Increasing Self-Efficacy and Reducing Alarm Fatigue in Nurses Working in Critical Care

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Chapter I

Alarm Fatigue

- Alarm fatigue is a problem that is prominent in nursing (Akturan et al., 2021).

- Lack of alarm management methods increase alarm fatigue (Petersen & Costanzo, 2017).

- This is an education-based project that is aimed at reducing alarm fatigue

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Problem Statement

- Alarms are safety interventions used in a critical care setting, including the intensive care unit (ICU) or step-down unit (SDU) (Søndergaard et al., 2022).

- With education on the appropriate use of patient alarms, alarm fatigue may be minimized. Alarm fatigue is a problem that can be seen in all inpatient settings (Winters et al., 2018).

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Background

- Alarm fatigue, or alarm desensitization, can be described as a sensory overload that leads to a slowed response or dismissal of the alarms. (Akturan et al., 2021).

- A multitude of alarms may cause stress on the nurse, leading to a negative effect on nurses' overall health. (Storm & Chen, 2021).

- Reduced interruptions by staff improves the patient ability to rest and heal (Williams et al., 2021).

Significance

- **Nursing Practice**
  - The use of alarms in an acute care setting

- **Nursing Research**
  - Initiating change to a practice or policy

- **Nursing Education**
  - Gaining and applying the knowledge of how alarm fatigue affects critical care nurses

- **Nursing Leadership**
  - Prevention role

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Project Objectives/ Aims

1. To assess the self-efficacy of nurses working in critical care settings through an educational intervention about alarm fatigue.

2. To assess self-efficacy posttest scores after the educational intervention is provided.

3. To disseminate the findings of the project through presentation of a poster or oral presentation at a conference and through publication.

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Research/Clinical Questions/Hypothesis

(P) Population: Registered Nurses that work in the critical care environment.

(I) Intervention: An educational intervention based on national guidelines mitigation techniques for alarm fatigue.

(C) Comparison: None.

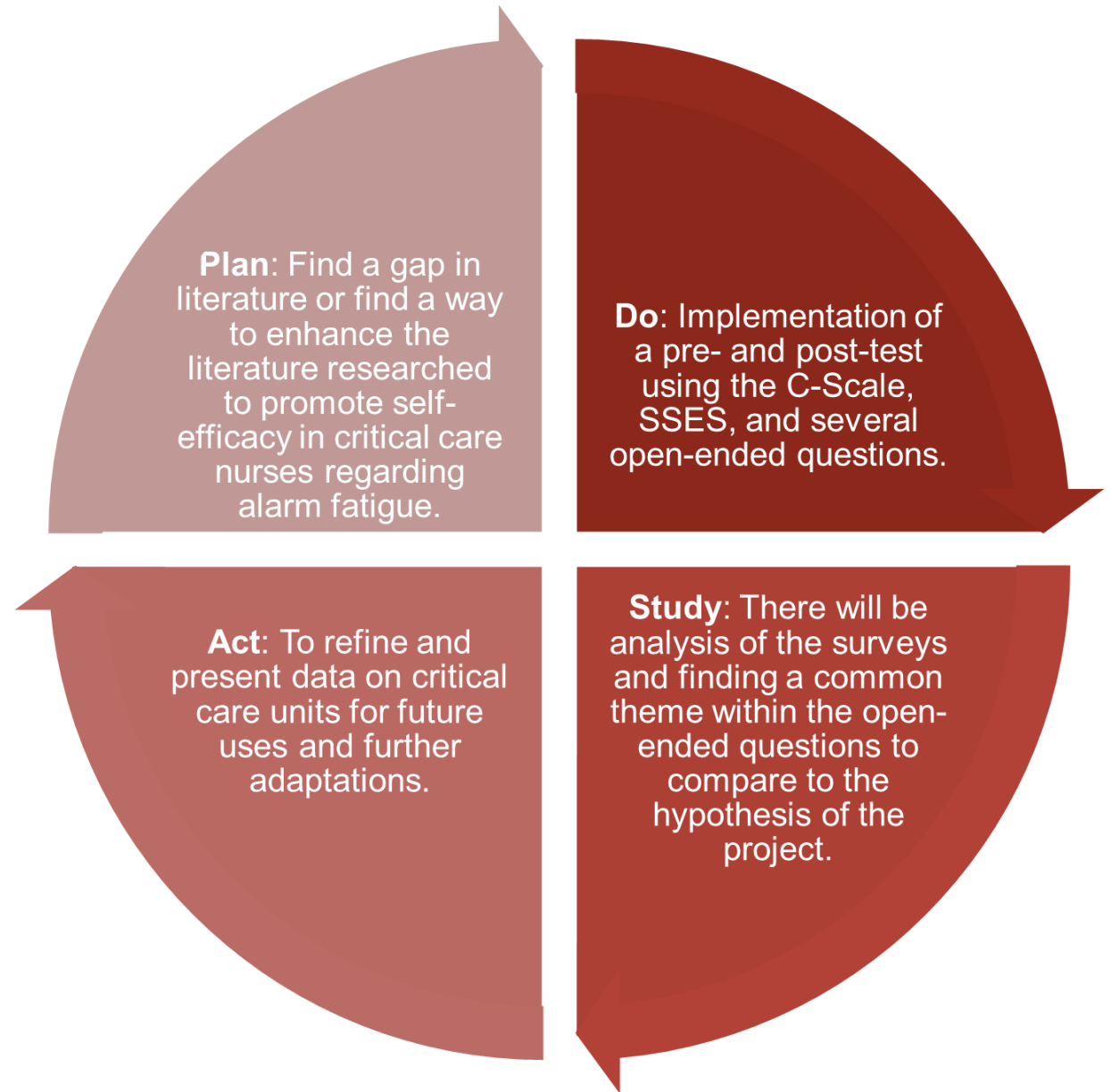**(O) Outcomes:** Increased self-efficacy in Critical Care Step Down RNs regarding alarm fatigue.

