

Preventing Cross-Contamination between the Patient and Anesthesia Workstation

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## **Abstract**

**Phase II Site:** Travis Air Force Base, California

**Project Title:** Preventing Cross-Contamination between the Patient and Anesthesia Workstation

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**Background, Problem/Issue:** Hospital-acquired infections (HAI) cost billions of dollars in additional healthcare costs to treat infections. HAI's also result in additional days spent in the hospital by patients, which results in additional risk for complications due to increased length of stay. Delayed return to work and home is also a concern with a loss of productivity by workers. For the military, an increase in the length of stay by warfighters means a decrease in wartime readiness. This directly affects military medicine and readiness as one of the core tenets is returning warfighters to the battlefield.

**Clinical Questions:** Among anesthesia providers at DGMC, what is the impact of a training video on perceptions of the utility of double gloving during airway induction?

**Project Design:** This evidence-based project used an educational video to demonstrate the benefits of using a double-gloving technique to prevent gross and cross contamination of the anesthesia workstation during airway manipulation. The video's effectiveness in changing anesthesia providers' perceptions was evaluated with pre- and post-questionnaires.

**Analysis of Results:** A short and direct educational video has mild to moderate efficacy in altering anesthesia provider perceptions regarding a double gloving technique's ability to decrease cross-contamination.

**Implications for Practice/Organizational Impact:** Decreasing cross-contamination in the operating room can decrease the rate of hospital-acquired infections, which reduces cost, length of stay, and time warfighters are not on the battlefield. Double-gloving is the most efficient and

practical way to decrease cross-contamination of the anesthesia workstation. Short and direct educational videos are a viable medium for altering anesthesia practice and perceptions. Given the limited sample size, this project would serve as a commendable pilot study for broader dissemination.

## **Introduction**

Anesthesia providers constantly contact the patient and the anesthesia workstation in the operating room (OR). This relationship increases the risk of spreading contaminants across multiple surfaces. Hand hygiene effectively reduces contamination; however, compliance remains inadequate (Paul et al., 2019). A typical hour of surgery can yield, on average, 149 hand-hygiene opportunities for the anesthesia provider. The lowest hand hygiene rates and highest cross-contamination risk occur during the anesthesia induction phase (Rowlands et al., 2014). Airway manipulation during induction is a critical event and many tasks must be completed quickly for the patient's safety. Research consistently identifies the practitioner's hands as the primary reservoir for bacteria transmission (Paul et al., 2014). An intervention would need to be efficient and reproducible during time critical, induction and airway manipulation to impact contamination. A decrease in the amount of cross contamination can benefit both the patients and healthcare organizations. This project proposed to evaluate the effect of an educational intervention and the perception of anesthesia providers on double-gloving for cross-contamination prevention.

## **Problem Synthesis**

Hospital-acquired infections (HAI) are infections acquired during a patient's hospital stay that were not present at the time of admission. HAIs significantly contribute to deaths, increased costs, and length of stay (LOS). The Center for Disease Control (CDC) estimated that in 2015 there were 687,000 HAIs in U.S. acute care hospitals, with 72,000 of those patients having died (CDC, 2021). LOS has increased by as much as five days due to HAIs (Ohannessian et al., 2018). The direct cost of HAIs to hospitals ranges from \$28 billion to \$45 billion (Scott, 2009). Anesthesia workstations pose a particular concern for contamination and transmission of

pathogens despite the widespread belief that surgical suites are sterile (Loftus et al., 2018). During induction, an anesthesia provider's right hand is placed in the mouth to scissor open the mouth and the right hand will touch adjustable pressure limiting valve, reservoir bag, oxygen flow knobs, and inhaled anesthesia canister or intravenous pump. Airway manipulation is a critical moment requiring sequential tasks, efficiently. In the case of the anesthesia workstation, bioburden and transmission of pathogens occurs within one case and then horizontally between cases, placing patients at risk for HAIs.

Contamination of the anesthesia workstation can occur in as few as four minutes with five gram-negative pathogens encountered routinely on the anesthesia workstation: *Acinetobacter*, *Pseudomonas*, *Moraxella*, *Brevundimonas*, and *Enterobacter*, which have been implicated in HAIs and are associated with higher morbidity and mortality (Loftus et al., 2015). *Staphylococcus aureus* sequence typing has indicated the intraoperative environment as the source of HAI from contamination (Loftus et al., 2018), and *Acinetobacter* species are problematic in multidrug-resistant organisms in military orthopedic infections (Murray et al., 2011). To prevent HAIs, anesthesia practices that directly impact the likelihood of workstation contamination and the spread of infections in the operating room need consideration.

### **Relevance to Military Nursing**

The relevance to military nursing in this project stems from the intense use of Certified Registered Nurse Anesthetists (CRNA) in deployed and austere environments. Delivering anesthesia in these environments may present the same initial burdens and requirements as stateside locations, but also additional unforeseen challenges such as limited staff, unfamiliar microorganisms, finite resources, and even enemy attacks. Our warfighters deserve demonstrated best practices regardless of whether they are within the confines of controlled

environments, such as Military Treatment Facilities (MTFs), or a makeshift building of opportunity in Africa. Undoubtedly, these stressful environments test our ability to limit harm to an inherently vulnerable group in less-than-ideal conditions through daily safe practices such as double gloving.

The Defense Health Agency (DHA) Quadruple aims are better care, better health, increased readiness for a lower cost. Double gloving is in alignment with the DHA as it is one of the most practical, low-cost way to prevent HAIs by anesthesia providers.

### **PICOT/Clinical Question**

Among anesthesia providers at DGMC, what is the impact of a training video on perceptions of the utility of double gloving during airway induction?

### **Search Strategy/Results/Solution**

A thorough literature search concerning the problem and possible solutions was conducted, thus yielding four possible interventions addressing the problem. The four interventions evaluated were double gloves during induction, a non-permeable one-time use barrier encapsulating the anesthesia workstation, the use of ultraviolet radiation (UV), and hand hygiene improvement by the anesthesia provider.

The first intervention consisted of two studies evaluating an impermeable workstation barrier device by Hunter et al. (2017) in a simulated environment and then by Biddle et al. (2018) in live operating rooms. Hunter et al. (2017) performed a prospective, randomized controlled trial with 42 participants. A substance with a fluorescent marker was placed in the mannequin's mouth before the procedure. This also occurred without the participants' knowledge. Afterward, a black light was used to evaluate 14 targets. The targets were graded as either

contaminated or not contaminated. This study showed a significant reduction of contaminated sites between the barrier and control groups, which was 44.8% down to 19.4%.

Biddle et al. (2018) evaluated studies performed in live operating rooms and used culture sampling of two general operating rooms. The only difference between the two rooms was the independent variable (clear non-permeable covering of the anesthesia workstation). Culture swabs were obtained at the beginning and end of the operating period and evaluated using colony-forming units (CFU). This study showed a statistically significant reduction in the global density of CFUs, with a mean of 108 for the control group and 29.2 for the intervention group (Biddle et al., 2018). These two studies show promising results for decreasing cross-contamination between the patient and the anesthesia workstation.

The second intervention evaluated UV light to clean the anesthesia workstation. Nottingham et al. (2017) created a randomized controlled trial measuring the effectiveness of a mobile UV device. This study employed mobile devices in operating rooms with inoculated materials placed on selected work area points. The previously contaminated points showed a 2 log<sub>10</sub> CFU reduction compared with untreated controls. The study was conducted in simulation conditions and yields a reduced validity. Another weakness is testing bioburden reduction in preplaced material vs. analyzing naturally present organisms. The UV decontamination run times average between 22 and 55 minutes per session and require personnel to leave the room during operation. This intervention is impractical as it would render the facility incapable of meeting the established DOD standard of 30-minute turnover between cases, and it was excluded as a viable option for implementation.

