Educational Intervention to Enhance Staff Knowledge and Increase Awareness Regarding Risk Assessment and Personal Protective Equipment Selection to Reduce Blood and Body Fluid Exposures

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Abstract

Introduction. Accidental occupational blood borne pathogen exposures pose a great occupational risk for healthcare workers, worldwide. After an occupational exposure, there is a potential risk for transmission of blood borne infections such as human immunodeficiency virus (HIV), hepatitis B and hepatitis C, to health care workers. Blood and body fluid exposures reported in an academic healthcare facility in Northeast Florida have been trending upward since 2015. The literature shows accidental blood borne pathogen exposures were greater among healthcare workers with little or no training in exposure prevention.

Methods. This Blood and Body Fluid Exposure Reduction project was conducted at a 304-bed academic healthcare system in northeast Florida. An online education module was created and focused on the impact of blood and body fluid splashes on nursing staff, recognizing risk for exposure, blood borne pathogens and prevention of exposures. Pre- and post-intervention surveys were sent to the inpatient RNs and PCTs to determine if there was an improvement in the response to the level of concern questions and the frequency rating questions, after completion of the education module.

Results. Post-intervention surveys did not show an improvement in response to the questions regarding level of concern and frequency rating. Participant responses did indicate personal protective equipment was readily available on the inpatient units.

Conclusions. Healthcare workers have the responsibility of awareness when selecting personal protective equipment (PPE) when providing patient care that places them at risk for blood borne pathogen exposure. Healthcare workers also have the responsibility to maintain compliance of healthcare facility policies designed to minimize occupation exposures. Education, alone, has not been successful in reducing accidental blood borne pathogen exposures. Monthly tracking and review of accidental exposures, understanding the root cause of the exposures, collaboration with nurse leaders and frontline staff and ongoing staff education may successfully reduce exposures.

Keywords: blood and body fluids, blood and body fluid splashes, blood borne pathogens, blood borne pathogens in nursing, nurses, occupational exposures, occupational hazards, hepatitis B, hepatitis C, human immunodeficiency virus, personal protective equipment, personal protective clothing, compliance, COVID-19, and infection prevention.

Educational Intervention to Enhance Staff Knowledge and Increase Awareness Regarding Risk Assessment and Personal Protective Equipment Selection to Reduce Blood and Body Fluid Exposures

Background and Significance

Occupational exposures to blood-borne pathogens through accidental contact with human body fluids is a worldwide concern. It is estimated there are 60 blood-borne infectious pathogens (Auta et al., 2017). Occupational exposures to blood and body fluids (BBFs) present a great risk to health care workers. Due to the serious consequences these occupational exposures can result in, many countries have established systems to monitor the exposures to blood and body fluids among health care workers (Auta et al., 2017). Although these incidents occur frequently, they are often underreported. According to Auta et al. (2017), occupational exposures can occur through percutaneous injury, such as a needle stick injury that penetrates the skin, a mucous membrane exposure of the eyes, nose or mouth or non-intact skin exposure. Exposure to contaminated needle stick injuries and infected blood and body fluid splashes present a significant risk of transmission of blood borne infections such as human immunodeficiency virus (HIV), hepatitis B and hepatitis C to health care workers (HCWs) (Belachew et al., 2017; Markovic-Denic et al., 2015; Swetharani et al., 2016). These blood-borne viruses can be found in body fluids such as blood, cerebrospinal fluid, pleural fluid, breast milk, amniotic fluid, vaginal secretions, peritoneal fluid, pericardial fluid, synovial fluid, semen, and any other body fluids containing blood (Beckett & Bright, 2013; Brewer et al., 2017). Exposure to and development of blood-borne infectious pathogens can be associated with disease related complications, decreased quality of life, economic burden associated with absence from work, long-term illness, disability and death, direct and indirect costs related to treatment, medications

and the potential complications (Fathi et al., 2017; Markovic-Denic et al., 2015). Not following the standard precautions, for infection control and prevention, can impact the employee's emotional and socioeconomic factors after a blood and body fluid exposure (Fathi et al., 2017; Markovic-Denic et al., 2015). Mitchell, (2019), notes that eye protection use is estimated to be 2.8-12.8% among health care workers. This author also discussed the increasing prevalence of patients with infectious diseases such as HIV, hepatitis B and C and noted that now, more than ever, it is imperative that health care personnel use personal protective equipment (PPE) as recommended by the Centers for Disease Control and Prevention (CDC), Occupational Safety and Health Administration (OSHA) and organizational policies.

Brewer et al. (2017), noted after a mucosal exposure to HIV, the risk of transmission to the health care worker is approximately 0.09%. After an accidental exposure to HIV, the health care worker should be treated with HIV post-exposure prophylaxis (PEP). If the HIV status of the patient is unknown at the time of the occupational exposure, PEP should be initiated until the HIV status of the patient has been determined. If the patient is determined to be HIV negative, PEP should be discontinued. If the patient is determined to be HIV positive, the health care worker should take PEP for four weeks. These authors also report the risk of HBV transmission is related to the degree of contact with the infected blood.

Contributing to this problem is evidence that health care workers may not be taking proper precautions. The risk and impact of an accidental blood and/or body fluid splash places the health care worker at increased incidence for transmission of a pathogenic organism which may result in illness or infection. Use of PPE is one of the most important steps a HCW can take to prevent the transmission of pathogens from patients to HCWs and HCWs to patients. If used correctly, PPE can significantly reduce the risk of acquiring and transmitting health care

associated infections (Jain et al., 2013). PPE must be readily available to staff for use. When readily available, staff use was as high as 95% (Jain et al., 2013).

The Occupational Safety and Health Administration (OSHA) describes personal protective equipment (PPE) as special garments or equipment specifically to be worn by employees to increase protection against infectious materials (Centers for Disease Control and Prevention, 2004). There is a variety of PPE that should be readily available to health care workers (HCW) including, but not limited to gloves, gowns/coveralls, masks/respirators, goggles and face shields and shoe covers (Valdez, 2015). Masks protect the HCW from inhalation of infectious particles and diseases spread through aerosol droplets. Masks also protect the HCW from blood and body fluid splashes into the nose and mouth. Gowns/coveralls help prevent the movement of some microorganisms through the protective clothing onto the HCW's attire; in some cases, impermeable, fluid-resistant protective clothing may be warranted (Honda & Iwata, 2016).

Staff provided reasons for not using PPE to include lack of adequate supply, PPE not available at the right time in the right place, knowledge deficit of PPE use, staffing shortages, patient care in urgent situations and a sense of wasting time donning PPE for use, glove use minimizes tactile sensations, lack of proper training and education (Cristina Da Silveira Chagas et al., 2013; Honda & Iwata, 2016; Jain et al., 2013). Jain et al. (2013) noted that the individual's own belief in infection prevention, perception of the risk factors, familiarity with available PPE usage and disposal are strong motivating factors in PPE usage. When PPE is not worn by staff, this decreases compliance and increases the risk for exposure to blood borne pathogens. Jain et al. (2013) reported, gloves to be the most common type of PPE used, followed by masks. These authors also noted eyewear use was omitted by staff in 96% of the procedures and gowns were

not used in 80% of the procedures. The overall use of PPE in high-risk areas was significantly higher than in low-risk areas. HCW in high-risk areas are more likely to use gloves and masks more often than health care workers in low-risk areas. Knowledge of why health care workers do not use PPE provides insight for initiatives to improve infection control prevention.

