Community, 2020). To achieve this, they can leverage a mobile application-based instructional module that offers cutting-edge training and resources to healthcare professionals. This module can cover various topics, including disease prevention, management, and best practices in healthcare delivery. By incorporating interactive learning experiences, simulation exercises, and real-time data analysis, the mobile app can engage users and promote active learning. It will empower healthcare professionals with the latest knowledge and skills, fostering a culture of continuous learning and improvement.

In line with the second goal of developing health information systems and applying international standards in managing healthcare infrastructure in UAE (UAE Statistical Annual Report, Statistics and Research Center Ministry of Health and Community, 2020), the mobile application-based instructional module can play a pivotal role. It can serve as a platform for healthcare professionals to access and manage health information efficiently and securely. By integrating with existing health information systems and ensuring adherence to international standards, the application can facilitate seamless knowledge exchange and improve information management within health facilities. The mobile application-based module will not only enhance the quality of healthcare services but also contribute to building a future-ready healthcare system that meets the needs of the community and aligns with global standards.

1.2 Problem statement

The problem addressed in this study encompasses two main aspects. First, there is a pressing need to enhance the knowledge and skills of ICU nurses in Sharjah, UAE, regarding the appropriate use of PR. This is crucial to ensure that patients are treated safely and ethically. Second, the study addresses the challenge of providing effective training to meet the educational needs of busy ICU nurses,

4

particularly during the pandemic, when healthcare professionals face increased workloads and restrictions on traditional learning methods.

There is lack of evidence regarding the application of restraints in critical care units (Pun, 2019). To ensure the safe and appropriate use of PRs in patient care, it is vital to conduct research and implement suitable educational programs and guidelines. Although no published study focuses on the use of PRs in the UAE, the annual reports from two Ministry hospitals, Al Qassimi Women's and Children's Hospital (2021) and Sharjah Kuwait Hospital (2021), which are unpublished internal reports, indicate a total of 691 restraint initiatives among 949 admissions in the critical care units. These initiatives include instances of repeated restraint orders for the same patients. Notably, the number of restraint initiatives in UAE critical care units is relatively high compared to rates of PR use in the ICU in other countries, which range from 23% to 76% (Hamilton et al., 2017; Rose et al., 2016; Suliman, 2018; van der Kooi et al., 2015). Eskandari et al., (2017) suggested that it is vital to investigate nurses' knowledge, attitude, and actual practice regarding PRs to create a strategy that will effectively reduce their use in hospitals. The high incidence of PR application in the ICU emphasizes the urgency to assess nurses' awareness regarding PRs and educate them about the best practices for better patient care.

Notably, limited research has been conducted among the Gulf countries, with a predominant focus on Saudi Arabia, primarily centered on psychiatric settings or general inpatient departments (Babu Thomas et al., 2021; Hasan & Abulattifah, 2019; Khalil et al., 2017). These studies emphatically underscore the critical significance of continuous education for nurses concerning the appropriate use of PRs. Such education is crucial for enhancing patient safety and safeguarding their well-being, particularly in critical care units where the use of PRs are notably high. The absence of studies on the level of knowledge, attitudes, and practices related to PRs among ICU nurses in the UAE emphasizes the need for further research in this field to address this critical gap in research.

According to the Ministry of Health and Prevention UAE Statistical Annual Report for 2019 and 2020, a total of 2,901 nurses were recruited during the pandemic period (UAE Statistical Annual Report, Statistics and Research Center Ministry of Health and Community, 2019; UAE Statistical Annual Report, Statistics and Research Center Ministry of Health and Community, 2020). This data highlights the importance of providing training to nurses on critical topics, such as the appropriate implementation of PRs, to ensure patient safety.

5

Furthermore, all Ministry hospitals in the UAE have adopted an updated standard regarding PR in accordance with the new JCI (Joint Commission Resources, Inc., 2020) standard. This updated JCI standard places significant emphasis on key areas such as risk assessment, utilizing measures with the least restrictions, comprehensive documentation and monitoring, and ensuring staff training and competency. Consequently, nurses are now obliged to receive training in order to correctly apply PRs in adherence to the revised standard. The implementation of this updated standard demonstrates a dedication to improving patient care and aligning with the latest JCI-recommended best practices.

