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Implementation of an ICU Surge Capacity Response Protocol

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Abstract

High consequence infectious diseases (HCID) threaten healthcare systems because of their high transmissibility, resulting in massive infections within hours. In the initial stages of an HCID outbreak in developing countries, there are no definite treatment pathways and guidelines to manage patients who become critically ill. The prolonged surge of critically ill patients affects the physical and mental well-being of intensive care unit (ICU) nurses due to many factors. An ICU surge capacity response protocol was implemented in four intensive care units for four months at one government hospital in the Philippines to address this problem. Using a pre-post survey design and convenience sampling, 90 ICU nurses were invited to participate in the project. The Short Form 36 survey was used to measure the participant's physical and mental well-being before and after implementing the protocol. Three open-ended questions were added to the post-intervention survey to gather additional feedback. A paired sample t-test was done to determine any difference between the pre-and post-test scores. The analysis revealed a statistically significant improvement in the mean scores. Using the Pearson correlation test, it was determined that job role was inversely correlated to the pretest scores. The thematic analysis findings revealed themes related to staffing, supplies, system, and mental health support. Limitations of the study included missing question items, and implementation of the project in a single nursing department. The findings in this project supported the need to implement an ICU surge capacity response protocol to manage surge of patients and improve the physical and mental well-being of ICU nurses.

Keywords: DNP Project, Preparedness for Highly Infectious Diseases, Critical Care Capacity

Executive Summary

Problem

The rise of High Consequence Infectious Diseases (HCID) like the SARS-CoV-2 virus is the biggest threat to health security globally. HCIDs are acute infectious diseases that are difficult to recognize and detect rapidly, have a high case fatality rate, have no immediate prophylaxis or treatment, can spread rapidly within hours, and require a health system response for effective, efficient, and safety management. HCIDs can cause a sudden surge of patients in the hospital because of their high transmissibility, which could overwhelm the health system, especially healthcare professionals leading to an increase in physical and mental health issues as the disease continues to ravage the community for a prolonged period. Healthcare systems in low- and middle-income countries do not have an existing surge capacity response plan to address staffing, supplies, space, and systems problems.

Purpose

The purpose of this quality improvement project was to evaluate if implementing a surge capacity response plan in the ICU can improve the physical and mental well-being of ICU nurses.

Goals

The goals of this quality improvement project were to improve the ICU nurses' physical and mental well-being by implementing a surge capacity response plan and allow them an opportunity to contribute to the improvement of the response plan at the end of the project.

Objectives

The objectives of the project were to measure the physical and mental well-being of ICU nurses through the Short Form 36 survey (Rand Corporation, 2022) before and after the project implementation, to identify differences in the physical and mental well-being of the respondents based on the demographic data, and to explore their experiences, proposed revisions, and recommendations to improve the response plan.

Plan

The project utilized a pre-post survey design and open-ended questions post-intervention. Ninety ICU nurses, selected by convenience sampling, were invited using Survey Monkey. After completing the pretest, participants viewed an educational video, followed by implementation of the surge capacity protocol in the ICU setting, and then a posttest with open-ended questions. Using SPSS 28, descriptive and inferential statistics were used to determine a difference in physical and mental well-being. The qualitative responses were analyzed separately.

Outcomes and Results

The analysis revealed a statistically significant difference in ICU nurses' physical and mental well-being ($t = -6.505$, $p = <.001$). The mean score in the pretest was 67.8735 and 76.9591 in the posttest. The mean score improved after the intervention. Additionally, twenty-four out of the 31 questions showed a statistically significant improvement in the scores. Job role and pretest mean score were weakly inversely correlated ($r = -.257$, $\rho = .035$). Thematic analysis revealed staffing, supplies, system, and mental health support themes.

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I proudly dedicate this project to my wife, Nina Angelie L. Soria, and my kids, Brienne Elysse L. Soria and Wynter Caely Soria. Your love, support, and understanding pushed me to greater heights.

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The emergence and re-emergence of high consequence infectious diseases (HCID) is a threat to global security. Emerging infectious diseases are a continuous hazard to humans that needs awareness and preparedness (Nii-Trebi, 2017). New and re-emerging diseases can spread quickly around the globe in as little as 36 hours, which results in outbreaks that devastate health systems, jeopardizes lives, and cripple economies (CDC, 2019). The current COVID-19 pandemic has crippled every country and health system and claimed millions of lives. Creating a more robust and well-prepared health system means a faster and smarter evidence-based response to address hospital surges, reduce patient mortality, improve patient outcomes, and reduce psychological effects on healthcare workers through developing and implementing a surge capacity response protocol. This Doctor of Nursing Practice (DNP) project aimed to describe adult ICU nurses' current situation and needs during a surge of patients during a pandemic. The paper reviews the practice problem, presents a systematic review of the available literature, discusses the background and rationale for implementing the quality improvement project, explains the market risk analysis and project objectives, and describes the methodology and evaluation processes for this quality improvement (QI) project. Lastly, the project findings, limitations, recommendations, and implications for change are discussed.

Problem Recognition and Definition

Statement of Purpose

This DNP quality improvement project aimed to evaluate if implementing a Surge Capacity Response Protocol would affect ICU nurses' mental and physical well-being caring for COVID-19 patients at the project hospital site located in Philippines. During pandemics, intensive care unit preparation includes a scalable response system for surge capacity,

coordination, and communication strategies (Kain & Fowler, 2019). The enactment of crisis standards of care (CSC) enables managers to make concrete decisions relating to supply, resource allocation, and provision to prioritize population-based response, rather than individually focused decisions, and failure to enact CSC may have psychological impacts on healthcare personnel (Hertelendy, Ciottone, Mitchell, Gutberg & Burkle, 2020). The project's primary outcome was to improve nurses' overall physical and mental well-being through the provision of sufficient staff, supplies, space, and system.

Problem Statement

Most local health care systems were overwhelmed in the initial stages of the Coronavirus 2019 (COVID-19) outbreak. According to the International Council of Nurses (ICN) (2021), 1.5 million healthcare workers were infected in 34 countries, 2,262 deaths among nurses in 59 countries, and 80% of ICN-member national nursing associations reported mental health distress among nurses. Physicians and nurses who had no training and were not experts in handling infectious diseases or critically ill patients were recruited or floated to provide care to patients with COVID-19. Health care providers are vital resources for every country. Their health and safety are crucial for continuous and safe patient care, and control of any outbreak. However, health care providers caring for patients with COVID-19 were under tremendous stress related to a substantial risk of infection, stigmatization, understaffing, and uncertainty. They showed an incredible sense of responsibility and concerted efforts in alleviating patients' suffering, including working in a totally new context, physical exhaustion due to heavy workloads and wearing protective gear for long hours, and the fear of becoming infected and infecting each other, their families, and communities. There were limited supplies such as personal protective equipment (gowns, N95 masks, gloves, eye shields, controlled air-purifying respirators),

mechanical ventilators, and other oxygen delivery systems. In a study by Marvaldi, Mallet, Dubertret, and Guessom (2021), health care workers worldwide developed high levels of psychiatric symptoms such as anxiety, depression, acute stress, post-traumatic stress, and sleep disorders. The lack or confusing COVID-19 infection control guidelines on disinfection procedures, procedural checklists for airway management, and lack of crisis standards exacerbated the situation. The Philippines is a disaster-prone country devastated by massive earthquakes, typhoons, flooding, industrial emergencies, and insurgencies.

The project site was the designated facility for any chemical, biological, natural, and other types of large-scale disasters that can trigger a surge of patients. Overwhelming admissions in hospitals resulted in the development of "coronaphobia" and pandemic fatigue among frontline Filipino nurses (Labrague & De los Santos, 2021). The project site hospital was short-staffed due to nurse resignations, and there were no pending applicants that could be hired. Staff shortages resulted in an increase in the nurse-patient ratio from 1:3 to 1:4-5. Twenty-five percent of the ICU nurses were infected with the virus since it started in late 2019 (SPMC, 2021). Additionally, nurses reported prominent stress levels, burnout, and other psychological symptoms. According to the Philippine Department of Health (2021), the study site hospital is located in the top city with the highest number of COVID cases and a slow vaccine rollout.

The practice problem statement for this DNP Project was that the hospital nor any of its clinical units had a structured response system to address the influx of patients beyond its conventional capacity, which affected ICU nurses' physical and mental well-being.

PICO

The capstone project utilizes the "PICO" question format rather than a formal research hypothesis. The PICO acronym stands for: Population or Patient (P), Intervention (I),

Comparative Intervention (C), and Outcome (O) (House & Oman, 2011). The PICO statement for this project was:

Population: Adult ICU nurses (managers and staff) caring for COVID-19 patients at a large tertiary training hospital in the Philippines

Intervention: Implementation of a surge capacity response protocol

Comparative: Pre-post physical and mental health survey

Outcome: Improved physical and mental well-being of adult ICU nurses.

The PICO question for this QI project was: Will the implementation of the Surge Capacity Response Protocol improve adult ICU nurses' mental and physical well-being?

Project Significance, Scope, and Rationale

This quality improvement project was based on the American Association of Colleges of Nursing's (AACN) DNP Practice Essentials, with an emphasis on Essential II Organizational and Systems Leadership for Quality Improvement and Systems Thinking and Essential III Clinical Scholarship and Analytical Methods for Evidence-Based Practice (Zaccagini & White, 2017). The practice essential on QI and systems thinking highlights the ability of the DNP-prepared nurse to revise care models that are responsive to the current and future requirements of patient groups established on scientific evidence in nursing and related sciences, including organizational and political sciences. Implementing evidence-based action plans to address ICU surge capacity in future large-scale threats is essential to maintain quality, safe patient care, and a positive work environment for nurses. The project is significant to ICU nurses, patients, project study site, the surrounding metropolitan area, and its neighboring regions. The results of this project enabled the hospital and nursing administration to evaluate the level of physical and mental well-being of its ICU nurses, institute measures to provide a better work environment for

nurses and serve as a benchmark for the departmental or hospital-wide implementation of surge capacity protocol.

The scope of this project was limited to the adult intensive care units and was implemented in the fall of 2021 in a large government hospital in the Philippines. This project did not aim to create or develop new knowledge in nursing practice, and the results cannot be generalized outside of the implementation site.

Theoretical Foundation

Three theories served as guiding frameworks for the project intervention. The General Adaptation Syndrome by Hans Selye is grounded on the physiologic and psychobiologic responses to stress that result in a three-stage reaction, namely alarm, resistance, and exhaustion. The end goal is coping through adaptation and homeostasis (Masters, 2018). According to Selye (1950), the general adaptation syndrome is a normal body response, and exposure to stress can produce diseases if the defense reaction is inadequate.

ICU nurses caring for COVID-19 patients are exposed to extreme stress levels for a prolonged period. The International Council of Nurses (2021) highlighted in its report a global phenomenon of mass trauma among nurses working in the COVID-19 response. Several studies concluded that the COVID-19 pandemic had affected nurses' psychological and mental health, manifested as stress, burnout, depression, and anxiety (Mo et al., 2020; Nemati et al., 2020; Wu et al., 2020). Filipino nurses experienced psychological distress, lower job satisfaction, decreased health perceptions, and increased turnover intention (Labrague & De los Santos, 2020).

Another significant theory that can be applied to this project is the Adaptation Model by Callista Roy, which viewed nursing's purpose to promote adaptive responses. The theory views the individual as a biopsychosocial being in continuous interaction with the changing

environment whose reaction could be adaptive or ineffective. It comprises four components: person, health, environment, and nursing. The theory assumes that the individual or group as a system is in constant interaction with the environment as the source of stimuli, which can either threaten or promote its existence (Model, 2013). The environment affects the individual's development and behavior. The person can make an effective or ineffective response to the stimuli. The theory views health as an inevitable dimension of an individual's life through the health-illness continuum. Nurses are considered an adaptive system that interacts in caring for patients. Nurses can either adapt effectively or ineffectively based on events and human stimuli in the environment. The input or stimuli for nurses in the workplace could be focal, contextual, or residual (Callis, 2020). A nurse in a COVID unit experiences a focal stimulus because of an unfamiliar working condition, lack of equipment or supplies, and lack of knowledge regarding the care plan for COVID-19 patients.