Jain et al. (2013) suggested in addition to increasing the awareness levels of HCWs, ongoing reinforcement for all HCWs regarding the importance and selection of PPE is necessary. The authors also noted PPE should also be made easily accessible to the HCW for increasing compliance. HCWs have a responsibility to adhere to the set standards of the health care facility and should be made accountable for not following these standards. Compliance to PPE usage by HCWs can be affected limiting factors at both the individual and health care facility level. However, these authors noted these factors can be overcome to improve the compliance of the HCW for PPE use.

History of PPE

Segal (2016), notes that PPE use dates to the war years, however she does not indicate which war, to prevent contamination from chemical warfare. Soldiers used respirators to protect themselves from toxic chemicals. Dating back even earlier, Leonardo da Vinci was thought to be the original inventor of the respirator during the 16th century. Respirators such as the N95 respirator mask, are now used to protect health care workers caring for patients with pulmonary tuberculosis or other respiratory illnesses transmissible via the airborne route. HCWs who are at risk are required to be fitted for and wear these masks to ensure maximum protection against airborne organisms.

There is evidence that PPE was used before the 18th century by physicians treating patients during the bubonic plague. Garments such as masks, leather gowns and black overcoats

were worn by physicians in the Middle Ages (Honda & Iwata, 2016). In 1863, Florence Nightingale affirmed the importance of clean patient surroundings in a hospital and the risk of environmental transmission of infectious agents (Jackson & Lynch, 1985). These authors note, during the same period in Paris, Jacques-Joseph Grancher believed that contact transmission of infection was more dangerous than airborne transmission.

In the late 1950s, there was not a concern for the potential exposure to infectious body substances unless the patient had a communicable disease. Nursing staff were advised to use gloves when caring for a patient with a communicable disease to avoid the exposure to potential pathogens (Jackson & Lynch, 1985).

In 1970, the CDC published a manual created for small hospitals as well as large teaching hospitals, outlining the various categories of isolation and recommendations for PPE use. Segal, (2016), reported once HIV was identified and Universal Precautions emerged as a new initiative to prevent the transmission of infection through needle stick injuries and possible skin contamination, the use of PPE increased. New recommendations followed and not only included the use of gloves and gowns, but also encouraged the use of face masks and eye shields to prevent mucous membrane exposure. PPE manufacturers faced high order demands to develop disposable impervious gowns, latex and vinyl gloves, procedure masks for use by healthcare workers in all specialties. At times, during the mid- and late- 1980s, some of the PPE items were periodically in short supply or unavailable (Segal, 2016). In the mid-1980s, the CDC recommended the use of gowns, masks and eye-protection whenever the healthcare worker was at an increased risk for exposure to blood borne pathogens (Honda & Iwata, 2016).

Problem Statement/Purpose

The blood and body fluid exposures reported in an academic healthcare facility in Northeast Florida, offering both inpatient and outpatient services, have been trending upward since 2015. In 2015, there were five blood and body fluid exposures reported. All five exposures were reported by RNs. In the following year, five RNs and three PCTs submitted a total of eight BBF exposure reports. The BBF exposures accidents in 2017 were reported by RNs (5) and a PCT (1). In 2018, there were 27 blood and body fluid splash accidents reported by healthcare personnel in the inpatient setting and ambulatory outpatient setting. The 27 blood and body fluid splashes reported, accounted for 21.2% of all blood and body fluid exposures (percutaneous and mucosal), in 2018. Fourteen blood and body fluid splashes were reported by nursing staff, registered nurses (11) and patient care technicians (3). Twelve of the exposures occurred in the inpatient setting and two exposures occurred in the outpatient setting.

The 2018 data provided the baseline data for this project and showed an increase in accidental exposures reported on the inpatient setting, by RNs and PCTs. In addition, data reported from January 1, 2019, through December 31, 2019, indicated there were 12 accidental blood and body fluid exposures, reported by RNs (9) and PCTs (3) in the inpatient setting. Through 2020, there were eight reported accidental exposures for RNs (5) and PCTs (3). The following graph, Figure 1, illustrates the number of exposures reported since 2015 and breaks down the exposure by job category for inpatient RNs and PCTs.

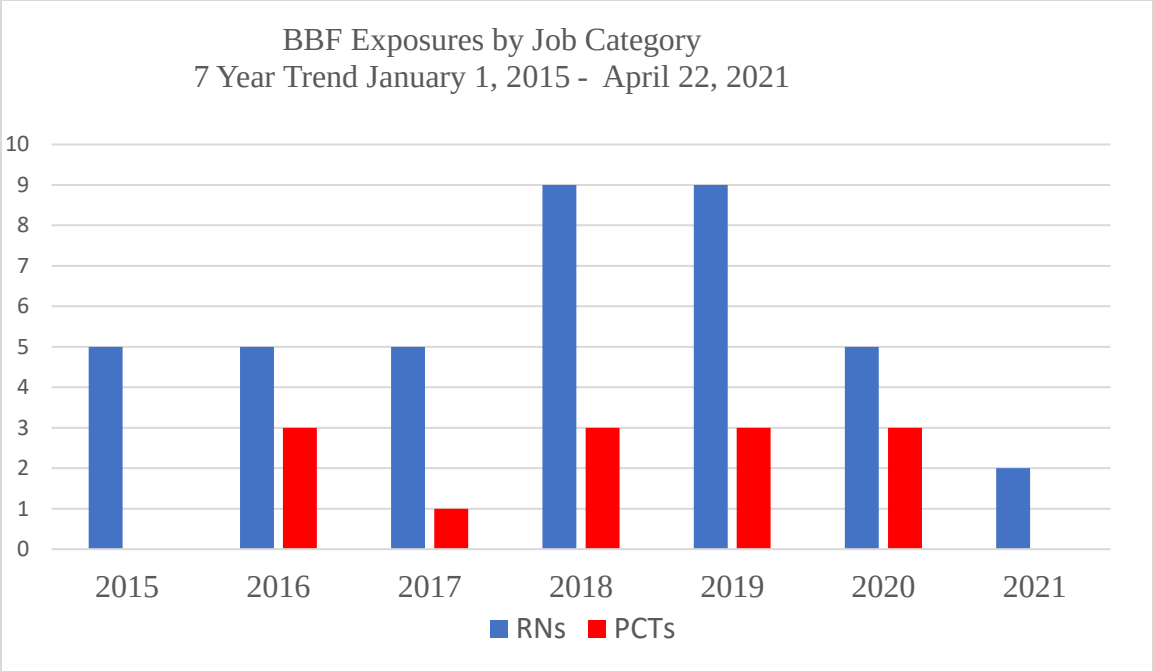


Figure 1

The number of BBFs reported, at this academic healthcare facility in Northeast Florida, have increased since 2015. The following graph, Figure 2, represents the seven-year trend of the total BBFs exposures in the inpatient setting from January 1, 2015, through April 22, 2021.

