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Post-Anesthesia Care Unit Bypass Initiative

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Abstract

Phase II Site(s): Walter Reed National Military Medical Center, Bethesda, MD

Project Title: Post-Anesthesia Care Unit Bypass Initiative

Authors: Major Adriana Vargas-Geminiano and Captain Thomas Vieten

Background or Problem/Issue: WRNMMC lacks a policy to fast-track monitored anesthesia care (MAC) cases through PACU causing increased utilization of resources.

Clinical Question or Purpose: In adult outpatient surgery patients, how does a post-anesthesia care unit (PACU) bypass system compare to the usual practice of no PACU bypass system, as measured by the length of stay (LOS) for post-operative patients over one month?

Project Design: Authors will implement a pilot project where selected patients undergoing minor orthopedic surgeries under MAC will bypass the PACU and go directly to the Ambulatory Procedure Unit (APU) from the Operating Room (OR). A PACU bypass tool will be used to assess patients who meet specific recovery and assessment criteria to bypass the PACU. Perioperative staff and leadership will be informed about the project goals, benefits, and timeline, via emails, in-services, and project champions. The pilot project will run for 30 days, and at the conclusion, the data will be analyzed.

Analysis of Results: Independent sample t-tests indicated a statistically significant difference in WRNMMC's current postoperative track and the proposed PACU bypass. The current system at WRNMMC averaged 111 minutes from leaving the OR to discharge, and the PACU bypass protocol patients were released in 56 minutes. Patients who bypassed the PACU with our protocol were discharged home 54 minutes faster with zero readmissions for anesthesia-related issues.

Organizational Impact/Implications for Practice: Implementing a PACU bypass system will decrease the time to discharge for many patients at WRNMMC, improve hospital and staffing resource utilization, and decrease costs. Additionally, this will achieve Quadruple Aim performance improvement of increased readiness, better health, better care, and lower cost. A PACU bypass system can optimize patient flow through recovery areas at deployed locations where resources are limited. Lower costs are achieved through the implementation of an evidence-based patient assessment tool that will help eliminate costly PACU admissions that are unnecessary.

Introduction

The Post-Anesthesia Care Unit (PACU) at Walter Reed National Military Medical Center (WRNMMC) provides care for fifteen to forty patients a day; however, WRNMMC could benefit from a streamlined recovery process of patients receiving Monitored Anesthesia Care (MAC), which would decrease time to discharge for patients, improving hospital and staffing resource utilization while also decreasing costs. Currently, all patients receive the same path of recovery care postoperatively. This includes patient admission to the PACU from the operating room (OR). Once PACU discharge criteria are met, patients transfer to the Ambulatory Procedure Unit (APU) to be discharged home. A PACU bypass system is a protocol that would allow patients who meet specific recovery and assessment criteria to bypass the PACU entirely, go directly to the APU from the OR, and reduce patient time to discharge and decrease hospital costs (Mamaril, 2000; White et al., 2003).

Significance of the Problem

WRNMCC currently who undergo minor eye surgical procedures bypass the PACU, but they lack a policy to bypass the PACU for other MAC cases. Subsequently, this leads to increased utilization of limited staff resources in the PACU and can cause a series of patient delays. National standards for PACU bypass are unclear, as this is a hospital-specific practice, and implementation of this system depends on a myriad of factors individual to each hospital. These factors include the number of PACU cases, for-profit status, and staff resources. Research has shown that the implementation of a PACU bypass has reduced patient time to discharge and decreased hospital costs (White et al., 2003). Implementing a PACU bypass system will decrease the time to discharge for many patients at WRNMMC and prevent the delay in their discharge caused by unnecessary PACU admission.

Current evidence supports that there are both financial and staffing benefits from the implementation of a PACU bypass system. Extended length of stay (LOS) of patients in the PACU increases adverse patient outcomes such as higher incidence and severity hypoxemia and arterial hypotension (Bashir et al., 2013; Kiekkas et al., 2019; Sillero & Zabalegui, 2018). Additionally, increasing LOS and inadequate staffing levels may increase staff workload, nurse dissatisfaction, and burnout (Bashir et al., 2013; Sillero & Zabalegui, 2018). Overall, prolonged LOS in the PACU leads to organizational issues that can negatively impact staff and patient outcomes.

Delayed discharge from the PACU is attributed to specific periods of increased utilization and patient traffic. A prospective look at over 2700 patients for the timing of delayed discharges from the PACU showed that the discharge delays were found almost exclusively on weekdays from 1000-1800 (Cowie et al., 2012). This shows that discharge delays occur when the operating room (OR) is busiest. The data suggests that a more streamlined approach to care during these busy periods would have the most significant benefit since that is when most delays tend to occur.

In considering the potential monetary recapture of a PACU bypass process improvement, it is essential to consider the overall cost of PACU care. The American Society of Peri-Anesthesia Nursing outlined the per-minute cost of the average PACU stay of 9,947 patients, stating that implementing streamlined measures, such as a PACU bypass, in their PACU saved 39,788 patient care minutes and 459,551 dollars in hospital cost (Enriquez, et al., 2017). This puts the average hospital cost of a PACU patient minute at $11.55. The average discharge delay is 64 minutes, which equates to $739.20 in excess hospital cost per delayed PACU patient, a large per patient cost when considering the thousands of patients per year. Currently, WRNMMC

does not utilize a PACU bypass screening process to assess patients' ability to bypass the PACU and go directly to the APU for discharge counseling. Evidence suggests that lack of screening and fast track options can impact the quality of care, staffing concerns, and increased costs. Therefore, leadership within the WRNMMC anesthesia department seeks evidence-based process improvement to the current PACU patient flow.

Relevance to Military Nursing

The Military Health System (MHS) provides care to more than 9.6 million beneficiaries in the U.S. and around the world. Of the 475 MHS facilities, 51 are classified as hospitals with surgical capabilities; in 2014, these facilities performed approximately 303,520 surgeries in the U.S. (The official website of the Military Health System, n.d; Andrews & Lehren, 2014). Additionally, from 2002 to 2013, the military performed 5686 medical, non-war, humanitarian surgical procedures in deployed locations (Weeks & Oh, 2016). Another study of U.S. members deployed to Iraq and Afghanistan shows that of 29,958 injuries, 10,203 were non-battle injuries that required surgical procedures (Tuan, 2018). Since most DOD beneficiaries that need surgical services require post-anesthesia care, the results of this project can be implemented across DOD military treatment facilities and positively impact their care.

Walter Reed National Military Medical Center averages 1400 surgical cases per month that require patient care in the PACU following surgery (S3 Surgery Scheduling System, 2020). Decreasing patient time to discharge by eliminating unnecessary steps in their recovery will contribute to the MHS goals for the Defense Health Agency by optimizing patient care and reducing hospital costs. A PACU bypass system will also achieve Quadruple Aim performance improvement consisting of increased readiness, better health, better care, and lower cost (The official website of the Military Health System, 2019). A PACU bypass system can optimize

patient flow through recovery areas at deployed locations where resources are limited. Lower costs are achieved through the implementation of an evidence-based patient assessment tool that will help eliminate costly PACU admissions that are unnecessary. This initiative can potentially save thousands of dollars of taxpayers' money that can be redirected to other areas of need.

System or Clinical Question

In adult outpatient surgery patients (P), how does a post-anesthesia care unit (PACU) bypass system (I) compare to usual practice of no PACU bypass system (C) as measured by LOS for post-operative patients (O) over one month (T)?

Literature Review of Solutions

To conduct the literature review based on our PICOT question, the authors used the National Library of Medicine PubMed and the Cumulative Index to Nursing and Allied Health Literature (CINAHL) databases, Google Scholar, and identified articles relevant to our project. Databases search keywords include: "PACU" OR "post anesthesia" OR "Post anesthesia Care Unit" OR "post anesthesia" AND "decreasing" AND "length of stay" AND "delayed discharge" OR "prolonged stay" AND "fast tracking" OR "fast-tracking" AND "delays" AND "patient" AND "flow" AND "organization" AND "perioperative nurses" AND "burnout." The phrase used to identify articles on Google Scholar was "ASPAN PACU decreased length of stay." The literature search was limited to English language articles based on PACU prolonged stay. As of November 1, 2020, our total results include 317 articles, 292 from PubMed; 23 from CINAHL; one from Google Scholar; and one from a citation list. The authors sent 65 articles to Covidence for review, of which 14 duplicates were removed. The authors also added one article from a citation embedded in a previously chosen PubMed article. Fifty-three articles were selected for final screening.

Titles and abstracts were reviewed for initial inclusion and exclusion. The Johns Hopkins Nursing Quality of Evidence-Based Practice tool was used to appraise the articles and assign evidence levels. Articles included in our final selection had evidence on same-day surgical adult patients who were discharged home with a "fast-tracking" intervention and those that discussed PACU bypass protocols, PACU flow, prevention of delayed discharge, and PACU decreased length of stay. Articles excluded had deficiencies such as small sample sizes, included interventions other than general anesthesia such as peripheral blocks, discussion of pediatric cases, or were written more than 25 years ago and deemed to have outdated information. Authors obtained complete copies of 25 articles that met our PICOT question criteria and selected twelve articles that narrowed information regarding PACU bypass and decreased PACU stay to decreased PACU discharge time. Six articles that support PACU bypass interventions, and six articles directly address some other aspect of our PICOT question.