The study was also anchored on a new concept called the 4S Theory of Surge Capacity. Surge capacity is the ability to respond effectively to events that produce a massive influx of patients that disrupt daily operations by obtaining suitable staff, supplies and equipment, structures, and systems to deliver sufficient care to meet the abrupt needs of an influx of patients after a large-scale incident or disaster (Adams, 2009). Surge capacity events can be chemical, biological, radiological, or natural disasters. The theory focuses on four key factors: the 4 S's, staff, stuff, structure, and systems. Staff refers to healthcare workers while stuff is composed of healthcare supplies and medical equipment. Structures involve facilities, logistics and systems, including protocols, standards, and policies. The COVID-19 pandemic caused unexpected global strain on health care systems wherein hospitals implemented surge capacity strategies to cater to the influx of patients.

Review of Evidence

Literature Selection/Systematic Process

To gain a deeper understanding of the effect of surge capacity to the physical and mental well-being of adult ICU nurses, a systematic review of literature (SROL) was conducted. The internet databases used were EBSCO Host, Academic Search Premier, Google Scholar, and CINAHL. The investigator used the following terms during the review: “surge capacity response”, “COVID-19”, “Philippines”, “crisis standards of care”, “preparedness”, “stress”, “mental health”, “staffing”, “supplies”, “personal protective equipment”, “system”, “clinical practice guidelines”, and “ICU nurses”. Clinical practice guidelines and protocols were also evaluated as part of the SROL. Articles written in 2019, 2020, and 2021 were most applicable to the COVID-19 pandemic, which was the major driving force for this project. The overall number of articles reviewed was 98, and 37 were found to be most pertinent for the QI project PICO question. The author did not limit the year of publication to provide an overview of surge capacity preparation. Articles written or published in English were selected, and low-quality articles were not reviewed and included.

Scope and Quality of Evidence

The investigator identified thirty-seven (37) articles that can be classified according to the seven-tiered levels of evidence by Melnyk & Fineout-Overholt (2015). Refer to Appendix A for a complete list of articles associated with each level of evidence.

- Level I – evidence from a systematic review or meta-analysis of randomized controlled trials; clinical guidelines based on systematic reviews or meta-analyses (RCT) – 14
- Level II – evidence from at least one well designed RCT - 0

- Level III – evidence from well-designed controlled trials without randomization – 0
- Level IV – evidence from well-designed case-control & cohort studies – 0
- Level V – evidence from systematic reviews of descriptive & qualitative studies – 2
- Level VI – evidence from a single descriptive study or qualitative study – 19
- Level VII – evidence from expert opinion, regulatory opinions, or reports from expert committees - 2

Background of Problem and Systematic Review of Literature

In addition to the previous discussion of the practice problem, the literature search provided a further background of the problem statement for this DNP project. Three themes identified in the literature were stress, anxiety, and other somatic symptoms, surge capacity, and crisis standards of care.

Stress, Anxiety, and other Somatic Symptoms

Intensive care unit nurses caring for COVID-19 patients experienced severe anxiety, burnout, sleep disturbances, and other forms of somatic symptom disorders. In the Philippines, nurses experienced dysfunctional anxiety levels while working in the COVID unit because of the lack of training and job status (Labrague & de los Santos, 2020). There is a surge of studies on how the COVID-19 pandemic has caused much stress to the various healthcare systems across the globe. It has compromised the workforce, particularly nurses who are at risk for psychological distress, insomnia, alcohol/drug misuse, post-traumatic stress disorder, depression, and other severe physical disorders that impact the quality of patient care (Junaid, Ali & Nazim, 2020; Mehdi et al., 2020; Ong et al., 2020; Papa et al., 2020; Stuijfzand et al., 2020; Salari et al., 2020). In fact, among healthcare workers, nurses are found to be the most anxious and stressed in caring for and treating patients infected with the COVID-19 virus (Mo et al., 2020). In a study by

Zhang et al. (2020), among frontline nurses caring for COVID-19 patients in Wuhan and Shanghai, participants reported having experienced burnout, high emotional exhaustion, and depersonalization. Studies also highlighted the need to implement psychological support strategies to improve the mental well-being of nurses (Luo, Guo, Yu, Jiang & Wang, 2020; Zhang et al., 2020). In a review and meta-analysis by Marvaldi et al. (2021), healthcare workers globally have experienced high levels of psychiatric symptoms and suggested targeted prevention strategies. According to a systematic research review by Hall, Johnson, Wattt, Tsipa & O'Connor (2016), burnout and poor well-being are related to patient safety issues.

In another Philippine study by Labrague and De Los Santos (2020) and Labrague (2021), the prevalence of coronaphobia among hospital nurses was high and clinical nurses reported moderate levels of pandemic-related fatigue. The studies recommended organizational measures such as training, support, adequate supply of PPE, policy development, and a safe working environment to improve the nurses' emotional and psychological health and well-being. Gupta, Balcom, Gulliver, and Witherspoon (2021), recommended the crucial need for more timely, broad, internationally comparable, and inclusive human resources for health to improve preparedness, response, and recovery guidelines for current and future pandemics. In a descriptive survey by Kleinpell et al. (2020) among 9,120 ICU clinicians, stress is caused due to concerns about personal protective equipment availability, staffing, and family exposure. The complexity of critically ill COVID-19 patients with multiple comorbidities, and inadequate staffing add to the extreme stress levels for nurses (Hofmeyr et al., 2020; Osunde et al., 2020).

Surge Capacity

Surge capacity is a new concept in nursing and is mostly used in the military and public health arena, but it has gained attention in disaster planning, where nurses play a crucial role

(Adams, 2009). The features of surge capacity are staff, stuff, structure, and systems. Surge capacity education in the acute care environment is not well-established or not standardized, which may result in great stress for nurses who are required to take on new roles as patients surge and hospitals have limited surge capacity (Chapman & Arbon, 2008; Rezaei, Maracy, Yarmohammadian & Sheikhbardsiri, 2018), and there is a lack of shared definition and decision making on surge (Singh et al., 2017). The study also emphasized the need for nurses to know that they are supported, have adequate knowledge about the event, and respond to surge events. Nurse staffing and systems are identified as the weak points in the hospital preparedness sequence (McHugh, 2010).

According to Al Mutair, Amr, Ambani, Salman, and Schwebius (2020) and Saurabh and Ranjan (2020), it is essential to develop guidelines to improve intensive care nursing surge capacity with the goal to augment and extend the hospital workforce, allocate resources in an ethical, rational, and organized manner that will benefit most patients. Experts recommended an evidence-based, innovative strategy that includes a review of the nurse-patient ratio, identifying alternatives from external or internal sources to support ICU nurses, utilizing a team-based approach, and creating a training model for non-ICU nurses (Abir, M., Nelson, C. D., Chan, E. W. M., Al Ibrahim, H., Cutter, C., Patel, K., & Bogart, A). An expert panel developed a rapid guideline that will help hospital leaders in surge capacity response planning, triage, family, and staff support given the evolving nature of COVID-19 (Aziz, 2020) and hospital bed expansion, management system, communication, supplies, simulation, training, and protocols (Sprung, 2010; Morton, DeAugustinis, Velasquez, Singh & Kelen, 2015; Yu et al., 2020).

Instituting and communicating infection control policies and measures during and after the pandemic can influence healthcare workers' behavior (Koh, Hegney & Drury, 2011) and

increase nurses' willingness to care for patients with infectious diseases (Wu et al. 2020). In a survey among 11,183 Chinese nurses, proper training and psychological support enhanced their health status and anxiety levels while working in critical care departments during the pandemic (Gan, Shi, Chair, Cao & Wang, 2020).

According to Hick et al. (2014), surge capacity preparation should include capability planning for mass critical care that involve a critical care expert; surge continuum; surge response targets; situational awareness and data sharing; lessening the impact on critical care; caring for special populations; and service de-escalation/cessation.

In the only study on COVID-19 surge capacity in the Philippines, Abad et al. (2021) highlighted the importance of developing a surge capacity response strategy to reduce delay in medical care, the prolonged turnaround time for laboratory confirmation, delay in the reorganization of hospital space and staffing, and level of awareness. COVID-19 ICU patients have an increased mortality rate of not less than 39% based on international studies and require a longer length of stay that needs more staffing, unique interventions, and stable availability of supplies and medicines (Armstrong, Kane & Cook, 2020; Abate, Ali, Mantfardo & Basu, 2020; Bartoszko, Farooqi, Alhazzani & Loen, 2020; Rees et al., 2020).

The tiered staffing strategy created by the Society of Critical Care Medicine (SCCM) effectively addresses expected nursing shortages during a pandemic (Al Mutair, Amr, Ambani, Salman & Schwebius, 2020). ICU nurses are supported by medical-surgical or reassigned nurses wherein the ICU nurse will supervise two (2) non-ICU nurses to handle four (4) ICU patients. In a 52 ICU bed tertiary medical center that utilized the tiered staffing model among adult ICU patients with acute respiratory distress syndrome (ARDS) and suspected or confirmed COVID-19, there were no differences in patient outcomes between traditional and tiered staffing

(Stempek, Liesching, Lei, Gray & Dargin, 2021). Additionally, in a quaternary care hospital in New York, using a tier-based model effectively cared for a more significant number of patients (Wells et al., 2021).

Crisis Standards of Care

The Institute of Medicine in 2009 initially developed the crisis standards of care (CSC) with the aim of making clinically informed decisions on allocating scarce resources during an epidemic that, includes preparing, conserving, substituting, adapting, re-using, and re-allocating resources and failing to plan would result to unwanted consequences such as resource wastage, death, and loss of trust (Hick, Hanfling, Wynia & Pavia, 2020). CSC is anchored on the principles of fairness, a duty to care, a duty to steward resources, transparency, consistency, proportionality, and accountability. Crisis standards of care are defined as a substantial change in usual healthcare operations and the level of care it can deliver by a pervasive or catastrophic disaster (Gostin et al., 2009). Toner et al. (2020) emphasized the need for a formal declaration that a CSC context exists in the facility and that future pandemic planning should be integrated with widely accepted ICU guidance. The World Health Organization has not released an international CSC implementation that will contribute to moral distress among healthcare workers (Hertelendy, Ciottone, Mitchell, Gutberg & Burkle, 2021). Based on the review of related literature, there are no available crisis standards of care in the Philippines.

According to Murray (2012), the use of CSC will ensure that clinical guidelines are standardized, ethical, and efficient during a crisis until operations are back to normal. Additionally, CSC events impose a heavy burden and emotional weight on health workers, so hospital leaders must find ways to address this issue. The American Nurses Association (2017) also recommended that the planning and design of CSC should ensure that nurses operating in

extremely harsh conditions and scarcities should be protected. Fear and stress are the emotions identified in CSC implementation, which might lead to post-traumatic stress disorder among healthcare professionals (Chuang, Cuartas, Powell & Gong, 2020). Disaster preparedness and response will also need regional and national partnerships to address engagement, staffing, and other needs to improve system capacity and recovery efforts (Walsh, Craddock, Gulley, Strauss-Riggs & Schor, 2015).

In a cross-sectional study involving 633 intensive care units in Asia-Pacific countries to evaluate PPE-preparedness, there were conflicting standards or variations related to training, practice, and stocking that need to be addressed (Rajamani et al., 2020). Based on the conservation and re-use principles in CSC, personal protective equipment action plans include reserving eyewear, gowns, and respiratory protection for high-risk procedures; use of powered air-purifying respirators to conserve masks; re-using N95 masks as recommended with current guidance; use of elastomeric half-face respirators or industrial grade N95 respirators; and continuous use of PPE within a cohort patient care area (Hick, Hanfling, Wynia & Pavia, 2020).