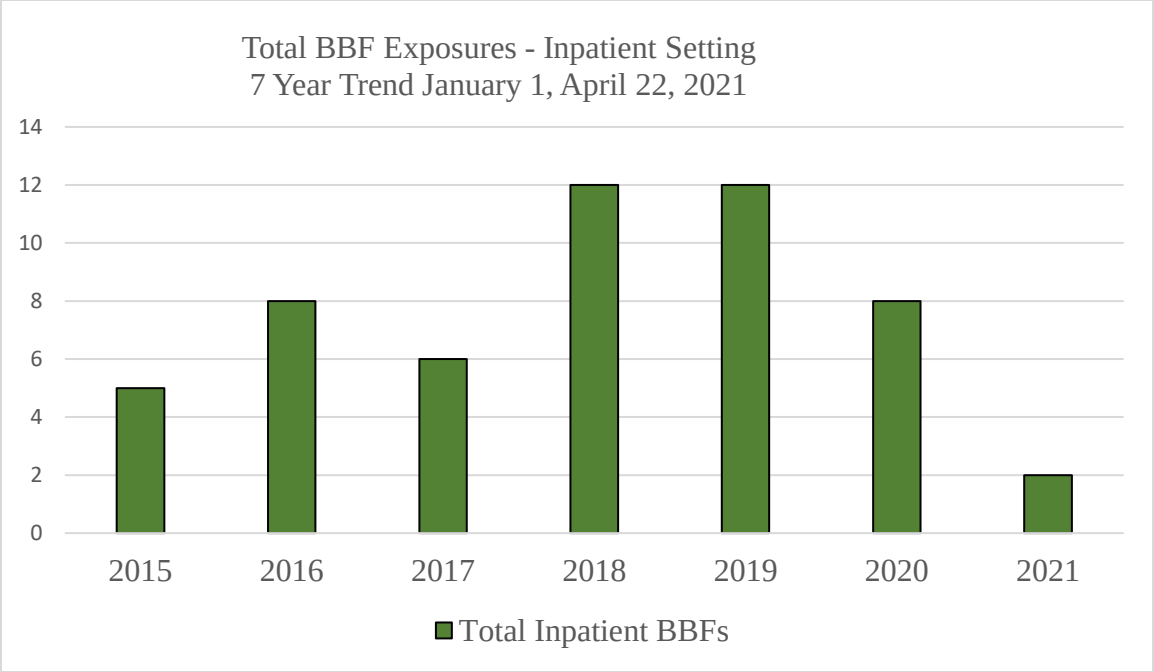


Figure 2

The following graph, Figure 3, shows the BBFs reported, monthly, for January 1, 2018 – April 22, 2021. Interesting to note, a thorough review of the reported blood and body fluid splashes by RNs and PCTs, during the month of July in years 2018, 2019, 2020 and 2021 confirmed there were no reports submitted by the nursing staff during this month. It is possible that beginning with 2020 when the expectation/requirement of staff to always wear masks and eyewear/goggles, because of COVID-19 pandemic, when providing face-to-face patient care helped prevent accidental splashes. However, this trend did not continue, despite the PPE expectations/requirements in the months leading to and following July. This DNP student and collaboration with some BBPER workgroup members were unable to determine the rationale for no exposures reported in July for the month of July. It is possible the number of surgical cases during the month of July is decreased, however, that could not be confirmed at the time of this project.

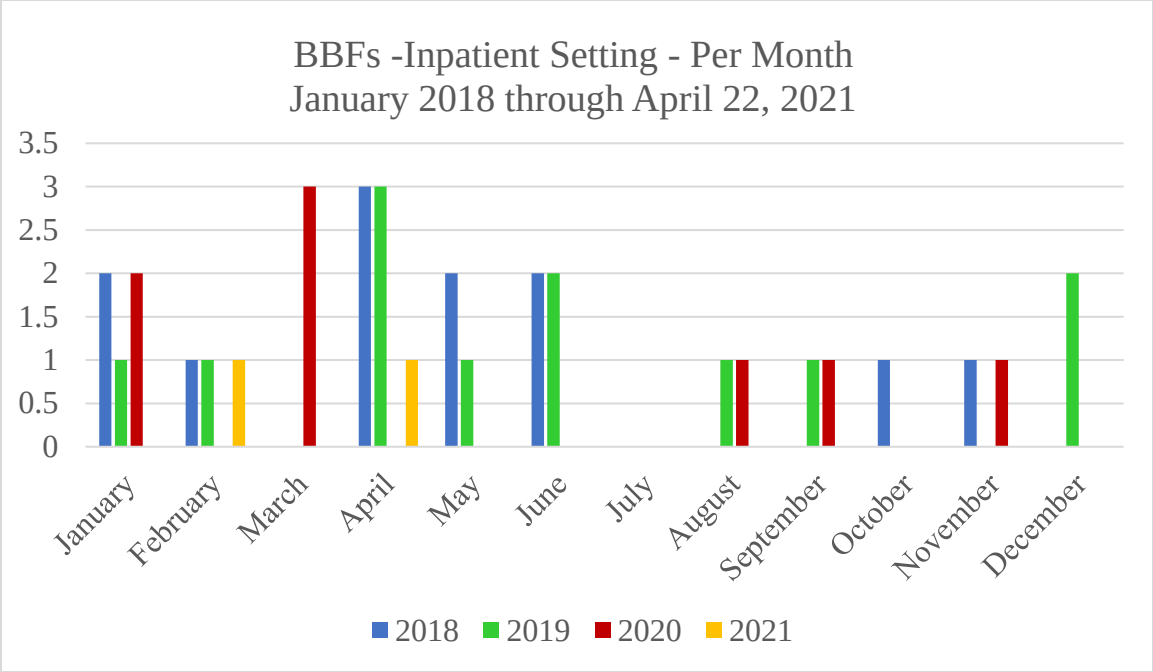


Figure 3

The patient care tasks associated and reported with increased risk of accidental blood and body fluid exposure include whole blood glucose finger sticks, IV catheter insertion and removal, emptying catheter bags, post-surgical/JP drains, handling contaminated equipment and giving an IM injection. Nurse leaders and healthcare organizations must consider measures that can be implemented to minimize or omit such incidents from the work units. Accidental blood and body fluid splash exposures can be significantly reduced/prevented when employees use the proper PPE. The focus of this DNP project will be the 32 blood and body fluid splashes, which occurred in the inpatient setting in 2018 (12), 2019 (12) and 2020 (8) and attributed because of nursing staff not using proper PPE.

An online education module, titled Blood and Body Fluid Exposure, was created to enhance staff knowledge regarding accidental BBF exposure and proper PPE selection. The purpose of this blood and body fluid exposure reduction project, was to increase compliance of proper PPE selection and use when providing patient care with an increased risk of accidental

exposure and reduce the incidence of blood and body fluid splashes among inpatient nursing staff (RNs and PCTs). After staff complete the online learning module, it is hoped there will be a 50% reduction in reported accidents during a comparable three-month period. Data collected for the three-month period post completion of the online learning will be reviewed to determine if there has been a decline in accidental BBFs reported on campus when compared to the previous year's data for the same months of each year. The goal of this DNP student was to implement the online education module, in the Spring of 2021, for review and completion by the inpatient RNs and PCTs. The nursing staff (RNs and PCTs) was given three weeks to complete the online learning. This DNP student reviewed data for three months following nursing staff completion of the education module to determine if there has been a reduction in reported BBF accidental exposures.