The third intervention examined was hand hygiene teaching. A study by Paul et al. (2019) evaluated hand hygiene compliance by a pre-post design using an educational

intervention on hand hygiene for anesthesia providers and increasing access to hand hygiene options. This study focused on increasing hand hygiene compliance and anesthesia providers have low compliance. The results were as follows: overall compliance with hand hygiene was 1.4% pre-implementation (n = 6), 43.1% post-implementation (n=186), and 37.9% 60 days post-implementation (n = 164) (Paul et al., 2019).

The fourth intervention for this project is double gloving for initial airway management and induction. Studies conducted by Birnbach et al. (2015) were differentiated by critical evaluation of sheathing the laryngoscope blade in a glove as one of the interventions opposed to single vs. double gloving. Three of these studies were performed in simulated environments, and one in a functioning operating room environment. Birnbach et al. (2015) used numerous sites contaminated with fluorescent markers and yielded a reduction of  $5.0 \pm 0.7$  ( $P < 0.001$ ) from  $20.3 \pm 1.4$  when comparing the use of double and single gloves, respectively. Birnbach et al. (2015) again used this intervention by adding one group sheathing the laryngoscope handle and blade in a glove immediately after intubation. The results of this study demonstrated that for the 18 environmental sites, ultraviolet light detected fluorescence on an average of 13.2 (95% confidence interval, 11.3–15.6) sites under the single-glove condition, 3.5 (2.6–4.7) with double gloves, and 0.5 (0.2–1.0) with double gloves with sheathing. Biddle et al. (2016) used a randomized clinical trial in a simulated environment, illuminating results where a single-glove group contaminated an average of 16.0 discrete sites compared with the double-glove group (7.6 discrete sites).

### **Focus Areas**

After a thorough literature review and consideration for the unique needs of MTFs, double gloving was chosen for the implementation strategy to best prevent cross contamination

of the anesthesia workstation. Double gloving had the highest probability of satisfying the DHA's Quadruple Aims, which focus on safety, cost, and quality. UV light decontamination was excluded due to the time requirement, cost of units, and additional equipment for deployment packages. Barrier devices, while promising, were excluded for similar reasons (additional cost and unreliable availability in deployed areas). Additional hand hygiene education has been employed and depends upon oversight and observation for compliance. Simply relying on hand hygiene is insufficient to prevent cross-contamination between the patient, provider, and anesthesia workstation. Double gloving during intubation is a cheap, highly effective, and easily reproducible intervention to reduce cross-contamination based on all available evidence.

### **Business Case Analysis**

Investing in appropriate evidence-based measures to decrease cross contamination between the patient, provider and anesthesia workstation will lower expenditures related to treating gross contamination. The Covid-19 pandemic has highlighted the need for optimizing policies and procedures to enhance infection control measures. The best practice initiative of utilizing double gloving during airway manipulation is supported by many benefits. This practice will lead to a decrease in gross contamination between the patient and anesthesia workstation. With a decrease in infections patient satisfaction scores will improve. DGMC will maintain its Joint Commission accreditation by subscribing to the compendium of strategies to prevent healthcare associated infections in an acute care environment. This initiative will also align practices with recommendations from both the American Society of Anesthesiologists and the American Association of Nurse Anesthesiology.

## **Organizing Framework**

The newly revised 2022 John Hopkins Evidence-Based Practice Model will provide a structural framework (Practice question, Evidence, Translation) to summarize, synthesize and translate this project's findings (Dang et al., 2021). This model was chosen due to its simple yet powerful use of three phases: the development of a practice question, a search for evidence to address the question, and translation of evidence to clinical practice. This allows for a focused project to translate evidence-based interventions into meaningful bedside practice.

An appropriate PICOT question was built to vector an appropriate intervention based on collected evidence. High-quality evidence was gathered utilizing the selective search criteria. After initial synthesis of evidence and findings, an action plan was created to provide an implementable intervention for anesthesia providers. The double gloving technique was identified as the practice setting-specific recommendation. The Johns Hopkins Evidence-Based Practice Model provided a framework for subsequent publication findings after analysis of results and stakeholder reported their concerns.

## **Project Design/General Approach**

This evidence-based assignment was a quality improvement venture utilizing pre- and post-education evaluations to assess the impact of double-gloving education on staff. The likelihood of each staff member implementing and recommending double gloving during airway manipulation was also assessed. We created a video comparing the spread of germs during both single gloving and double gloving during airway manipulation. All participating providers were asked to fill out a pre- and post-questionnaire. The participants were also allowed to perform airway manipulation on a mannequin previously treated with a solution that would allow us to

track the spread of germs. All participants were either Anesthesiologists or CRNAs at David Grant Medical Center.

### **Setting and Population**

Located in between San Francisco and Sacramento, CA, at Travis Air Force Base, David Grant Medical Center (DGMC) is the flagship military treatment facility in the United States Air Force. This status affords the delivery of care to a service area comprising approximately 500,000 Department of Defense and Department of Veteran Affairs eligible beneficiaries within 17 counties covering 40,000 square miles. The current annual operating budget of approximately \$315 million permits the staffing of more than 2,500 personnel (646 active-duty officers, 933 enlisted personnel, 70 Individual Mobilization Augmentee (IMA) reservists, 311 civil service civilians, 270 contractors, 100 Veterans Affairs personnel, 70 Red Cross workers and 200 military retiree volunteers). Total annual patient encounters are 1.7 million (1,586 outpatient visits, 61 Emergency Department visits, 13 ED admissions, 156 dental appointments, 2 babies delivered, 20 patients admitted, 65 daily inpatients, 55 unique surgical procedures, and 16 operations daily). Additional resources at DGMC consist of \$1.6 Million Hemodialysis and \$610,000 Peritoneal Dialysis units, \$5.5 Million Joint Spine and Neurosurgery service, \$6.7 Million Joint Inpatient Mental Health Unit, \$5.7 Million Joint Radiation Oncology center, \$4.4 Million Robotically assisted hybrid cardiovascular operating room, and a hyperbaric chamber. This program's quality improvement education activities were concentrated on anesthesia providers delivering care in the Operating Rooms.

### **Procedural Steps**

- Finalize project design; garner faculty approval (December 2021)
- Pre Education observations and surveys (Jan 2022)
- Acquire necessary tools (Jan 2022)
  - Video production equipment
  - Black-light system and dye
- Create training materials (Feb 2022)
  - Video production and editing
  - Training day design
- Conduct training session (Mar 2022)
- Post Education observations and surveys (Apr 2022)

### **Analysis of the Results**

Overall data results show that anesthesia provider's perceptions of double gloving changed after viewing the video training. Although overall perspectives appeared to increase toward the intervention, gender and profession did appear to project different propensities in perception. Regarding question four, it is notable that physician anesthesiologists were entirely unswayed by the training, reporting no change in perception. Both questions 4 and 5 showed that males were less likely to report a change in practice or perfection. Once again, it should be noted that the sample size was limited, but there does appear to be variability in efficacy based on the provider's positions and gender. Questionnaire responses demonstrate that female CRNAs were more willing to shift their practice after an evidence-based training video. It should be noted that participants were not blinded to the nature of the study. As such, there is a potential for acquiescence bias.

This preliminary questionnaire data shows that females and CRNAs are more likely to change perceptions and practices based on this intervention. Therefore, male and physician anesthesiologists are less likely to have their perceptions changed by this training. A short and direct educational video does appear to have mild to moderate efficacy in altering anesthesia provider perceptions regarding double gloving techniques' ability to decrease cross-contamination. Educators and anesthesia staff leaders may benefit from utilizing this or similar training techniques to encourage perception or behavior change.

### **Potential Barriers and Dissemination Plan**

Potential barriers to adopting this recommendation are cost, buy-in, and continuity. The cost of this intervention will increase the number of gloves used, a negligible expense. Preconceived notions of the effectiveness of a small change can have a biased effect on providers' willingness to change their practice. The most significant hurdle will be provider buy-in and reluctance to change behavior. Gross contamination and cross contamination has been shown at the global level to link the provider's hands with aide of *Staphylococcus* sequence typing; however, there are no on-going surveillance at the local level (Loftus et al., 2018). Limited data directly linking a reduction in workstation contamination to a reduction in infections and care costs contribute to low implementation rates. A change in practice can be difficult to implement and maintain without motivated leadership, consistent continuity programs, and random surveillance. However, the recent pandemic has emphasized the importance of the adoption of strategies to prevent cross contamination, as a means to protect our patients and ourselves from inadvertent HAIs. Poor attendance to the training day and voluntary involvement in the educational training, both video and hands-on, impacted the overall reach of the project.