The literature supports the need to develop and implement a hospital or unit-specific surge response plan that impacts nurses, patients, and the community. Nurses have the duty to plan, and failure to do so would result in a catastrophe, as what nurses have experienced in the COVID-19 pandemic (Brewer K, 2010). Several studies highlight the need to protect healthcare professionals from stress and poor mental health to be fully functional and maintain the operation of the health system. In a systematic review by Gupta et al. (2021), only a small sample of studies focused on the health and well-being of healthcare professionals during a health system surge. Most of these are from hypothetical scenario-based assessments. Additionally, none of the reviewed studies identified post-pandemic strategies for the health and well-being of employees

who have endured months of high levels of stress. The methods specified in the literature have been applied in several healthcare systems around the world during the COVID-19 pandemic to address the issues on space, staff, supplies, and systems.

Project Plan and Evaluation

Market Analysis

Strengths, Weaknesses, Opportunities, and Threats (SWOT)

SWOT analysis is a universally used and effective method in the strategic management process to analyze internal and external environments, favorable or unfavorable, to achieve the objectives (Merba, 2017). A SWOT analysis was completed for this project, as shown in Table 1.

Strengths. The strength of this project was the support of the Philippine government, the Chief Training Officer, Chief Nursing Officer, Director of Critical Care Nursing Services, and Nurse Managers of study site. An additional strength of this project was the staff nurse's cooperation and willingness to learn.

Weaknesses. The weakness of this project was the delayed turnaround time of documents from the project site because they were overwhelmed with operational issues related to the COVID-19 pandemic. The majority of office workers were working remotely, causing a delay in processing request letters due to the lockdown imposed by the Philippine government because of the increasing number of cases. Additionally, the time difference was also a challenge for the investigator and the unit managers during project meetings. Nurses were tired and overworked with the various surges that took place.

Opportunities. The project was the first surge capacity protocol implemented in the facility that can be used hospital-wide if successful. The most significant opportunity for this project was to improve the readiness of the ICU to respond to future surges and threats, being the

only referral facility in Southern Philippines for emerging infections or large-scale disasters. The project can also serve as a benchmark for other clinical departments in the hospital to implement until it can be integrated into a hospital-wide surge protocol. Additionally, the project was also expected to positively affect the physical and mental well-being of ICU nurses who have been exposed to unprecedented levels of stress for an extended period since 2019. Philippine healthcare officials predicted that a surge would continue because of the slow vaccination rollout and high community transmission of new variants.

Threats. Given the current health crisis in the Philippines, the threat for this project was the delay in the implementation since the facility was overwhelmed by COVID-19 admissions because of high community transmission, lack of vaccines, misinformation, and other factors. The facility increased its allocated COVID beds from 408 to 600 (ABS-CBN, 2021). Patient admissions might also decrease as vaccination rates improve and may not create a surge of patients.

Table 1

SWOT Analysis

Strengths	**Weaknesses**
• Support of the Chief Training Officer, Chief Nursing Officer, Director of Critical Care Nursing Services & Nurse Managers • Cooperation and willingness to learn of ICU Staff Nurses	• Delayed turnaround time of documents at the project site • Time difference between the investigator and the participants
Opportunities	**Threats**
• First surge capacity to be implemented in the facility • It can serve as a benchmark for other clinical departments in the hospital • Positive effect on the physical and mental well-being of the participants • Health experts predict that the surges will continue because of high community transmission	• Delay in the implementation at the project site due to ongoing surge • Alternatively, maybe a decrease in patient admissions that will not result in a surge of patients

Driving and Restraining Forces

Driving forces include motivations, attitudes, behaviors, and other characteristics that promote or support the change while restraining forces go against or maintain the current

situation (Marcus, Coleman & Deutsch, 2011). The driving forces must be stronger than the restraining forces to initiate change.

The main driving force for this project was the potential benefits of implementing a surge capacity response protocol for the intensive care unit, which includes the improvement of the mental and physical well-being of nurses, ensuring adequate staff and supplies, and improving patient outcomes and experience. Pandemics or disasters produce expected surges that require the use of preexisting strategies or action plans to reduce the loss of life and maintain control (Einav et al., 2014). Another driving force for this project was to understand the status of ICU nurses' mental and physical well-being that can impact the quality of care provided to patients.

The restraining forces that could impact the study were the timeliness of the Institutional Review Board of the project site, known as the Cluster Ethics Review Committee (CERC), and the willingness of nurses to undergo an educational session regarding the protocol. The clerical/supporting staff of the CERC were working from home because of the imposed work restrictions, and members of the committee were overwhelmed with administrative and clinical roles related to the pandemic. ICU nurses were already burned out with their workload, which could have caused a delay in completing the education session.

Need, Resources, and Sustainability

The need for this project was due to the lack of an institutional action plan to manage the surge of patients that can impact the organization and its employees. The successful implementation of the surge capacity protocol in the ICU might result in the implementation in another nursing department and eventually develop into a hospital-wide protocol for the project site.

There were resources that must be available to complete this project, including organizational support, a technological platform to develop the educational session, and the survey application used to assess the mental and physical well-being of the nurses. The resources needed for the project included communication platforms such as Zoom and Webex, which were available for free, and Survey Monkey for the pre-and post-surveys. The project also required the buy-in of the nursing staff of the ICU department and their time to participate.

The project's sustainability depended on the organization's financial support in terms of maintaining an exclusive stockpile of supplies for surge capacity. Though restraining forces exist, this project was feasible to implement because of the strong support of the Philippine government, hospital leadership, and the Critical Care Nursing Department Leadership team. The Unit Managers also expressed their interest and support in implementing the project in response to their experiences during the COVID-19 pandemic. The administration of the survey through an online platform required a small investment on the part of the investigator.

Feasibility, Risks, and Unintended Consequences

Feasibility. The implementation of this quality improvement project was feasible since the project site was comparable to the settings found in the literature. Factors that impacted the feasibility of the project were the surge of COVID-19 cases and the fast turnover of ICU nurses. The administration of the survey was feasible since it utilized an electronic format that could be easily sent to the respondents.

Risks. There were no risks or harm to the participants in this QI project.

Unintended Consequences. There were no unintended consequences identified during the implementation of the project.

Stakeholders and Project Team

The stakeholders of this project included the leadership team of the Critical Care Nursing Department, adult ICU nurses, allied health professionals, patients, family members, and the community. The project team comprised the investigator, faculty chair, DNP mentor, and the Critical Care Nursing Department Leadership Team.

Cost-Benefit Analysis

According to Pechacek and Zaccagnini (2019), a cost-benefit analysis effectively demonstrates the benefit of addressing the problem, which can justify the cost. Investment in emergency preparedness is a less priority in healthcare organizations and has received massive budget cuts over the years (Pines, Pilkington, Cabbarus County, and Seabury, 2014). Policies for surge capacity response related to prices of critical care resources can be instituted to avoid price-gouging by vendors. Non-implementation of a surge capacity protocol would increase the incidence of stress, burnout, and turnover, affecting the quality of care and leading to costly errors. The cost of employee turnover in the Philippines is estimated at $5,500 and higher depending on the employment type (Matthews, 2020). The costs for implementing the project included a subscription to Survey Monkey for the pre-and post-tests survey, office supplies/printing/binding, video presentation creation and editing fee, and IBM SPSS for data analysis. Refer to Appendix B for a table depicting the budget and resources for this project. Participants did not receive compensation for attending the educational session per hospital policy. The DNP student and clinical mentor spent approximately 240 hours developing the site-specific protocol.

As discussed in the previous section of this proposal, the identified benefits of the project were to improve the physical and mental well-being of ICU nurses, which could impact turnover,

retention, and quality of patient care. Additionally, it can reduce ICU length of stay and improve mortality and morbidity rates. The successful implementation of the protocol can also be replicated in the hospital's difference major departments, which will eventually become the basis of developing a hospital-wide surge capacity protocol.

Mission, Vision, and Goals

The mission was to successfully develop a surge capacity response protocol for the adult intensive care units. The vision was that health care facilities would have the personnel, equipment, space, and system to maintain the highest level of care to critically ill patients during a surge event. The main goal of this project was to improve the adult ICU nurses' physical and mental well-being following the implementation of a surge capacity response protocol. A secondary objective was to allow the ICU nurses an opportunity to share their perspectives on the implementation of the surge protocol at the end of the QI project.

Outcome Objectives

The primary outcome identified for this project was to measure adult ICU nurses' mental and physical well-being using the standardized Short Form 36 before and after implementing the protocol. This enabled the investigator to assess if there was a change in the mental and physical well-being of the participants. The second objective was to identify the differences in mental and physical well-being based on demographic data. Additionally, the DNP student collected post-intervention data from the nurses using open-ended questions to explore the respondents' experience, proposed changes, and suggestions to improve the protocol. The DNP student followed the projected timeline for this project as depicted in Appendix C.

Logic Model

Setting target goals and benchmarks were performed using the logic model as shown in Appendix D (W.K. Kellogg Foundation, 2004). It is important to identify the necessary resources and collaborate with the DNP mentor in improving the proposed project. The first step of the process was identifying the needed resources for the project. Resources included hospital administration and nursing leadership support, ICU annual procurement plan, budget availability, staffing plan, and survey tools. Constraints for the project were also identified. The next step was to determine the project outcomes. The outcome measures are categorized as output, short- and long-term outcomes, and impact. The last step for the logic model is to identify the project's overall impact on the nurses and the organization.

Population and Sampling Parameters

The participants of the QI project were from the Nursing Service of the project site, with a population of 1,204 staff nurses: 800 are full-time nurses, and 400 are contractual nurses. Out of the total population, 90 were assigned as ICU nurses (managers and staff) caring for COVID-19 patients. The DNP student utilized the convenience sampling method wherein only those full-time and part-time nurses who were assigned to the ICU for at least six months were chosen as respondents of the study. This method was used because of the ready availability of the sampling units (Sim, 2000). Floaters and other multidisciplinary team members were excluded. Floaters and other interdisciplinary team members belong to the medical-surgical nursing department and support services that are not within the scope of the critical care nursing department. One of the disadvantages of this method is the risk of bias (Profetto-McGrath, Loiselle, Beck, Polit, 2011). A power analysis was done using the Power Table for d (Polit, 2010). The sample size estimation of the study is 36 with an alpha of 0.05 and a power that is equal to .80. An invitation to

participate was sent to the nurses through electronic mail. See Appendix E for the information sheet/letter (recruitment letter) shared with the staff nurses/managers.

Setting

The project site was at the four adult intensive care units of the Department of Critical Care Nursing in the largest government-owned teaching, training, and referral hospital with an authorized bed capacity of 1,500, located in the Philippines. The four ICUs have a total bed capacity of 44, which caters to critically ill COVID-19 patients. The ICUs had an additional 16 beds to accommodate the influx of patients. COVID-19 floors were excluded from the study since they handle mild cases and are not under the Department of Critical Care Nursing. As the referral facility, it served as the primary center for admission of emerging and re-emerging infections from SARS-CoV in 2002, H1N1 in 2009, MERS-CoV in 2012, and the latest SARS-CoV-2. During the current pandemic, the hospital admitted 15,979 positive cases, 13,989 recoveries, 1,719 deaths, ICU bed occupancy rate of 100%, and a COVID-19 floor occupancy rate of 100% as of February 20, 2022 (SPMC, 2022). Outpatient and non-emergent surgical procedures were suspended, and major patient care areas were converted to COVID-19 isolation floors.

QI Design Methodology and Measurement

This QI project utilized a pre-post survey design with open-ended questions post-intervention. This type of design allows the investigator to measure the occurrence of an effect before and after an intervention is applied. According to Terry (2017), this type of design is the only practical method of assessing the impact of an intervention. Open-ended questions enable the respondents to provide additional feedback on how to improve the implemented protocol further. They also offer a richer source of information than closed-ended questions (Terry, 2017). The DNP

student evaluated the intervention program's effect, the Intensive Care Unit Surge Capacity Protocol, on the respondents' mental and physical well-being utilizing their pre-and post-survey scores.