Even though there is a crucial role for PR in ICU settings, there is a gap in the availability of comprehensive and user-friendly instructional resources tailored to the specific needs of ICU nurses in the ministry hospital in the emirates of Sharjah. Despite the availability of library resources, there is a lack of specific, detailed instructional modules regarding PR beyond the existing, very brief guidelines. To address these gaps, it would be beneficial to develop instructional modules that cover essential aspects of PR, including indications, assessment, application techniques, monitoring, documentation, and strategies for minimizing its use through alternative interventions. Simultaneously, it is essential to create a pre- and post-intervention assessment tool that can be used alongside these modules to assess its effectiveness. Consequently, there is a pressing need to develop, validate, and customize an instructional module and assessment tool that can be readily accessed, bridging this gap and equipping ICU nurses with the essential knowledge and skills to apply PR techniques effectively and safely.

The mobile application-based instructional module provides training on PR for both newly recruited ICU nurses and experienced nurses in Ministry Hospitals. It specifically caters to the needs of nurses who are new to the ICU environment, hailing from diverse educational and cultural backgrounds, as they are often recruited from different countries (Paulo et al., 2019). Additionally, the module offers enhancement training for experienced nurses who have aready received basic PR management training, aiming to bridge any gaps in their existing knowledge and skills. By utilizing this mobile application-based instructional module, both new and experienced nurses can improve their understanding and implementation of appropriate PR practices. Ultimately, this comprehensive training ensures the safety and well-being of patients by promoting effective and responsible use of PRs.

6

The limited understanding of the effectiveness of an instructional module on PR in improving the knowledge, attitudes, and practices of ICU nurses, specifically in the UAE, highlights the problem addressed in this study. Although studies conducted in various countries show that PR is a widely practiced approach in ICU settings, there is a lack of studies in the UAE that evaluate the impact of instructional modules on ICU nurses' knowledge, attitudes, and practices in this area. Additionally, in the current pandemic situation where ICU nurses are busier than ever, it is crucial to explore the effectiveness of advanced technology, such as a mobile application-based instructional module, to ensure maximum participation and accessibility for busy ICU nurses.

ICU nurses work in a busy and dynamic healthcare environment, especially during a pandemic. While traditional methods of education, like lectures and workshops, have been used in the past, they may not effectively meet the educational needs of ICU nurses in such an environment. Moreover, the COVID-19 pandemic, with its impact on restricted movements, has highlighted the importance of utilizing innovative educational methods, such as mobile applications. These technologies provide flexible and easily accessible learning opportunities for healthcare professionals, enabling them to adapt to evolving needs and changing circumstances effectively.

Regularly reflecting on one's own knowledge, skills, and attitudes is the individual responsibility of nurses, allowing them to identify gaps in their professional practice (Bindon, 2017). This self-paced learning enables ICU nurses to critically assess their experiences and make improvements in their practice. By engaging in ongoing reflection, nurses can recognize areas where they may lack knowledge, skills, or have biases that could impact patient care. They can then take proactive steps, such as attending educational programs, collaborating with colleagues, and utilizing online resources, to address these gaps and continually enhance their KAPs (Knowledge, Attitude, and Practice). Ultimately, this reflective practice promotes professional growth and ensures competent and compassionate nursing care.

New technologies continue to emerge, promising to change and rejuvenate the higher education system of today. There has been a need for a paradigm shift in nursing education, from a teacher-centered to a learner-centered approach (Sharma, 2017). Nursing education must consequently provide nurses with the required knowledge, skills, and competences to use technology successfully and efficiently (Singh & Masango, 2020). Staff and students were forced to adjust to the fast digitization of both the curriculum and teaching methods as a result of

7

the pandemic. One of the more encouraging aspects of the current tough circumstances is the significant progress that many academic institutions and employees have made in becoming more accustomed and comfortable with digital methods in education (Georgsson, 2020). However, the digitization of CE specifically for staff nurses is not evident. Mobile applications offer several advantages, including ease of access, convenience, and interactive learning experiences. Therefore, exploring the effects of a mobile application-based instructional module on the knowledge, skills, and attitudes of ICU nurses regarding PR is crucial. When considering how the learning may be translated to modify practice and influence patient outcomes, the effectiveness of e-learning interventions for nurses in a CE environment is uncertain. This highlights the need to conduct a study on the digitalization of CE for staff nurses.

The arrival of the pandemic and the subsequent rapid digitalization have served as the researchers' motivation to assess the effectiveness of a mobile application-based instructional module on the subject of PR. This topic holds great importance within Patient Safety Systems, particularly due to the diverse educational and experiential backgrounds of nurses recruited from various countries during the pandemic. The ICU, where PR is predominantly utilized, has been selected as the primary area of focus for this study. Moreover, the researchers' personal experience in educating the busiest ICU nurses further drives the decision to select ICU nurses as the sample for this research. Additionally, the utilization of self-paced learning as an alternative to traditional learning methods during the pandemic further contributes to the researchers' motivation.