Article appraisal was performed utilizing the Johns Hopkins Nursing Quality of Evidence-Based Practice tool to assign a level of evidence and quality rating (Dang & Dearholt, 2017). No IA evidence articles were identified, but our appraisal includes one-level IB article, three level IIIB articles, and two-level VB articles. Authors were unable to find randomized experimental data on a standardized PACU bypass tool, but our literature review captured the benefits and pitfalls of PACU bypass research and implementation.

Focus Areas

After a review of the literature, the authors found the dominant themes were the cost and causes of discharge delays and the reasons for delays. Authors found many articles on the adverse effects of poor staffing or staffing inefficiency on patient outcomes, and the benefits of

PACU bypass systems, including decreased hospital cost and increased patient and staff satisfaction.

After the literature review and project planning, the short-term goals include gaining stakeholders' support, approval from the IRB, writing a standard operating procedure (SOP) that identifies patients who do not need PACU admission. This will be based on a criterion that includes a focused neurological assessment and LOC, respiratory rate, blood pressure, and time of the last opioid. If the measure is met, these patients can bypass the PACU, decreasing their time to discharge. The long-term goals include implementing the pilot program, presenting the results to stakeholders, and implementing the PACU bypass system SOP.

Business Case Analysis

The authors recommend the implementation of a PACU bypass system at WRNMMC. Given that delayed discharges are found almost exclusively at times when the operating room is busiest from 1000-1800 on weekdays (Cowie et al., 2012), a more streamlined approach to care during these periods would have the most benefit. Authors were able to extrapolate from peer-reviewed articles that the average cost to patients of one minute of PACU care is $11.55, and the average time of a delayed discharge is +64 minutes. (Enriquez, et al., 2017; Tessler et al., 1999) With the implementation of a PACU bypass system, WRNMMC could allow approximately 88% of patients that successfully bypass the PACU to be discharged within 60 minutes of leaving the OR. (White & Song, 1999). This system will provide a streamlined, cost-efficient, and evidenced-based solution to WRNMMC's current post-operative efficiency concerns.

Organizing Framework

Authors are using the Iowa Model Revised (Iowa Model Collaborative, 2017) to create and sustain change at WRNMMC. Following the step guidelines, the authors first had to assess the need for change in practice. Given that there are MTF's around the country that use a PACU bypass, authors already know that implementation has proven helpful in the military hospital. WRNMMC does not have a PACU bypass but has a robust surgical service in the context of patient volume and therefore will benefit more from the improved efficiency of a PACU bypass. Using a wide array of peer-reviewed article searches, authors have already moved past stage two and located the best evidence to assist us in project design and implementation of our goals. After gathering articles, progression through stage three included critically analyzing the research to gain a broad view of the issues authors faced and potential solutions. Stage four will be to design practice change, where authors access successful protocols from other MTF's that have a PACU bypass in place and tailor those protocols to a PACU bypass specifically for WRNMMC. The authors will also conduct in-service training to provide the staff with the knowledge and tools to succeed in our initiative. Step five will be the actual implementation of our pilot program and evaluation of the results following completion of the trial period. Finally, step six will fully integrate the PACU bypass initiative to become standard practice at WRNMMC. The authors' goal for the pilot program is to decrease the time from leaving the OR to patient discharge by at least 25% for patients receiving MAC and therefore can be a part of a more significant process improvement to benefit both the patient population and the staff at WRNMMC.

Project Design

General Approach

Our project is a quality improvement initiative to decrease the excess hospital cost from discharge delays and streamline the patient flow from the end of surgery until discharge. Currently, WRNMMC does not have a PACU bypass system. The goal is to conduct a pilot study and evaluate if selected MAC cases can bypass the PACU and decrease PACU to discharge time, potentially saving financial and staff resources.

Setting and Population

Walter Reed National Military Medical Center (WRNMMC) is located in Bethesda, Maryland. With 244 beds, over 100 clinics and specialties, and approximately 7000 staff, WRNMMC is one the largest military medical center in the U.S and provides care to over one million beneficiaries yearly (Walter Reed National Military Medical Center, 2020). Surgical services include basic and advanced laparoscopy, bariatric surgery, colorectal surgery, general surgery, pediatric surgery, surgical oncology, complex wound care, trauma surgery, and wounded warrior surgical care (Walter Reed National Military Medical Center, 2019). WRNMMC performs approximately 16,800 surgeries yearly (S3 Surgery Scheduling System, 2020). The PACU maintains 20 recovery beds that provide phase I and II recovery. The Ambulatory Procedure Unit (APU) admits patients prior to surgery and receives selected patients following surgery for phase II care (Walter Reed National Military Medical Center, 2019).

Our project will consist of adult patients undergoing orthopedic surgery using Monitored Anesthesia Care, to include moderate or deep sedation and/or regional anesthesia to bypass PACU and be discharged directly to the APU unit upon leaving the OR postoperatively. Any patient receiving general anesthesia will not be considered for this protocol. This project's primary research will require coordination between the OR, PACU, and APU staff. Anesthesia

providers making the PACU bypass assessment, and APU nursing staff receiving PACU bypassed patients will be the major players in the pilot program.

Procedural Steps

A protocol for PACU bypass will be developed using research from peer-reviewed articles, examples from MTF's that currently utilize a PACU bypass system, and input from Anesthesia leadership at WRNMMC. This protocol will be a live document that can accommodate changes as needed during implementation. The protocol will include the Aldrete scoring system, OR RN to APU RN report criteria, transfer of patients, hand-off, and troubleshooting. A detailed plan for patients who were identified for PACU bypass but did not meet discharge criteria will be included for emergency and unplanned occurrences.

Authors will then conduct a "pre-data" group collection. Timestamps for patients that would meet inclusion criteria for PACU bypass and use the current post-operative track at WRNMMC will be collected. A baseline will be established for the time frame from the end of surgery until discharge, as well as time spent in the PACU before admission to the APU for discharge planning and release. Aldrete scoring will be collected if available, as well as anesthesia time, surgery time, and type of anesthetic used.

To identify patients for "post-data" group inclusion, authors will be using a modified version of the Aldrete assessment. These provide a tool to assess a patient's need for phase 1 or 2 post-anesthesia care. Phase 1 patients still need direct management as they return to baseline vital signs and need to go to the PACU. Phase 2 patients have care based on individual needs as they prepare for discharge, and some of these patients can altogether bypass Phase 1 due to the nature of their recovery needs. The patients who can bypass phase 1 will be able to discharge

more quickly due to removing the unnecessary PACU stay. With a slight modification of these established tools for the specific needs of WRNMMC, authors will be able to identify MAC patients and consider them for the PACU bypass. Determination of eligibility will be two-fold, a pre-operative indicator of the case being MAC anesthesia with or without regional anesthesia, and at the end of the case using the PACU bypass assessment done by the anesthesia provider. Any patient receiving general anesthesia will be disqualified from protocol inclusion.

Implementation of the PACU bypass system will be a multi-step process. The first will be education for Anesthesia providers and nurses with in-service training on the PACU bypass system. The critical groups for education will be nurses from the OR, PACU, and APU. Each of these groups will have a part in the PACU bypass that differs from the current system at WRNMMC. Educational information will be available for staff to reference, with visual reminders and printouts of the bypass criteria readily accessible. The charge nurses for the OR, PACU, and APU will select motivated individuals to participate in the implementation of our protocol. Using the same staff during process implementation will allow for better continuity and understanding of the protocol. Staff who are involved can also help to streamline the protocol should efficiency issues become apparent to any involved party.

The next step will be to have a small trial consisting of 8-15 patients that meet the requirements for PACU bypass. Authors will gather data on timestamps critical to our analysis, such as time from leaving the OR to discharge and time spent in PACU. Patients will be identified using the S3 surgical scheduling system, and OR, APU, and PACU staff will be made aware of days selected to implement the protocol (S3 Surgery Scheduling System, 2020). The

authors will be providing anesthesia to the selected patients and will use the protocol to guide post-operative care.

After completing the pilot study, the data collected will be analyzed by a statistician. Using the statistical analysis, results will be shared with the WRNMMC Anesthesia team and then presented to stakeholders via a PowerPoint presentation. Authors will then finalize a manuscript and submit it for peer review journal inclusion.

Data Analysis Plan

Descriptive statistics will be used to describe and analyze structure, process, and outcome measures. Levels of measurement will include nominal and ratio data. The appropriate statistical test is the student t-test, descriptive statistics to include mean, median, and standard deviation. The independent variable is the patient route through the recovery area (nominal). The dependent variable is the time to patient discharge from the recovery area in minutes (interval). Descriptive statistics data includes the level of care or patient route to recovery (Phase I vs. Phase II) and type of surgery and comparing PACU minutes saved and any changes in overall time to discharge.

Descriptive data will be collected during phase I of the project to determine the type of surgery, patient demographics, PACU bypass criteria. Outcome variables and ratio levels of measurements will be analyzed when the raw data is available and ready to be analyzed.