(T) Timeline: This project will be implemented in Summer 2023 semester.

Evidence Based Model

Plan-Do-Study-Act

- The EBP model used to guide this project will be the PDSA model.
  - History of the model
  - Questions of the model

Plan: Find a gap in literature or find a way to enhance the literature researched to promote self-efficacy in critical care nurses regarding alarm fatigue.

Do: Implementation of a pre- and post-test using the C-Scale, SSES, and several open-ended questions.

Act: To refine and present data on critical care units for future uses and further adaptations.

Study: There will be analysis of the surveys and finding a common theme within the open-ended questions to compare to the hypothesis of the project.

Theoretical Framework

- Developed by Albert Bandura in 1977

- Four Main Sources of Influence
    Mastery Experiences
        Performance Outcomes
    Vicarious Experiences
        Social Role Models
   Social Persuasion
    Emotional States

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Chapter II

Levels of Evidence

Level of Evidence	Description	Articles
Level I	Experimental study, randomized controlled trial (RCT), systematic review of RCT's, with or without meta-analysis	1
Level II	Quasi-experimental study, systematic review of a combination of RCTs and quasi-experimental, or quasi-experimental studies only, with or without meta-analysis	10
Level III	Non-experimental study, systematic review of a combination of RCTs, quasi-experimental and non-experimental studies only, with or without meta-analysis. Qualitative study or systematic review with or without a meta-synthesis	8
Level IV	Opinion of respected authorities and/or nationally recognized expert committees/consensus panels based on scientific evidence Includes: Clinical practice guidelines Consensus panels	7
Level V	Based on experiential and non-research evidence Includes: Literature reviews, quality improvement, program or financial evaluation, case reports, opinion of nationally recognized experts(s) based on experiential evidence	1

Literature Review
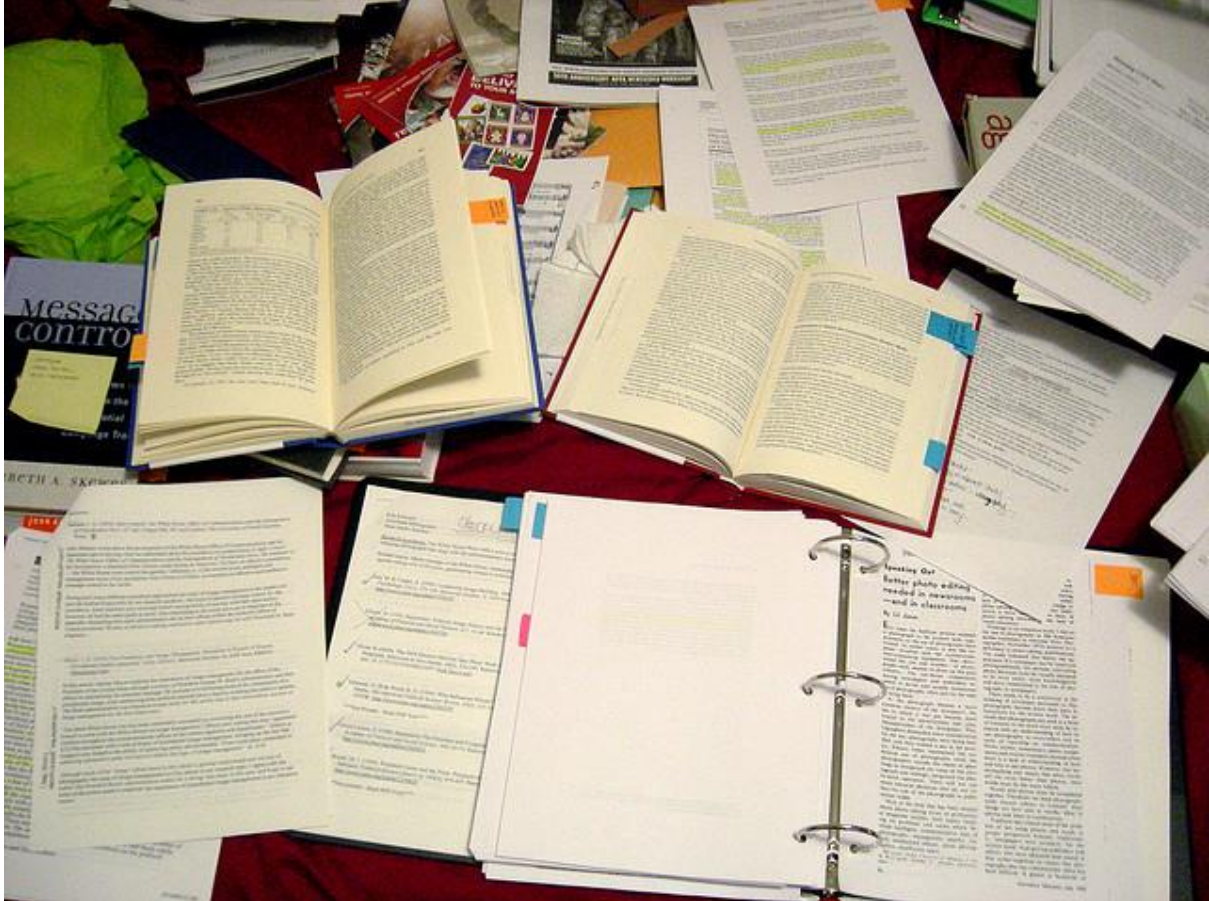
- Nurse-Driven Protocol