On a coordinated Training Day, *For The Love of Gloves*, was shown to anesthesia providers. The pre-questionnaire was filled out, video viewed, and post-questionnaire was filled out. Additionally, anesthesia providers had the opportunity to individually contrast contamination with the use of double vs single gloving with DAZO fluorescence.

### **Project Results**

The eleven completed questionnaires from the training day were collected and entered into a custom excel worksheet to facilitate statistical analysis. Post hoc analysis was completed with STATA/SE Version 17.0 software and the assistance of a biomedical statistician. Demographic results include gender, professional position, and experience. Regarding gender, 54% were male, and 45% were female. Professionally, 27% were physician anesthesiologists, and the remaining 73% were CRNAs. Experience levels were grouped into four categories based on years of clinical practice; 9% were within 1-2 years, 54% were 3-5 years, 27% were 6-9 years, and the final 9% were greater than or equal to 10 years.

The initial analysis focused on a comparison of pre- versus post-training perceptions. Pre-question three asked participants, “Do you think double gloving, in general, is an effective technique for prevention of cross-contamination?” The percentage of the sample who thought that double gloving was an effective technique (compared to being ineffective or neutral) was numerically higher after the training (8/11 or 73%) compared to before the training (i.e., 5/11 or 45%). A proportion test showed that this difference was not statistically significant ( $p > .05$ ), although the study was likely not adequately powered to detect statistical significance. At the request of team members, additional statistical analysis was applied to identify possible correlations between sex and professional positions. A comparison of responses based on gender showed that female participants reported an increase in efficacy from 60% to 100%, while males

only rose from 33% to 50%. A similar analysis of provider position showed that CRNA (n=8) perception rose from 50% to 75%, while physician anesthesiologists (n=3) rose from 33% to 66%.

Next, Pre-question four asked participants, "Do you think double gloving during airway placement, specifically, is an effective technique for preventing cross contamination?" The percentage of the sample who thought that double gloving during airway placement specifically was an effective technique (compared to being ineffective or neutral) was numerically higher after the training (7/11 or 64%) compared to before the training (i.e., 5/11 or 45%). A proportion test showed that this difference was not statistically significant ( $p>.05$ ), although the study was likely not adequately powered to detect statistical significance. Males' responses increased from 33% to 50%, while females' responses increased from 60% to 80%. From a professional perspective, physician anesthesiologists notably had no change in perception to question four, while CRNA's perception increased from 37% to 62%.

Pre-question five asked participants, "Do you recommend double gloving to your colleagues?" (PreQ4) versus "Will you recommend double gloving to your colleagues?" (PostQ5). The percentage of the sample who reported that they NEVER recommend double gloving to colleagues was numerically lower after the training (5/11 or 45%) than before the training (i.e., 8/11 or 73%). A proportion test showed that this difference was not statistically significant ( $p>.05$ ), although the study was likely not adequately powered to detect statistical significance. Male responses reflected no change (33% pre to 33% post). Female responses indicated a rise from 20% to 80%. Professionally, physician anesthesiologists demonstrated no change in response: 67% before and after. CRNA responses rose from 13% to 50%.

Finally, team members intended to compare questionnaire results between PreQ2 (“How often do you use double gloving during airway placement?”) and PostQ6 (“How often do you intend to implement double gloving in your practice?”). Unfortunately, the different wording in the questionnaire makes it challenging to create reliable contrast between the results. If we assumed that participants equated the two questions, results would show a significant drop in “never” responses from 54% to 27% and a rise in “at least sometimes” from 45% to 72%. Again, we must beware of drawing conclusions regarding the effects of training on the answer to this question since the questions were worded differently pre- vs. post-training.

### **Analysis of the Results**

Overall data results show that anesthesia providers' perceptions of double gloving changed after viewing the video training. Although overall perspectives appeared to increase toward the intervention, gender and profession did appear to project different propensities in perception. Regarding question four, it is notable that physician anesthesiologists were entirely unswayed by the training, reporting no change in perception. Both questions 4 and 5 showed that males were less likely to report a change in practice or perfection. Once again, it should be noted that the sample size was limited, but there does appear to be variability in efficacy based on the provider's positions and gender. Questionnaire responses demonstrate that female CRNAs were more willing to shift their practice after an evidence-based training video. It should be noted that participants were not blinded to the nature of the study. As such, there is a potential for acquiescence bias.

This preliminary questionnaire data shows that females and CRNAs are more likely to change perceptions and practices based on this intervention. Therefore, male and physician anesthesiologists are less likely to have their perceptions changed by this training. A short and

direct educational video does appear to have mild to moderate efficacy in altering anesthesia provider perceptions regarding double gloving techniques' ability to decrease cross-contamination. Educators and anesthesia staff leaders may benefit from utilizing this or similar training techniques to encourage perception or behavior change.

### **Organizational Impact/Implications to Practice & Policy**

The literature review demonstrated the effectiveness of the double-gloving airway management technique in reducing gross contamination of the anesthesia workstation. The education project demonstrated the effectiveness of a video presented to anesthesia staff as demonstrated by an increase in the favorable opinion of the practice in the post-video questionnaires compared to pre-video questionnaires. This change in behavior and practice will benefit patients as a reduction in contamination leads to a reduction in infection rates. This change in practice supports the DHAs Quadruple Aim model by reducing hospital stays, increasing readiness, and reducing the cost associated with treating infections.

### **Future Directions for Research and Practice**

Given the extremely small number of questionnaire responses and the training limited to a single health care facility, this project would be best viewed as a pilot study. While this video does appear to influence anesthesia providers' perceptions, soliciting questionnaire results from a larger population would be an essential precursor before publishing results or making broader recommendations. Further, implementers would be encouraged to modify the questionnaire to ensure that pre- and post-intervention questions match. Further training and questionnaires would provide additional information on the impact that gender and profession may have on a provider's response to such a training implementation.

Further, creating and disseminating similar training videos may yield exciting results regarding the elements that maximal influence provider perceptions. Variables to consider would be the length of the training videos, training content, actors involved, or regional/geographic influences on "practice culture" within a healthcare facility.

### **Conclusion**

The objective of this project was to determine the effectiveness of an educational video on the perceptions of anesthesia providers concerning a change in practice. Evidence shows that this intervention reduces gross and cross contamination of the anesthesia workstation. While there is no evidence to directly tie a reduction in cross-contamination of the anesthesia workstation to a reduction in hospital-acquired infections, any reduction in contamination is prudent for anesthesia providers to adopt and align with infection control recommendations. This project demonstrated that a small intervention such as a video shown on a training day could effectively change viewpoints concerning how providers practice. Therefore, we recommend other organizations try this education technique in their attempts to change perceptions and behavior, reducing gross and cross contamination of the anesthesia workstation.