Potential Barriers

This project's potential barriers include lack of leadership support, staff resistance to change, staff non-compliance with project guidelines, and poor attendance to in-service training. If the team encounters a lack of leadership support, authors plan to develop an evidence-based

PowerPoint about the project's benefits and present it to leadership and stakeholders before any implementation efforts or staff training. This project will require great awareness of leadership support and buy-in, so authors will be holding regular meetings with stakeholders to answer questions and modify the project if needed. If the project is approved but faces leadership and staff resistance to change, authors plan to conduct short team meetings and short and concise training sessions to ensure staff stays engaged and aware of the program's potential patient, time, and cost benefits. To address possible staff non-compliance, authors plan to encourage participating staff and assist with the pilot program to ensure staff questions are answered. For in-service training, authors will provide food and beverages to improve attendance/motivate participants.

Dissemination Plan

After the literature review is complete and the project is approved, results will be shared with WRNMMC shareholders. A Post-Anesthesia Care Unit (PACU) bypass Standard Operating Procedure (SOP) will be drafted in compliance with facility regulations. The SOP will be disseminated to perioperative department staff. Operating Room, PACU, and APU champions will be selected and trained to provide guidance during implementation.

To comply with the Defense Health Agency Quadruple Aim goals, the project can be further disseminated through the TriService Nursing Research Program (TSNRP) Fostering Excellence in Military Nursing Science in an attempt to standardize this program across military settings. Finally, the authors plan to submit the project for publication to the Peri-Anesthesia Nursing Organization and the American Association of Nurse Anesthesiology (AANA).

HIPAA Concerns/Ethical Considerations

This project does not require collecting patients' protected health information (PHI). Any data collection will be managed by the primary researchers and stored on a password protected Common Access Card (CAC) enabled computers.

Project Results

The initial sample size included two data sets. The first set included 12 patients who used WRNMMC's current post-operative track through the PACU (pre-data). The second set included 13 patients who were identified as candidates for PACU bypass (post-data). One patient in the PACU bypass data set did not meet the criteria for bypass and had to be taken to PACU for recovery and was left out of the data analysis for the PACU bypass, leaving 12 patients in both sets.

Quantitative data included timestamps at multiple points for each patient from leaving the operating room until discharge from the hospital. Aldrete scores were also used to determine eligibility for discharge from PACU to APU in pre-data and eligibility for PACU bypass from OR to APU in post-data. Qualitative data was collected by analyzing whether each patient in post-data was readmitted after being fast-tracked, with a binary "yes" or "no". Zero patients from post-data required readmission from anesthesia-related complications. The form of anesthesia used in the post-data was collected, to include if the patient had regional anesthesia, intra-operative narcotic administration, and other pain medications used intraoperatively.

Data points analyzed for this study focused on the amount of time that a patient experienced from the end of their operation i.e., time leaving the OR, to their discharge time. The mean difference was 54.75 minutes with a standard error of 10.73 minutes. The mean number of minutes for the time from leaving the OR to discharge for set 1 was 111.41 minutes with a standard deviation of 30 minutes. The mean number of minutes from OR to discharge for

set 2 was 56.67 minutes with a standard deviation of 21.97 minutes. To explore the potential difference in the current protocol at WRNMMC and the PACU bypass, the mean time from OR to discharge was analyzed using independent sample t-tests. The p-value for the analysis was $p < .0001$, implying that there is a statistically highly significant difference in the mean times between the two groups.

Descriptive statistics, including mean and standard deviation, were also analyzed for individual variables. Total PACU time had a mean of 56.41 minutes, with a standard deviation of 25.21 minutes. Total APU time had a mean of 44.08 minutes and a standard deviation of 14.41 minutes.

Analysis of Results

Based on the statistical analysis results, authors concluded that the PACU bypass system is a valuable and cost-saving measure to improve resource efficiency at WRNMMC. Given that patients who received similar surgeries in both groups were discharged 50% faster with the PACU bypass system than using the current system, our data illustrates that our protocol can significantly improve the postoperative course for patients at WRNMMC.

Overall, 12 of the 13 patients initially identified as PACU bypass candidates could use the protocol to be discharged much faster by bypassing the PACU. The one patient who was unable to meet the Aldrete criteria of 8 upon leaving the OR was the only patient who received dexmedetomidine. This illustrates a vital component of this protocol, which is anesthetic management. In the current system, anesthesia providers frequently bring patients to the PACU with an Aldrete score of < 8, knowing that they will have time in the PACU to awaken fully. However, with this new protocol, there will be an increased onus on the provider to time the return of patient awareness with the end of the case and facilitate the PACU bypass.

Many military treatment facilities already incorporate a PACU bypass as part of their postoperative management of patients, yet WRNMMC currently only uses the bypass for patients receiving eye surgery. With the results from orthopedic surgeries, authors have established that our protocol can be used across a much broader spectrum of patients receiving surgery at WRNMMC. With the potential to incorporate a PACU bypass system, decreasing postoperative time to discharge by upwards of 50% in this patient population, authors can vastly improve the current post-operative protocol at WRNMMC.

Organizational Impact and Implications to Practice and Policy

This project's results and literature review findings support implementing a PACU bypass system at WRNMMC. The impact on the organization will include improvement of hospital/ staffing resource utilization and decreased costs without compromising patient care, outcomes, or satisfaction. Additionally, it meets the MHS Ready Reliable Care (RRC) High-Reliability Organization (HRO) aims.

This initiative can potentially decrease healthcare costs that can be redirected to other areas of need. The literature review indicates that the average cost of one minute of PACU care is $11.55, and the average time of a delayed discharge is 64 minutes (Enriquez, et al., 2017; Tessler et al., 1999). Based on the project's findings, patients spend approximately 56.41 minutes in the PACU; For example, the selected surgical procedures are scheduled twice a week, totaling approximately six surgeries per week. Over a year, there is a potential saving of approximately 199 thousand dollars. This savings can be used to fund other potential MHS programs aimed to improve patient care in the U.S and overseas U.S military facilities. Additionally, extended lengths of stay (LOS) of patients in the PACU also lead to staffing concerns that increase the risk

for adverse patient outcomes (Bashir et al., 2013), which can cost thousands of additional unnecessary expenses.

The Defense Health Agency focuses on increasing the high reliability of military health care organizations by emphasizing best health care practices and improving health care outcomes. Implementing a PACU bypass system meets different MHS principles such as decreasing patient time to discharge by eliminating unnecessary steps in their recovery, sensitivity to operations by being mindful of how people, processes, and systems impact outcomes (The official website of the Military Health System, 2021). A PACU bypass system will also achieve Quadruple Aim performance improvement consisting of increased readiness, better health, better care, and lower cost (The official website of the Military Health System, 2019).

A PACU bypass system implementation at WRNMMC has staff, patient, and organizational benefits. This system is already in use in multiple military medical facilities, and the system was smoothly implemented during this project with no major issues. It had no negative implications or adverse patient outcomes. A draft policy has been completed and implemented into practice.

Future Directions for Research and Practice

The authors provided evidence-based practice literature that illustrates the benefits of implementing a PACU bypass system. Our pilot project reflected similar benefits, and the authors have drafted a PACU bypass system standard operating procedure (SOP), thus facilitating its implementation. The SOP provides a road map for stakeholders and staff to conduct a trial using similar surgical procedures, coordinate with staff involved, update the SOP as needed, and establish a PACU bypass system. Stakeholders can further expand this system to include other surgical procedures.

Conclusion

This project illustrated that implementing a PACU bypass system could decrease time to discharge for patients, improve staffing resource utilization, and decrease costs without compromising patient outcomes. A statistically significant decrease in time from leaving the OR to time of discharge was found in patients who went through the PACU bypass system compared to patients who did not bypass PACU. The findings were consistent with published literature and led us to recommend implementing a PACU bypass system at WRNMMC.