Current Exposure Control Plan

The current Exposure Control Plan in place, at this academic healthcare system, requires employees complete education/training upon initial hire and annually thereafter. The training is provided by this health care system, at no cost to the employee and must be completed during working hours. The annual training informs staff how to access the OSHA Standard 29 CFR 1910. 1030 Bloodborne Pathogens (BBP), Occupational Safety and Health Administration, (1992), and provides direction for accessing the healthcare system's Bloodborne Pathogen Exposure Control Plan in the electronic Policy Library. The annual training also describes blood borne pathogen diseases including the epidemiology, symptoms and mode of transmission, identifies tasks that may increase the employees' risk to bloodborne pathogens and lists engineering controls, work practices recommendations and PPE recommendations to prevent/reduce splashes. The required annual training provides a detailed process for employee

to use following an accidental blood and body fluid splash/exposure, post-exposure evaluation process and the required follow-up with Employee/Occupational Health.

This Exposure Control Plan also requires that mask and eye protection with side shields, face shields that fully cover the front and sides of the face or a mask with attached shield must be worn whenever splashes, spray, droplets, or aerosols of blood or other potentially infectious materials may be generated and there is a potential for eye, nose, or mouth contamination. Employees are expected to use PPE (gloves, a mask and eye shield/goggles) when handling/emptying any blood/body fluid containers such as Jackson-Pratt drains, urine drainage bags, colostomy bags, nasogastric tubes, ventilator tubes, and feeding tube systems. PPE should also be used when accessing veins/arteries, starting intravenous devices, central lines, performing finger stick whole blood glucose testing, and obtaining patient blood samples. Prescription eyeglasses must be equipped with protective side shields if used for eye protection. Reusable PPE must be decontaminated between uses and stored to prevent contamination. Face shields, goggles, masks or a combination of these PPE should be used to protect the mucous membranes of the eyes, nose and mouth when performing tasks that may generate splashes, sprays or droplet transmission of blood, body fluids, secretions and excretions such as delivery of an infant, surgical procedures, dental procedures, washing of contaminated equipment and instruments, wound irrigation, suctioning, bronchoscopy and endoscopy procedures, endotracheal intubation and care and post mortem care.

Occupational exposure follow-up includes an investigation of the event with the purpose of preventing, diagnosing and/or treating any blood borne illness. Immediate first aid is recommended to minimize exposure risk. All follow-up care and treatment are coordinated by Employee/Occupational Health at no cost to the employee.

Description of Quality Improvement Project

In 2018, in an academic healthcare facility in northeast Florida, 12 accidental blood and body fluid exposures were reported, in the inpatient setting, by RNs (9) and PCTs (3). These accidental blood and body fluid exposures presented a problem to the safety to the nursing staff by increasing the potential risk of transmission of blood borne pathogens, specifically hepatitis B, hepatitis C and HIV. A review of the accidental blood and body fluid exposures reported at this academic healthcare facility indicated not all nursing staff were using the required/recommended PPE while providing patient care tasks with an increased potential for accidental exposure. In 23 (out of 24 total) blood and body fluid exposures reported by RNs and PCTs in 2018 and 2019, only one of the RNs or PCTs reported wearing goggles/eye shields while providing the patient care associated with an increased risk of exposure. In 2018, nine out of the 12 exposures were accidental splashes into the RN or PCT's eyes; in 2019, 11 out of the 12 exposures involved splashes into the employees' eyes. The twelfth exposure was reported as a splash into the employee's nose. In the 2019 data, one employee reported wearing eye protection, however, it is not known if the employee was wearing personal prescription glasses and considered these proper PPE or if the employee was wearing approved PPE goggles at the time of the accidental exposure. In seven out of the eight accidental exposures reported in 2020, the RNs and PCTs indicated they were not wearing protective eyewear or masks, despite facility policy. If the RNs and PCTs who reported the accidental exposures had been wearing approved PPE goggles/eye shields, it is possible the exposures could have been prevented. According to the EOH nurse supervisor at this healthcare facility, there have not been any reported transmission of disease related to an accidental blood and body fluid exposure.

This quality improvement project focused on the inpatient RNs and PCTs in an academic healthcare system in Northeast Florida. The quality improvement intervention was the implementation of an additional online module, with a focus on enhancing staff knowledge, increasing awareness of risk assessment and PPE selection, and reducing accidental blood and body fluid exposures three months post-intervention. The baseline data for this project was collected in 2018 and indicated that 21.2% of the total number of occupational exposures at this academic health care system were mucous membrane/mucosal related and occurred when nursing staff were not wearing minimal recommended/required PPE (eye shield/goggle, mask and gloves). Of those mucous membrane/mucosal related accidents, 51.8% were reported by inpatient nursing staff (RNs and PCTs). Accidental blood and body fluid exposure data collected through 2019 and 2020 was included as pre-intervention data. The goal of this quality improvement project was to achieve a 50% reduction of occupational exposures, for the three months post online education intervention, when compared to the same three months period of previous years. Following completion of the online education, it is possible there may be an increase in reporting because of enhanced knowledge.

Scope of Project

At an academic healthcare facility in Northeast Florida, there was an upward trend of accidental blood and body fluid exposures, since 2015. Accidental blood and body fluid exposures can be prevented if staff select and use the proper PPE while performing patient care that increases the risk of exposures. A review of the recent reports indicated a trend of staff not using adequate or proper PPE during patient care. In the 12 incidents reported by nursing personnel (RNs and PCTs), in 2018, none of the staff reported wearing eye protection at the time of the accidental splash. In 2019, of 12 incidents submitted, only one RN reported wearing eye

protection at the time of the blood and body fluid splash. In both years, two RNs reported wearing a mask during the performed procedures. The 2020 data also indicated an ongoing trend of nursing staff not using PPE as required by facility policy. Procedures reported in the 2018, 2019 and 2020 accidental occupational exposures included emptying Jackson-Pratt (JP) drains, working with an intravenous line occlusion, accessing an intermittent needle therapy (INT), malfunction of vacuum tube, accidental splash during a gastroenterology and thoracentesis procedures, whole blood glucose finger stick, discontinuing an intravenous line, administering blood and while giving patient an intramuscular injection.

The location of the blood and body fluid exposures was not limited to any one unit in the inpatient setting. Accidental exposures were reported on the following inpatient/hospital units, radiology, gastroenterology procedure suite, emergency department, cardiovascular unit, abdominal transplant unit, neurosciences unit, medical intensive care unit, surgical intensive care unit, progressive care unit, surgical/bariatric unit, medical hematology/oncology unit and orthopedic/urology inpatient units.