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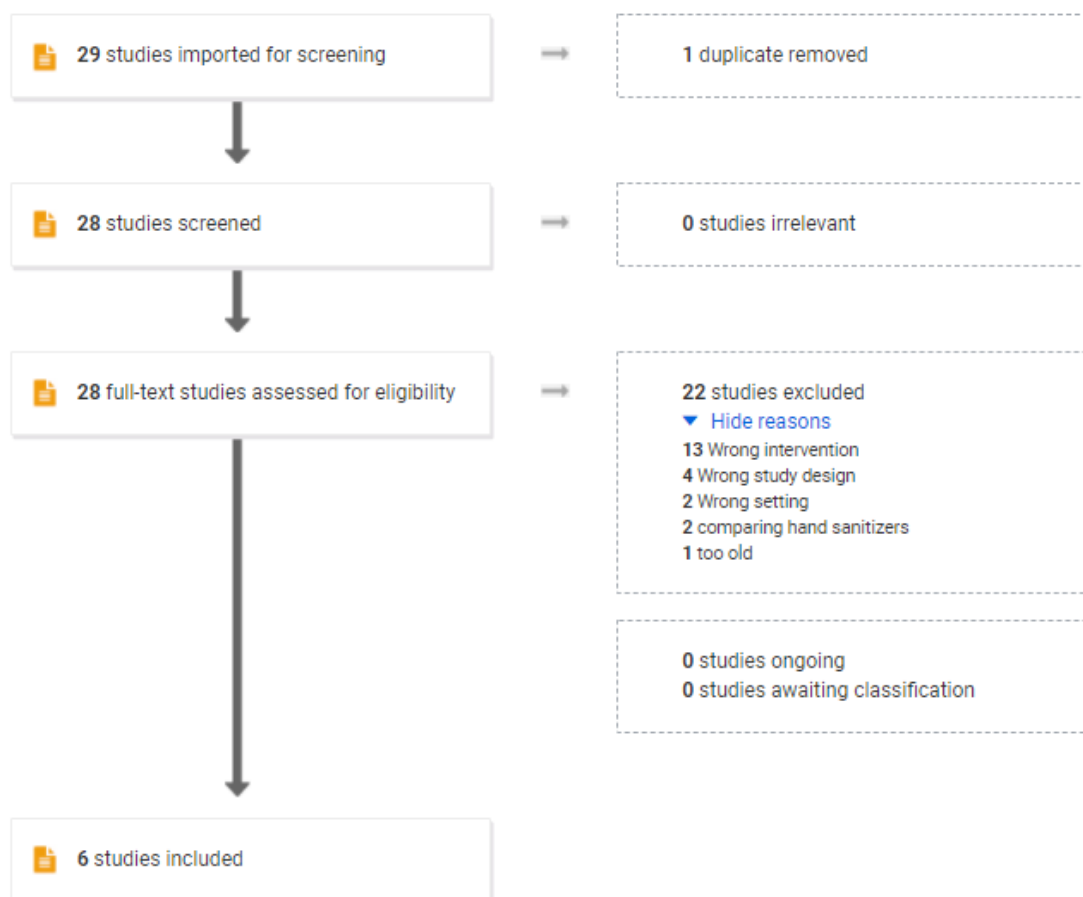
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## Appendices Appendix A

### *PRISMA Flow Diagram*



## Appendix B

## Evidence Table

| A                                | B   | C   | D  | E  | F   | G                                     |
|----------------------------------|---|---|--|--|---|---------------------------------------|
| 1st Author Name (Publication Yr) | Independent Variables AND LEVEL OF MEASUREMENT  | Dependent Variables AND LEVEL OF MEASUREMENT  | Results  | Strengths (how promoted internal/external validity)  | Weaknesses (biases; poorly controlled threats to internal/external validity)  | LEVEL OF EVIDENCE - using JHNEBP tool |
| Biddle, 2016                     | double glove, nominal   | presence of DAZO (nonpathogenic marker) with Woods light, nominal   | decrease in contamination with use of double gloving and removal after intubation but contamination still occurred   | single blinded, 2 member of team did a sweep w/ woods light, check list, photographs and 100% verified   | in a simulation environment, sampling, participants were told video taped for future didactic purposes  | level I                               |
| Jaffe, 2019                      | education on infection prevention & double gloving, nominal   | proper use of double gloving and contamination via woods light, nominal   | reduced contamination; $p < 0.001$ APL/vaporizer, breathing bag, and face mask   | longitudinal - same individual, pre and post 1 weeks and 1 month   | education impacted contamination - lack of standard sequence of events, no checklist, external - live environment, internal - complexity of cases   | level II                              |
| Bimbach, 2015 'double            | two pairs of gloves vs standard (one), nominal  | contamination in the operating room, DAZO fluorescence, nominal   | single glove 20.3 vs 5.0 contaminated sites with double glove  | sites selected a priori  | in a simulated environment, focus on one group of residents   | level I                               |
| Porteus, 2018                    | education bundle, nominal   | contamination of 20 pre selected sites with UV light measured in person and photos, nominal. video taken to measure time of hand hygiene with contamination | contamination decreased by score decreased by 4, 27% reduction between baseline and intervention. ventilator $p < 0.02$ & anesthesia care $< 0.001$  | simulated environment, control case type/time/number of personnel that may be present. UV light validated in simulation but not live patient environments. same investigator read a script. contamination scored in real time and with photos (difference of 0.16 scoring but not statistical significant) |   | level II                              |
| Plemmons, 2019                   | 30 mins of PP education @ anesthesia meetings, visual reminders, & emails, nominal  | audit tool, either contaminated or not, Nominal   | hand hygiene/double glove improved @ 3 weeks and no statistical difference 3 months. Medication practices unchanged and clean vs dirty work area separation statistically significant at 3 weeks and 3 months. self reporting of perceived and actual observation dissimilar (79.1% different) | focused on one group of providers and clear audit tool   | survey was given after the education, unable to be blind at 3 weeks and 3 months & Hawthorne effect may have had effect. 35 initial to 30 at subsequent observations not clear, no mention of power analysis or how sample size chosen. | level II                              |
| Bimbach, 2015 'sheathing         | random assignment to 3 different groups: ultimately compare 1 glove, 2 gloves, & (IV) 2 gloves sheathing laryngoscope blade/hands | 25 sites set a priori on patient and anesthesia provider, DAZO fluoresce with UV light, nominal   | patient contamination: single glove 5.6 sites contaminated on patient vs 2.5 double gloves and 0.3 double gloves/sheath, environment contamination; 13.3 single, 3.2 double glove and 0.6 for double w/ sheathing  | standard induction to last 6 minutes with standard sequence (previous research takes 4 minutes to contaminate), pre selected sites   | simulation environment, optimal time remove outer gloves post intubation could have impacted, participants may have been aware of experiment and influenced behavior  | level I                               |

## Appendix C

Data Analysis Table

| Unit of Analysis | 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       | IV (referred to as descriptive variable) | Infection prevention Bundle                     | <b><u>Variable Description:</u></b><br>Implementation of infection prevention bundle (double gloving, confining airway equipment to a single area, and increased hand hygiene)<br><b><u>Measure Type:</u></b><br>Process | After Baseline simulated case; Ten areas in the AWE are examined with the UV light source for the presence of any UV tracer | 0 = before Intervention<br>1 = post Intervention | Nominal                   | Before implementation of Infection prevention Bundle: October 2021;<br><br>After implementation of Infection Prevention Bundle: December 2022; | None  | N/A   |
|                  | DV (referred to as outcome variable)     | Anesthesia work environment (AWE) contamination | <b><u>Variable Description:</u></b><br>Mean % Distribution of ultraviolet tracer contamination within the AWE BEFORE and AFTER the intervention<br><b><u>Measure Type:</u></b><br>Outcome                                | After Second simulated case; Ten areas in the AWE are examined with the UV light source for the presence of any UV tracer   | 0 to 100%  | Ratio                     | Before implementation of Infection prevention Bundle: October 2021;<br><br>After implementation of Infection Prevention Bundle: December 2022; | Paired t-test or Wilcoxon signed-rank test (if issues with normal distribution) | Based on relevant literature, decreased subject contamination score of 4.0 (95% confidence interval, 2.2–5.6; $P < .001$ ), a 27% reduction in score between baseline and intervention scenarios. |

**Appendix D**

**BUSINESS CASE with VALUE BASED CARE ASSESSMENT**

**Proposed Title for Project/Initiative/Opportunity to Improve**

Among anesthesia providers at David Grant Medical Center (DGMCC), how would a double gloving method, compared to traditional single gloving, impact the amount of contamination on the anesthesia workstation?