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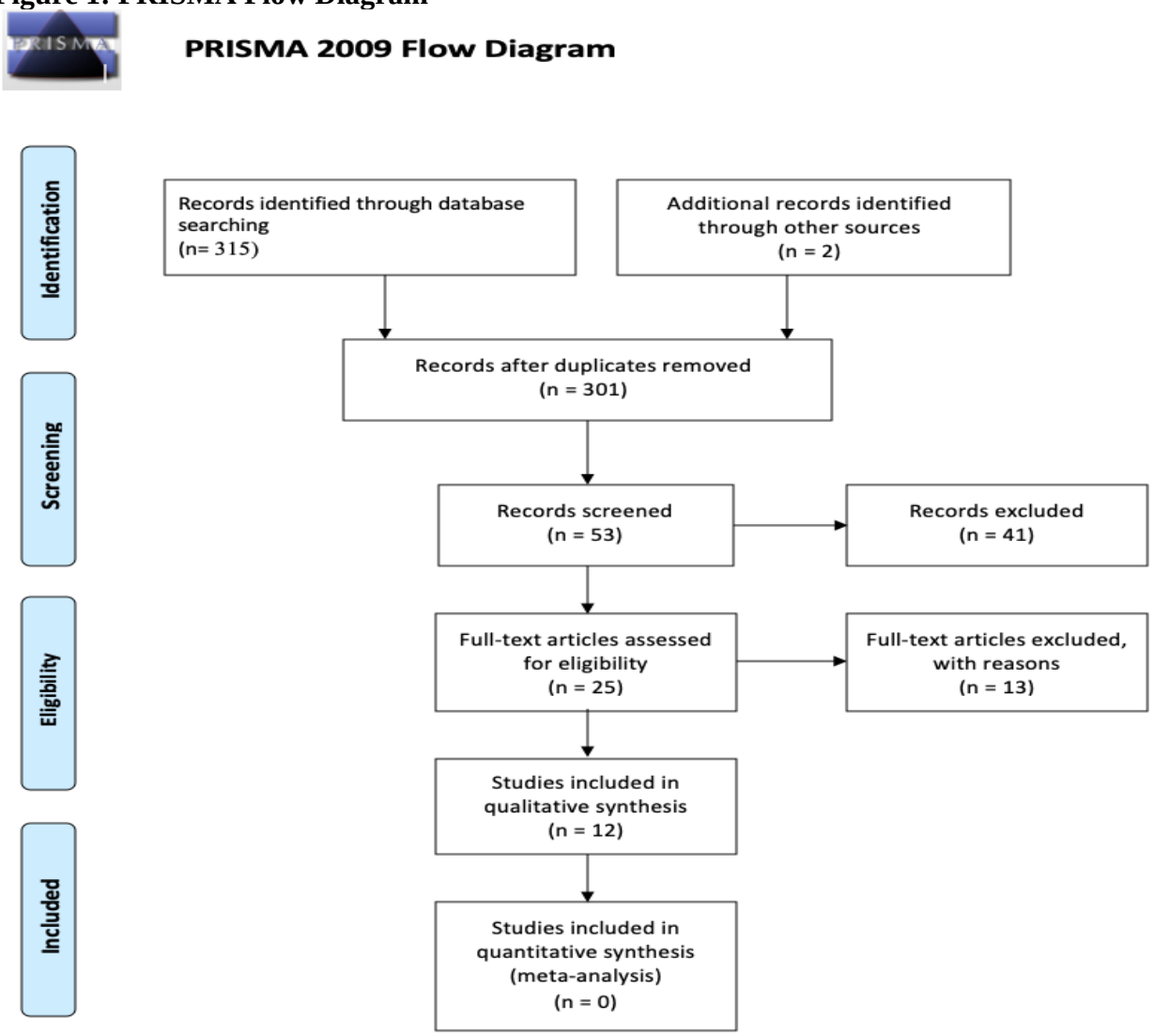
Appendices

Appendix A: Forms Used in Data Collection

Figure 1: PRISMA Flow Diagram



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For more information, visit www.prisma-statement.org.

Figure 2: Evidence Table

	Study Purpose/Aims	Research Questions/Hypotheses (IF different from/specifically described separately from study purpose & aims)	Study Design	Total Sample Size (How many initially, how many at final analysis?)	Sampling Plan	Independent Variables AND LEVEL OF MEASUREMENT	Dependent Variables AND LEVEL OF MEASUREMENT	Statistical Analyses - what tests were used for which research questions?	Results	Strengths (how promoted internal/external validity)	Weaknesses (biases; poorly controlled threats to internal/external validity)	LEVEL OF EVIDENCE - using JHNEBP tool (Strength and Quality)
Dexter et al., 2005	A systematic review of strategies to reduce delays in admission into PACUs from ORs. The purpose of this article was to evaluate for managers how to choose interventions based on effectiveness and practicality.	A systematic review of strategies to reduce delays in admission to the Post-Anesthesia Care Unit PACUs from the Operating Rooms (ORs).	Systematic review	Number of reviewed studies was not provided.	Management interventions of (1) adjusting PACU nurse scheduling each month based on anticipated daily workload; (2) adjusting nurse schedules on the day before surgery when the OR schedule is finalized; (3) adjusting PACU staffing on the day of surgery; (4) changing sequences of surgical cases in ORs to reduce the risk of delays in PACU admissions; (5) reducing PACU length of stay by eliminating delays; and (6) excluding patients from the PACU	Not applicable	Not applicable	Information not provided.	This systematic review examined six different interventions that managers can use when it comes to making OR-PACU patient flow decision making. The authors did not evaluate whether one intervention is better than the other, but they provided strategies, advantages, disadvantages, examples, unit characteristics to consider, financial factors, and detailed algorithms for different management interventions.	The aim of the systematic review was clearly stated. The result section was succinct for each intervention and authors provided different detailed algorithms and strategies to help reduce delays in PACU.	Author called their methodology "operations research," but it was not described. The interventions were described but it is not known how the authors decided to include or exclude any particular studies. No mapping review was provided.	IIB
Duncan et al., 2001	To evaluate the effectiveness of short-acting anesthetic drugs and techniques to achieve recovery room bypass criteria after minor surgery in a community hospital.	Outcomes of interest included patient morbidity, success in achieving post-anesthesia care unit (PACU) bypass criteria, impact upon nursing resources, duration of operating room (OR) and hospital stay, and pharmaceutical costs before and after implementation.	Experimental: Pilot study	100 patients	A cohort of 100 ASA I and II patients aged 18–65 yrs undergoing simple knee arthroscopy or minor peripheral orthopedic procedures was compared to a similar cohort treated in the three months prior to the study period. Two hospitals were studied with 50 patients from each hospital.	Nominal: Short-acting medications administered in the perioperative environment.	Nominal: Achievability of fast-track criteria using the modified Aldrete scoring system.	Two-way analysis of variance was used to test for hospital and study group differences in duration of surgery (DOS), total OR time, time to discharge, and total hospital stay. Tests of association between the surgeons, anesthesiologists, and bypass rates for cases were done using Fisher's exact test.	Successful PACU bypass occurred in 83% of cases and no patient morbidity was demonstrated prior to discharge home. Achievement of PACU discharge criteria while in the OR did not prolong the OR time, and discharge from hospital occurred earlier in the patients who did not require PACU care (P=0.0006 all "fast-track cases" vs all "controls"). Nursing complaints were more numerous when the day surgery personnel did not normally participate in PACU care. The cost of anesthetic care was significantly more using ultra-short acting drugs.	Results are consistent with recent literature in regards to the importance of fast-tracking patients to decrease PACU length of stay and decrease cost. Additionally, different statistical methods were appropriately used to address the researchers outcomes.	Internal validity: lack of short-acting protocol and standardization. Anesthesiologists were remanded and encouraged to follow the expectations of the study. Staff was not retrained to follow a documentation protocol. Another weakness of this study is that it was published in 2001. Since it is an old study, the external validity might not be strong at the present time. For example, the tool used for fast-track determination was the standard Aldrete score, which is no longer used for fast-tracking. Nevertheless, it is an important study as it was one of the first studies to address the importance of fast-tracking in the PACU.	IIB
Marmaril, 2000	To review the pros and cons of two fast-tracking initiatives and to evaluate ethical issues for clinical practice.	To review the pros and cons of two fast-tracking initiatives and evaluate ethical issues in an effort to ensure safe, quality, and cost-effective care is maintained when using these fast-tracking models.	Non-experimental	Not described	Not described	Not applicable	Not applicable	Not applicable	The author reviewed the pros and cons of two models of fast-tracking in the perianesthesia setting, which includes PACU I bypass and rapid PACU progression (RPP).	Author narrowed the review to the pros and cons of 2 models of fast-tracking.	No methodology about the studies or articles reviewed was provided.	VB
Rice et al., 2015	This is a process improvement project to introduce and evaluate the efficacy of fast-tracking ambulatory surgical patients in a community hospital.	Primary outcomes: (1) PACU-bypass rate; (2) PACU holds incidence and duration (time in minutes); (3) LOS following the surgical procedure; and (4) overall cost comparison between the reference and fast-track groups. Secondary outcomes were to determine the WFTS inter-rater reliability between the anesthesia providers and the ACU staff nurses and to describe the demographics of patients who successfully fast-tracked, determining common traits.	Observational pre-post design	150 patients	Purposive/convenience sampling Reference period: 75 patients evaluated with the White Fast-Track Score (WFTS) and standard/current recovery pathway. Implementation period: 75 patients evaluated by the anesthesia provider using the WFTS tool while in the operating room (OR).	Not discussed	Not discussed	Descriptive statistics: frequencies, mean, etc for nominal data Mann Whitney test to compare reference and implementation hold times (ratio). Student t test to compare reference OR to home time and and fast-tracked patients in the implementation group (ratio). A Kappa test to determine interrater reliability. A two-sample t test to compare the characteristics between fast-track eligible and ineligible patients.	79% of the patients fast-tracked in the implementation group (compared to 81% in the reference group). There was a significant decrease in PACU hold incidences and in PACU hold duration during the implementation period. There was a significant decrease in LOS for the implementation period. The fast-tracking system demonstrated that not all patients who receive general anesthesia need to go through phase 1; short acting medications help, but it is expensive.	This improvement project presented a detailed methodology, describing the design and statistical analysis, and can therefore be easily replicated. Results were succinct and consistent with similar studies. Good description of the WFTS, sampling, and institutions characteristics. Tables were useful to describe statistical and descriptive data. Authors acknowledged	Lack of patient randomization and variety of surgical procedures, although the authors explained this is difficult in clinical studies. Due to the study design and sample number it was difficult to rule out confounding factors. OR time charting was not standardized as staff did not receive formal instruction. No patient follow-up after discharge.	VB
White et al., 1999	To compare fast-track eligibility using the modified Aldrete score system and the new fast-track criteria in outpatients undergoing laparoscopic surgery with one of three standardized general anesthetics.	Researchers hypothesized that using the new scoring system to determine a patient's fast-track eligibility could reduce the need for parenteral medication administration in the phase II recovery area.	Experimental: RCT – 2 group posttest only	216 female patients	216 female outpatients undergoing either laparoscopic tubal ligation (LT) or cholecystectomy (LC) procedures at the University of Texas Southwestern Medical Center at Dallas. No information provided about anesthetic treatment assignment: 62 patients received Desflurane, 86 patients received Sevoflurane, and 68 patients received propofol.	Nominal: Fast Track scoring system and type of general anesthesia treatment.	Ordinal: Discontinuation of anesthesia to fast-track eligibility (time in minutes - ratio), fast-track eligibility on arrival in phase I PACU (time in minutes - ratio). Nominal: Interventions required after fast-track eligibility was achieved.	(1) One-way analysis of variance for continuous variables and χ^2 test for discrete variables (2) Descriptive statistics means, standard deviation, etc for nominal data.	Overall, 22-29% of patients in the modified Aldrete scoring system subsequently required IV analgesics and antiemetics, which was significantly higher than the group in the new fast-track system, where none of the patients required additional parenteral medications.	Results are consistent with studies that have evaluated the fast-tracking tools and its impact on LOS in the PACU and bypassing PACU. The use of Chi-square non-parametric tests for nominal variables and such as desflurane, sevoflurane, and propofol. One-way analysis of variance was used to analyze the means of the three different medication treatments and continuous variables. The tables provided were very helpful to understand descriptive and statistical data.	There was not sufficient information about the study design and methods. There was control of the general anesthesia administration techniques, but the lack of setting, sampling and study design descriptions make it difficult to know of any possible confounding factors and threats such as attrition. There was no discussion about patient recruitment or team members training. There were no reports of a Cronbach alpha or interrater reliability. Researchers used different statistical models and descriptive tables were provided, but the result section failed to show specific details.	IB
White et al., 2003	Assessing the impact of discharging outpatients home directly from the PACU as an alternative to "PACU bypassing."	Assessing the impact of discharging outpatients home directly from the PACU as an alternative to "PACU bypassing."	Experimental: Pilot Study	1,380 adult outpatients initially: 428 patients in the regular PACU group and 952 patients included in the fast-track group.	Purposive sampling PACU patients at Zale Lipshy University Hospital (ZLUH).	Nominal: Patient PACU route to discharge.	Ordinal: Duration to discharge in minutes (ratio).	Descriptive Statistics- mean, standard deviation, median. Wilcoxon rank sum test-used to compare length of time in Phase I and Phase II recovery areas for those who were initially considered for the APCU discharge but were admitted to the "regular" PACU. Statistical significance was defined as P Value <.05.	Results: Of the patients admitted to the PACU fastrack, 88% were discharged home within 60 minutes and 12% were discharged from PACU within 88 +/- 12 minutes. No readmissions or complications after discharge were reported in this group. For the control group (428 patients) admitted to the regular PACU, recovery time was 38 +/- minutes and 61+/- 32in the stepdown unit.	Strengths: (1) The data is precise, easy to analyze, and clearly showed that changes to PACU routing via the fast track system were effective in decreasing time to discharge. (2) Data was collected over a lengthy time period (12 months) to include a wide variety of cases. 3) Patients with unintended complications from surgery or post operative complications were not included in the study, preventing the intended subject data to be skewed. (4) The study sample included all other PACU patients and was representative of the hospitals' entire PACU patient population. (5) The data distinguishes between medical, administrative, and patient related factors that contributed to failure of discharge within 60 minutes, allowing for better representation of data. (6) None of the fast-tracked discharged patients had to be readmitted after discharge.	Weaknesses: (1) Some of the excluded patients from this study (i.e patients with alzheimer's, limited mobility, or no available adult to take the patient home) are problems that all hospitals face, and this subset of the population could have been further studied. (2) Institutional cost saving of the fast-tracking pilot was not studied and could have greatly increased the gravitas of this study. (3) While the study briefly mentions the type of anesthesia used on each case, it should have included a more robust explanation of how that impacted discharge timing, as it mentions that 90% of the fast track patients received MAC technique, and that those receiving general anesthesia were more likely to be admitted to the "regular" PACU area which coincided with a higher percentage of delayed discharge. (4) There was no explanation of how to minimize the medical and nonmedical factors that contribute to a prolonged PACU stay.	II B