The study aims to investigate the effects of the mobile application-based instructional module on ICU nurses in Sharjah, UAE with a focus on the topic PR. It seeks to examine how this innovative educational tool can improve their understanding and application of PR practices. By enhancing the knowledge and skills of ICU nurses, the study aims to promote patient safety, minimize the negative physical and psychological effects associated with PR, and improve the overall quality of care in the ICU setting.

1.3   Significance of the study

The Effects of Mobile Application-Based Instructional Module on PR Among ICU Nurses in Sharjah, UAE" holds significant importance in addressing the need to improve the knowledge and skills of ICU nurses in managing PR. The

study highlights the concerns related to the use of PR in ICUs and emphasizes the potential negative effects on patients' physical and psychological well-being. By exploring the effectiveness of a mobile application-based instructional module, the study aims to enhance the engagement and participation of ICU nurses in online learning, ultimately improving their understanding and application of PR techniques. The study focuses on the appropriate use of PR in intensive care to enhance patient safety and minimize adverse events associated with PR.

The study explores the use of a mobile application-based instructional module as a novel educational intervention for ICU nurses in the UAE. Traditional CE programs may be difficult to schedule and may not effectively engage nurses. In the context of the UAE, which has a diverse workforce of nurses from different educational backgrounds and training experiences, the study recognizes the need to provide accessible and tailored educational resources for both new and experienced nurses.By utilizing mobile technology and interactive learning experiences, the study aims to provide accessible, convenient, and engaging education to ICU nurses, thereby promoting lifelong learning and improving their competency.

The COVID-19 pandemic has necessitated a shift towards e-learning and online education. The study recognizes the challenges posed by the pandemic and seeks to explore the effectiveness of a mobile application-based teaching module in the ICU setting. By leveraging mobile technology, the study offers a solution that can be implemented during times when in-person training may be limited or restricted.

The study acknowledges the limited research conducted in the Gulf region, specifically in the UAE, on the appropriate use of PR in critical care settings. By conducting research in the UAE, specifically in Sharjah, the study aims to contribute to the body of knowledge in the region and provide valuable insights into the educational needs of ICU nurses regarding PR.

Furthermore, the study aligns with the Joint Commission's mission and standards for Patient Safety Systems. By training nurses on the appropriate use of PR, organizations can create effective patient safety systems, reduce adverse events, and promote a fair and just safety culture. The study emphasizes the role of organizational leaders and staff in establishing a comprehensive patient safety

system and highlights the importance of ongoing education in upholding safe and up-to-date practices.

In addition, the study aligns with the National patient safety initiatives and Joint Commission's mission and standards for Patient Safety Systems. By training nurses on the appropriate use of PR, organizations can create effective patient safety systems, reduce adverse events, and promote a fair and just safety culture. The study emphasizes the role of organizational leaders and staff in establishing a comprehensive patient safety system and highlights the importance of ongoing education in upholding safe and up-to-date practices.

The study aligns with the goals of the UAE' healthcare sector, which focuses on comprehensive and integrated healthcare delivery and the application of international standards in managing healthcare infrastructure. By utilizing a mobile application-based instructional module, the study contributes to the development of health information systems and promotes the use of innovative technologies to improve healthcare services and information management within health facilities.

In conclusion, the study's significance lies in its potential to improve patient safety, enhance nursing education, and contribute to the delivery of high-quality care in the ICU. By addressing the need for improved knowledge and skills in managing PR and exploring the effectiveness of mobile application-based instruction, the study contributes to the advancement of nursing practice, patient outcomes, and healthcare systems. Furthermore, the study's findings can have broader implications for the field of ICU nursing, informing educational strategies and interventions globally. By demonstrating the benefits of mobile application-based instruction and its potential to engage learners and promote lifelong learning, the study can influence nursing education practices, professional development, and ultimately, the quality of care provided to critically ill patients.

1.4   Research questions

1. How can the knowledge, attitudes, and practices of ICU nurses regarding PR be assessed, and how can a mobile application-based instructional module be tailored to meet the specific needs of ICU nurses?

2. In ICU nurses, what is the effectiveness of a mobile application-based instructional module on PR in improving their knowledge, attitudes, and practices regarding PR techniques?

1.5   Objectives

1.5.1   General objective:

To assess the effectiveness of a mobile application-based instructional module in improving the knowledge, attitude, and adherence to best practices in PR techniques among ICU nurses in Sharjah, UAE, after developing an assessment tool and instructional module, with the overarching objective of enhancing patient care and safety in the ICU by promoting a comprehensive understanding and appropriate implementation of PR practices.