- Alarm Management

- Impact of Alarms on Nurses

- Gaps in Literature

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Nursing Implications

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1. Impact on Population Outcomes

2. Legal and Policy Issues

3. Quality and Safety

4. Cost Effectiveness

Chapter III

Design

- Mixed Method Design
  - Confidence Scale (C-Scale)
  - Strengths Self-Efficacy Scale (SSES)
  - 6 open ended question

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Sample

Convenience Sample

Sample Size 60 RNs

Setting

400 bed hospital

38 bed Critical Care Step-Down unit

Phillips IntelleVue MX450 and X3 models

Intervention

- Nurse-Driven Protocol
- Bundle Intervention
- AACN Guidelines
- Pre- and Post test

Intervention

Instrumentation

Confidence Scale (C-Scale)

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Instrumentation

Strengths Self-Efficacy Scale

Strengths Self-Efficacy Scale

Instructions: Listed on the following pages are statements about attitudes, feelings, and behaviors toward strengths self-efficacy. Strengths self-efficacy is defined below for you. Please refer to the definition below as you complete the questionnaire.

Strengths self-efficacy is the level of one's confidence in her/his ability to practice and apply her/his strengths.

Strength is a combination of talent with associated knowledge and skills, and it is defined as the ability to provide consistent, near-perfect performance in a specific task.

Strength = Talent + Knowledge + Skill

Talent is a naturally recurring pattern of thought, feeling or behavior. It is created by combining your natural talents with acquired knowledge and skills.
Knowledge consists of two types. *Factual knowledge* is gained through content and vocabulary training. *Experiential knowledge* is gained with experience and practical lessons.
Skill is defined as the sequence of steps for a specific activity.

Example: 1.2.3 ?

In the box below, please list up to 5 of your strengths. There are no right or wrong answers.

1. _____
2. _____
3. _____
4. _____
5. _____
   _____

Please respond to each of the following items thoughtfully. There are no right or wrong answers. Use the 10-point scale below to rate each of the statements as it applies to you.

0 Not at all	1	2	3	4	5 Moderately Confident	6	7	8	9	10 Extremely Confident

How confident are you in your ability to ….

1. _____ use your strengths at work?
2. _____ use your strengths in your relationships?
3. _____ focus on developing your top strengths?
4. _____ apply your strengths in several situations?
5. _____ focus on your strengths every day?
6. _____ identify ways to build on existing strengths?
7. _____ determine your ways to apply your strengths?
8. _____ find ways to regularly use your strengths?
9. _____ use your strengths without any struggles?
10. _____ develop your strengths through practice?

0 Not at all	1	2	3	4	5 Moderately Confident	6	7	8	9	10 Extremely Confident

How confident are you in your ability to ….

11. _____ use your strengths to enhance your relationships?
12. _____ track the growth of your strengths overtime?
13. _____ find ways to apply your strengths in the things you do every day?
14. _____ accomplish a lot by using your strengths?
15. _____ identify different areas where your strengths can help you?
16. _____ allow your strengths to play a major role in your life?
17. _____ put your strengths into action in your daily life?
18. _____ apply your strengths at work/school?
19. _____ focus on developing your most important strengths?
20. _____ use your strengths in many situations?
21. _____ put your strengths to use in your daily life?
22. _____ use your strengths to overcome any obstacle?
23. _____ use your strengths to succeed?
24. _____ determine how to build on your current strengths?
25. _____ identify strengths that you use to improve your relations with others?
26. _____ use your strengths in your leisure activities?
27. _____ to utilize several strategies for enhancing your strengths?
28. _____ use your strengths every day?
29. _____ identify a strength that you need to use to accomplish a task?
30. _____ find ways to use your strengths at work/school every day?
31. _____ use your strengths at any time?
32. _____ use your strengths to help you achieve your goals in life?
33. _____ improve your life through focusing on your strengths?
34. _____ practice your strengths in areas where you excel?