Figure 3: Data Analysis Table

		Variable Name	Variable Description and type of measure	Data Source	Possible Range of Values	Level of Measurement	Time Frame for Collection	Statistical Test	Decision Rule
Population or Event	**IV**: (in book referred to as descriptive variable)	Patient route through the PACU	Patient route to PACU Type: Structure Measure	PACU Management & records	0 = Current system No phase bypass PACU fast-track system 1 = Phase bypass PACU fast-track system	Nominal	3 months	None	N/A
	DV: (in book referred to as outcome variable)	Time to patient discharge from PACU	Time to patient discharge from PACU in minutes Type: Outcome measure	PACU patient records	0 - 500+ minutes	Ratio	3 months	Student t-test, Descriptive Statistics-mean /median/SD	Based on the literature: a decrease in time to patient discharge from PACU

Figure 4: BCA Worksheet

BUSINESS CASE with VALUE BASED CARE ASSESSMENT	
Proposed Title for Project/Initiative/Opportunity to Improve	
Implementation of a Post-Anesthesia Care Unit (PACU) Fast-Track Phase Bypass System.	
Opportunity Statement	
Improving patient flow through the PACU will decrease discharge delays that are caused by inefficiencies in the current system. A Phase Bypass system can rapidly assess postoperative patient status and will be able to predict and deploy proper resources, staffing, and monitoring needs of the patient, eliminating current system redundancies. Implementation of a phase bypass system in the PACU at WRNMMC will decrease average length of stay in the PACU, improving patient satisfaction and lowering costs related to delayed discharge.	
Business Opportunity/Objectives	
Macro objectives: 1. Decrease average patient time from PACU admission to discharge from the PACU 2. Reduce the hospital costs of delayed discharge and the increased staffing needed to cover delays 3. Eliminate redundancies in current system with improved patient care protocols **Micro objectives:** 4. Improve patient satisfaction 5. Improve staff satisfaction	
Potential Impact of the Initiative/Project	
1. Increased readiness a. Promotes an integrated system of readiness and health via continuous improvement projects that can be implemented at multiple DOD facilities. b. Patient outlook-Decreased time to discharge after surgery will increase patient satisfaction with their care **2. Better Care** a. Eliminating current system redundancies and decreasing time from PACU admission to PACU discharge improves patient and family satisfaction, as well as decreases stress on current staff by streamlining care. **3. Better Health** a. Improves health outcomes by minimizing adverse events such as hypoxemia and hypotension which can lead to delayed discharge and unexpected hospital admissions. **4. Cost efficiency and data collection** a. Data collection on average time from PACU admission to discharge with a phase bypass system as compared to current system, as well as current staffing needs vs staffing needs with phase bypass system for cost comparison. b. Decreased time to discharge with a phase bypass system is defined by time in minutes. The goal is to reduce the discharge time by approximately 30 minutes from the current system, which will reduce the dollars spent on delayed discharges from PACU in staffing, care minutes, and resource dollars c. Monthly data on PACU stay time sorted by surgery type and patient co-morbidities.	
Alternatives (courses of action) chosen for Analysis	
1. Implementation of a PACU Fast-Track Phase Bypass System (FTPB) 2. Level/intensity of patient monitoring needs in the PACU based on length of surgery 3. *"Status Quo"*: All patients being admitted to PACU receive the same nurse:patient ratio and are monitored the same way.	
Analysis of Alternatives	
Alternative 1:	Implementation of a PACU Fast-Track Phase Bypass System (FTPB)
Pros	**Cons**
1. Decrease length of PACU stay 2. Decrease number of delayed discharges 3. Increase staff capability 4. Decreased cost to hospital d/t reduced patient care time.	1. Need for major implementation policy change 2. Staff apprehension of more training and change in system 3. Risk of increase in adverse patient events such as hypoxemia and arterial hypotension (Kiekkas, et al. 2019).

Alternative 2:	**Increasing PACU nurse staffing**
Pros	**Cons**
1. More nurses will decrease nurse:patient ratio. 2. If nurses have less patients, they are more likely to accomplish tasks quickly. 3. Increasing staffing during busy hours would potentially decrease discharge delays.	1. Hiring more staff increases hospital costs in salary. 2. Requires the military to increase billets for every hospital, in an area that is already undermanned. 3. Mixed data on cost effectiveness vs decrease in delayed discharges.
Alternative 3:	*"Status Quo"*: Continue current practice of no analgesic with PIVC insertion
Pros	**Cons**
1. Does not require training or policy change 2. Already the standard of care. 3. Current system is mostly effective at maintaining functionality and turnover with patient load.	1. All patients receive the same level and ratio of nursing care regardless of needs. 2. Does not utilize staff capabilities to maximize throughput. 3. Industry standard of care exceeds current system capabilities.