1.5.2   Specific objectives :

1. To develop and validate tools for assessing ICU nurses' knowledge, attitudes, and practices regarding PR

2. To develop and validate a PR instructional module that will be delivered via a mobile application.

3. To determine the relationship between socio-demographic variables and knowledge, attitude, and practice of ICU nurses regarding PR.

4. To determine the effectiveness of a mobile application-based instructional module on PR among ICU nurses.

1.6   Hypotheses

1. There will be a significant association between socio-demographic variables with knowledge attitude and practice of ICU nurses regarding PR.

© COPYRIGHT UPM

2. The knowledge, attitude & practice score regarding PR among ICU nurses will be significantly higher after mobile application-based instructional module.

1.7   Summary

The study aims to address the need for enhancing the knowledge and skills of ICU nurses in the UAE regarding the appropriate use of PR. With the increasing popularity of online CE and the impact of the COVID-19 pandemic, a mobile application-based teaching module is proposed as an innovative and accessible approach to improve nurse engagement and learning outcomes. The application of PR in ICUs is a common practice to ensure patient safety, but it raises ethical concerns and potential negative effects on patients' physical and psychological well-being. The lack of comprehensive and user-friendly instructional resources tailored to the specific needs of ICU nurses further emphasizes the need for this study.

The study's problem statement highlights the gaps in knowledge and practices related to PR among ICU nurses in the UAE. It emphasizes the importance of developing and validating an instructional module that can be readily accessed and provides detailed guidance and practical training on PR. The recent recruitment of a significant number of nurses during the pandemic period makes it crucial to train them on critical topics like the appropriate use of PRs to ensure patient safety. The study also stresses the significance of reflective practice and continuous learning for ICU nurses to identify and address gaps in their professional practice. Finally, the study proposes exploring the effectiveness of a mobile application-based instructional module to improve ICU nurses' knowledge, attitudes, and practices, ultimately enhancing patient care and outcomes in the ICU.

Overall, the study seeks to use technology and innovative approaches to bridge the educational gaps among ICU nurses and provide them with the necessary knowledge and skills for the appropriate use of PR. By offering a mobile application-based instructional module, the researchers aim to engage nurses in self-directed and autonomous learning, fostering a culture of continuous learning and improvement within the healthcare system. Through this initiative, the study aims to enhance patient safety and contribute to building a future-ready healthcare system that aligns with global standards.

REFERENCES

Ahmadi, M., Bagheri-Saweh, M. I., Nouri, B., Mohamadamini, O., & Valiee, S. (2019). Effect of interventional educational programs on intensive care nurses' perception, knowledge, attitude, and practice about physical restraints: A pre-/postclinical trial. *Critical Care Nursing Quarterly*, *42*(1), 106–116. https://doi.org/10.1097/CNQ.0000000000000244

Almomani, M. H., Khater, W. A., Qasem, B. A. A. L., & Joseph, R. A. (2021). Nurses' knowledge and practices of physical restraints in intensive care units: An observational study. *Nursing Open*, *8*(1), 262–272. https://doi.org/10.1002/NOP2.625

Ayre, C., & Scally, A. J. (2017). Critical Values for Lawshe's Content Validity Ratio. *Measurement and Evaluation in Counseling and Development*, *47*(1), 79–86. https://doi.org/10.1177/0748175613513808

Babu Thomas, R., Mohammad Al Zahrani, A., Samih Ismail Saleh, A., Oudah Al Balawi, A. S., & Ali Khubrani, F. (2021). A Descriptive Study to Evaluate Registered Nurse's Knowledge, Attitude and Practice of Physical Restraints in King Salman Armed Forces Hospital in Tabuk, Kingdom of Saudi Arabia in 2019. *Saudi J Nurs Health Care*, *4*(12), 437–445. https://doi.org/10.36348/sjnhc.2021.v04i12.002

Balci, H., & Arslan, S. (2018). Nurses' Information, Attýtude and Practices towards Use of Physical Restraint in Intensive Care Units. *Journal of Caring Sciences*, *7*(2), 75–81. https://doi.org/https://doi.org/10.15171/jcs.2018.012

Bennett, C. (1975). *Up the Hierarchy*. *Journal of Extension*, 7-12. Retrieved from https://archives.joe.org/joe/1975march/1975-2-a1.pdf

Bindon, S. L. (2017). Professional Development Strategies to Enhance Nurses' Knowledge and Maintain Safe Practice. *AORN Journal*, *106*(2), 99–110. https://doi.org/10.1016/J.AORN.2017.06.002

Carmines, E. G., & Zeller, R. A. (1979.). *Reliability and validity assessment*. Sage publications.