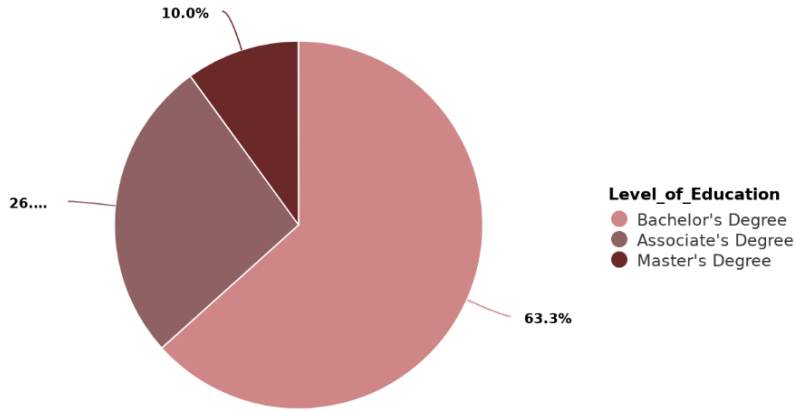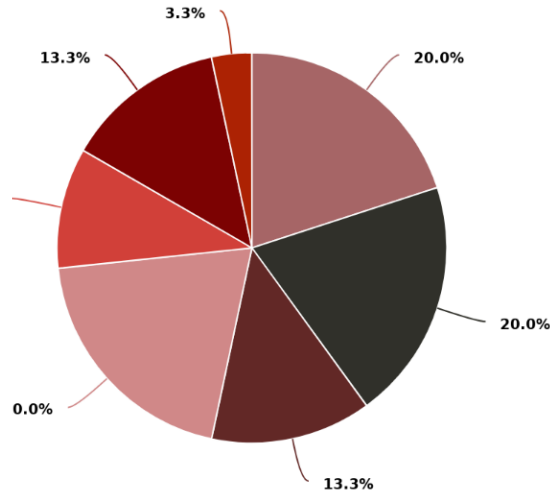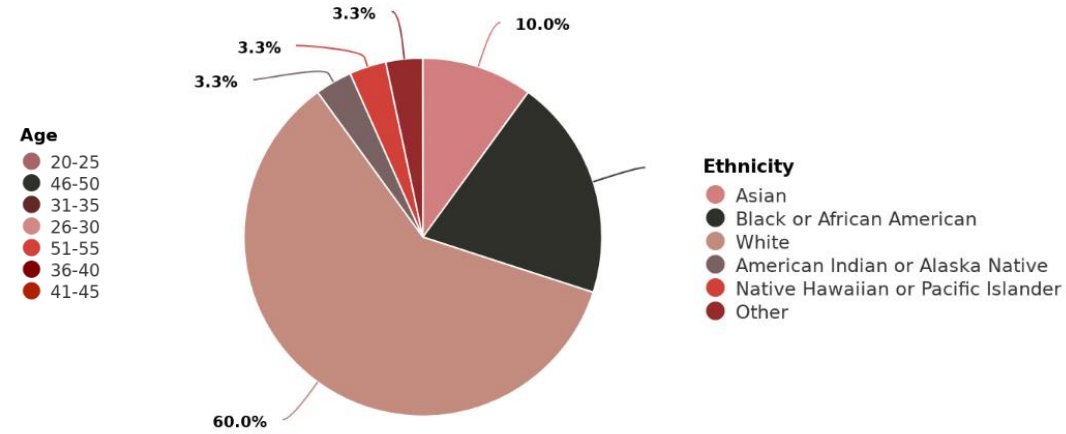Regis College

Chapter IV
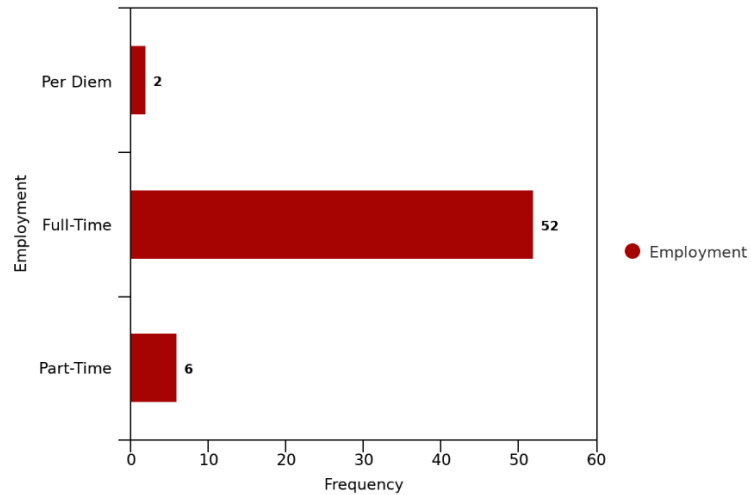
Demographics
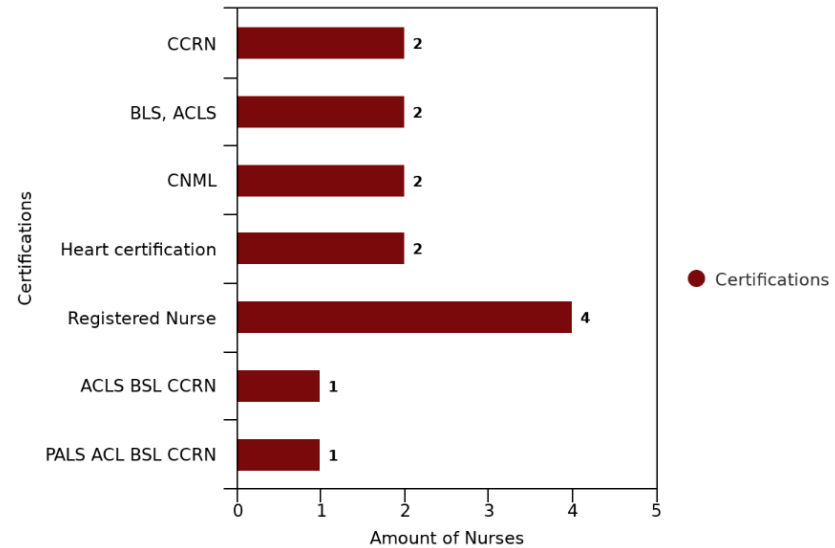
Results – Questionnaire

Variable	n	%
Q1		
Probably yes	7	22.58
Definitely yes	14	45.16
Might or might not	3	9.68
Probably not	1	3.23
Missing	6	19.35
Q4		
Probably yes	12	38.71
Definitely yes	12	38.71
Might or might not	1	3.23
Missing	6	19.35
Note. Due to rounding errors, percentages may not equal 100%.		