Review of the blood and body fluid exposure report indicated nursing staff on the surgical intensive care unit, neuroscience unit and the orthopedic/urology unit had the highest number of accidental blood and body fluid exposures. The pulmonology/gastroenterology unit, which opened in early 2019, and the medical units did not report any accidental exposures by RNs and PCTs in the five-year reporting time frame. It is possible the nursing staff on these units wear PPE while caring for the higher acuity patient or that nursing staff have experienced accidental exposures but have not reported the incidents for a variety of reasons. Kessler et al. (2011), noted many healthcare workers feel accidental mucosal exposures are perceived as low

risk, therefore often not reported. These authors also note underreporting has been a problem in healthcare, for many years.

The blood and body fluid accidental occupational exposure incident reports, submitted by nursing staff, indicated some nursing personnel in this academic healthcare system are not using PPE correctly and as outlined in the Exposure Control Plan. In the 32 BBF exposures reported in 2018, 2019 and 2020, only three (0.09%) of the RNs reported wearing eye protection while performing patient care related tasks with an increased risk of BBF splashes. The objective of this DNP quality improvement project is to determine if an additional online education module will successfully enhance staff knowledge and increase awareness regarding risk assessment and selection and use of appropriate PPE selection when there is an increased risk of accidental blood and body fluid exposure, resulting in fewer blood and body fluid exposures.

COVID-19

On March 11, 2020, the World Health Organization announced that the coronavirus (COVID-19) had reached global pandemic status (Rollins, 2020). COVID-19 is a new disease, different than other diseases caused by coronaviruses, Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) (World Health Organization, 2020). COVID-19 is novel and caused more severe infections than other coronaviruses. Symptoms of the virus include fever, cough, shortness of breath, sore throat muscle pain, and new loss of sense of taste or smell and gastrointestinal symptoms (Centers for Disease Control and Prevention, 2020; Dotters-Katz & Hughes, 2020).

COVID-19 presented a threat to patients, families, communities, healthcare facilities and academic facilities. To slow down the transmission of the virus, good hygiene practices were encouraged, economic and societal shutdowns were quickly implemented. Local and federal

governments ordered individuals and communities to shelter in place, quarantine exposed individuals and isolate the infected individuals (Preskorn, 2020). Social and physical distancing and shutdowns had a negative impact on individuals, communities, and societies, bringing social and economic life to a near stop (World Health Organization, 2020). The goal of this epidemiological approach was to flatten the curve or reducing the height of the peak of infections (Preskorn, 2020).

Non-essential services such as hair salons, barber shops, nail salons, day spas, movie theaters and waterparks were shutdown. Public and private schools were closed, including institutions for higher learning. As a result, in-person classes were suspended until further notice. For parents of school age children, collaboration with teachers became necessary as mandated home schooling was implemented. In institutions for higher learning, electronic learning was an option for many students. In addition, extracurricular group activities and large events were cancelled. The healthcare facility in northeast Florida, stopped all student activities such as clinicals, meetings, in-person classroom and projects that required face-to-face interaction between individuals. As a result, the implementation of this project was delayed until after the 2020 summer semester. In addition to ceasing all student activities, this healthcare facility implemented video and tele-conference meetings instead of face-to-face meetings. All non-essential travel to conferences and between enterprise healthcare facilities was stopped.

At the end of March 2020, as COVID-19 cases increased, executive leadership, in this healthcare facility, sent communications to all frontline staff outlining the need to wear PPE, specifically masks and eyewear. Information regarding PPE use was delivered in a variety of venues, including email, electronic newsletters, electronic staff information boards in staff only areas. At the beginning of April 2020, it was mandatory that all employees who were in direct

contact with patients wear a mask. Direct contact with patients included staff working at reception areas, inpatient unit desks and frontline HCWs. Staff working on units where direct patient care was provided, were required to wear a facility-provided procedural or surgical mask. In areas that perform procedures, staff were required to wear PPE as outlined in the Infection Prevention and Control guidelines. Procedural and surgical masks should be changed if the mask becomes wet, damaged, difficult to breathe through or visibly soiled. A mask could be worn up to one week if the integrity was not compromised. Employees were provided with mask care and storage instructions when using a mask for more than one day. Employees who worked in buildings where no patient care, were required to wear cloth masks.

In mid-April 2020, as COVID cases began to rise locally, throughout the state and nationwide, this healthcare facility mandated that all patients and visitors wear masks upon entering any of the buildings on campus. In addition, the healthcare facility provided eyewear to all patient facing staff. Eye protection was required for all staff providing direct patient care, safety glasses should be worn in nonprocedural areas. HCWs in procedural areas such as the surgical suites, interventional radiology suites, ED and intensive care units could use face shields to extend the use of masks when exposure to blood or body fluids is greater.

Use of PPE became strictly enforced and included the mandatory use of masks, goggles/face shields when providing direct patient care or when face-to-face with a patient. When providing aerosol producing patient care, the HCW was required to don mask, goggles/face shield, isolation gown and gloves. At times, there were shortages of surgical masks, N95 masks (required for aerosol producing patient care) and goggles/face shields. As a result of these shortages, staff were required to use the same mask for numerous consecutive days, or until visibly soiled. As HCWs, in this healthcare facility, became more familiar with the

requirements to use PPE in their daily practice, there was a decrease in the number of blood and body fluid exposures reported. The mandatory use of masks and eyewear/goggles has had a positive impact in prevention of blood and body fluid splashes.

The COVID-19 pandemic continued to impact healthcare in the United States in 2021. This healthcare facility experienced a surge in cases in March and April and then a third surge in August 2021. During the time of increased cases, various methods for communicating the need for proper PPE selection when caring for non-COVID and COVID positive patients were sent by the organization. Additional online education regarding PPE donning and doffing was required of inpatient staff and ambulatory staff who volunteered or were selected to work in the inpatient setting during the surge. Since the conclusion of this project, this DNP student does not know if there have been any accidental blood and body fluid splashes reported by RNs and PCTs. AN update will be provided by the EOH nurse supervisor in the third quarter BBPER workgroup meeting.

Literature Review

A review of the literature was completed in two databases, PubMed and Cumulative Index to Nursing an Allied Health Literature (CINAHL). The following keywords were used: *blood and body fluids, blood and body fluid splashes, blood borne pathogens, blood borne pathogens in nursing, nurses, occupational exposures, occupational hazards, hepatitis B, hepatitis C, human immunodeficiency virus, personal protective equipment, personal protective clothing, compliance, COVID-19, and infection prevention*. Articles retrieved from this literature search were written in English, between the years 1985-2020.

Occupational Exposures/Blood and Body Fluid Splashes

Nurses have a high risk of occupational exposure to blood and body fluids, which can be

associated with the transmission of pathogens such as hepatitis B virus (HBV), hepatitis C virus (HCV), and human immunodeficiency virus (HIV) (Yi et al., 2018). These authors completed a two-year study, in China, and reported approximately 48% of health care workers with an exposure to blood and body fluids had detectable levels of blood borne pathogens including HBV, HCV or HIV. These statistics are alarming and indicative of the importance of ensuring prevention measures are in place for nurses and other health care workers to minimize the incidence of occupational exposure. Occupational injury can occur through percutaneous injuries when a needle or sharp instrument/object penetrates the skin and mucous membrane exposure to the eyes, nose and mouth. Percutaneous injuries account for approximately 66-95% of accidental occupational exposures (Auta et al., 2017). Factors/procedures associated with needle stick injuries include surgical procedures, suturing, IV catheter placement, recapping needles, and blood sampling (Shokuhi et al., 2012).