CASP Checklists - Critical Appraisal Skills Programme. (2021). https://casp-uk.net/casp-tools-checklists/

Centers for Medicare & Medicaid Services (CMS). (2020). State Operations Manual Appendix A-Survey Protocol, Regulations and Interpretive Guidelines for Hospitals Transmittals for Appendix A.

Chaghari, M., Saffari, M., Ebadi, A., & Ameryoun, A. (2017). Empowering Education: A New Model for In-service Training of Nursing Staff. Journal of Advances in Medical Education & Professionalism, 5(1), 26. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5238493/

Chang, Y. Y., Yu, H. H., Loh, E. W., & Chang, L. Y. (2016). The efficacy of an in-service education program designed to enhance the effectiveness of physical restraints. *Journal of Nursing Research*, 24(1), 79–86. https://doi.org/10.1097/JNR.0000000000000092

Dickinson, T., & Clark, L. L. (2020). Rapid tranquillisation: An issue for all nurses in acute care settings. *British Journal of Nursing*, 29(15), 880–883. https://doi.org/10.12968/bjon.2020.29.15.880

Eales, S. (2020). Restrictive practice: Should all nurses be competent in safe holding and restraint? *British Journal of Nursing*, *29*(3), 170–171. https://doi.org/10.12968/BJON.2020.29.3.170

Elliott, B., & Dillon, C. A. (2012). Online learning: An innovative solution to meeting the challenges of staff education. *Journal for Nurses in Staff Development*, *28*(6), 285–287. https://doi.org/10.1097/NND.0B013E31827259DE

Eltaliawi, A. G., El-Shinawi, M., Comer, A., Hamazah, S., & Hirshon, J. M. (2017). Restraint use among selected hospitalized elderly patients in Cairo, Egypt. *BMC Research Notes*, *10*(1), 1–6. https://doi.org/10.1186/S13104-017-2978-X/TABLES/3

Ertuğrul, B., & Özden, D. (2021). Nurses' knowledge and attitudes regarding physical restraint in Turkish intensive care units. *Nursing in Critical Care*, *26*(4), 253–261. https://doi.org/https://doi.org/10.1111/nicc.12541

Eskandari, F., Abdullah, K. L., Zainal, N. Z., & Wong, L. P. (2017). Use of physical restraint: Nurses' knowledge, attitude, intention and practice and influencing factors. *Journal of Clinical Nursing*, *26*(23–24), 4479–4488. https://doi.org/10.1111/JOCN.13778

Eskandari, F., Abdullah, K. L., Zainal, N. Z., & Wong, L. P. (2018). The effect of educational intervention on nurses' knowledge, attitude, intention,

practice and incidence rate of physical restraint use. *Nurse Education in Practice*, *32*, 52–57. https://doi.org/10.1016/J.NEPR.2018.07.007

Georgsson, M. (2020). *Rethinking the Provision of Education During the COVID-19 Pandemic—Online Learning and Nursing Informatics.* https://www.himss.org/resources/rethinking-provision-education-during-covid-19-pandemic-online-learning-and-nursing

Gest, C. D. (2021). A Web-Based Nursing Education for Thermoregulation. *Journal for Nurses in Professional Development*, *37*(4), 249–256. https://doi.org/10.1097/NND.0000000000000755

Govranos, M., & Newton, J. M. (2014). Exploring ward nurses' perceptions of continuing education in clinical settings. *Nurse Education Today, 34*(4), 655–660. https://doi.org/10.1016/NEDT.2013.07.003

Hamilton, D., Griesdale, D., & Mion, L. C. (2017). The prevalence and incidence of restraint use in a Canadian adult intensive care unit: A prospective cohort study. *Canadian Journal of Critical Care Nursing, 28*(3), 25–33. https://www.caccn.ca/files/CJCCN/28-3-2017%20CJCCN.pdf

Harper, M. G., Maloney, P., & Shinners, J. (2017). Looking Back and Looking Forward Through the Lens of the Nursing Professional Development: Scope and Standards of Practice, 3rd Edition. *Journal for Nurses in Professional Development*, *33*(6), 329–332. https://doi.org/10.1097/NND.0000000000000402

Hasan, A. A. H., & Abulattifah, A. (2019). Psychiatric nurses' knowledge, attitudes, and practice towards the use of physical restraints. *Perspectives in Psychiatric Care, 55*(2), 218–224. https://doi.org/10.1111/PPC.12335

Janelli, L. M., Scherer, Y. K., Kanski, G. W., & Neary, M. A. (1991). What Nursing Staff Members Really Know About Physical Restraints. Rehabilitation Nursing, 16(6), 345–348. https://doi.org/10.1002/J.2048-7940.1991.TB01245.X

Janelli, L. M., Stamps, D., & Delles, L. (2006). Physical restraint use: a nursing perspective. *Medsurg nursing : official journal of the Academy of Medical-Surgical Nurses*, *15*(3), 163–167.