1. Do you have alarm fatigue?

2. What are your strategies to prevent it?

3. Can you define alarm fatigue?

4. Have you experienced it?

5. Is there anything that causes it specifically?

6. Do you think the strategies set by the American Association of Critical-Care Nurses are helpful?

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Results – Confidence Scale
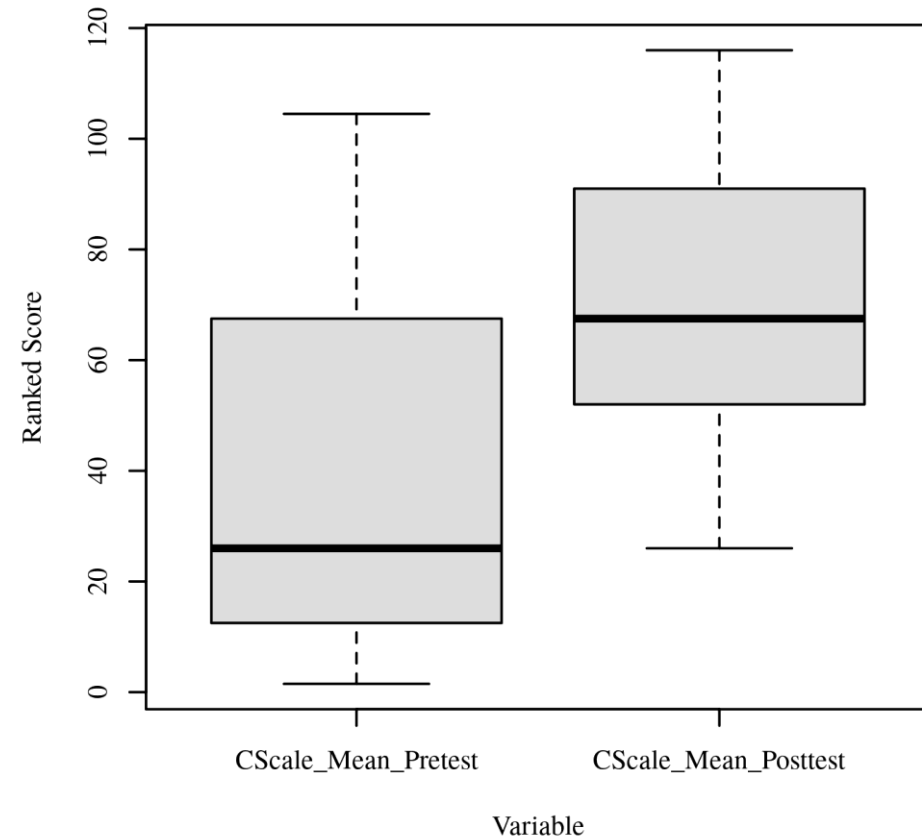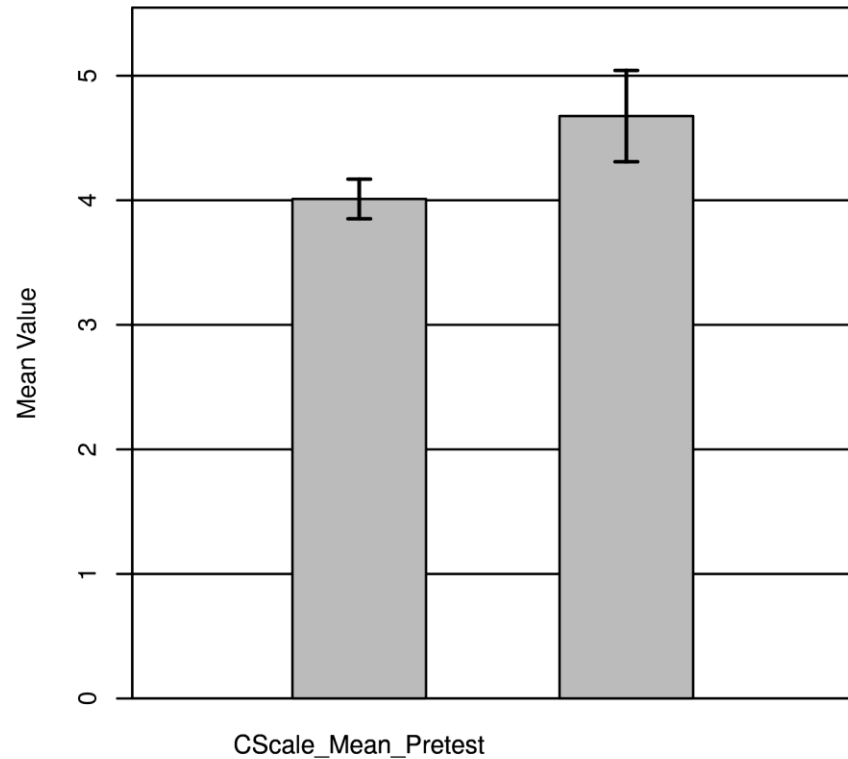
CScale_Mean_Pretest		CScale_Mean_Posttest				
M	SD	M	SD	t	p	d
4.01	0.62	4.68	1.42	-3.62	< .001	0.48
Note. N = 58. Degrees of Freedom for the t-statistic = 57. d represents Cohen's d.						