Variables (Independent, Dependent, and Extraneous)

The independent variable was the Intensive Care Unit Surge Capacity Protocol, including staffing contingency plan, crisis standards of care, and strategic critical supplies stockpile.

The project's dependent variable was the mental and physical well-being of the respondents as measured by the Short Form 36 Survey.

The extraneous variables were the levels of stress and anxiety of the respondents.

Description of Intervention/Treatment Protocol and Data Collection

Intervention

The ICU surge capacity protocol is a dynamic and customized plan developed by the DNP student in partnership with the Nursing Leadership Team of the Department of Critical Care Nursing at the project site. The DNP student worked remotely and collaboratively with the nursing leadership team in developing and implementing the protocol. The protocol was anchored on the four underpinning components of surge capacity: staff, supplies/stuff, space, and systems. The action plans/interventions were derived from established clinical practice guidelines and protocols deemed applicable and practical to the project site (SCCM, 2020). The staffing component of the protocol covered the tier-based staffing model and the rapid training of non-ICU nurses to augment the staffing needs. The supplies/stuff section addressed preparation/stockpiling, conserving, substituting, adapting, re-using, and re-allocating resources. The protocol also included identifying the alternative physical spaces that can be safely utilized during a surge event and establishing a

surge management system. Each ICU was provided with a printed copy of the protocol for easy reference within the shift.

The participants were required to undergo a 10-minute educational video that described the background of surge capacity and the specific interventions or steps that were implemented in their respective units. Refer to Appendix F to view the outline of topics covered in the video. Nurses viewed the video at their convenient time and did not receive compensation. Nurses had the option to view the educational video during their work hours.

Treatment Protocol and Data Collection

The project was implemented after the DNP student had secured approval, first from the project site and then from the Regis University Institutional Review Board (IRB). Approval from Regis University IRB is attached as Appendix G. A site approval letter for this proposed QI project was obtained from the Director for Critical Care. See Appendix H for the letter of intent. The Director for Critical Care Nursing is responsible for creating and implementing QI projects as part of their job function and has signature authority for these projects. Additionally, the Director was also a member of the Cluster Ethics Review Committee (CERC) and has received various training related to research and IRB functions. The DNP student obtained the list of full-time and part-time registered nurses from the Human Resource Section within one week after the permission to conduct the project was obtained. The Chief Nursing Officer and the Patient Care Director for Critical Nursing provided the DNP student with the nurses' current areas of assignments. The names of the participants were kept in a password-protected computer, and the list was separated from the raw survey data and SPSS analysis, which were de-identified. The nurses were invited to participate through electronic mail (blind copied) with an attached information sheet. The DNP student administered a demographic survey and the pre-survey (Short Form 36) via Survey

Monkey. The participants were given one to two weeks to complete the survey. A video presentation about the ICU surge capacity protocol was sent to the participant's email address. The participants were given one to two weeks to complete the educational sessions. The project lead answered any questions via a scheduled Zoom session if requested by the participant or through email. The DNP student and the project team implemented the protocol one week after the educational session, and a surge had occurred. After the DNP project intervention was completed (at the end of the fall semester of 2021), the DNP student administered a post-intervention open-ended questionnaire and measured the respondent's physical and mental well-being again using the same tool through Survey Monkey. The participants were given four months to participate in the project which ended December 2021. Refer to Appendix I for the flowchart of intervention and collection process.

Protection of Human Subjects

The protection of human rights is important in any project. The DNP student completed the CITI training course completion report as required (Appendix J). As stated previously, the project was approved as non-research or a quality improvement study by the Director for Critical Care Nursing and Regis University Institutional Review Board. There were no identified risks or harm to the participants in the project. Participation or non-participation did not impact the nurses' employment and performance. The surge protocol was instituted as standard practice in the fall of 2021; thus, the ICU staff nurses and managers were required to attend the educational session and use the protocol during surge events. Participation in the pre-post physical and mental health surveys and open-ended questions were voluntary. Accessing and completing the surveys/questionnaires implied consent. Confidentiality and anonymity of the participants were ensured. De-identified data were stored and will be protected in a secured database for three

years. Communications between ICU Department (Site Coordinator) and the DNP student [(Project Primary Investigator (PI)] regarding protocol development and implementation occurred remotely via phone and videoconferencing. The DNP Project PI conducted the project remotely in the United States and was not present at the project site at any time during the implementation of the QI study.

Instrumentation: Description of and Reliability/Validity

Demographic Instrument

The first survey tool was the participants' demographic information developed by the DNP student, which will be correlated with the Short Form 36 responses. The demographic variables include generation, highest educational attainment, job role, years in the current role, and employment status. The tool was presented to the mentor and statistician for approval. The levels of measurement for this tool were nominal and interval. It took approximately 1-2 minutes for the participants to complete.

Short Form Survey (SF-36)

The DNP student used the Short Form Questionnaire (SF-36) developed by Rand Corporation (2022), which is publicly available without cost and does not require written permission to use of the health survey. The company is a nonprofit, nonpartisan research organization that creates solutions to public policy issues to make global communities safer, secure, healthier, and more prosperous through high-quality research and analysis. The tool comprises of a combination of 36 Likert questions and yes/no questions that describe an individual's general health status. It is divided into eight domains of health that include physical functioning, physical role, pain, general health, vitality, social function, emotional role, and mental health. The questions and their categories as summarized in Appendix K. The tool is

reliable and valid for measuring people's health-related quality of life in many countries (Cech & Martin, 2012). The tool has been effectively used to develop mental health research (Ware & Gandeck, 1994). The tool's Cronbach's Alpha is greater than 0.85, and the reliability coefficient is greater than 0.75 in all domains except for social functioning, which can gauge health perceptions in the broad population (Brazier et al., 1992). Managed care companies and Medicare most widely use the tool to monitor and assess care outcomes in adults. Additionally, the tool has high consistent validity (Lins-Kusterer et al., 2019). The levels of measurement include nominal, ordinal, and interval. The participants took approximately 10-15 minutes to answer the survey.

Open-ended Questionnaire

The DNP student included three open-ended questions to explore the respondents' experience, proposed changes, and suggestions to improve the protocol (See Appendix L) for a list of questions). The use of open-ended questions in research inspires and elicits an emotional response from the respondent without restriction, allowing the researcher to extract sensitive behaviors, and giving plentiful data or other prospective research opportunities (The SAGE Encyclopedia of Communication Research Methods, 2017). The project investigator and the faculty chair developed the open-ended questions. The content validity was assessed by the unit managers at the project site. The participants' total time to answer the questionnaire was 8-10 minutes.

Data Analysis and Intended Statistics

The data gathered were analyzed using descriptive and inferential statistics with the assistance of the statistics faculty at Regis University. The DNP student planned to use descriptive statistics to organize and summarize large amounts of data, including graphs, percentages, and

averages (Holcomb, 2016). Mean scores of pre-post Short Form-36 surveys were compared. A paired-samples t-test determined whether a statistical significance exists between the pretest and post-test scores using the SPSS program version 28. A p level of <0.05 was used to determine statistical significance. A paired t-test is used when comparing group means when people in the groups being compared are the same or paired (Polit, 2010). A correlation test can determine if a relationship exists between the demographics and the pretest scores. Other tests were performed as indicated by the SPSS output and recommendations from the statistics faculty.

A thematic analysis can help the DNP student interpret and make sense of the participant's responses to the open-ended questions. The verbatim responses were read and re-read by the investigator and the statistics professor independently. Similarities and differences from the text were compared and categorized. The number of occurrences of a specific text was counted and grouped accordingly. The thematic analysis allows the investigator to examine the participant's perspectives, identify similarities and differences, and possibly produce unforeseen insights (Nowell, Norris, White, and Moules, 2017). The next section of the paper will discuss the findings and results of the project.

Project Findings and Results

The pre- and post-intervention data comprised of quantitative and commentaries/suggestions from the open-ended questions from the respondents. The pre-and post-intervention questions administered via Survey Monkey consisted of 31 out of the original thirty-six questions. Five questions under general health, physical health problems, and emotional health problems were missing. For general health, the missing question was, "Does your health now limit you in walking one block?". Under physical health problems, the following sub-questions were missing: "Were limited in the kind of work or other activities" and

"Had difficulty performing the work or other activities (for example, it took extra effort)." In the emotional problem section, the following questions were missing: "Cut down the amount of time you spent on work or other activities" and "Accomplished less than you would like".

According to Polit (2010), quantitative data is defined as information that is in quantified or numerical form. The responses were encoded using the 1s/blanks scheme. For example, in the question on highest educational attainment, if the answer was "Bachelor's degree," it was coded as "1", and "Master's degree" as "2". The SF-36 (31) survey questions, excluding the demographic questions, were scored based on the RAND 36-Item Health Survey scoring instructions, a two-step process. The pre-coded numeric values were recorded based on the scoring key provided. Every item was scored in a 0 to 100 range, with 0 as the lowest and 100 as the highest possible score. The second step was to average all the items in the scale to create the eight scale scores. Questions that were not answered or left blank are not considered in calculating the scale scores. The data were coded except for the responses to the open-ended questions. The data were then entered into the SPSS (28) software for analysis. A reliability test was not conducted since the SF-36 survey was incomplete, i.e., missing five questions as previously stated.

Ninety nurses underwent educational training on the surge capacity response protocol. Seventy-five out of 90 nurses responded in the pre-test, and 77 out of 90 responded in the post-test. Nine respondents were removed during the analysis since they were not able to complete either the pre-and, posttests; some started the test but did not finish or filled out only a few items. A total of 68 respondents were included in the analysis. The overall response rate on the survey for this project was 76%.

Outcome Objective 1: Measurement of Mental and Physical Well-Bing of Adult ICU Nurses Before and After Implementing the Protocol

A paired sample t-test was performed to identify a difference in ICU nurses' physical and mental well-being before and after implementing the surge capacity response protocol. A p level of <0.05 was used to determine statistically significant results. As shown in Table 2, the analysis revealed that the difference is statistically significant (t= -6.505, p value= <.001). The mean score in the pretest was 67.8735 and 76.9591 in the post-test. The mean score improved after the intervention, indicating an improvement in the nurse's overall physical and mental well-being post-intervention of the protocol. Additionally, twenty-four out of the 31 questions showed a statistically significant improvement in the scores (refer to Appendix M for a summary of paired questions with correlations). A Pearson correlation test was used to designate the magnitude and direction of two variables on an interval scale (Polit, 2010). It is appropriate for determining a linear relationship between two variables.

Table 2

Paired Samples Test

(n = 68)

		Paired Differences							Significance	
					95% Confidence Interval of the Difference					
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	One-Sided p	Two-Sided p
Pair 1	PRESF36AggrScore - POSTSF36AggrScore	-9.08559	11.51801	1.39676	-11.87354	-6.29764	-6.505	67	<.001	<.001

Outcome Objective 2: Differences in Mental and Physical Well-being Based on Demographic Data

The pre-intervention demographic data provided an overall characteristic or description of the respondents. Sixty-seven respondents were born between 1982 and1998, whereas one was born between 1965 and 1981. The majority of the respondents were staff nurses (64), while the rest were nurse managers (3). Fifty-eight respondents worked full-time, while none worked part-time. Sixty respondents finished a bachelor's degree, while seven had a master's degree as their highest educational attainment. Years of work experience varied among the respondents, with the majority having worked at least one to five years (37), followed by those who have worked for six to ten years (29), more than six months (1), and more than fifteen years (1). The summary of the demographic data is shown in Table 3.