JBI Critical Appraisal Tools | JBI. (2021). https://jbi.global/critical-appraisal-tools Joint Commission Resources, Inc. (2020). *2020 Hospital Accreditation Standards:*

A., Diana, S., McCray, A., McFarren, A., & Domb, A. (2016). A non-pharmacologic approach to decrease restraint use. *Intensive and Critical Care Nursing*, *34*, 20–27. https://doi.org/10.1016/J.ICCN.2015.08.004

Kaitelidou, D., Economou, C., Galanis, P., Konstantakopoulou, O., Siskou, O., Domente, S., De Boer, D., Boerma, W. G., & Groenewegen, P. P. (2019). Development and validation of measurement tools for user experience evaluation surveys in the public primary healthcare facilities in Greece: A mixed methods study. *BMC Family Practice*, *20*(1), 1–12. https://doi.org/10.1186/S12875-019-0935-6/FIGURES/2

Kang, J., & Seomun, G. A. (2017). Evaluating Web-Based Nursing Education's Effects: A Systematic Review and Meta-Analysis. *Nursing Education Perspectives, 40*(11), 1677–1697. https://doi.org/10.1177/0193945917729160

Kassew, T., Dejen Tilahun, A., & Liyew, B. (2020). Nurses' Knowledge, Attitude, and Influencing Factors regarding Physical Restraint Use in the Intensive Care Unit: A Multicenter Cross-Sectional Study. *Critical Care Research and Practice*, *2020*. https://doi.org/10.1155/2020/4235683

Kaya, H., & Dogu, O. (2018). Intensive Care Unit Nurses' Knowledge, Attitudes And Practices Related To Using Physical Restraints. *International Journal of Caring Sciences*, 61–70. https://www.internationaljournalofcaringsciences.org/docs/8_dogu_original_11_1.pdf

Khalil, A. I., Al Ghamdi, M. A. M., & Al Malki, S. (2017). Nurses' knowledge, attitudes, and practices toward physical restraint and seclusion in an inpatients' psychiatric ward. *Issues in Mental Health Nursing, 38*(10), 821–826. https://doi.org/10.1080/01612840.2017.1338504

Kong, E. H., Kim, M., & Kim, S. (2021). Effects of a Web-Based Educational Program Regarding Physical Restraint Reduction in Long-Term Care Settings on Nursing Students: A Cluster Randomized Controlled Trial. *International Journal of Environmental Research and Public Health, 18*(13), 6698. https://doi.org/10.3390/IJERPH18136698

Sharma, R. K. (2017). Emerging Innovative Teaching Strategies in Nursing. *JOJ Nurse Health Care*, *1*. https://juniperpublishers.com/jojnhc/pdf/JOJNHC.MS.ID.555558.pdf

Lau, B. D., Shaffer, D. L., Hobson, D. B., Yenokyan, G., Wang, J., Sugar, E. A., Canner, J. K., Bongiovanni, D., Kraus, P. S., Popoola, V. O., Shihab, H. M., Farrow, N. E., Aboagye, J. K., Pronovost, P. J., Streiff, M. B., & Haut, E. R.

(2017). Effectiveness of two distinct web-based education tools for bedside nurses on medication administration practice for venous thromboembolism prevention: A randomized clinical trial. *PLoS ONE*, *12*(8). https://doi.org/10.1371/journal.pone.0181664

Liaw, S. Y., Wong, L. F., Lim, E. Y. P., Ang, S. B. L., Mujumdar, S., Ho, J. T. Y., Mordiffi, S. Z., & Ang, E. N. K. (2016). Effectiveness of a Web-Based Simulation in Improving Nurses' Workplace Practice With Deteriorating Ward Patients: A Pre- and Postintervention Study. *J Med Internet Res 2016;18(2):E37 Https://Www.Jmir.Org/2016/2/E37*, *18*(2), e5294. https://doi.org/10.2196/JMIR.5294

Luk, E., Burry, L., Rezaie, S., Mehta, S., & Rose, L. (2015). Critical care nurses' decisions regarding physical restraints in two Canadian ICUs: A prospective observational study. *The Canadian Journal of Critical Care Nursing*, 26(4), 16–22.