**Opportunity Statement (Description of proposed project/initiative/opportunity to improve)**

Investing in appropriate evidence-based measures to decrease cross contamination between the patient, provider and anesthesia workstation will lower expenditures related to treating gross contamination. The Covid-19 pandemic has highlighted the need for optimizing policies and procedures to enhance infection control measures.

**Business Opportunity/Objectives (Prioritize listing – macro and micro objectives)**

1. Decrease gross contamination
2. Increase Patient Satisfaction
3. Cost Savings
4. Maintain Joint Commission Accreditation
5. Compliance with current workstation infection control recommendations from American Society of Anesthesiologists (ASA) and American Association of Nurse Anesthesiology (AANA)

**Potential Impact of the Initiative/Project (Identify outcome metrics & benchmarks/and how objectives align with Quadruple Aim, Value Based Care, and HRO goals)**

1. Rate of gross contamination in general surgery patients
2. Patient satisfaction surveys as reported on Interactive Customer Evaluations (ICE) reports and take home surveys
3. Dollars spent on treating gross contamination in surgical patients
4. Continuously re-examine all process measures to ensure they continue to meet Joint Commission accountability criteria
5. Provide highest quality care through verified infection control practices

**Alternatives (courses of action) chosen for Analysis *Alternatives***

1. Double gloving
2. UV light disinfection
3. Remain “status quo”: unchanged practice

**Analysis of Alternatives *Alternatives***

|                                   |  |  |
|-----------------------------------|--|--|
| Alternative 1:                    | Double Gloving   |  |
| Pros                              | Cons   |  |
| Substantive peer-reviewed support | Provider “buy-in   |  |
| Ease of implementation            |  |  |
| Alternative 2:                    | UV Light and Barrier method on anesthesia machine wrap (AMW) |  |
| Pros                              | Cons   |  |

|   |  |
|---|--|
| <p>Reduces the measurable bio-burden on the anesthesia workstation. Convenient, minimal training requirements, reduces bioburden.</p> | <p>Less substantive evidence in contrast to double gloving initiative.<br/>                 Cost prohibitive; sourcing new equipment<br/>                 Time consuming. Can not be used in same-day turnover and allows for continued horizontal transmission.<br/>                 Cost for barrier device for Anesthesia Machine is \$35 per set (Biddle et al., 2018)</p> |
|---|--|

|                       |   |
|-----------------------|---|
| <p>Alternative 3:</p> | <p>“Status Quo”</p>   |
| <p><b>Pros</b></p>    | <p><b>Cons</b></p>  |
| <p>Convenient</p>     | <p>Perpetuates outdated practices, fails to employ effective modern practice recommendations. Places patients at increased risk for gross contamination</p> |

**Assumptions** *Assumptions*

Current single gloving practices contribute to gross contamination  
 Resistance to change in practice from current anesthesia staff  
 Cost infections attributed to surgery are approximately 1.43 times greater for patients with gross contamination, relative to patients without gross contamination (Schweizer et al., 2014)

**Recommendation and Rationale** *Make a choice*

Recommendation Make a choice

Double Gloving

**Rationale** *Make a choice*

Multiple peer-reviewed references confirm the efficacy and importance of utilizing double gloving and increased hand hygiene to reduce cross-patient contamination of the anesthesia workstation. Improved infection control compliance is expected to directly impact gross contamination rates and improve patient outcomes.

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

The double gloving initiative represents virtually no risk to staff, patients or financial loss due to nominal added expense of using a second set of gloves during airway manipulation related to intubation. This evidence based intervention provides improved infection control compliance and adheres to the latest recommendations by the AANA.

Risks and Mitigation Plan

| Risks   | Plan   |
|---|--|
| 1. Staff Compliance   | 1. Training day presentation, staff training, evidence-based project (EBP) training  |
| 2. Misuse of double gloving procedure                             | 2. Adequate instruction, training day simulations  |
| 3. Room setup; required availability for providers to wear gloves | 3. Coordination with logistics and anesthesia technicians to ensure room set up includes appropriate glove selection       |
| 4. Acquisition of additional gloves; sourcing                     | 4. Ensure adequate stock in maintained from logistics  |
| 5. Need for additional glove sizes                                | 5. Coordination with acquisitions/logistics team to ensure glove sizes are stocked in small, medium, large and extra large |

Implementation Plan

| Phase 1:   | Gather Evidence   |                            |
|--|---|----------------------------|
| Milestone Description:   | Review relevant research pertaining to decreasing the spread of pathogens in the operating room. Interview and recruit shareholders from DMGC’s infectious disease, Operating Room, and Anesthesia departments to provide detailed baseline data. |                            |
| Deliverables   | Due Date  | Accountable Person         |
| Measurable Goal: Gather information related to DGMC’s infection rates; review a minimum of 12 meta-analyses, systemic reviews, and interviews with subject matter experts. | Three Months  | Principle POC/investigator |
| Resources Needed   |   |                            |
| Online access and training on local research databases. Downtime from normal duties to conduct research. Weekly schedules from shareholders (to arrange interviews).       |   |                            |
| Expected Level of Benefit  |   |                            |
| Research creates the foundation to create buy-in from shareholders. Compliance will suffer if relevant evidence supporting a change in practice is not provided.           |   |                            |
| Phase 2:   | Dissemination of findings   |                            |

|   |  |                            |
|---|--|----------------------------|
| Milestone Description:  | Present at infection control meetings for engagement. Educate shareholders on research and benefits.   |                            |
| Deliverables  | Due Dates  | Accountable Person         |
| Present a slide show or poster at the scheduled group infection control meeting   | The next monthly meeting after data has been collected and analyzed  | Principle POC/investigator |
| Resources Needed  |  |                            |
| Poster materials, printing costs  |  |                            |
| Expected Level of Benefit   |  |                            |
| Garner stakeholder buy-in to support aims of research   |  |                            |
| Phase 3:  | Develop a custom video for education; 3-4 min video showing and contrasting the benefits of double gloving. Write policy and procedures for institutional approval   |                            |
| Milestone Description:  | Video will demonstrate initial 'status quo' intubation with single gloves and an intubation with double gloves. The video will demonstrate a notable comparison of contamination that occurred with both methods |                            |
| Deliverables  | Due Dates  | Accountable Person         |
| MP4 or .mov video; uploaded to youtube and vimeo for rapid dissemination via email link and social media  | 4 Months   | Principle POC/investigator |
| Resources Needed  |  |                            |
| Video filming equipment, video editing software, SIM center usage for filming, Black light and DAZO fluorescent marking gel. Project participants will participate as actors and filming-team for the video. Assigned roles are to-be-determined. |  |                            |
| Expected Level of Benefit   |  |                            |
| Broad and accessible dissemination of project materials to DGMC anesthesia staff. Increased compliance and buy-in of staff using the double gloving technique for induction.  |  |                            |
| Phase 4:  | DGMC Anesthesia provider training event; project presentation during scheduled training time. Dissemination of training video with possible hands-on training opportunity.                                       |                            |
| Milestone Description:  | Completed baseline survey of the use of gloves during airway manipulation/intubation. Completion of DGMC anesthesia training day with at least 50% of anesthesia's staff attendance.                             |                            |
| Deliverables  | Due Dates  | Accountable Person         |
| Validated/standardized observational tool and survey dissemination to DGMC anesthesia providers   | TBD  | Principle POC/investigator |
| Resources Needed  |  |                            |

Time allotted for staff to attend training; coordinate training date and time with OR leadership. Office space for training. Audio and video equipment to present training video.

Expected Level of Benefit

Individual provider buy-in from viewing the training video and training. Enthusiastic support from staff CRNAs and physician anesthesiologists.

Phase 5: Evaluation of Training

|                        |   |
|------------------------|---|
| Milestone Description: | <p>Conduct daily random observational compliance audits of anesthesia providers conducting airway manipulation.</p> <p>Measurable Goal: Drastic increase in providers utilizing double gloving techniques</p> |
|------------------------|---|

| Deliverables  | Due Dates   | Accountable Person         |
|---|---|----------------------------|
| Compliance report delivered to shareholders every quarter | Initial report due one month after the training event. Future reports will be generated after every quarter | Principle POC/investigator |

Resources Needed

Access to Operating rooms on a continual basis to conduct observations; Updated contact information for shareholders of each department; access to staff for bi-annual training days.