Table 3

Summary of Demographic Data

(n = 68)

Demographics	Frequency	Percent
Year Born		
1982-1998	67	98.5%
1965-1981	1	1.5%
[1]**Job Role**		
Nurse Manager	3	4.5%
Staff Nurse	64	95.5%
Employment Status		
Part-time	10	14.7%
Full-time	58	85.3%
[2]**Educational Attainment**		
Bachelor's	60	89.6%
Master's	7	10.4%
Years in Role		
➢ 6 months	1	1.5%
1-5 years	37	54.4%
6-10 years	29	42.6%
11-15 years	1	1.5%

[1]Missing 1 data entry; n - 67

[2]Missing 1 data entry; n = 67

A Pearson correlation test was performed to identify a relationship between the pretest scores and the demographics, as shown in Table 4. Based on the analysis, job role and the pretest scores have weak statistically significant inverse correlations ($r = -.257$, $\rho = .035$). A correlation coefficient of $0.25 < r < 0.5$ is a weak correlation. A negative or inverse relationship happens when high values on one variable are associated with low values on another (Polit, 2020). This means that as one value goes up, the other goes down. Thus, when the job role goes down, the pretest score will go up. As for job role to pretest, numerous reasons could cause this relationship with the pretest score including job role differences, education, training, test content, and job satisfaction. The majority of the respondents are staff nurses who provide direct nursing care. Resiliency among nurses could be another factor for this result. ICU nurses in the facility are constantly exposed to increased levels of stress due work-related factors.

Table 4

Pearson Correlation

(n = 68)

PREJobRole	Pearson Correlation	.027	-.162	1	.300*	.091	-.257*
	Sig. (2-tailed)	.830	.190		.014	.465	.035
	N	67	67	67	67	67	67

Outcome Objective 3: Post-intervention Open-ended Questions to Explore the Respondents' Experience, Proposed Changes, and Suggestions to Improve the Protocol

Thematic Analysis Summary

Three open-ended questions were included in the post-intervention survey to explore additional feedback from the respondents. As listed in Table 5, four emerging themes were

identified after aggregating the responses, including staffing, supplies, system, and mental health support.

Table 5

Examples of Responses from Open-ended Questions according to theme

Staffing	*Supplies*	*System*	*Mental Health Support*
"Limited staff due to quarantine" "Increase manpower complement"	"Limited supply of N95." "Lacking supplies and manpower."	"Miscommunication on receiving direct admission from other hospitals." "Improvement of system and process flow."	"Emotional instability." "Anxiety within the workplace."

Question No. 1: "What have you experienced as the greatest challenge(s) that have affected the workflow on your ICU unit during a surge?" Twenty-five participants answered staffing/manpower as the most significant challenge. One of the participant's responses was, "…the number of COVID cases were rising. I need to go to work and limit my absences due to understaffing" which was categorized into the staffing theme. Another two responses that fell into the staffing and mental health support category were, "Most of the staff are being infected of the virus, but still, we have to work and double our effort and time to augment staffing" and "The greatest challenge that our unit is facing the surge of the pandemic is when some of my coworkers felt tired and burned out. Some of them got sick and transmitted with that certain disease which really affected our unit workflow, such as understaffing, caring for critical level 4 patients with few staff only, and came to such time that we decided to revise the protocols and workflow for us to easily render the care the patients need to have." Seven participants answered

about stress, anxiety, and fear as their greatest challenge. One participant stated about "emotional instability."

Question No. 2: "What changes do you think need to be made to improve your workflow and care that you provide to patients during a surge?". Twenty-four participants believe that staffing issues such as nurse-patient ratio and training can improve the workflow. Two participants' responses were, "There should be enough staff in every unit especially during surge," and "The right nurse to patient ratio in the ICU." Five participants highlighted the need for hospital and nursing management support. One of them stressed the importance of leadership support for implementing change: "Whatever change to be implemented, it will not still be much effective when nurses are not motivated to do so. Nurses on the frontline need a good support from all aspects of their institution such as felt supervision and guidance from their leaders, fair and just distribution of risk allowances, and anything else that could possibly boost our morale might improve the workflow significantly." One participant made a positive comment regarding the protocol that was implemented: "I think at this moment there's no more changes that we need to apply during the surge because I think the flow, and protocols of our units made a good choice and planned well for the good and benefits of our patients."

Question No. 3: "Please feel free to share anything else you would like for us to know." Twenty-two participants declined to add additional comments. Two participants emphasized the importance of staff rotation which falls under the staffing theme. One participant stated that "Doesn't mean that we endure the lack of manpower we are okay, or we are not tired. We cannot provide quality nursing care for our patients most especially in this time of global pandemic." Three participants underscored the importance of improving the system and process flow. One participant stressed the importance of monitoring the nurses' physical and mental well-being:

"During this time of crisis that we are facing nowadays, health is the most priority especially on us health workers, because this is the key weapon in delivering and rendering the care to our patient. That's why it is very important that every institution must came up to an idea that they would monitor especially the health status, mentally, physically, and emotionally of our health workers, let's all think that health is really a wealth."

This project aimed to investigate if the utilization of an ICU surge capacity response protocol would improve the mental and physical well-being of ICU nurses. Based on the significant result from the survey, the use of an ICU surge capacity response protocol may have impacted their physical and mental well-being. However, responses in the post-questionnaire indicate that nurses still had concerns with staffing, mental and physical health issues, and lack of full leadership support.

Limitations, Recommendations, and Implications for Change

Limitations

There were several limitations to this QI project, including the missing five questions from the SF 36 survey questionnaire, and the setting was applied only to the ICU of the hospital. Sixty-eight out of ninety ICU nurses participated since some of the responses were discarded due to incomplete answers that could not be paired in the posttest. Therefore, the results are not suggestive of the overall physical and mental well-being of ICU nurses.

Recommendations

A similar project can be implemented using the complete SF-36 survey questionnaire to measure the respondents' physical and mental well-being. It is highly recommended that the facility would continue implementing the surge capacity protocol based on the improved mean scores in twenty-four out of thirty questions. It is also recommended to consider the feedback,

comments, and suggestions of the respondents gathered from the open-ended questions to improve the protocol. The duration of the study can also be extended to investigate the effect of the implementation further.

Implications for Change

The result of the project implies that the physical and mental well-being of ICU nurses during a surge of whatever origin can be maintained or improved using an evidence-based surge capacity response protocol. If feasible, the facility can continue, modify, or replicate the protocol in other major service areas or even for the whole organization. Based on the feedback, staffing continued to be a significant factor affecting nurses despite the staffing guidance provided by the protocol. It is recommended that the facility examine the current ICU staffing and present the result of this project to the proper regulatory bodies of the Philippine Government, such as the Department of Health and the Civil Service Commission. According to Philippine laws and regulations, they are authorized to increase staffing standards. Creating mental health support or employee support program for ICU nurses and other employees is also crucial based on the participants' feedback to help address anxiety and other psychological symptoms that may arise during a crisis such as a surge.

Conclusion

The quantitative and qualitative evidence reveals that a surge of patients in the ICU can cause physical and mental strain on nurses. This paper provides an overview of ICU nurses' physical and mental well-being in one major government hospital in the Philippines. A surge capacity response protocol was developed and implemented based on theory and evidence-based practices. Data analysis showed an increase in the respondents' physical and mental well-being scores after implementing the ICU surge capacity response protocol. The job role is inversely

correlated to the pretest mental and physical health score. Based on the result of the intervention, it is highly recommended that the surge capacity protocol be implemented continuously and modified according to the respondents' suggestions. Identifying strategies and action plans to address staffing, supplies, systems, and mental health issues are also recommended.

References

Abad, C. L., Lansang, M. A. D., Cordero, C. P., Viray, E. D. E., Tiangco, B. J., Bello, J. A. G., ... & Saniel, M. C. (2021). Early experience with COVID-19 patients in a private tertiary hospital in the Philippines: Implications on surge capacity, healthcare systems response, and clinical care. *Clinical Epidemiology and Global Health*, *10*, doi: 10.1016/j.cegh.2020.100695

Abate, S. M., Ahmed Ali, S., Mantfardo, B., & Basu, B. (2020). Rate of Intensive Care Unit admission and outcomes among patients with coronavirus: A systematic review and Meta-analysis. *PloS one*, *15*(7), e0235653.

Abir, M., Nelson, C. D., Chan, E. W. M., Al Ibrahim, H., Cutter, C., Patel, K., & Bogart, A. (2020). *Critical care surge response strategies for the 2020 COVID-19 outbreak in the United States*. RAND Corporation. https://www.rand.org/pubs/research_reports/RRA164-1.html

ABS-CBN News. (2021). *Southern PH Medical Center to add beds, as COVID-19 cases rise in Davao*. https://news.abs-cbn.com/. https://news.abs-cbn.com/news/06/09/21/southern-ph-medical-center-to-add-beds-as-covid-19-cases-rise-in-davao

Adams, L. M. (2009). Exploring the concept of surge capacity. *The Online Journal of Issues in Nursing*, *14*(2). https://doi.org/10.3912/OJIN.Vol14No02PPT03

Al Mutair, A., Amr, A., Ambani, Z., Salman, K. A., & Schwebius, D. (2020). Nursing Surge Capacity Strategies for Management of Critically Ill Adults with COVID-19. *Nursing Reports*, *10*(1), 23-32.

American Nurses Association. (2017). *Who Will Be There? Ethics, the law, and a nurse's duty to respond in a disaster*.

https://www.nursingworld.org/~4af058/globalassets/docs/ana/ethics/who-will-be-there_disaster-preparedness_2017.pdf

Armstrong, R. A., Kane, A. D., & Cook, T. M. (2020). Outcomes from intensive care in patients with COVID-19: A systematic review and meta-analysis of observational studies. *Anaesthesia*, *75*(10), 1340-1349.

Aziz, S., Arabi, Y. M., Alhazzani, W., Evans, L., Citerio, G., Fischkoff, K., ... & Christian, M. D. (2020). Managing ICU surge during the COVID-19 crisis: rapid guidelines. *Intensive Care Medicine*, *46*, 1303-1325.

Brazier, J. E., Harper, R., Jones, N. M., O'cathain, A., Thomas, K. J., Usherwood, T., & Westlake, L. (1992). Validating the SF-36 health survey questionnaire: New outcome measure for primary care. *British Medical Journal*, *305*(6846), 160-164.

Chapman, K., & Arbon, P. (2008). Are nurses ready? Disaster preparedness in the acute setting. *Australasian Emergency Nursing Journal*, *11*(3), 135-144.

Bartoszko, J. J., Farooqi, M. A. M., Alhazzani, W., & Loeb, M. (2020). Medical masks vs N95 respirators for preventing COVID-19 in healthcare workers: A systematic review and meta-analysis of randomized trials. *Influenza and Other Respiratory Viruses*, *14*(4), 365-373.

Brewer K. *Who will be there? Ethics, the law, and a nurse's duty to respond in a disaster*. Silver Spring, MD: American Nurses Association 2010 Jun. ANA issue brief; http://www.nursingworld.org/MainMenuCategories/WorkplaceSafety/DPR/Disaster-Preparedness.pdf.

Callis, A. M. B. (2020). Application of the Roy Adaptation Theory to a care program for nurses. *Applied Nursing Research*, *56*, 151340. doi: 10.1016/j.apnr.2020.151340

Centers for Disease Control and Prevention. (CDC). (2019). *Protecting Americans from the Threat of Infectious Disease*. https://www.cdc.gov/globalhealth/security/ghsareport/2018/protecting-americans.html

Chuang, E., Cuartas, P. A., Powell, T., & Gong, M. N. (2020). "We're not ready, but I don't think you're ever ready." Clinician perspectives on implementation of crisis standards of care. *AJOB empirical bioethics*, *11*(3), 148-159.