Mahipalsinh, R. (2021). Mobile Applications in the eLearning Industry. eLearning Industry. https://elearningindustry.com/role-of-mobile-applications-in-the-elearning-industry

Muir-Cochrane, E., Oster, C., & Grimmer, K. (2020). International research into 22 years of use of chemical restraint: An evidence overview. *Journal of Evaluation in Clinical Practice*, 26(3), 927–956. https://doi.org/10.1111/jep.13232

Nasrate, H., Shamlawi, A., & Darawad, M. W. (2017). Improving ICU Nurses' Practices of Physical Restraints in Jordan: Effect of an Educational Program. Health, 9(12), 1632–1643. https://doi.org/10.4236/HEALTH.2017.912120

Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). McGraw-Hill.

Oneill, K., Robb, M., Kennedy, R., Bhattacharya, A., Dominici, N. R., & Murphy, A. (2018). Mobile Technology, Just-in-Time Learning and Gamification: Innovative Strategies for a CAUTI Education Program. *Online Journal of Nursing Informatics*, *22*(2), 1–7. https://www.himss.org/resources/mobile-technology-just-time-learning-and-gamification-innovative-strategies-cauti

Patient Safety Systems (PS) Chapter | *The Joint Commission*. (2021). https://www.jointcommission.org/standards/patient-safety-systems-ps-chapter/

Paulo, M. S., Loney, T., & Lapão, L. V. (2019). How do we strengthen the health workforce in a rapidly developing high-income country? A case study of Abu Dhabi's health system in the United Arab Emirates. *Human Resources for Health*, *17*(1), 1–8. https://doi.org/10.1186/S12960-019-0345-9/FIGURES/2

PRISMA. (2020), from http://prisma-statement.org/prismastatement/flowdiagram.aspx?AspxAutoDetectCookieSupport=1

Pun, B. T. (2019). Guideline Update: Bundle up for Pain, Agitation and Delirium. In AACN Critical Care Webinar Series. Retrieved from https://www.aacn.org/education/webinar-series/wb0055/guideline-update-bundle-up-for-pain-agitation-and-delirium

Rose, L., Burry, L., Mallick, R., Luk, E., Cook, D., Fergusson, D., Dodek, P., Burns, K., Granton, J., Ferguson, N., Devlin, J. W., Steinberg, M., Keenan, S., Reynolds, S., Tanios, M., Fowler, R. A., Jacka, M., Olafson, K., Skrobik, Y., & Mehta, S. (2016). Prevalence, risk factors, and outcomes associated with physical restraint use in mechanically ventilated adults. *Journal of Critical Care, 31*(1), 31–35. https://doi.org/10.1016/J.JCRC.2015.09.011

Salehi, Z., Joolaee, S., Hajibabaee, F., & Ghezeljeh, T. N. (2020). The challenges of using physical restraint in intensive care units in Iran: A qualitative study. *Nursing in Critical Care*, 22(1), 34–40. https://doi.org/10.1177/1751143719892785

Schneider, M., & Good, S. (2018). Meeting the challenges of nursing staff education. *Nursing*, *48*(8), 16–17. https://doi.org/10.1097/01.NURSE.0000541402.97845.2F

Sheen, S. T. H., Chang, W. Y., Chen, H. L., Chao, H. L., & Tseng, C. P. (2008). E-learning education program for registered nurses: The experience of a teaching medical center. *Journal of Nursing Research*, *16*(3), 195–201. https://doi.org/10.1097/01.JNR.0000387306.34741.70

Singh, F., & Masango, T. (2020). Information Technology in Nursing Education: Perspectives of Student Nurses. *The Open Nursing Journal*, 14(1), 18–28. https://doi.org/10.2174/1874434602014010018

Statistics and Probability, from https://stattrek.org/

Stinson, K. J. (2016). Nurses' attitudes, clinical experience, and practice issues with the use of physical restraints in critical care units. *American Journal of Critical Care*, 25(1), 21–26. https://doi.org/10.4037/ajcc2016428

Suen, L. K. P. (1999). Knowledge, attitude and practice of nursing home staff towards physical restraints in Hong Kong nursing homes. *Asian Journal of Nursing Studies*, 5(2). https://ira.lib.polyu.edu.hk/bitstream/10397/2498/1/AJNS11.pdf