Expected Level of Benefit

Anticipate an increase in compliance of >25% from base-line double gloving from anesthesia providers while manipulating the airway.

**NOTE:** Modified from Harvard Business Review Press. (2011). *Pocket mentor: Developing a business case*. Boston: Author (pp 82-85).



**Appendix E****Project Year 1 (2021)**

| Activity             | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|----------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Project Planning     |     |     | X   | X   | X   | X   | X   | X   | X   | X   | X   |     |
| Stakeholder Meetings |     |     |     |     |     |     |     |     |     |     | X   | X   |

**Project Year 2 (2022)**

| Activity               | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Stakeholder Meetings   | X   | X   | X   |     |     |     |     |     |     |     |     |     |
| USUHS VPR Submission   |     |     |     |     |     |     |     |     | X   |     |     |     |
| USUHS VPR Approval     |     |     |     |     |     |     |     |     |     |     |     |     |
| Sit IRB Submission     |     |     | X   |     |     |     |     |     |     |     |     |     |
| Site IRB Approval      |     |     |     |     | X   |     |     |     |     |     |     |     |
| Project Planning       |     |     | X   | X   | X   | X   |     |     |     |     |     |     |
| Project Implementation |     |     |     |     |     |     | X   |     |     |     |     |     |
| Data Collection        |     |     |     |     |     |     | X   |     |     |     |     |     |
| Data Analysis          |     |     |     |     |     |     | X   | X   |     |     |     |     |
| Dissemination/Write Up |     |     |     |     |     |     |     |     |     | X   | X   | X   |

Appendix F: CITI Certifications

  Completion Date: 06-Apr-2021  
Expiration Date: 05-Apr-2024  
Record ID: 41978901

This is to certify that:


**Julius Brown**

Has completed the following CITI Program course: Not valid for renewal of certification through CME.

**OUUSD P&R Human Research**  
(Curriculum Group)  
**Biomedical Investigators and Research Study Team**  
(Special Interest Group)  
**1 - Basic Course**  
(Stage)

Under requirements set by:

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

 Collaborative Institutional Training Initiative

Verify at [www.citiprogram.org/verify/?w5db97053-4916-4d06-880a-c37ca6499a37-41978901](http://www.citiprogram.org/verify/?w5db97053-4916-4d06-880a-c37ca6499a37-41978901)

  Completion Date: 09-Apr-2021  
Expiration Date: 08-Apr-2024  
Record ID: 41966810

This is to certify that:

**Michael Millar**

Has completed the following CITI Program course: Not valid for renewal of certification through CME.

**OUUSD P&R Human Research**  
(Curriculum Group)  
**Biomedical Investigators and Research Study Team**  
(Special Interest Group)  
**1 - Basic Course**  
(Stage)

Under requirements set by:

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

 Collaborative Institutional Training Initiative

Verify at [www.citiprogram.org/verify/?w35a09e2b-58da-491e-8c2-8f50a73883-41966810](http://www.citiprogram.org/verify/?w35a09e2b-58da-491e-8c2-8f50a73883-41966810)

  Completion Date: 15-Apr-2021  
Expiration Date: 14-Apr-2024  
Record ID: 42015816

This is to certify that:

**Steven Vietti**

Has completed the following CITI Program course: Not valid for renewal of certification through CME.

**OUUSD P&R Human Research**  
(Curriculum Group)  
**Biomedical Investigators and Research Study Team**  
(Special Interest Group)  
**1 - Basic Course**  
(Stage)

Under requirements set by:

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

 Collaborative Institutional Training Initiative

Verify at [www.citiprogram.org/verify/?w420e80b5-99d7-4c2a-b8ce-e0702ec335-42015816](http://www.citiprogram.org/verify/?w420e80b5-99d7-4c2a-b8ce-e0702ec335-42015816)

  Completion Date: 11-Apr-2021  
Expiration Date: 10-Apr-2024  
Record ID: 41978065

This is to certify that:

**andrea pagliara**

Has completed the following CITI Program course: Not valid for renewal of certification through CME.

**OUUSD P&R Human Research**  
(Curriculum Group)  
**Biomedical Investigators and Research Study Team**  
(Special Interest Group)  
**1 - Basic Course**  
(Stage)

Under requirements set by:

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

 Collaborative Institutional Training Initiative

Verify at [www.citiprogram.org/verify/?w679c5ea-705d-4b84-9977-668c3458d6-64-41978065](http://www.citiprogram.org/verify/?w679c5ea-705d-4b84-9977-668c3458d6-64-41978065)

Appendix G: USU Form 3202N

**USUHS FORM 3202N**  
**DANIEL K. INOUE GRADUATE SCHOOL OF NURSING**  
**EVIDENCE-BASED PRACTICE/PERFORMANCE IMPROVEMENT PROPOSAL**

|                |
|----------------|
| VPR Date Stamp |
|----------------|

Project Number:  (VPR will assign)

Project Title:  
 Reduction of anesthesia workstation contamination through double gloving