Department of Health. (2021). *COVID-19 Tracker*. https://doh.gov.ph/covid19tracker

Donna J. Cech, Suzanne "Tink" Martin, Chapter 5 - Evaluation of Function, Activity, and Participation, Editor(s): Donna J. Cech, Suzanne "Tink" Martin, Functional Movement Development Across the Life Span (Third Edition), W.B. Saunders, 2012, Pages 88-104, ISBN 9781416049784. https://doi.org/10.1016/B978-1-4160-4978-4.00005-3.

Einav, S., Hick, J. L., Hanfling, D., Erstad, B. L., Toner, E. S., Branson, R. D., ... & Task Force for Mass Critical Care. (2014). Surge capacity logistics: Care of the critically ill and injured during pandemics and disasters: CHEST consensus statement. *Chest*, *146*(4), e17S-e43S.

Gan, X., Shi, Z., Chair, S. Y., Cao, X., & Wang, Q. (2020). Willingness of Chinese nurses to practice in Hubei combating the coronavirus disease 2019 epidemic: A cross-sectional study. *Journal of Advanced Nursing*, *76*(8), 2137-2150.

Gostin, L. O., Hanfling, D., Hanson, S. L., Stroud, C., & Altevogt, B. M. (Eds.). (2009). *Guidance for establishing crisis standards of care for use in disaster situations: A letter report*. Washington DC: National Academies Press (US).

Gupta, N., Balcom, S. A., Gulliver, A., & Witherspoon, R. L. (2021). Health workforce surge capacity during the COVID-19 pandemic and other global respiratory disease outbreaks:

A systematic review of health system requirements and responses. *The International Journal of Health Planning and Management*. doi: 10.1002/hpm.3137

Hall, L. H., Johnson, J., Watt, I., Tsipa, A., & O'Connor, D. B. (2016). Healthcare staff wellbeing, burnout, and patient safety: A systematic review. *PloS one*, *11*(7), e0159015.

Hertelendy, A. J., Ciottone, G. R., Mitchell, C. L., Gutberg, J., & Burkle, F. M. (2020). Crisis standards of care in a pandemic: Navigating the ethical, clinical, psychological and policy-making maelstrom. *International Journal for Quality in Health Care*, *33*(1), mzaa094, https://doi.org/10.1093/intqhc/mzaa094

Hick, J. L., Einav, S., Hanfling, D., Kissoon, N., Dichter, J. R., Devereaux, A. V., ... & Task Force for Mass Critical Care. (2014). Surge capacity principles: Care of the critically ill and injured during pandemics and disasters: CHEST consensus statement. *Chest*, *146*(4), e1S-e16S.

Hick, J. L., Hanfling, D., Wynia, M. K., & Pavia, A. T. (2020). Duty to plan: Health care, crisis standards of care, and novel coronavirus SARS-CoV-2. *NAM Perspectives*. https://nam.edu/duty-to-plan-health-care-crisis-standards-of-care-and-novel-coronavirus-sars-cov-2/

Holcomb, Z. C. (2016). *Fundamentals of descriptive statistics*. United Kingdom: Taylor & Francis.

Hofmeyr, R., Earle, E., Boden, R., Nejthardt, M., Torborg, A., Van der Spuy, K., ... & Van Tonder, C. (2020). Risk factors and interventions associated with mortality or survival in adult COVID-19 patients admitted to critical care: A systematic review and meta-analysis. *Southern African Journal of Anaesthesia and Analgesia*, *26*(3), 116-127.

Houser, J. & Oman, K. S. (2011). *Evidence-based practice: An implementation guide for healthcare organizations*. Sudbury, MA: Jones & Bartlett.

International Council of Nurses. (2021). *International Council of Nurses COVID-19 Update*. https://www.icn.ch/. https://www.icn.ch/sites/default/files/inline-files/ICN%20COVID19%20update%20report%20FINAL.pdf

Junaid, K., Ali, H., & Nazim, R. (2020). Depression among healthcare workers during the COVID-19 pandemic in low and middle-income countries: A systematic review. *Annals of King Edward Medical University*, *26*(Special Issue), 252-258. doi: 10.1097/CCM.0000000000004521

Kain, T., & Fowler, R. (2019). Preparing intensive care for the next pandemic influenza. *Critical Care*, *23*(1), 1-9.

Kleinpell, R., Ferraro, D. M., Maves, R. C., Gill, S. L. K., Branson, R., Greenberg, S., ... & Kaplan, L. J. (2020). Coronavirus disease 2019 pandemic measures: Reports from a national survey of 9,120 ICU clinicians. *Critical Care Medicine*. 10.1097/CCM.0000000000004521

Koh, Y., Hegney, D. G., & Drury, V. (2011). Comprehensive systematic review of healthcare workers' perceptions of risk and use of coping strategies towards emerging respiratory infectious diseases. *International Journal of Evidence-Based Healthcare*, *9*(4), 403-419.

Labrague, L. J., & De los Santos, J. A. A. (2020). COVID-19 anxiety among front-line nurses: Predictive role of organizational support, personal resilience and social support. *Journal of Nursing Management*, *28*(7), 1653-1661.

Labrague, L. J., & de Los Santos, J. A. A. (2020). Fear of Covid-19, psychological distress, work satisfaction and turnover intention among frontline nurses. *Journal of Nursing Management*. doi: 10.1111/jonm.13168. Epub 2020 Oct 11

Labrague, L. J. (2021). Pandemic Fatigue and Clinical Nurses' Mental Health, Sleep Quality and Job Contentment During The COVID-19 Pandemic: The Mediating Role of Resilience. *Journal of Nursing Management*. doi: 10.1111/jonm.13383

Labrague, L. J., & De Los Santos, J. A. A. (2021). Prevalence and predictors of coronaphobia among frontline hospital and public health nurses. *Public Health Nursing*, *38*(3), 382-389.

Lins-Kusterer, L., Valdelamar, J., Aguiar, C. V. N., Menezes, M. S., Martins, E., & Brites, C. (2019). Validity and reliability of the 36-Item Short Form Health Survey questionnaire version 2 among people living with HIV in Brazil. *Brazilian Journal of Infectious Diseases*, *23*, 313-321.

Liu, Y. E., Zhai, Z. C., Han, Y. H., Liu, Y. L., Liu, F. P., & Hu, D. Y. (2020). Experiences of front-line nurses combating coronavirus disease-2019 in China: A qualitative analysis. *Public Health Nursing*, *37*(5), 757-763.

Luo, M., Guo, L., Yu, M., & Wang, H. (2020). The psychological and mental impact of coronavirus disease 2019 (COVID-19) on medical staff and general public–A systematic review and meta-analysis. *Psychiatry research*, 113190.

Marcus, E. C., Coleman, P. T., Deutsch, M. (2011). *The handbook of conflict resolution: Theory and practice*. Germany: Wiley.

Marvaldi, M., Mallet, J., Dubertret, C., Moro, M. R., & Guessoum, S. B. (2021). Anxiety, depression, trauma-related, and sleep disorders among healthcare workers during the

covid-19 pandemic: A systematic review and meta-analysis. *Neuroscience & Biobehavioral Reviews*. doi: 10.1016/j.neubiorev.2021.03.024

Masters, K. (2018). *Role development in professional nursing practice*. Jones & Bartlett Learning.

Matthews, H. (2020). *Employee Turnover in The Philippines: Cost and Causes*. https://www.cambridgeentrepreneuracademy.com/. https://www.cambridgeentrepreneuracademy.com/employee-turnover-in-the-philippines-cost-and-causes/

McHugh, M. D. (2010). Special features: Health policy: Hospital nurse staffing and public health emergency preparedness: Implications for policy. *Public Health Nursing*, *27*(5), 442-449.

Mehdi, M., Waseem, M., Rehm, M. H., Aziz, N., Anjum, S., & Javid, M. A. (2020). Depression and anxiety in health care workers during COVID-19. *Biomedica*, *36*.

Melnyk, B.M., & Fineout-Overholt, E. (2015). *Evidence-based practice in nursing and healthcare*. (3rd ed.). Philadelphia, PA: Wolters Kluwer.

Merba, T. A. T. (2017). Swot analysis: A theoretical review Emet GÜREL•. *The Journal of International Social Research*, *10*(51), 994-1006.

Mo, Y., Deng, L., Zhang, L., Lang, Q., Liao, C., Wang, N., ... & Huang, H. (2020). Work stress among Chinese nurses to support Wuhan in fighting against COVID-19 epidemic. *Journal of Nursing Management*, *28*(5), 1002-1009.

Model, R. A. (2013). Sister Callista Roy. *Nursing Theorists and Their Work-E-Book*, 111335.

Morton, M. J., DeAugustinis, M. L., Velasquez, C. A., Singh, S., & Kelen, G. D. (2015). Developments in surge research priorities: A systematic review of the literature following

the academic emergency medicine consensus conference, 2007–2015. *Academic Emergency Medicine*, *22*(11), 1235-1252.

Murray, J. S. (2012). Crisis standards of care: A framework for responding to catastrophic disasters. *AJN The American Journal of Nursing*, *112*(10), 61-63.

Nemati, M., Ebrahimi, B., & Nemati, F. (2020). Assessment of Iranian nurses' knowledge and anxiety toward COVID-19 during the current outbreak in Iran. *Arch Clin Infect Dis*, *15*(COVID-19), e102848.

Nii-Trebi, N. I. (2017). Emerging and Neglected Infectious Diseases: Insights, Advances, and Challenges. *BioMed Research International*, *2017*, 1–15. https://doi-org.dml.regis.edu/10.1155/2017/5245021

Nowell, L. S., Norris, J. M., White, D. E., & Moules, N. J. (2017). Thematic analysis: Striving to meet the trustworthiness criteria. *International Journal of Qualitative Methods*. https://doi.org/10.1177/1609406917733847

Ong, J. J., Bharatendu, C., Goh, Y., Tang, J. Z., Sooi, K. W., Tan, Y. L., ... & Sharma, V. K. (2020). Headaches associated with personal protective equipment–A cross-sectional study among frontline healthcare workers during COVID-19. *Headache: The Journal of Head and Face Pain*, *60*(5), 864-877.

Osunde, N. R., Olorunfemi, O., Chukwuka, L., Oyewole, O. M., & Olawale, M. O. (2020). Quality of nursing care assessment in the context of coronavirus disease (COVID-19) pandemic in the University of Benin teaching hospital, Benin-City, Nigeria: Patients' perspectives. *Nigerian Journal of Basic and Clinical Sciences*, *17*(2), 84.

Pappa, S., Ntella, V., Giannakas, T., Giannakoulis, V. G., Papoutsi, E., & Katsaounou, P. (2020). Prevalence of depression, anxiety, and insomnia among healthcare workers during the

COVID-19 pandemic: A systematic review and meta-analysis. *Brain, Behavior, and Immunity*. doi: 10.1016/j.bbi.2020.05.026

Pechacek, J. M., Zaccagnini, M. (2019). *The Doctor of Nursing Practice Essentials: A new model for advanced practice nursing. United States*: Jones & Bartlett Learning, LLC.

Pines, J. M., Pilkington, W. F., Cabarrus County, N. C., & Seabury, S. A. (2014). Value-based models for sustaining emergency preparedness capacity and capability in the United States. *Institute of Medicine. January*.

Polit, D. F. (2010). *Statistics and data analysis for nursing research*. United Kingdom: Pearson.

Profetto-McGrath, J., Loiselle, C. G., Beck, C. T., Polit, D. F. (2011). *Canadian essentials of nursing research*. United Kingdom: Lippincott Williams & Wilkins.

Rand Corporation (2022). *36-Item Short Form Survey (SF-36)*. https://www.rand.org/health-care/surveys_tools/mos/36-item-short-form.html

Rajamani, A., Subramaniam, A., Shekar, K., Haji, J., Luo, J., Bihari, S., ... & Audits, R. T. A. (2021). Personal protective equipment preparedness in Asia-Pacific intensive care units during the coronavirus disease 2019 pandemic: A multinational survey. *Australian Critical Care*, *34*(2), 135-141.