Epidemiology-Hepatitis B

Hepatitis B virus (HBV) is a member of the hepadnaviral family. The virus is transmitted when blood, semen or other contaminated bodily fluids from an infected person, come in contact with mucous membranes or an open wound of a person who is not infected (Kemp et al., 2019). The HBV is a global health problem. Routes of acquiring HBV infection vary geographically and are related to the incidence of infection (Hsu et al., 2019). In endemic areas, mother-to-infant transmission (MTIT) is the primary mode of transmission HBV. Mothers who are seropositive for hepatitis B are at an increased risk for perinatal transmission of the virus. Prior to the availability of the hepatitis B vaccine, it was estimated that approximately 90% of infants born to mothers HBV seropositive, became chronically infected (Hsu & Chang, 2019). These authors indicated in countries such as the United States and Europe, with low endemic regions, HBV

infection is generally transmitted via sexual contact with individuals with chronic HBV infection, or by percutaneous exposure.

Epidemiology-Hepatitis C

Hepatitis C virus (HCV) is a hepatotropic virus. HCV can be transmitted via the parenteral route which includes injection drug use, blood transfusion, unsafe injection practices, and healthcare related procedures (Gupta et al., 2014). The authors noted, HCV causes acute hepatitis, which is mostly subclinical, but which gradually evolves into chronic hepatitis in about 80% of those infected. People infected with HCV are at risk for developing chronic liver disease, cirrhosis, and primary hepatocellular carcinoma. Healthcare workers are at risk of occupational exposure following percutaneous injury or accidental mucosal splashes (Poll, 2012). It is important for healthcare workers to be fully trained and aware of safe handling and disposal of sharp instruments. Adherence to universal precautions prevents occupational exposure to this virus.

Epidemiology-Human Immunodeficiency Virus

The prevalence of HIV positive tests in the United States is estimated to be 0.13% per 100, 000 persons tested; HIV has an environmental survival half-life of 28 hours to several days (Brewer et al., 2017). These authors also noted the risk of HIV transmission to a healthcare worked after mucosal exposure is approximately 0.09%. Accidental blood and body fluid exposure to HIV should be considered an urgent medical issue and treatment should begin immediately. If the patient's HIV status is positive or not known at the time of exposure, the healthcare worker should begin HIV post-exposure prophylaxis immediately. If the patient is determined to be HIV negative, the PEP should be discontinued; if the patient tests HIV positive

the PEP is administered for four weeks and additional monitoring/testing is required for follow-up of the health care worker's HIV status (Brewer et al., 2017).

Epidemiology-Occupational Accidents in Healthcare Workers

The risk of exposure is not limited to hospital-based health care personnel. Brewer et al. (2017) describe a German study indicating in which approximately 64% of the respondents reported having a needle stick injury that was not reported. The authors of this study indicated health care workers in academic settings were more likely to report injuries than those in private practice. Brewer et al. (2017) compared the findings in the German study to one completed in the United States. This study indicated approximately 45.2% of the respondents experienced a needlestick injury that went unreported (Donnelly et al., 2013). Future studies should be completed to determine what process can be implemented to ensure and assist health care workers in private practice to increase reporting rates of occupational exposure incidents.

The risk of transmission to a healthcare worker from an infected person following a sharps injury is estimated to be one in three (30%) when the patient is infected with Hepatitis B and is "e" antigen positive (indicating high infectivity), one in 30 (3%) when the patient is infected with Hepatitis C and one in 300 (0.3%) when the patient is infected with HIV (Beckett & Bright, 2013). Brewer et al. (2017) note the risk of HIV transmission to a healthcare worker after mucosal exposure is 0.09%. In 2005, it was estimated on an annual basis, more than 3 million occupational exposures occur through percutaneous injury. It was estimated 40% of HBV and HCV infections and approximately 2.5% of HIV infections in health-care workers are a result of percutaneous injuries (Auta et al., 2017). Belachew et al. (2017) noted in their study, 199 (out of 314 participants, 62.6%) of the participants were exposed to blood and body fluids, of which 177 (88.9%) involved blood splashes.

A study was completed by Jahic et al. (2018) to determine the characteristics of occupational exposure accidents among hospital health care workers at the University Clinical Centre Tuzla, Bosnia and Herzegovina. A cross-sectional questionnaire was administered to participants March 1, through December 31, 2014. Surveys were sent to 1089 participants. The researchers received 1031 completed responses from health care workers at risk for blood and body fluid exposures in their daily practice. Forty five of the 1031 participants, (4.5%) had been infected with HBV or HCV. There were no HIV cases reported and 29.3% of the participants indicated they did not know whether they had been infected with a blood borne pathogen and 28% of the participants did not answer the question. There was a higher rate of incidence among nurses. Most of the nurse participants (69.8%) reported having one or more episodes of contact with patient's blood (Jahic et al., 2018). Jahic et al. (2018) reported 24% of the participants indicated they had multiple contacts. Nurses and medical technicians in the surgical departments were twice as likely to have an exposure compared to physicians and support staff. According to Jahic et al. (2018), nurses were more likely to report an incident than physicians. The authors noted the World Health Organization (WHO) estimate that approximately 40% of HBV and HCV infections are related to occupational exposure incidents (Pruss-Ustun et al., 2003).

In a study completed by Belachew et al. (2017), a self-administered questionnaire revealed 199 out of the 318 participates (62.6%) reported blood/body fluid exposure involving blood splashes (88.9%) while drawing blood, during vein puncture and injection; approximately 30% of the nurses reported two exposures. These authors also noted the risk of exposure was higher among male nurses than their female counterparts. Single nurses had a greater likelihood of occupational exposure risk than those nurses who were married. Belachew et al. (2017) also

noted nurses who work on surgical units were more likely to have occupational exposures than those working on chronic illness units/clinics.

Auta et al. (2017) completed a systematic review and meta-analysis of the prevalence of occupational exposure to blood and body fluids in healthcare workers in Africa. These authors reviewed articles published between January 2000 and August 2017 that reported blood and body fluid exposures that occurred through percutaneous injury, mucous membrane exposure and non-intact skin exposure and bites. There were 904 articles identified through the literature search. However, only 65 of the articles were eligible for this review. The articles involved studies in 21 African countries, providing good insight into the prevalence of occupational exposures to healthcare workers in Africa. This review revealed that approximately two thirds of the healthcare workers in Africa had an occupational exposure and half of the healthcare workers reported an occupational exposure once a year. For unclear reasons, the percentage of occupational exposures in North Africa countries was greater than occupational exposures in South Africa countries (Auta et al., 2017). The authors were unsure if this difference could be related to underreporting, education and awareness or advanced infection control practices.

Personal Protective Equipment and Other Safety Devices

Personal protective equipment (PPE) should be worn to minimize exposure to hazards that cause serious workplace injuries and illnesses. These injuries and illnesses may result from contact with chemical, radiological, physical, electrical, mechanical, or other workplace hazards. Personal protective equipment may include items such as gloves, safety glasses and shoes, earplugs or muffs, hard hats, respirators, or coveralls, vests and full body suits. For this DNP paper, donning of PPE refers to the use of gloves, mask and goggles/eye shields when the HCW has an increased risk for accidental blood and body fluid exposure.