Assumptions

1. The average discharge delay is 64 minutes, and the five most common reasons are; busy patient transporters (41%), delayed anesthesia assessment (36%), busy PACU nurses (15%), busy receiving floor (6%), and delayed radiology interpretation (2%)(Tessler et al., 1999).
2. 76% of PACU patients at hospitals that lack a Phase Bypass system have discharge delays (Tessler et al., 1999).
3. Delayed discharges from the PACU are found almost exclusively from 1000-1800 on weekdays (Cowie et al., 2012)
4. The average cost of a PACU patient minute is $11.55. (Enriquez et al., 2017)
5. The average cost of a delayed PACU discharge is 64 minutes x $11.55= $739.20 to the hospital (Enriquez et al., 2017, Tessler et al., 1999)
6. Data taken directly from S3 surgery scheduling system at WRNMMC-Walter Reed National Military Medical Center averages 1400 PACU patients per month.
7. Phase Bypass fast tracking systems decrease time to discharge, improve patient satisfaction, and reduce hospital costs. (Mamaril, 2000; White et al., 2003).

Recommendation and Rationale

Recommendation

Alternative 1-Implementation of a Phase Bypass system We recommend implementation of a Phase Bypass fast track system for the PACU at WRNMMC.

Rationale

Given that delayed discharges are found almost exclusively at times when the operating room is busiest from 1000-1800 on weekdays (Cowie et al., 2012), a more streamlined approach to care during these periods would have the most benefit. Walter Reed could have potentially saved $4,527,432 by eliminating delayed PACU discharges in 2019 and implementation of a phase bypass system using the White Fast Track Score could potentially allow for 88% of patients to be discharged within 60 minutes of PACU arrival. (White & Song, 1999). This system will provide a streamlined, cost efficient and evidenced based solution to WRNMMC's current PACU efficiency concerns.

Value Based Care - Investment Required by the Organization and the Associated "VALUE" or $ GAINED.

I. Quality projected based on:

Patient Related Benefit:	**Decrease PACU stay by 30 minutes**

1. Research shows that the average delayed PACU discharge adds 64 minutes of patient care time, and 76% of PACU patients are delayed when there is no phase bypass system. (Tessler et al., 1999) 2. Walter Reed averages 1400 PACU patients per month, and 16,800 per year, which means there are potentially 12,768 delayed discharges that total 817,152 minutes of excess patient stay. 3. When using a phase bypass system, 88% of patients can be discharged within 60 min of PACU admission. (White & Song, 1999). Assuming the average WRNMMC PACU stay is 90 minutes, our goal is to decrease PACU Stay by 30 minutes with implementation of the phase bypass system.	
Increased patient satisfaction: **1.** Assuming patient PACU safety satisfaction is 85%, we estimate a 10% increase satisfaction due to decreased PACU time stay.	**Increase patient satisfaction by 10%**
Financial Benefit: 1. The average cost of PACU stay per minute is $11.55. 2. Research shows that the average delayed PACU discharge adds 64 minutes of patient care time, and 76% of PACU patients are delayed when there is no phase bypass system. 3. Walter Reed averages 1400 PACU patients per month, and 16,800 per year, which means there are potentially 12,768 delayed discharges that total 817,152 minutes of excess patient stay. 4. 817,152 minutes x $11.55 per pacu minute = $9,438,105.6 as the yearly cost of delayed discharges. 5. Pilot Program-One month trial with goal of reducing discharge delay minutes by 25%. 817,152 delay minutes per year /12 = 68,096 delay minutes per month. 68,096 x 25% = 17,024 minutes saved from pilot program process improvement. 17,024 x 11.55 per minute = 196,627$ recapture from reduction of delayed discharges 6.	**$9,438,105.6 in excess cost to hospitals per year** **Pilot Program Goals for cost recapture $196,627**
TOTAL	**1. $196,627 recapture from pilot program goal** **2. Increased Patient Satisfaction from 85 to 95%** **3. Decrease PACU length of stay by an average of 30 mins per patient for a minimum of 25% of patients**

II. Projected cost based on hourly salary:

1.Program Design and Development-Two SRNA's as POC and one CRNA as Faculty Supervisor-Approximately 200 hours for research, study, and protocol design.	**$ 40,000.00**

2. Staff Training-Approximately 40 RN's and 15 Medical Technicians. Each staff will require 3 hours of training.	**1.RN training cost: $4200.00** **2. Medical technician training cost: $540.00**
3. Pilot Program-Two principal investigators(20 hours each), Five PACU RN staff and 1 Medical Technician (10 working days of 8 hours each, for a total of 80 hours per staff members) 4. RN-35$/hr, Medical Technician 12$/hr, SRNA 50$/hr, CRNA 100$/hr.	**Pilot program cost:** **1.RN salary: $14,000.00** **2. Medical Technician salary: $480.00**
TOTAL	**$59,220.00**

Total program cost	**$59,220.00**
Total Pilot program recapture	**$196,627.20**

Risks and Mitigation Plan	
Risks	**Plan**
1. Leadership and staff resistance to change	- Provide details about the project and educate leadership and staff about the potential benefits. - Establish a standard operating procedure.
$2. Staff non-compliance with project guidelines	- Implement a mandatory orientation to describe the project and benefits. - Provide ongoing education and project updates, its benefits and importance to adhere to the project guidelines. - Seek support from leadership.
3. Lack of leadership support	- Conduct initial project meetings ensuring all the stakeholders are present to receive the necessary information.

Implementation Plan		
Phase 1:	Conduct meta-analysis of conduct literature research for best available evidence and practices	
Milestone Description:	Conduct meta-analysis of conduct literature research for best available evidence and practices on Phase Bypass systems to determine methodology and procedures on implementation of fast-tracking systems. Gather institutional data for baseline comparison	
Deliverables	Due Date	Accountable Person
Measurable Goal: **Gather 10-15 documents on phase bypass systems and do meta-analysis of data.**	One month	All members of the EBP team
Resources Needed		
1. Access to research databases and adequate time for article review. 2. Allow for time with senior research personnel to ensure validity of research criteria and prevent extraneous data from inclusion.		
Expected Level of Benefit		
This research will lay the foundation of the entire project. Without clear direction and evidence-based research, this project will fail to materialize an achievable goal and greatly delay progress.		
Phase 2:	Dissemination of findings leadership and key stakeholders.	
Milestone Description:	Conduct a meeting with the anesthesia, PACU, and OR services leadership, nursing and providers staff to disseminate our research findings. Measurable goal: Leadership approval to proceed with the project.	
Deliverables	Due Dates	Accountable Person

Measurable Goal: 1. Develop a concise and professional presentation. **2.** Leadership approval to proceed with the project.	Two months after phase 1 is finalized. Total at 3 months	Site POC/All members of the EBP team
Resources Needed		
1. Assigned time to gather information and develop the presentation 2. Assigned a time to ensure all the stakeholders are present during the presentation 3. Mitigate risk by ensuring continuous communication with phase director to ensure the presentation meets guidelines		
Expected Level of Benefit		
The project objectives and benefits ensure that stakeholders are informed and make an educated decision with final project approval.		
Phase 3:	Develop and conduct a training plan for PACU staff. Create standard operating procedure for Phase Bypass. Conduct a Pilot implementation program to measure effectiveness.	
Milestone Description:	Develop a simplified and quick training program for PACU staff to teach concept, procedure, and implementation of the new PACU Fast-Track system. Conduct a small (10% of daily PACU patients) pilot trial to measure effectiveness and ensure protocol is working as intended.	
Deliverables	Due Dates	Accountable Person
Measurable goals: SOP for Fast Track Training manual/PowerPoint for staff education	One month of training following leadership approval to proceed to allow for multiple training sessions, One month for pilot trial. Total at 5 months	Principal POC/Investigator, in accordance with PACU service chief.
Resources Needed		
1. Time for POC to organize and draft training manuals/SOP. Buy-in from PACU service chief to encourage attendance at training sessions. 2. Time to observe PACU staff working patients into the pilot program for question and answer during initial trial. Utilization of PACU resources and staff during pilot program. 3. Mitigate risks by asking for high speed and motivated staff volunteers to conduct pilot.		
Expected Level of Benefit		
If the Pilot program can be shown as effective and decrease patient stay time, this will increase staff "buy-in" to participate in system change for the PACU. Having full staff training sessions and a written SOP will achieve clarity on project goals. Benefits of program will be proven/disproven by the pilot program and guide full implementation, adjustment, or dismissal of project goals.		
Phase 4:	Implementation of the phase bypass pilot program	
Milestone Description:	Staff has already been trained and is ready to implement the bypass protocol.	
Deliverables	Due Dates	Accountable Person
100% of the assigned phase bypass groups initiate the protocol.	Two weeks after everyone has been trained and leadership is aware and has agreed with the implementation date.	Principal POC/ investigators, phase II director, and participating staff.
Resources Needed		
1. PACU bed availability, phase bypass tool/ forms (previously developed by investigators), available staff, and investigator time availability to monitor implementation. 2. Department leadership involvement to ensure compliance.		
Expected Level of Benefit		

Project implementation is finalized, and data is available for analysis.		
Phase 5:	Data analysis and program evaluation	
Milestone Description:	Raw data analysis of the phase bypass protocol	
Deliverables	Due Dates	Accountable Person
Measurable goal: Decreased PACU stay by at least 30 minutes. Deliverables Due Dates Accountable Person 100% of the data/results is available for analysis.	Three months after phase bypass protocol implementation	Principal POC/ investigators and phase II director.
Resources Needed		
1. Assigned time to analyze the data and write the results for dissemination.		
Expected Level of Benefit		
Finalized results rejecting or supporting the initial hypothesis that implementing a PACU phase bypass reduces PACU length of stay, increases patient satisfaction, and increases annual savings.		