Rees, E. M., Nightingale, E. S., Jafari, Y., Waterlow, N. R., Clifford, S., Pearson, C. A., ... & CMMID Working Group. (2020). COVID-19 length of hospital stay: A systematic review and data synthesis. *BMC medicine*, *18*(1), 1-22.

Rezaei, F., Maracy, M. R., Yarmohammadian, M. H., & Sheikhbardsiri, H. (2018). Hospitals preparedness using WHO guidelines: A systematic review and meta-analysis. *Hong Kong Journal of Emergency Medicine*, *25*(4), 211-222.

Roy, C. (2013). *Generating middle range theory: From evidence to practice*. United States: Springer Publishing Company.

Salari, N., Khazaie, H., Hosseinian-Far, A., Ghasemi, H., Mohammadi, M., Shohaimi, S., ... & Hosseinian-Far, M. (2020). The prevalence of sleep disturbances among physicians and nurses facing the COVID-19 patients: a systematic review and meta-analysis. *Globalization and Health*, *16*(1), 1-14.

Saurabh, K., & Ranjan, S. (2020). Preparedness, perceived impact and concerns of health care workers in a teaching hospital during coronavirus disease 2019 (COVID-19). *Journal of Family Medicine and Primary Care*, *9*(8), 4247.

Selye, H. (1950). Stress and the general adaptation syndrome. *British Medical Journal*, *1*(4667), 1383.

Sim, J., Wright, C. (2000). *Research in health care: Concepts, designs and methods*. United Kingdom: Nelson Thornes.

Singh, S. R., Coker, R., Vrijhoef, H. J., Leo, Y. S., Chow, A., Lim, P. L., ... & Hildon, Z. J. L. (2017). Mapping infectious disease hospital surge threats to lessons learnt in Singapore: a systems analysis and development of a framework to inform how to DECIDE on planning and response strategies. *BMC Health Services Research*, *17*(1), 1-14.

Sprung, C. L., Zimmerman, J. L., Christian, M. D., Joynt, G. M., Hick, J. L., Taylor, B., ... & Adini, B. (2010). Recommendations for intensive care unit and hospital preparations for an influenza epidemic or mass disaster: summary report of the European Society of Intensive Care Medicine's Task Force for intensive care unit triage during an influenza epidemic or mass disaster. *Intensive Care Medicine*, *36*(3), 428-443.

Society for Critical Care Medicine. (2020). *United States Resource Availability for COVID-19*. https://www.sccm.org/. https://www.sccm.org/Blog/March-2020/United-States-Resource-Availability-for-COVID-19.

Southern Philippines Medical Center. (SPMC). (2022, February 20). *SPMC COVID-19 Report 20 February 2022*. https://spmc.doh.gov.ph/. https://spmc.doh.gov.ph/2-uncategorised/10326-spmc-covid-19-report-20-february-2022

Stempek, S., Liesching, T., Lei, Y., Gray, A., & Dargin, J. (2021). 115: The effect of a tiered staffing model on outcomes for patients with ARDS during the COVID pandemic. *Critical Care Medicine*, *49*(1), 42.

Stuijfzand, S., Deforges, C., Sandoz, V., Sajin, C. T., Jaques, C., Elmers, J., & Horsch, A. (2020). Psychological impact of an epidemic/pandemic on the mental health of healthcare professionals: a rapid review. *BMC public health*, *20*(1), 1-18

Terry, A. J. (2017). Clinical Research for the Doctor of Nursing Practice. United States: Jones & Bartlett Learning.

The SAGE Encyclopedia of Communication Research Methods. (2017). United States: SAGE Publications.

Toner, E., Mukherjee, V., Hanfling, D., Hick, J., Biddison, L., Adalja, A., Watson, M., & Evans, L. (2020, November 24). *Crisis Standards of Care: Lessons from New York City Hospitals' COVID-19 Experience*. https://www.centerforhealthsecurity.org/. https://www.centerforhealthsecurity.org/our-work/publications/crisis-standards-of-care-lessons-from-new-york-city-hospitals-covid-19-experience

Walsh, L., Craddock, H., Gulley, K., Strauss-Riggs, K., & Schor, K. W. (2015). Building health care system capacity to respond to disasters: Successes and challenges of disaster preparedness health care coalitions. *Prehospital and Disaster Medicine*, *30*(2), 112.

Ware, Jr, J. E., & Gandek, B. (1994). The SF-36 Health Survey: Development and use in mental health research and the IQOLA Project. *International Journal of Mental Health*, *23*(2), 49-73.

Wells, C. M., Zhang, Z., Spano-Szekely, L., Siller, J., Brannon, H., Schulz, K., ... & Kohli-Seth, R. (2021). Tiered model of nurse staffing for critical care and emergency departments in the wake of a pandemic. *JONA: The Journal of Nursing Administration*, *51*(2), E1-E5.

W. K. Kellogg Foundation. (2004). Logic Model Development Guide. https://wkkf.issuelab.org/resource/logic-model-development-guide.html

Wu, Y., Wang, J., Luo, C., Hu, S., Lin, X., Anderson, A. E., ... & Qian, Y. (2020). A comparison of burnout frequency among oncology physicians and nurses working on the frontline and usual wards during the COVID-19 epidemic in Wuhan, China. *Journal of Pain and Symptom Management*, *60*(1), e60-e65.

Wu, B., Zhao, Y., Xu, D., Wang, Y., Niu, N., Zhang, M., ... & Meng, A. (2020). Factors associated with nurses' willingness to participate in care of patients with COVID-19: A survey in China. *Journal of Nursing Management*, *28*(7), 1704-1712.

Yifan, T., Ying, L., Chunhong, G., Jing, S., Rong, W., Zhenyu, L. & Peihung, L. (2020). Symptom cluster of ICU nurses treating COVID-19 pneumonia patients in Wuhan, China. *Journal of Pain and Symptom Management*, *60*(1), e48-e53.

Zaccagnini, M., & Pechacek, J. M. (2019). *The Doctor of Nursing Practice essentials: A new model for advanced practice nursing*. Jones & Bartlett Learning.

Zhang, Y., Wang, C., Pan, W., Zheng, J., Gao, J., Huang, X., ... & Zhu, C. (2020). Stress, burnout, and coping strategies of frontline nurses during the COVID-19 epidemic in Wuhan and Shanghai, China. *Frontiers in Psychiatry*, *11*, 1154.

Appendix A

Scope of Evidence

Levels of Evidence	Number of Articles	Authors and Dates
I. Systematic Review or Meta-analysis	14	Abata et al., (2020); Armstrong, Kane & Cook (2020); Bartoszko et al., (2020); Gupta et al. (2021); Junaid, Ali & Nazim (2020); Koh, Hegney & Drury (2011); Luo et al., (2020); Marvaldi et al., (2021); Morton et al., (2015); Pappa et al., (2020); Rees et al., (2020); Rezael et al., (2018); Salari et al., (2020); Taylor et al., (2020)
II. Randomized controlled trial	0	
III. Controlled trial without randomization	0	
IV. Case-control or Cohort study	0	
V. Systematic Review of Qualitative or Descriptive Studies	2	Jabeen et al., (2020); Singh et al., (2017)
VI. Qualitative or Descriptive Study	19	Chapman (2008), Gan et al., (2020); Kleinpell et al., (2020); Labrague (2021); Labrague & de los Santos (2020a); Labrague & de los Santos (2020b); Labrague & de los Santos (2020c); Liu et al., (2020); Mehdi et al., (2020); Nemati, Ebrahimi & Nemati (2020); Pecorarol, Clemente & Luzi (2020); Ong et al., (2020); Osunde et al., (2020); Rajamani et al., (2020 Saurabh & Ranjan (2020); Walsh et al., (2015); Wu et al., (2020); Yifan et al., (2020)
VII. Opinion or Consensus	2	Einav et al., (2014); Sprung et al., (2010)

Melnyk & Fineout-Overholt (2015)

Appendix B

Budget and Resources

Activity	Projected Cost
Survey Monkey Subscription	$99.00
Office Supplies, Printing, Binding	$100.00
IBM SPSS	$99.00 per month x3 months = $297.00
Video presentation creation and editing fee	$442.92
Protocol development by DNP student and mentor	240 hours
Time spent by participants to answer survey questions	17 minutes
Nurse Managers Monthly Salary	$700.00
Staff Nurses Monthly Salary	$500.00
Total	$938.92 excluding the participants salary 257 minutes

Appendix C

Project Timeline

	May 2020	June – Dec 2020	June 2021	July 2021	August 2021	Sept 2021	Oct 2021	Nov 2021	Dec 2021	Jan 2022	Feb 2022	March 2022	April 2022
PICO Identified													
Literature Review													
Write Proposal													
IRB Approval													
Recruit nurses													
Educate RNs													
Implementation													
Data Collection													
Data Analysis													
Defense													
Dissemination													

Appendix D

Logic Model

RESOURCES	ACTIVITIES	OUTPUTS	SHORT & LONG-TERM OUTCOMES	IMPACT
In order to accomplish our set of activities we will need the following:	*In order to address our problem or asset we will accomplish the following activities:*	*We expect that once accomplished these activities will produce the following evidence of service delivery:*	*We expect that if accomplished these activities will lead to the following changes in 1-3 then 4-6 years:*	*We expect that if accomplished these activities will lead to the following changes in 7-10 years:*
Hospital administration & nursing leadership team support Annual Procurement Plan Budget availability Nursing Manpower Complement Survey tool	Assessment of somatic symptom disorders among ICU nurses Develop ICU surge capacity response protocol based on 4S Theory of Surge Capacity and Crisis Standards of Care	Hospital crisis standards of care Stockpile of supplies for ICU surge capacity Staffing plan for ICU surge capacity	Improved mental and physical well-being of ICU nurses Improved patient outcomes Increased job satisfaction and retention among ICU nurses Reduced delay in health services during surges	Decreased the incidence of poor mental and physical well-being among ICU nurses ICU readiness for surge capacity

W. K. Kellogg Foundation. (2004). Logic Model Development Guide. https://wkkf.issuelab.org/resource/logic-model-development-guide.html

Appendix E

Quality Improvement Information Sheet for ICU Staff Nurses/Managers

Dear Sir/Madame:

Greetings!

I am Patrick Simon S. Soria, and I am currently working at _____ Hospital in _____. I previously worked in your institution for fifteen (15 years) before I migrated to the United States in 2019. I am finishing my Doctor of Nursing Practice (DNP) degree at Regis University in Denver, Colorado. One of the requirements for the degree is the completion of a Quality Improvement Project (QI).

My QI project titled, *Implementation of an ICU Surge Capacity Protocol,* is seeking to evaluate if the implementation of a Surge Capacity Response Protocol would affect the physical and mental well-being of adult ICU nurses. ICU nurses have reported high levels of stress, anxiety, and other psychological symptoms, especially during the COVID-19 pandemic.

The surge protocol will be instituted as standard practice fall 2021, thus ICU staff nurses and managers will be required to watch a pre-recorded training video that introduces the protocol, and use the protocol during surge events. A link to the 6-minute pre-recorded video will be sent to your email. Participants will have the opportunity to ask questions or clarifications by sending an email to the project investigator. Printed copies of the surge protocol will also be available in the ICU unit for quick access during a surge event.

If you choose to participate in this QI DNP Project, you will be asked to:

1. Complete a demographic form and physical and mental well-being survey via SurveyMonkey prior to viewing the pre-recorded training video and using the protocol.
    a. Demographics include age range based on generation category, education, job role, years in current job role and employment status (full or part time) and will take 1 to 2 minutes to answer.
    b. The physical and mental well-being survey consists of 36 questions and will take approximately 10-15 minutes to complete. It is a reliable and viable tool for measuring health-related quality of life of people in many countries.

~~2.~~ After training and implementation of the surge capacity protocol, complete the post-physical and mental well-being survey and answer 3 open-ended questions via SurveyMonkey. The open-ended questions will give you an opportunity to share your experience using the protocol, recommend proposed changes, and offer suggestions to better improve the protocol. Time to complete post-survey and open-ended questions will be approximately 10-15 minutes.