| SECTION A: STUDENT POC INFORMATION   |   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
|--|---|--|--|---------------------|--|----------------------|------------------------|------------------------|----------------------|---|--------------------------------------|--|---|--|--|---|----------------------------------|--------------------------------------|----------------------|----------------------|--|
| 1. Name (Last, First, MI): <b>Millar, Michael</b>  | Student E-mail: <b>michael.millar@usuhs.edu</b>   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| 2. Home Address: <input type="text"/>  | Cell Number: <input type="text"/>   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| SECTION B: COMMITTEE CHAIR / SENIOR MENTOR INFORMATION   |   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| 3. Name (Last, First, MI): <b>Ransom, Laura</b>  | E-mail: <b>Laura.Ransom@usuhs.edu</b>   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| 4. Telephone: <input type="text"/> Fax: <input type="text"/>   |   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| 5. USUHS Building/ Room No.: <b>DGMC Phase II Site</b>   |   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| SECTION C: PROJECT INFORMATION   |   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| 6. Attach the Abstract for the proposal, including the following sections: Site Location of the Project, Title, Authors, Background or Problem/Issue, Clinical Question/Purpose, Project Design, Anticipated Organizational Impact/Implications for Practice and also include the Proposed Timeline. Single space the abstract and use Times New Roman font, size 12.  |   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| 7. Is this proposal related to an active research project of the Chair/Senior Mentor identified in Section B? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No<br>If yes, complete below; if no, proceed to Part 8.<br>Project Number: <input type="text"/><br>Project Title: <input type="text"/>  |   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| Project Start Date: <input type="text"/>   | Project End Date: <input type="text"/>  |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| 8. Anticipated period of performance: Project Start Date: <b>2 Feb 2022</b> Project End Date: <b>1 June 2022</b>   |   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| 9. Performance Site(s): <b>Travis Air Force Base</b>   |   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| 10. Does this project involve any classified information? (Contact the USUHS Security Office for guidance) <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No   |   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| 11. Do you have a funding source for this project? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> NA<br>If yes, specify the funding agency and the amount provided: <input type="text"/>   |   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| SECTION D: SIGNATURES  |   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| The following signatures attest to the validity of the above information:  |   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;"> <b>Michael Millar</b><br/> <small>MILLAR.MICHAEL<br/>                             J.1186174034<br/>                             Digitally signed by<br/>                             MILLAR.MICHAEL.1186174034<br/>                             Date: 2022.01.28 13:13:19 -0500</small> </td> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;"> <b>RANSOM.LAURA.JANE.1256762281</b><br/> <small>Digitally signed by<br/>                             RANSOM.LAURA.JANE.1256762281<br/>                             Date: 2022.09.29 09:22:27 -0700</small> </td> </tr> <tr> <td style="padding: 5px;">Student (Project Point of Contact for the Group)<br/><b>BARBER.KENNETH.DOUGLAS.1177263644</b><br/><small>AS.1177263644</small></td> <td style="padding: 5px;">Chair/Senior Mentor</td> </tr> <tr> <td style="padding: 5px;"><small>Digitally signed by<br/>                             BARBER.KENNETH.DOUGLAS.1177263644<br/>                             Date: 2022.10.13 11:59:17 -0400</small></td> <td style="padding: 5px;"><input type="text"/></td> </tr> <tr> <td style="padding: 5px;">Chair/Program Director</td> <td style="padding: 5px;">Chair/Program Director</td> </tr> <tr> <td style="padding: 5px;"><input type="text"/></td> <td style="padding: 5px;"><b>SEIBERT.DIANE.C.1084932279</b><br/><small>279</small></td> </tr> <tr> <td style="padding: 5px;">DNP Project Director or PhD Director</td> <td style="padding: 5px;">Associate Dean for Academic Affairs, GSN</td> </tr> <tr> <td style="padding: 5px;"><b>SIMMONS.ANGELA.MARIE.1143313375</b><br/><small>1143313375</small></td> <td style="padding: 5px;"><b>ROMANO.CAROLA.A.1032050294</b><br/><small>0294</small></td> </tr> <tr> <td style="padding: 5px;"><small>Digitally signed by<br/>                             SIMMONS.ANGELA.MARIE.1143313375<br/>                             Date: 2022.10.24 15:36:23 -0400</small></td> <td style="padding: 5px;"><small>Digitally signed by<br/>                             ROMANO.CAROLA.A.1032050294<br/>                             Date: 2022.10.24 15:55:32 -0400</small></td> </tr> <tr> <td style="padding: 5px;">Associate Dean for Research, GSN</td> <td style="padding: 5px;">Dean, DKU Graduate School of Nursing</td> </tr> <tr> <td style="padding: 5px;"><input type="text"/></td> <td style="padding: 5px;"><input type="text"/></td> </tr> </table> | <b>Michael Millar</b><br><small>MILLAR.MICHAEL<br/>                             J.1186174034<br/>                             Digitally signed by<br/>                             MILLAR.MICHAEL.1186174034<br/>                             Date: 2022.01.28 13:13:19 -0500</small> | <b>RANSOM.LAURA.JANE.1256762281</b><br><small>Digitally signed by<br/>                             RANSOM.LAURA.JANE.1256762281<br/>                             Date: 2022.09.29 09:22:27 -0700</small> | Student (Project Point of Contact for the Group)<br><b>BARBER.KENNETH.DOUGLAS.1177263644</b><br><small>AS.1177263644</small> | Chair/Senior Mentor | <small>Digitally signed by<br/>                             BARBER.KENNETH.DOUGLAS.1177263644<br/>                             Date: 2022.10.13 11:59:17 -0400</small> | <input type="text"/> | Chair/Program Director | Chair/Program Director | <input type="text"/> | <b>SEIBERT.DIANE.C.1084932279</b><br><small>279</small> | DNP Project Director or PhD Director | Associate Dean for Academic Affairs, GSN | <b>SIMMONS.ANGELA.MARIE.1143313375</b><br><small>1143313375</small> | <b>ROMANO.CAROLA.A.1032050294</b><br><small>0294</small> | <small>Digitally signed by<br/>                             SIMMONS.ANGELA.MARIE.1143313375<br/>                             Date: 2022.10.24 15:36:23 -0400</small> | <small>Digitally signed by<br/>                             ROMANO.CAROLA.A.1032050294<br/>                             Date: 2022.10.24 15:55:32 -0400</small> | Associate Dean for Research, GSN | Dean, DKU Graduate School of Nursing | <input type="text"/> | <input type="text"/> |  |
| <b>Michael Millar</b><br><small>MILLAR.MICHAEL<br/>                             J.1186174034<br/>                             Digitally signed by<br/>                             MILLAR.MICHAEL.1186174034<br/>                             Date: 2022.01.28 13:13:19 -0500</small>  | <b>RANSOM.LAURA.JANE.1256762281</b><br><small>Digitally signed by<br/>                             RANSOM.LAURA.JANE.1256762281<br/>                             Date: 2022.09.29 09:22:27 -0700</small>  |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| Student (Project Point of Contact for the Group)<br><b>BARBER.KENNETH.DOUGLAS.1177263644</b><br><small>AS.1177263644</small>   | Chair/Senior Mentor   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| <small>Digitally signed by<br/>                             BARBER.KENNETH.DOUGLAS.1177263644<br/>                             Date: 2022.10.13 11:59:17 -0400</small>   | <input type="text"/>  |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| Chair/Program Director   | Chair/Program Director  |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| <input type="text"/>   | <b>SEIBERT.DIANE.C.1084932279</b><br><small>279</small>   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| DNP Project Director or PhD Director   | Associate Dean for Academic Affairs, GSN  |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| <b>SIMMONS.ANGELA.MARIE.1143313375</b><br><small>1143313375</small>  | <b>ROMANO.CAROLA.A.1032050294</b><br><small>0294</small>  |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| <small>Digitally signed by<br/>                             SIMMONS.ANGELA.MARIE.1143313375<br/>                             Date: 2022.10.24 15:36:23 -0400</small>   | <small>Digitally signed by<br/>                             ROMANO.CAROLA.A.1032050294<br/>                             Date: 2022.10.24 15:55:32 -0400</small>   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| Associate Dean for Research, GSN   | Dean, DKU Graduate School of Nursing  |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| <input type="text"/>   | <input type="text"/>  |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| In light of the above signatures, the project is approved.<br><input type="text"/>   |   |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |
| USUHS Vice President for Research  | Date  |  |  |                     |  |                      |                        |                        |                      |   |                                      |  |   |  |  |   |                                  |                                      |                      |                      |  |



DEPARTMENT OF THE AIR FORCE  
60TH MEDICAL GROUP (AMC)

26 May 2022

**FINAL IRB DETERMINATION – NON-HUMAN RESEARCH**

**Determination Date: 26 May 2022**

**PROJECT LEAD:** Maj Laura Jane Ransom, DNP, CRNA  
Capt Julius Brown, SRNA  
Maj Michael J. Millar, SRNA  
Capt Andrea Leigh Pagliara, SRNA  
Maj Steven Vietti, SRNA

**IRB Reference Number:** FDG20220039P

**PROJECT TITLE:** "Reduction of Anesthesia Workstation Contamination with Double Gloving."

**1. You may begin your project, as you would any other clinical or operational activity, with the approval and sponsorship of your leadership.**

Your project was determined on 26 May 2022 to be considered not human research as defined by DoD regulation 32 CFR 219 and FDA regulation 21 CFR 56. Continued IRB oversight for this activity is not required. The proposed project does not include non-routine intervention or interaction with a living individual for the primary purpose of obtaining data regarding the effect of the intervention or interaction, nor do the researchers obtain private, identifiable information about living individuals.

Since the IRB does not have regulatory oversight for your study, it is the investigator's responsibility to validate the study's scientific merit and research design and to ensure the conduct of the study is upheld by the highest ethical standards, as required by the Wing. Should you require assistance in reviewing the scientific merit and research design of your study, please contact the Protocol Office. Protection of subjects' rights safety and welfare and responsibility for protecting PHI/PII and research data now fall on the investigator and their commander.

In accord with DoDI 6000.08 any intramural funding of this study as research or as a clinical investigation may continue to be received or sought regardless of this IRB determination.