Figure 5: The Iowa Model Revised: EBP to Promote Excellence in Healthcare.

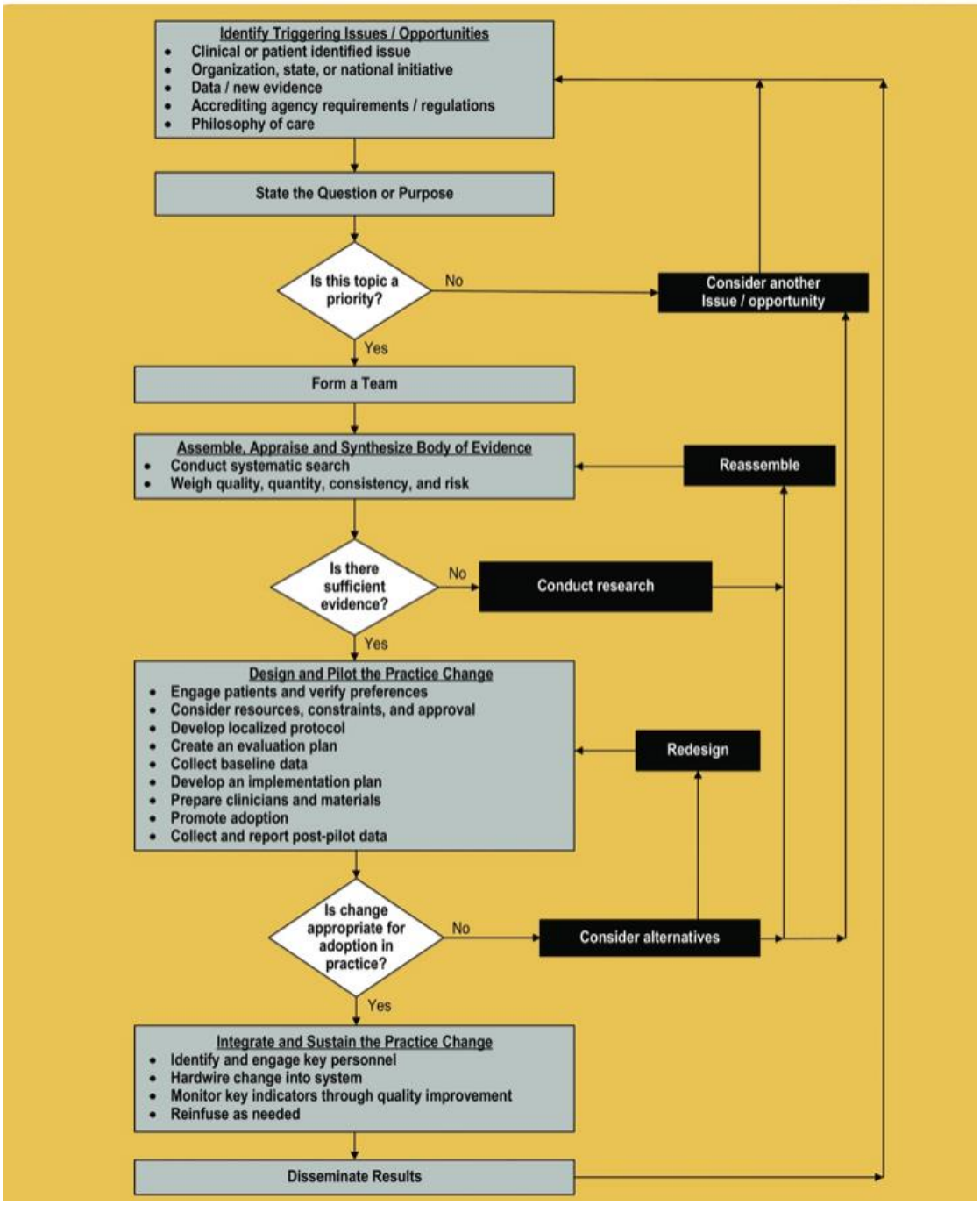

Figure 6: Project Timeline

Year 1: 2019 - 2020												
Activity/Month	**May 19**	**Jun 19**	**Jul 19**	**Aug 19**	**Sep 19**	**Oct 19**	**Nov 19**	**Dec 19**	**Jan 20**	**Feb 20**	**Mar20**	**Apr 20**
Research											X	X
Problem synthesis and evidence table											X	X
Write-up and synthesis of the problem											X	X
Table of the evidence appraisal of the solution											X	X
Write-up of synthesis of selected EBP solution											X	X
Draft of preliminary data analysis plan (worksheet)											X	X
Project Planning											X	X

Year 2: 2020 - 2021												
Activity/Month	**May 20**	**Jun 20**	**Jul 20**	**Aug 20**	**Sep 20**	**Oct 20**	**Nov 20**	**Dec2 20**	**Jan 21**	**Feb 21**	**Mar 21**	**Apr 21**
Project Planning	X	X	X	X	X	X	X	X	X	X	X	X
Business Case Analysis					X	X	X	X				
BCA presentation							X	X				
DNP written plan submission							X	X				
Project research	X	X	X	X	X	X	X	X	X	X	X	X
IRB											X	X
Dissemination of findings leadership and key stakeholders										X	X	X

Year 3: 2021 - 2022												
Activity/Month	**May 21**	**Jun 21**	**Jul 21**	**Aug 21**	**Sep 21**	**Oct 21**	**Nov 21**	**Dec 21**	**Jan 22**	**Feb 22**	**Mar 22**	**Apr 22**
Implementation of the phase bypass pilot program.					X	X						
IRB	X	X	X									
Data analysis and program evaluation.						X	X	X				
Raw data analysis of the phase bypass protocol.						X	X	X				
Dissemination of findings								X	X	X	X	X
Presentation draft										X		
Presentation										X		X

Appendix B: Team Mentor Agreement Form

Appendix C: Daniel K. Inouye Graduate School of Nursing
DNP Project Team Mentor (Committee Membership) Agreement Form

DOCTOR OF NURSING PRACTICE PROJECT
DNP Project Clinical Question and Team Mentor (Committee Membership) Agreement Form

Graduation Year: 2022 **Phase 2 Site(s) Name:** WRNMMC

Name(s) of DNP Project Student Team:

1.	Maj Adriana Vargas-Geminiano	AGCNS ☐	FNP ☐	PMHNP ☐	RNA ■	WHNP ☐
2.	Capt Thomas Vieten	AGCNS ☐	FNP ☐	PMHNP ☐	RNA ■	WHNP ☐
3.		AGCNS ☐	FNP ☐	PMHNP ☐	RNA ☐	WHNP ☐
4.		AGCNS ☐	FNP ☐	PMHNP ☐	RNA ☐	WHNP ☐
5.		AGCNS ☐	FNP ☐	PMHNP ☐	RNA ☐	WHNP ☐
6.		AGCNS ☐	FNP ☐	PMHNP ☐	RNA ☐	WHNP ☐

The tentative title of the DNP Project Proposal for this student group is:

Post-Anesthesia Care Unit Bypass Initiative

Committee Approved DNP Project Clinical Question:

In adult outpatient surgery patients, how does a post-anesthesia care unit (PACU) bypass system compared to usual practice of no PACU bypass system, as measured by LOS for post-operative patients over a one-month period of time?

Names of DNP Project Team Mentors: LCRD Douglas Johnson

I agree to serve as a member of the DNP Project Team (Team Mentors) for the above DNP Student Project Team. As a Project Team Mentor, I agree to the duties and responsibilities outlined within the DNP Project Manual which include but are not limited to the provision of consultation and guidance supporting the entire DNP project journey and to ensure the DNP project is of sufficient rigor and demonstrates doctoral level scholarship to meet the requirements for USUHS GSN graduation.

NOTE: You may have 3-4 DNP Team Mentors [committee members including your DNP Senior Mentor (Chair)]. The Phase II Site Director may also be a member of the group, as well as other USUHS faculty or others who may serve as content experts. All non-USUHS faculty selected as a Team Mentor must be approved by the DNP Project Director.