All personal protective equipment should be safely designed and constructed and should be maintained in a clean and reliable fashion. The PPE should fit the employee comfortably, encouraging compliance. When the PPE does not fit comfortably, employees may choose not to use the equipment, although required by the organization. Failure to use PPE can increase the risk of blood and body exposure and occupational incidents (Occupational Safety and Health Administration, n.d.). It is important for employees to have administrative leadership support to provide protection against occupational exposure to ensure proper and regular use. Employers are also required to train employees with potential for exposure to blood and body fluids to an increased awareness of PPE and when it is necessary to wear, select the appropriate PPE for the task at hand, how to don and doff the PPE without increasing risk of accidental exposure/contamination. Employees should also be knowledgeable of the limitations of the equipment, proper care and storage of PPE, useful life, and disposal of the equipment. Employers should support the implementation of a PPE program that addresses the potential for exposure, the proper selection and use of PPE, education of employees, ongoing assessment of the education and effectiveness.

In a study completed by Kang et al. (2017) with willing participants from selected units at the University of Pittsburg Medical Center (UPMC) Presbyterian Hospital, PPE practices were observed in clinical settings, videotaped in simulation settings, a survey was administered, and a follow-up simulation video session was recorded. Each simulation participant was evaluated after the simulation, with fluorescent powder and an ultraviolet light; the authors reported 97% of the participants had at least one incident of contamination in the PPE doffing exercise. There were only two participants who did not have a contamination in either simulation exercise. Participants reported, via survey, that PPE use was at times, cumbersome. Although participants

felt relatively confident in the use of simple PPE, they had low confidence in full body protective PPE. Participants voiced additional concerns, including PPE slowed the HCW in delivering patient care, concerns about effectiveness of some PPE supplies, and indicated they would like more training in donning and doffing PPE properly to avoid self-contamination. Kang et al. (2017) results emphasize the necessity of standardized PPE practices and the need for PPE and infection control and prevention training and education for all health care workers who may be at risk for accidental occupational exposures to blood and body fluids.

Green-McKenzie et al. (2001) examined the relation of the availability of PPE and engineering controls to infection control in prisons in the state of Maryland. The authors noted the prevalence of HIV, HBV and HCV are higher in the prison patient population and may be related to a high incidence of intravenous drug use in this population. This consideration may put the prison HCWs at a higher risk for occupational exposure. The participants in this study reported an increased use of PPE and engineering controls when the supplies were readily available to staff. The chance of wearing a mask or safety glasses/goggles were increased by factors of three and five, respectively, when PPE was readily available (Green-McKenzie et al., 2001). The authors noted additional factors which may increase the risk of exposure, such as inadequate staffing levels, limited supplies and safety equipment in addition due to limited training and education.

Cristina Da Silveira Chagas et al. (2013), noted that masks and eye protection are the PPE used less often. The lab coat was the most frequently used PPE. The authors concluded it is necessary to standardize processes and safe practices while handling blood and body fluids that may increase the potential for occupational exposure. Standardized practices should include the routine use of PPE and care in handling of sharps. The work environment should be conducive

to safety and protection of the health care worker while on duty. PPE should be readily available and stored in accessible areas. Another reason for not using PPE was that the supplies are not always located in a convenient area for easy access and use. The individual health professional must also take the responsibility and accountability for using PPE as recommended in organizational policies.

A study by Jain et al., (2013), was performed in a tertiary care referral hospital from August 2009 to March 2010. Surveys were distributed during regularly scheduled infection control rounds and educational sessions to staff including critical care providers, faculty, residents, medical assistants, staff and registered nurses working in intensive care units, operation rooms and hospital units. The paper copy surveys were issued to participants to complete and were collected the same day. The survey asked respondents to identify PPE that should be used in seven specific situations outlined in the questionnaires. The procedures listed included insertion of central lines, endotracheal tubes, urinary catheters, control of major splash of blood, cleaning of incontinent patients, PO medication administration and obtaining the patient's blood pressure. Participants were also asked to identify the PPE they used in specific situations. Questions also included information about the availability of PPE on their specific units, easy access to PPE, the unit manager's attitude towards PPE use and the staff's own role in PPE use for their own safety and infection prevention and control in the hospital. In this study, the authors noted the use of PPE was significantly higher in moderate and high-risk area. Staff in low-risk areas were more likely not to use PPE. PPE was more readily used when more readily available. For example, gloves were four times more likely to be used if easily accessed. Eye wear was 24 times more likely to be used if readily available. The authors noted this is a significant finding and something to consider when encouraging PPE use (Jain et al., 2013).

This study also noted, although HCWs are generally aware of infection prevention and control measures regarding PPE use, compliance was found to be at a low of 54%. Therefore, awareness is not a reason for decreased compliance. Other factors such as PPE non-availability, storage of PPE in inconvenient locations, discomfort and interference with patient care duties are reasons reported by staff for noncompliance. These authors recommend adequate staff orientation and training, ongoing education reinforcement, ease of access to PPE, adequate storage of PPE supplies and organizational support and individual accountability for improved PPE compliance; achieving all these recommendations could lead to improved staff compliance in PPE use.

Honda and Iwata (2016) provide a general understanding of PPE use related to high-risk settings, particularly pathogens transmitted via airborne droplets such as various forms of the influenza virus, severe acute respiratory syndrome, Middle East respiratory syndrome and filoviruses, Ebolavirus, Cueva virus and Marburgvirus. Although the focus was related to these viruses, one can also apply the results of their review to occupational exposure and general infection prevention practices. Without proper education, health care workers lack the awareness and understanding of correct PPE use to prevent the transmission of infectious pathogens through blood and body splashes.

Interventions – Education

Belachew et al. (2017), noted a significant finding related to occupational exposure and infection prevention education; nurses who had no training on this topic were six times more exposed than those nurses who had received the education. This finding is significant in supporting the need for occupational exposure risk and infection prevention education for health care workers with the intent to significantly reduce blood and body fluid incidents. These

authors suggest infection prevention education may help nurses practice safely, thereby decreasing blood and body fluid exposures and needlestick injuries.

In 2014, Moore et al. completed a study using a convenience sample of nursing staff, from a large metropolitan private hospital to assess the compliance rate of PPE use. The intent of the study was to develop and implement an educational program designed to increase the compliance rate of PPE use in the peri-operative setting of this hospital. Although these authors identified that education was a large component of maintaining infection control standards, it is not the only factor that can improve compliance. The authors also noted other studies have indicated the efforts of continuous education programs has resulted in significant improvements in handwashing compliance. As noted by other studies, it is evident that ongoing training and education is important to sustained practice improvement.

Auta et al., (2017), indicated occupational exposures were greater among healthcare workers who received little or no training in infection control prevention. The literature review noted that staffing shortages resulted in longer work hours for the healthcare worker and may cause fatigue and diminished alertness and potential for increased risk of occupational exposure. Healthcare workers who worked more than 40 hours per week were more likely to be exposed than those who worked less hours. There was no significant difference reported between healthcare workers with greater than five years of experience compared to those with less than five years of experience.