Results – Strengths and Self- Efficacy
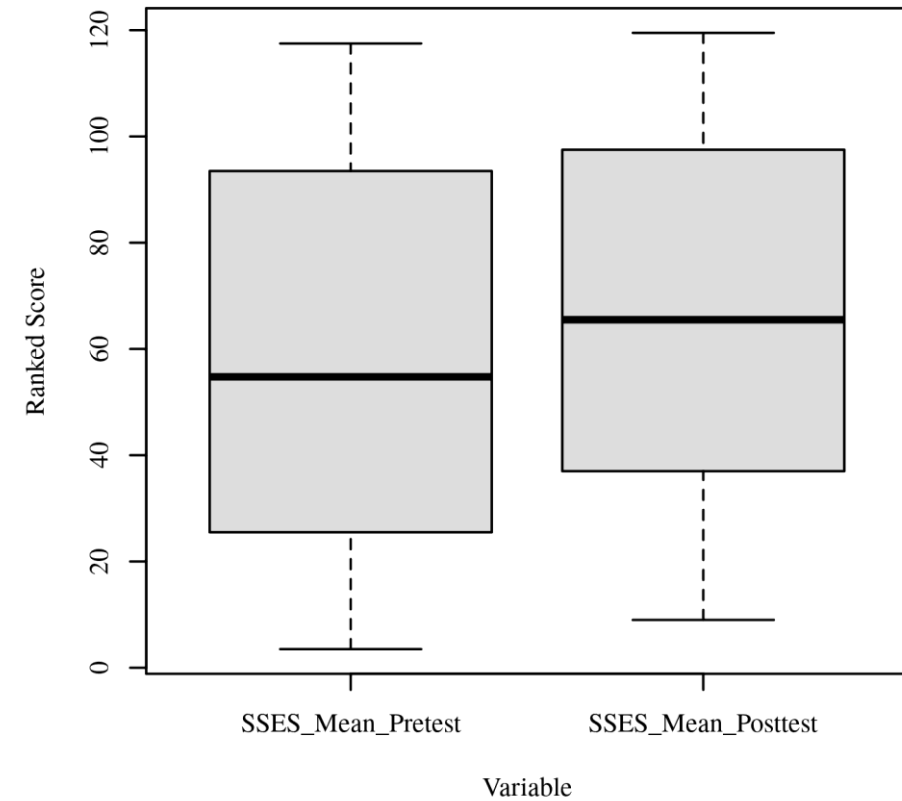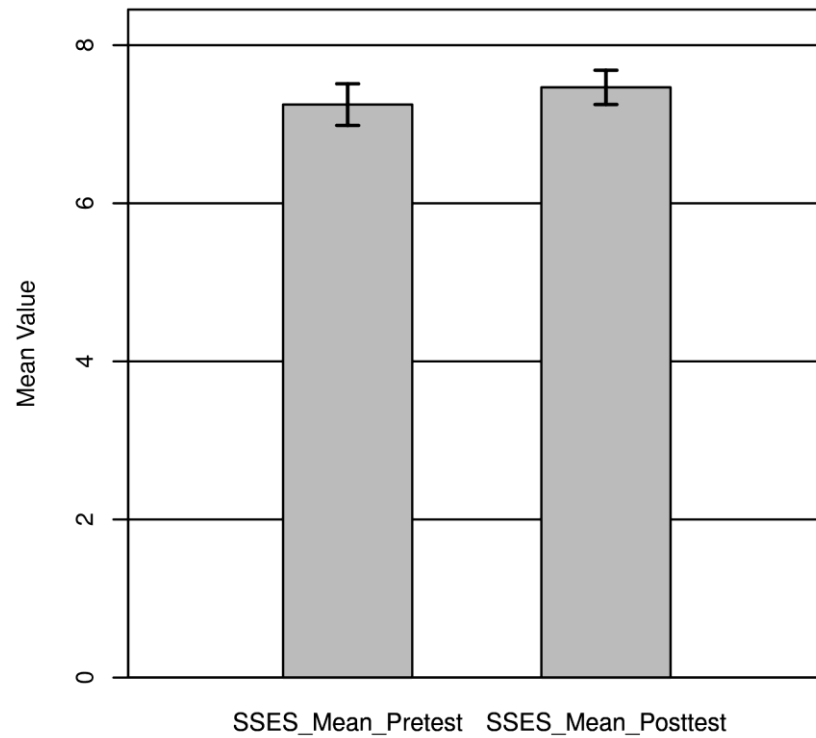
SSES_Mean_Pretest		SSES_Mean_Posttest				
M	SD	M	SD	t	p	d
7.25	1.04	7.47	0.86	-7.58	< .001	0.98
Note. N = 60. Degrees of Freedom for the t-statistic = 59. d represents Cohen's d.						