**2. Your project has received a one-time research determination. If the goals and/or activities of the project change during the course of the project, or if new activities are proposed that would constitute human subjects research, re-contact the Protocol Office, so that a regulatory expert may determine whether or not the revised plan involves human subject research activities.**

3. This project does not require an institutional update submission to the 60 MDG EDO. Your project will be administratively removed after 3 years from the original determination date, without any further action. Contact the 60 MDG Protocol Office if you wish to extend this determination following the 3 years.
4. Contact the 60 MDG Protocol Office regarding any publications/ presentations resulting from your study. There is a specific 60 AMW PA form that is required in such instances.
5. IAW DASD (HRPO) Operating Instructions 2019.10.03 this research will be documented and made available to the Defense Health Agency Office of Research Protections (DHA ORP) upon request. If DHA ORP disagrees with the Designated Reviewer's determination, the research study may be temporarily suspended until resolution.
6. If you have any questions, please contact the 60 MDG Protocol Office at (707) 423-7268 or by email at [usaf.travis.60-mdg.mbx.60mdg-cifprotocoloffice@mail.mil](mailto:usaf.travis.60-mdg.mbx.60mdg-cifprotocoloffice@mail.mil). Please include your project title and reference number in all correspondence or inquiries.

 X WIESE, CARLA.A. Digitally signed by  
WIESE, CARLA.A. NN.1036735356  
NN.1036735356 Date: 2022.05.26 10:30:47 -0700

CARLA A. WIESE, LT COL, USAF, NC  
60 MDG Exemption Determination Official



**Appendix F: Daniel K. Inouye Graduate School of Nursing  
DNP Project Senior Mentor Approved Abstract/Impact Statement Form**

**DOCTOR OF NURSING PRACTICE PROJECT  
Senior Mentor Approved Abstract/Impact Statement Form**

**Graduation Year:** 2023 \_\_\_\_\_

**Name(s) of DNP Project Student Team:** *(full name/rank)*

|                                |                                  |                                |                              |                                |   |                               |
|--------------------------------|----------------------------------|--------------------------------|------------------------------|--------------------------------|---|-------------------------------|
| 1. <u>Julius Brown/Capt</u>    | Phase II Site: <u>Travis AFB</u> | AGCNS <input type="checkbox"/> | FNP <input type="checkbox"/> | PMHNP <input type="checkbox"/> | RNA <input checked="" type="checkbox"/> | WHNP <input type="checkbox"/> |
| 2. <u>Michael Millar/Major</u> | Phase II Site: <u>Travis AFB</u> | AGCNS <input type="checkbox"/> | FNP <input type="checkbox"/> | PMHNP <input type="checkbox"/> | RNA <input checked="" type="checkbox"/> | WHNP <input type="checkbox"/> |
| 3. <u>Steven Vietti/Major</u>  | Phase II Site: <u>Travis AFB</u> | AGCNS <input type="checkbox"/> | FNP <input type="checkbox"/> | PMHNP <input type="checkbox"/> | RNA <input checked="" type="checkbox"/> | WHNP <input type="checkbox"/> |
| 4. <u>Andrea Pagliara/Capt</u> | Phase II Site: <u>Travis AFB</u> | AGCNS <input type="checkbox"/> | FNP <input type="checkbox"/> | PMHNP <input type="checkbox"/> | RNA <input checked="" type="checkbox"/> | WHNP <input type="checkbox"/> |
|                                |                                  | <input type="checkbox"/>       | <input type="checkbox"/>     | <input type="checkbox"/>       | <input type="checkbox"/>                | <input type="checkbox"/>      |
|                                |                                  | <input type="checkbox"/>       | <input type="checkbox"/>     | <input type="checkbox"/>       | <input type="checkbox"/>                | <input type="checkbox"/>      |

**ABSTRACT**

***David Grant Medical Center***

**Project Title:** Among anesthesia providers at David Grant Medical Center (DGMC), how does education on double gloving during airway manipulation at induction, compared to traditional single gloving, impact behavior change?

**Authors:** Millar, M., Pagliara, A., Brown, J., & Vietti, S.

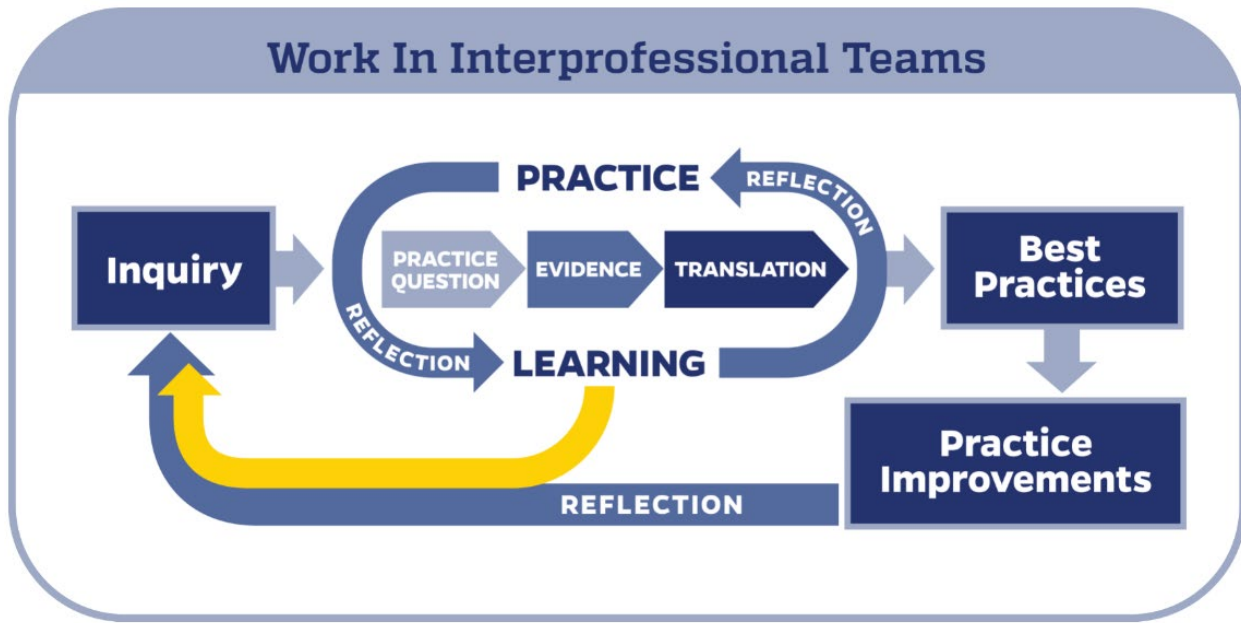
**Background or Problem/Issue:** Anesthesia workstation environment and practices pose a particular point of concern for gross contamination and transmission of pathogens to patients (Loftus et al., 2018). Globally, contamination has been shown through cultures of anesthesia workstation before and after cases, *Staphylococcus aureus* sequence typing, and direct observation in both operating rooms and simulation (Loftus, 2018). In the United States approximately 1 in 25 inpatients have an infection related to hospital care and subsequently cost the U.S. healthcare system billions of dollars annually (Scott, 2009). Particularly in the context of COVID dramatic effect on global healthcare, there is a renewed interest in avoiding preventable hospital acquired infections (HAIs). As such, the Uniformed Services University (USUHS) faculty at DGMC, Travis AFB, CA, have expressed concerns regarding the anesthesia provider cross-contaminating patients via the anesthesia workstation.

**Clinical Question or Purpose:** Among anesthesia providers at David Grant Medical Center (DGMC), how does education on double gloving during airway manipulation at induction, compared to traditional single gloving, impact behavior change?

**Project Design:** The Johns Hopkins Evidence-Based Practice Model was the organizing framework utilized. Pre questionnaire, education and post questionnaire will be used to determine behavior adoption.

**Organizational Impact/Implications for Practice:** Intraoperative contamination is well-established throughout multiple peer-reviewed studies and sequence typing of *Staphylococcus aureus* and other gram-negative bacteria; however, latency in the onset of symptoms can make root cause analysis challenging (Loftus et al., 2018). Although contamination data is not currently being collected at David Grant Medical Center, anesthesia workstation contamination has been linked to HAIs globally. Adoption of double gloves during airway induction will reduce contamination and result in lower costs, better outcomes, and improve patient experiences. Both professional organizations of anesthesia, American Association of Nurse Anesthesia (AANA) and American Society of Anesthesiologists (ASA) recommend utilizing double gloving during induction.

**Appendix J:** Johns Hopkins Evidence Based Practice Model



(Dang et al., 2022)