Senior Mentor (Chair):	LCRD Douglas Johnson	Signature: JOHNSON.DOUGLAS.TIMOTHY.1024141973 Digitally signed by JOHNSON.DOUGLAS.TIMOTHY.1024141973 Date: 2021.01.15 10:57:05 -05'00'	Date:
Team Mentor (Member):		Signature:	Date:
Team Mentor (Member):		Signature:	Date:
Team Mentor (Member):		Signature:	Date:

Form Version: 4 December 2020

Appendix C: CITI certificate

CITI PROGRAM

Completion Date 16-Mar-2020
Expiration Date 16-Mar-2023
Record ID 35961961

This is to certify that:

Adriana VargasGeminiano

Has completed the following CITI Program course:

OUSD P&R Human Research (Curriculum Group)
Research Subjects (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Office of the Under Secretary of Defense (Personnel and Readiness)

CITI Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wea2aff23-5528-4c25-b264-eeae15684c4d-35961961

CITI PROGRAM

Completion Date 16-Mar-2020
Expiration Date 16-Mar-2023
Record ID 35961954

This is to certify that:

Thomas Vieten

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

OUSD P&R Human Research
(Curriculum Group)
Research Subjects
(Course Learner Group)
1 - Basic Course
(Stage)

Under requirements set by:

Office of the Under Secretary of Defense (Personnel and Readiness)

CITI Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?wa85e91c7-58b4-4926-9335-a83444e17065-35961954

Appendix D: USU VPR Form 3202N

USU
Uniformed Services University

OFFICE OF RESEARCH
4301 JONES BRIDGE ROAD
BETHESDA, MAYLAND 20814
PHONE: (301) 295-3303; FAX: (301) 295-6771

NOTICE OF PROJECT APPROVAL

Change Number: Original

VPR Site Number:	GSN-61-11775
Principal Investigator:	Vargas-Geminiano, Ardina
Department:	Graduate School of Nursing
Project Type:	Student
Project Title:	Post-Anesthesia Care Unit Bypass Initiative
Project Period:	3/2/2021 to 3/2/2022

Assurance and Progress Report Information:

Name	Sup	Approval Type	Status	Approved On	Forms Received
Progress Report	0			To be Submitted	N/A

Remarks:
This Notice Of Project Approval has been reviewed and approved. Please remember that you must submit a final Progress Report (Form 3210) upon completion of this project.

Questions regarding this approval should be directed to the following person in the Office of Research:
Sharon McIver, (301) 295-9814.

RANDOLPH.TOYA.V.1242107698 Digitally signed by RANDOLPH.TOYA.V.1242107698 Date: 2021.03.02 16:13:19 -05'00'

Mark G. Kortepeter, MD, MPH Date
FACP, FIDSA, FASTMH
COL (R) MC US Army
Vice President for Research
Uniformed Services University of the Health Sciences

cc: File
Dr. Kennett Radford
Laura Taylor

Appendix E: MTF IRB/PI Letter of Determination

19 July 2021

From: CHIEF, DEPARTMENT OF RESEARCH PROGRAMS, WALTER REED NATIONAL MILITARY MEDICAL CENTER, BETHESDA, MD 20889

To: Maj Adriana Vargasgeminiano, RN

Subject: Command Start Letter for Project IRB# WRNMMC-EDO-2021-0687, title of: *"Post-Anesthesia Care Unit Bypass Initiative"*

1. Congratulations! You have been granted approval to conduct your project at Walter Reed National Military Medical Center, Bethesda (WRNMMC).

2. Your project was approved after administrative review by an Exempt Determinations Officer (EDO). Study-specific agreements and EDO stipulations have been met, or have been determined to be unnecessary based on your study review.

3. You, as the study Principal Investigator (PI) are ultimately responsible for the development, conduct, and management of all aspects of the project, to include submitting an annual project status update and submitting modifications to your project through the electronic IRB (EIRB) system to the Department of Research Programs (DRP). It is also your responsibility to ensure all members of the project team (associate investigators, research coordinators and assistants, collaborators, consultants, mentors, etc.) are technically competent, have been properly trained, and are appropriately qualified to perform the procedures described in the project, and that they understand their roles and responsibilities according to the study protocol. An EDO must approve all modifications to the study protocol prior to implementation unless there is an immediate risk to subject safety. Immediate communication with the DRP is expected when this exception occurs. Examples of modifications to the protocol requiring prior approval from the EDO include, but are not limited to, a change to the onsite PI or addition of study team members, an increase in sample size, addition of other data points or data collection sites, sources of outside funding, or changes in the inclusion or exclusion criteria for study participation. All amendments, deviations, adverse events, or any other pertinent information must be submitted to DRP using EIRB as a new submission within this protocol.

4. If the collection and/or analysis of data for your project are to continue beyond one year, you must submit an annual report. Otherwise, your project will be non-compliant with local command rules and regulations. Please allow adequate time (minimum of 45 days) for review and approval of your annual update to avoid non-compliance.

5. You may be sent an automatic reminder from the EIRB system or a DRP staff member approximately 90 and/or 60 days before your annual report is due. This is a courtesy email; ultimately it is your responsibility as the study PI to maintain your project files and know how and when your submissions are due to the DRP. All study-related materials should be maintained

in a secured, locked location or within password protected computer files with access only by study team members.

6. Promptly report all unanticipated problems involving risks to subjects or others (UPIRSO), related serious adverse events (SAE), or any project deviations that affect subjects' safety or rights and/or the integrity of the study to the Human Protections Administrator, Robert Roogow and/or Chief of the Department of Research Programs, CDR Ling Ye.

7. If you are deployed or leave WRNMMC, you must transfer the project records to a new PI and submit the modification to change to do so PRIOR to leaving WRNMMC. Custody of all original data must be retained by the division in which they were generated. An investigator who moves to another institution may submit a written request to the Director, WRNMMC, to remove copies of the data from WRNMMC. This request must contain an itemized description of the data and must specify where the data will be located in the future. These requests will be submitted through DRP.

8. All products of dissemination, including publications, abstracts, manuscripts, case reports, presentations, and book chapters that report on the results or conduct of a WRNMMC approved protocol; include WRNMMC-assigned personnel or patients as subjects; or reports citing WRNMMC in the title or byline) or in any way reflect a WRNMMC affiliation must be submitted for WRNMMC publication clearance and approval before publication or presentation.

9. If your project involves standardized information gathering, such as a survey, you may be subject to DoDD 8910 (Information Collection and Reporting) as well as DoDI 1100.13 (Surveys of DoD Beneficiaries). You as the PI have the responsibility to comply with any applicable rules or clearance procedures to assure your approval is not rescinded by higher level review. (A survey is defined as a systematic data collections, using personal or telephonic interviews, or self-administered questionnaires, in paper or digital format, from a sample or census of 10 or more persons as individuals or representatives of agencies that elicit attitudes, opinions, behavior, and related demographic, social, and economic data to identical questions that are to be used for statistical compilations for research or policy assessment purposes.)

10. Please do not hesitate to contact DRP for assistance (dha.bethesda.j-11.list.drp-leadership@mail.mil, 301-295-8239) or the undersigned at ling.ye.mil@mail.mil with questions or concerns.

YE.LING.1454821064 Digitally signed by YE.LING.1454821064 Date: 2021.07.19 15:40:06 -04'00'

LING YE, DDS, PHD

CDR, DC, USN

CHIEF, DEPARTMENT OF RESEARCH PROGRAMS

Appendix F: PAO Clearance/Level of Dissemination Classification

Approval complete

on Apr 5, 2022

Adriana Vargas-Geminiano approved
Apr 5, 4:30 PM

"Thank you, "

USU Pub Clearance approved
Apr 4, 12:42 PM

Kenneth Barber approved
Apr 4, 11:31 AM

Seibert, Diane approved
Apr 4, 11:30 AM

Kenneth Barber requested approval from Adriana Vargas-Geminiano, USU Pub Clearance, Kenneth Barber, Seibert, Diane
Apr 4, 11:03 AM

"I submitted on behalf of Major Vargas-Geminiano, WRNMMC"

Appendix G: DNP Project Completion Verification Form

Appendix G: Daniel K. Inouye Graduate School of Nursing
DNP Project Completion Verification Form

DOCTOR OF NURSING PRACTICE PROJECT
Completion Verification Form

The DNP Project titled: Post-Anesthesia Care Unit Bypass Initiative

was completed at Walter Reed National Military Medical Center by the following student(s):

(Student Name)	*(Digital Signature)*
Maj Adriana Vargas-Geminiano	VARGASGEMINIANO.ADRIANA.1393929916 Digitally signed by VARGASGEMINIANO.ADRIANA.1393929916 Date: 2022.04.24 11:20:53 -04'00'
Captain Thomas Vieten	VIETEN.THOMAS.EDWARD.1016631864 Digitally signed by VIETEN.THOMAS.EDWARD.1016631864 Date: 2022.04.24 14:28:17 -04'00'
	[redacted]
	[redacted]
	[redacted]

The DNP Practice Project Team verifies that the following components of the DNP project, accomplished by the above students, is of sufficient rigor and demonstrates doctoral level scholarship to meet the requirements for USUHS GSN graduation:

- Presentation of DNP project to the leadership/stakeholders at the Phase II Site,
- Abstract/Impact Statement (*Appendix F*), and
- DNP Project written report (*Appendix E*).

Verified by:

(type name)	*(Digital Signature)*	
LCDR Lauren Suszan	LCDR Lauren Suszan, DNP, CRNA Digitally signed by LCDR Lauren Suszan, DNP, CRNA Date: 2022.04.27 20:19:43 -04'00'	Senior Mentor
	[redacted]	Team Mentor
	[redacted]	Team Mentor
LCDR H. Lang	LANG.HENRY.JAMES.1093123979 Digitally signed by LANG.HENRY.JAMES.1093123979 Date: 2022.04.28 15:58:31 -04'00'	Team Mentor & Phase II Site Director

***For RNA Students only** - add the following additional signature for final verification of project completion:*

LCDR Kenneth Barber	BARBER.KENNETH.DOUGLAS.1177263644 Digitally signed by BARBER.KENNETH.DOUGLAS.1177263644 Date: 2022.04.29 07:21:58 -04'00'
RNA Project Director *(type name)*	*(Digital Signature)*

Form Version: 4 December 2020