Chapter V

Conclusion

A substantial consensus was reached among participants, indicating concurrence on the efficacy of the American Association of Critical Care Nurses (AACN) guidelines and a shared acknowledgment of the significant impact of alarm fatigue on critical care nurses.

Implications for Nursing

Nursing Practice

Nursing Research

Nursing Education

Nursing Leadership

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Next Steps

Dissemination of Findings

- Journal of Critical Care
- Nursing Outlook
- American Journal of Nursing

References

Akturan, S., Güner, Y., Tuncel, B., Üçüncüoğlu, M., & Kurt, T. (2021). Evaluation of alarm fatigue of nurses working in the COVID-19 Intensive Care Service: A mixed methods study. Journal of clinical nursing. https://doi.org/10.1111/jocn.16190

American Association of Critical Care Nurses (AACN). (2013). AACN practice alert: alarm management. Crit Care Nurse, 33(5):83-86.

Andersen, T., & Watkins, K. (2018). The Value of Peer Mentorship as an Educational Strategy in Nursing. Journal of Nursing Education, 57(4), 217–224. https://doi.org/10.3928/01484834-20180322-05

Bi, J., Yin, X., Li, H., Gao, R., Zhang, Q., Zhong, T., ... & Li, Z. (2020). Effects of monitor alarm management training on nurses' alarm fatigue: A randomised controlled trial. Journal of Clinical Nursing, 29(21-22), 4203-4216. https://doi.org/10.1111/jocn.15452

Bradley, V. M. (2021). Learning Management System (LMS) use with online instruction. International Journal of Technology in Education (IJTE), 4(1), 68-92. https://doi.org/10.46328/ijte.36

Bridi, A. C., Louro, T. Q., & da Silva, R. C. (2014). Clinical Alarms in intensive care: implications of alarm fatigue for the safety of patients. Revista latino-americana de enfermagem, 22(6), 1034–1040. https://doi.org/10.1590/0104-1169.3488.2513

Casey, S., Avalos, G., & Dowling, M. (2018). Critical care nurses' knowledge of alarm fatigue and practices towards alarms: A multicentre study. Intensive and Critical Care Nursing, 48, 36-41. https://doi.org/10.1016/j.iccn.2018.05.004

Coates, A. (2021). The Prevalence of Philosophical Assumptions Described in Mixed Methods Research in Education. Journal of Mixed Methods Research, 15(2), 171–189. https://doi.org/10.1177/1558689820958210

Connelly, L. M. (2021). Using the PDSA Model Correctly. MEDSURG Nursing, 30(1), 61–64.

Davies, R. (2012). 'Notes on nursing: What it is and what it is not'. (1860): By Florence Nightingale. Nurse Education Today, 32(6), 624–626. https://doi.org/10.1016/j.nedt.2012.04.025

Funk, M., Clark, J. T., Bauld, T. J., Ott, J. C., & Coss, P. (2014). Attitudes and practices related to clinical alarms. American journal of critical care: an official publication, American Association of Critical-Care Nurses, 23(3), e9–e18. https://doi.org/10.4037/ajcc2014315

Gonzalo, A. (2021). Florence Nightingale: Environmental theory. Nurseslabs. Mar, 5. https://nurseslabs.com/florence-nightingales-environmental-theory/

Halpern, N. A. (2014). Innovative Designs for the Smart ICU: Part 2: The ICU. CHEST, 145(3), 646–658. https://doi.org/10.1378/chest.13-0004

Hravnak, M., Pellathy, T., Chen, L., Dubrawski, A., Wertz, A., Clermont, G., & Pinsky, M. R. (2018). A call to alarms: current state and future directions in the battle against alarm fatigue. Journal of electrocardiology, 51(6), S44-S48.

https://doi.org/10.1016/j.jelectrocard.2018.07.024

Hussain, A., & Karim, K. (2020). Enhancing Patient's Surrounding: Application of Nightingale's Environmental Theory Into Nursing Practice. I-Manager's Journal on Nursing, 10(1), 45-49. http://dx.doi.org/10.26634/jnur.10.1.16688

Johnston, M., & Magnan, M. A. (2019). Using a Fall Prevention Checklist to Reduce Hospital Falls: Results of a Quality Improvement Project. AJN American Journal of Nursing, 119(3), 43–49. https://doi.org/10.1097/01.NAJ.0000554037.76120.6a

Katowa-Mukwato, P., Mwiinga-Kalusopa, V., Chitundu, K., Kanyanta, M., Chanda, D., Mwelwa, M. M., ... & Carrier, J. (2021). Implementing evidence based practice nursing using the PDSA model: Process, lessons and implications. International Journal of Africa Nursing Sciences, 14, 100261. https://doi.org/10.1016/j.ijans.2020.100261

Ko, Y., Issenberg, S. B., & Roh, Y. S. (2022). Effects of peer learning on nursing students' learning outcomes in electrocardiogram education. Nurse Education Today, 108, N.PAG. https://doi.org/10.1016/j.nedt.2021.105182

Lawson, T., Weekes, L., & Hill, M. (2018). Ensuring success and sustainability of a quality improvement project. BJA education, 18(5), 147–152. https://doi.org/10.1016/j.bjae.2018.02.002