Suen, L. K., Lai, C. K., Wong, T. K., Chow, S. K., Kong, S. K., Ho, J. Y., Kong, T. K., Leung, J. S., & Wong, I. Y. (2006). Use of physical restraints in rehabilitation settings: Staff knowledge, attitudes, and predictors. *Journal of Advanced Nursing*, 55(1), 20–28. https://doi.org/10.1111/j.1365-2648.2006.03883.x

Suliman, M. (2018). Prevalence of physical restraint among ventilated intensive care unit patients. *Journal of Clinical Nursing, 27*(19–20), 3490–3496. https://doi.org/10.1111/JOCN.14588

Suliman, M., Aloush, S., & Al-Awamreh, K. (2017). Knowledge, attitude and practice of intensive care unit nurses about physical restraint. *Nursing in Critical Care*, 22(5), 264–269. https://doi.org/10.1111/nicc.12303

Summers, A. (2015). Continuing professional development in Australia: Barriers and support. *Journal of Continuing Education in Nursing, 46*(8), 337–339. https://doi.org/10.3928/00220124-20150721-11

Taha, N. M., & Zeinab, A. H. (2013). Physical Restraints in Critical Care Units: Impact of a Training Program on Nurses' Knowledge and Practice and on Patients' Outcomes. *Journal of Nursing & Care*, 02(02). https://doi.org/10.4172/2167-1168.1000135

UAE Statistical Annual Report, Statistics and Research Center Ministry of Health and Community. (2019). *UAE Statistical Annual Report, 2019*. https://mohap.gov.ae/assets/download/b9462c5a/UAE%20Statistical%20Annual%20Report%202019.pdf

UAE Statistical Annual Report, Statistics and Research Center Ministry of Health and Community. (2020). *UAE Statistical Annual Report, 2020*. https://mohap.gov.ae/assets/download/53ceb061/UAE%20Statistical%20Annual%20Report%202020.pdf

van der Kooi, A. W., Peelen, L. M., Raijmakers, R. J., Vroegop, R. L., Bakker, D. F., Tekatli, H., van den Boogaard, M., & Slooter, A. J. C. (2015). Use of

physical restraints in Dutch intensive care units: A prospective multicenter study. *American Journal of Critical Care, 24*(6), 488–495. https://doi.org/10.4037/ajcc2015348

Wang, L., Zhu, X. P., Zeng, X. T., & Xiong, P. (2019). Nurses' knowledge, attitudes and practices related to physical restraint: a cross-sectional study. *International Nursing Review*, *66*(1), 122–129. https://doi.org/10.1111/INR.12470

Whittemore, R., & Knafl, K. (2005). The integrative review: updated methodology. *Journal of Advanced Nursing*, *52*(5), 546–553. https://doi.org/10.1111/J.1365-2648.2005.03621.X

Wilson, H. S. (1990). *Research in nursing* (2nd ed.). Addison-Wesley.

Wu, X. V., Chan, Y. S., Tan, K. H. S., & Wang, W. (2018). A systematic review of online learning programs for nurse preceptors. *Nurse Education Today*, *60*, 11–22. https://doi.org/10.1016/J.NEDT.2017.09.010

Yoo, J., De Gagne, J. C., Kim, H. J., & Oh, J. (2019). Development and evaluation of a web-based acute pain management education program for Korean registered nurses: A randomized controlled trial. *Nurse Education in Practice*, *38*, 7–13. https://doi.org/10.1016/j.nepr.2019.05.013

Zamanzadeh, V., Ghahramanian, A., Rassouli, M., Abbaszadeh, A., Alavi-Majd, H., & Nikanfar, A.-R. (2015). Design and Implementation Content Validity Study: Development of aninstrument for measuring Patient-Centered Communication. *Journal of Caring Sciences*, *4*(2), 165. https://doi.org/10.15171/JCS.2015.017

Zhang, C., Liu, D., & He, Q. (2021). The characteristics of ICU physical restraint use and related influencing factors in China: a multi-center study. *Annals of Palliative Medicine*, *10*(2), 1198206–1191206. https://doi.org/10.21037/APM-20-563

Ziaei, M., Massoudifar, A., Rajabpour-Sanati, A., Pourbagher-Shahri, A.-M., & Abdolrazaghnejad, A. (2018). Management of Violence and Aggression in Emergency Environment; a Narrative Review of 200 Related Articles. *Advanced Journal of Emergency Medicine*, 3(1), e7. https://doi.org/10.22114/AJEM.v0i0.117