Participation in this project is completely voluntary and will not affect employment status if you participate or not participate. Accessing and completing the surveys and open-ended questions implies consent. There are no risks associated with participation or non-participation. Data collected from demographics, surveys, and open-ended questions will be kept strictly

confidential, without any personal identifiers. The benefits of this project are the improvement of working conditions, patient outcomes, and the readiness of the ICU for future surges.

I am grateful for your time and support as we strive to improve our health system. For questions, concerns, and clarifications, you may contact me at +13208083318 or email at psoria@regis.edu. You may also contact the Regis University Capstone Chair, Dr. Kathleen Whalen, at kwhalen@regis.edu or _____.

Sincerely,

Patrick Simon S. Soria, MSN, RN, CNM, CHA, FPCHA

Appendix F

ICU Surge Capacity Response Protocol

I. Surge Capacity Definition

II. Staffing Plan

Tiered staffing

Training of deployed non-ICU nurses

III. Supplies

Checklist of stockpile of surge supplies

IV. Space

Space Allocation Contingency Plan

V. System

ICU Surge Capacity Nursing Leadership Team

Society of Critical Care Medicine (2020)

Appendix G

Regis University IRB Approval Form

REGIS UNIVERSITY

REGIS.EDU

Institutional Review Board

DATE:	August 23, 2021
TO:	Patrick Simon Soria
FROM:	Regis University Human Subjects IRB
PROJECT TITLE:	[1789308-1] Implementation of an ICU Surge Capacity Response Protocol
SUBMISSION TYPE:	New Project
ACTION:	DETERMINATION OF NOT RESEARCH
DECISION DATE:	August 23, 2021

Thank you for your submission of New Project materials for this project. The Regis University Human Subjects IRB has determined this project does not meet the definition of human subject research under the purview of the IRB according to federal regulations.

The project may proceed as written.

We will retain a copy of this correspondence within our records.

If you have any questions, please contact the Institutional Review Board at irb@regis.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Regis University Human Subjects IRB's records.

Appendix H

Letter of Intent

DNP Project Letter of Intent

To: _____

Department Head for Critical Care Nursing

From: PATRICK SIMON S. SORIA, MSN, RN, CNM, CHA, FPCHA

Subject: ***Implementation of an ICU Surge Capacity Protocol***

Date: July 13, 2021

I am writing to obtain permission to conduct a quality improvement (QI) project in your facility with the purpose of evaluating if the implementation of a Surge Capacity Response Protocol would affect the mental and physical well-being of ICU nurses by the fall of 2021. This project will be done to fullfill requirements for completion of the Doctor of Nursing Practice degree at Regis University, Denver, CO. The following information will review the study:

This project will employ a **Population-Intervention-Comparative-Outcome (PICO)** format for development of the study question to be investigated:

Population: Adult ICU nurses (managers and staff) caring for COVID-19 patients at a hospital in _____

Intervention: Implementation of a surge capacity response protocol

Comparative: Pre-post physical and mental health survey

Outcome: Improved mental and physical well-being of adult ICU nurses

Project Question: Will the implementation of a Surge Capacity Response Protocol improve the mental and physical well-being of adult ICU nurses?

Project Significance: The implementation of evidence-based action plans to address ICU surge capacity in future large-scale threats is important to maintain quality, safe patient care and a

positive work environment for nurses. The project is significant to ICU nurses, patients, the project site, the city, and its neighboring regions. The results of this project may enable the hospital and nursing administration to assess the level of physical and mental well-being of its ICU nurses and institute measures to provide a better work environment for nurses in this ICU setting.

Type of Study: Quality improvement initiative using a pre-post survey design and 3 open-ended questions post-intervention; convenience sample

Letter of Intent (cont.)

Participant Requirement: ICU Managers and Staff Nurses with more than 6 months experience in the critical care setting. The surge protocol will be instituted as standard practice fall 2021, thus the ICU staff nurses and managers will be required to attend the online educational session and use the protocol during surge events. Participation in the online pre-demographic questionnaire, pre-post physical and mental health surveys and post-open-ended questions is voluntary. I will send a recruitment email (blind-copied) to potential ICU nurse target population with an information sheet to inform them of the project and invite them to participate.

Risks, Cost, and Benefits:

Risks: There is no identified risk or harm to the participants in the project. Prior to implementation of this QI project, I will obtain approval from the Director of ICU (member of Cluster Ethics Review Committee, CERC) and Regis University IRB committee. The Director of ICU will first determine if the project is a quality improvement initiative vs. a research study which would need a higher level of review by CERC. Accessing and completing the surveys implies participant consent. Confidentiality and anonymity of the participants will be ensured. De-identified data will be stored and protected in a secured database. Communications between ICU Department (Site Coordinator) and the DNP Project Primary Investigator (PI) regarding protocol development and implementation will occur remotely via phone and/or videoconferencing. The DNP Project PI will be conducting project remotely in the United States and will not be at the project site at any time during implementation of QI study.

Costs: Costs are minimal. Participants will not receive any compensation for participating in educational session or for volunteering to take pre-demographic questionnaire, pre-post surveys and post-open-ended questions.

Benefits: The benefits of the project are perceived improvement in the physical and mental well-being of ICU nurses which could impact turnover, retention, and quality of patient care, and prepare the ICUs for future surges. Other potential benefits include decrease LOS and improved morbidity and mortality rates and improved ICU readiness for surges.

Project Goals and Objectives:

The main goal of this project is to improve the adult ICU nurses' physical and mental well-being, following the implementation of a surge capacity response protocol. A secondary goal is to give the ICU nurses an opportunity to share their perspectives on the implementation of the surge protocol at the end of the QI project.

Objectives:

1. Measure the mental and physical well-being of adult ICU nurses using the standardized Short Form 36 before and after the implementation of the protocol.
2. Identify the differences in mental and physical well-being based on demographic data.
3. Collect post-intervention data from the nurses using open-ended questions to explore the respondents' experience, proposed changes, and suggestions to better improve the protocol.

Letter of Intent (cont.,)

Permission is requested to conduct this quality improvement project at the Adult ICU Units of the Department of Critical Care Nursing, ____hospital in Philippines.

I have included a template for the brief site approval letter that is required on letterhead from you.

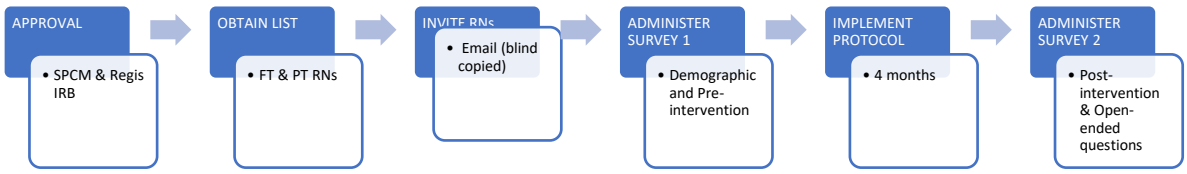
Thank you for your assistance with completing my DNP Project.

Sincerely,

Patrick Simon S. Soria, MSN, RN, CNM, CHA, FPCHA
DNP Student, Regis University, Denver, CO, USA

Appendix I

Intervention and Data Collection Process Flowchart



Appendix J

CITI Course Completion Report

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)

COMPLETION REPORT - PART 1 OF 2
COURSEWORK REQUIREMENTS*

* NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details. See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.

- **Name:** Patrick Simon Soria (ID: 9874843)
- **Institution Affiliation:** Regis University (ID: 745)
- **Institution Email:** psoria@regis.edu
- **Institution Unit:** Nursing

- **Curriculum Group:** Human Research
- **Course Learner Group:** Social Behavioral Research Investigators
- **Stage:** Stage 1 - Basic Course

- **Record ID:** 40842551
- **Completion Date:** 12-Feb-2021
- **Expiration Date:** 12-Feb-2024
- **Minimum Passing:** 80
- **Reported Score*:** 95

REQUIRED AND ELECTIVE MODULES ONLY	DATE COMPLETED	SCORE
Unanticipated Problems and Reporting Requirements in Social and Behavioral Research (ID: 14928)	07-Feb-2021	5/5 (100%)
Populations in Research Requiring Additional Considerations and/or Protections (ID: 16680)	07-Feb-2021	5/5 (100%)
Conflicts of Interest in Human Subjects Research (ID: 17464)	07-Feb-2021	5/5 (100%)
History and Ethical Principles - SBE (ID: 490)	07-Feb-2021	4/5 (80%)
The Federal Regulations - SBE (ID: 502)	08-Feb-2021	5/5 (100%)
Assessing Risk - SBE (ID: 503)	08-Feb-2021	5/5 (100%)
Informed Consent - SBE (ID: 504)	08-Feb-2021	5/5 (100%)
Privacy and Confidentiality - SBE (ID: 505)	08-Feb-2021	5/5 (100%)
Defining Research with Human Subjects - SBE (ID: 491)	08-Feb-2021	5/5 (100%)
Consent Tools Used by Researchers (ID: 16944)	12-Feb-2021	3/5 (60%)
Consent and Cultural Competence (ID: 17263)	12-Feb-2021	5/5 (100%)

For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution identified above or have been a paid Independent Learner.

Verify at: www.citiprogram.org/verify/?kdcb89b7f-8b41-4212-9562-115f9d3212ea-40842551

Collaborative Institutional Training Initiative (CITI Program)
Email: support@citiprogram.org
Phone: 888-529-5929
Web: https://www.citiprogram.org

Appendix K

Summary of SF-36 Scales and Number of Items

Scale	SF-36 Number of Items
Physical functioning	10
Role limitations due to physical health	4
Role limitations due to emotional problems	3
Energy/fatigue	4
Emotional well-being	5
Social functioning	2
Pain	2
General Health	6

Rand Corporation (2022). *36-Item Short Form Survey (SF-36)*. https://www.rand.org/health-care/surveys_tools/mos/36-item-short-form.html

Appendix L

Post Intervention of Surge Protocol Questionnaire

Instructions: Please answer the following questions that relate to the implementation of the Surge Protocol in your ICU during the last months of 2021.

1. What have your experienced as the greatest challenge(s) that have affected the workflow on your ICU unit during a surge?
2. What changes do you think need to be made to improve your workflow and care that you provide to patients during a surge?
3. Please feel free to share anything else you would like for us to know.

Appendix M

Summary of Pairs with Significant Correlation

Pair	p value
Pair 1 – PreQ1 – PostQ1	.018
Pair 2 – PreQ2 – PostQ2	<.001
Pair 5 – PreQ5 – PostQ5	.027
Pair 6 – PreQ6 – PostQ6	.008
Pair 8 – PreQ8 – PostQ8	.015
Pair 9 – PreQ9 – PostQ9	.004
Pair 10 – PreQ10 – PostQ10	<.001
Pair 11 – PreQ12 – PostQ12	.005
Pair 12 – PreQ13 – PostQ13	.004
Pair 13 – PreQ14 – PostQ14	.003
Pair 14 – PreQ19 – PostQ19	.002
Pair 15 – PreQ20 – PostQ20	<.001
Pair 16 – PreQ21 – PostQ21	.003
Pair 17 – PreQ22 – PostQ22	.027
Pair 18 – PreQ23 – PostQ23	.001
Pair 19 – PreQ24 – PostQ24	.041
Pair 20 – PreQ25 – PostQ25	<.001
Pair 21 – PreQ26 – PostQ26	.049
Pair 22 – PreQ27 – PostQ27	.007
Pair 23 – PreQ28 – PostQ28	.032
Pair 24 – PreQ29 – PostQ29	.004
Pair 25 – PreQ30 – PreQ30	<.033
Pair 26 – PreQ31 – PostQ31	<.001
Pair 27 – PreQ32 – PostQ32	<.001