Lewandowska, K., Weisbrot, M., Cieloszyk, A., Mędrzycka-Dąbrowska, W., Krupa, S., & Ozga, D. (2020). Impact of alarm fatigue on the work of nurses in an intensive care Environment—A systematic review. *International Journal of Environmental Research and Public Health*, *17*(22), 8409. https://doi.org/10.3390/ijerph17228409

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Lewis, C. L., & Oster, C. A. (2019). Research Outcomes of Implementing CEASE: An Innovative, Nurse-Driven, Evidence-Based, Patient-Customized Monitoring Bundle to Decrease Alarm Fatigue in the Intensive Care Unit/Step-down Unit. Dimensions of Critical Care Nursing, 38(3), 160–173. https://doi.org/10.1097/DCC.0000000000000357

McDonald, E. W., Boulton, J. L., & Davis, J. L. (2018). E-learning and nursing assessment skills and knowledge – An integrative review. Nurse Education Today, 66, 166–174. https://doi.org/10.1016/j.nedt.2018.03.011

Moen, R. D., & Norman, C. L. (2010). Circling back. Quality Progress, 43(11), 22-28.

Nguyen, J., Davis, K., Guglielmello, G., & Stawicki, S. P. (2019). Combating Alarm Fatigue: The Quest for More Accurate and Safer Clinical Monitoring Equipment. In S. P. Stawicki, & M. S. Firstenberg (Eds.), Vignettes in Patient Safety - Volume 4. IntechOpen. https://doi.org/10.5772/intechopen.84783

Petersen, E. M., & Costanzo, C. L. (2017). Assessment of Clinical Alarms Influencing Nurses' Perceptions of Alarm Fatigue. Dimensions of Critical Care Nursing, 36(1), 36–44. https://doi.org/10.1097/DCC.0000000000000220

Picarillo, A. P. (2018). Introduction to quality improvement tools for the clinician. *Journal of Perinatology*, 38(7), 929–935. https://doi.org/10.1038/s41372-018-0100-4

Pramodini, D. V. & Sophia, K. A. (2022). Evaluation Of Importance for Research in Education. *International Journal of Social Science & Interdisciplinary Research (IJSSIR).* ISSN: 2277-3630 Impact factor: 7.429, 11(01), 33-37.

Rahim, S. (2013). Clinical application of Nightingale's environmental theory. *i-manager's Journal on Nursing,* 3(1), 43-46.

Seifert, M., Tola, D. H., Thompson, J., McGugan, L., & Smallheer, B. (2021). Effect of bundle set interventions on physiologic alarms and alarm fatigue in an intensive care unit: A quality improvement project. *Intensive & Critical Care Nursing,* 67, N.PAG. https://doi.org/10.1016/j.iccn.2021.103098

Seow, J. P., Chua, T. L., Aloweni, F., Lim, S. H., & Ang, S. Y. (2022). Effectiveness of an integrated three-mode bed exit alarm system in reducing inpatient falls within an acute care setting. *Japan Journal of Nursing Science,* 19(1), 1–7. https://doi.org/10.1111/jjns.12446

Sher, A. N. A., & Akhtar, A. (2018). Clinical Application of Nightingale's Theory. *Journal of Clinical Research & Bioethics*, 9(4), 1-3. https://doi.org/10.4172/2155-9627.1000329

Søndergaard, S. F., Beedholm, K., Kolbæk, R., & Frederiksen, K. (2022). Patients' and Nurses' Experiences of All Single-Room Hospital Accommodation: A Scoping Review. *Health Environments Research & Design Journal (HERD)* (Sage Publications, Ltd.), 15(1), 292–314. https://doi.org/10.1177/19375867211047548

Storm, J., & Chen, H. (2021). The relationships among alarm fatigue, compassion fatigue, burnout and compassion satisfaction in critical care and step-down nurses. *Journal of Clinical Nursing* (John Wiley & Sons, Inc.), 30(3/4), 443–453. https://doi.org/10.1111/jocn.15555

Turmell, J. W., Coke, L., Catinella, R., Hosford, T., & Majeski, A. (2017). Alarm fatigue: Use of an evidence-based alarm management strategy. *Journal of nursing care quality,* 32(1), 47-54. https://doi.org/10.1097/NCQ.0000000000000223

Williams, E. T., Bubu, O. M., Seixas, A., Sarpong, D. F., & Jean-Louis, G. (2021). Ambient Stimuli Perpetuate Nighttime Sleep Disturbances in Hospital Patients With TBI. *Biological Research for Nursing*, 23(4), 637–645. https://doi.org/10.1177/10998004211016060

Winters, B. D., Cvach, M. M., Bonafide, C. P., Xiao Hu, Konkani, A., O'Connor, M. F., Rothschild, J. M., Selby, N. M., Pelter, M. M., Mclean, B., Kane-Gill, S. L., & Hu, X. (2018). Technological Distractions (Part 2): A Summary of Approaches to Manage Clinical Alarms with Intent to Reduce Alarm Fatigue. *Critical Care Medicine,* 46(1), 130–137. https://doi.org/10.1097/CCM.0000000000002803

Zborowsky, T. (2014). The Legacy of Florence Nightingale's Environmental Theory: Nursing Research Focusing on the Impact of Healthcare Environments. *HERD: Health Environments Research & Design Journal*, 7(4), 19–34. https://doi.org/10.1177/193758671400700404

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