The use of PPE is also vital in health care workers who administer chemotherapy. A program was developed at Dana-Faber Cancer Institute to monitor and report staff compliance and use of PPE and encouraged staff to become involved in the auditing and reporting of incidents (Hennessey & Dynan, 2014). There are specific procedures related to the use of PPE

that should be followed during the preparation, administration, disposal and accidental spill clean-up. Despite staff awareness of the recommendations and the risk of occupational exposure, there are nurses who refuse or choose not to use PPE as recommended. The aim of the project was to complete an assessment of the use of PPE on an ambulatory oncology unit, staff education and to implement best practices for ongoing process improvement of staff and patient safety. Hennessy and Dynan (2014) initially reported PPE compliance was determined to be 30-40%, which was lower than anticipated.

During a project, which began in 2009, to examine PPE use of nurses in an ambulatory oncology practice, staff at Dana-Farber Cancer were required to attend a mandatory, comprehensive education session focusing on increasing awareness of the health care workers of the hazards of chemotherapy and to eliminate awareness of the risk as a barrier to PPE use. The education was also attended by a panel of infusion nurses, a pharmacist an occupational nurse and a clinical assistant (Hennessy & Dynan, 2014). The panel was present to identify and discuss potential barriers to PPE use. Six months after the education and panel discussion was completed, monthly audits, using an observation tool, were implemented in the organization to measure compliance of PPE use and infection control standards. Immediate feedback was provided, during the observations, to staff who were not successfully compliant with their infection control practice. The authors reported the Dana-Farber Cancer Institute continued various infection control practices to reinforce safe practice and PPE use when handling and administering chemotherapy. Audits at the end of 2012 indicate performance levels at 90% or better.

Although the Dana Farber Cancer Institute project focused on the use of PPE when handling and administering chemotherapy, the lessons learned from this project can be

transferred to a project to increase the use of PPE to prevent blood and body fluids. The steps taken, implementation and success of this project should be considered when focusing on a project dedicated to increasing use and compliance of PPE to prevent blood and body fluid splashes in this academic health care system.

Cristina Da Silveira Chagas et al., (2013), assessed the knowledge of emergency department (ED) nursing staff and their occupational risks and how they use personal protective equipment in their daily work. The authors conducted data via recorded semi-structured interviews with emergency nursing personnel in a hospital in South Brazil between March and December 2011. Findings suggested the ED nurses were knowledgeable of the occupational risks. However, despite this knowledge, many nurses often neglected to use the PPE in an emergent situation. They based their decisions on the urgent care needed by the patients in the ED, stating there is no time to don PPE when the patient needs medical attention. In addition, recommended continuing education programs be offered to staff to maintain awareness and ensure PPE use and compliance. Staff should be held accountable for the proper and continued use of PPE when caring for patients who may put the health care worker at risk for occupational exposure. Health care workers need to take responsibility for protecting themselves from occupational exposures. When working with patients, it is important to recognize that every patient could potentially have a blood borne disease/infection. In lieu of this, the HCWs should take the necessary precautions when caring for all patients. The authors concluded use of PPE should be the routine and not the exception for safe practice. Cristina Da Silveira Chagas et al. (2013) recognized that orientation and training programs should be completed by new and established health care workers. Health care organizations should have standardized measures used when providing care to patients. The health care organization, executive leadership, and

nursing leadership should support ongoing infection control and prevention education for all with the occupational exposure risk. Health care workers at risk for occupational exposure should also be offered the appropriate vaccines to increase immunization status. Vaccination surveillance programs should also be readily available to staff with occupational risk hazards.

Jahic et al. (2018) cited studies conducted in Serbia indicating that health care workers reported they were unsure if they were tested post exposure and/or if they had not been tested post exposure. This information is alarming indeed, as it possesses additional risk factors not only for the health care worker, but future patients. Studies done in Serbia, Malaysia, Canada and Scotland indicate nurses are the group with the most reported cases of blood borne pathogen exposures, followed by physicians. As noted in other studies, Jahic et al. (2018) agree education of health care workers should be standard practice, with the goal of reducing blood and body fluid exposures. This is especially critical in developing countries where there is no training nor follow-up surveillance following accidental exposures.

It is important to establish PPE use does not eliminate the risk of occupational exposure. PPE use reduces the risk when used and disposed of properly. John et al., (2016), issued a survey to a convenience sample of health care workers at The Cleveland Veterans Affairs Medical Center in Ohio. The survey included questions related to PPE training during professional education, training while working in health care, training methods used and the participant's confidence level of proper PPE use. These authors also compared the education and training used at The Cleveland Veterans Affairs Medical Center with other health care facilities in Ohio by sending electronic survey to 10 Ohio hospitals and long-term-care facilities. The survey asked the facilities about type and timing of PPE training, and if the training included donning and doffing processes. The most common type of training in the facilities was

computer-based, videos or live demonstrations. More than half of the facilities required completion of annual PPE training.

The convenient sample survey results were evenly distributed among three groups of 74, nurses, physicians, and allied health professionals. Of the three groups, the nurses reported they were more likely to use gloves, report PPE training, feel confident about effectively donning and doffing PPE and teach others about proper use of PPE. Unfortunately, 19% of the respondents reported there was no need to use hand hygiene if gloves were used as PPE (John et al., 2016). This statement should be considered when developing the educational intervention specific for the project discussed in this paper.

Sangwan et al. (2011) reported the percentage of blood and body fluid exposure among HCWs in a tertiary care academic medical center of the Armed Forces is less than other parts of India. However, these authors noted the exposure rate was unacceptably higher than desired. The authors noted the number of HCWs reported occupational exposures was higher than those reported by HCWs in the United States and Japan. HCWs surveyed in this study indicated barriers to using PPE is the emergent situation of the patient. If care/treatment was needed urgently, the HCW was less likely to don PPE. The HCWs surveyed in this study indicated PPE was always available in the work areas.

The authors note the use of PPE needs to improve in this Armed Forces medical center. They suggested PPE education/training to reinforce and clarify the specific infection control guidelines to prevent occupational exposure. The education would aim at improving knowledge and information regarding PPE use and the reduction/prevention of occupational exposures in this setting.

Culture of Safety

Moore et al. (2014) suggest the impact of a strong, positive culture of safety in the organization in addition to support from coworkers and administrative staff enhance PPE use compliance. Supportive teams that foster a culture of safety and compliance are more likely to have enhanced compliance rates overall. This study indicated barriers to PPE use included staff perceived low risk patients, a lack of time if emergent patient care was needed. PPE interferences with ability to provide patient care. According to Benedicto (2017), an organization's safety culture is defined by what it stands for and does in the pursuit of safety. The organizational culture is reliant on individual and group beliefs, values, attitudes, perceptions, competencies, and patterns of behavior.

True leadership commitment requires an alignment of executive leaders including the organization's governing body/board of trustees, senior management, and physician and nurse leaders; all levels of leadership must share the same goal of eliminating harms to patients and employees (Chassin & Loeb, 2013). These authors also noted that healthcare organizations with this vision are generally not satisfied with the current level of safety and are always striving towards improved levels of safety and have a true commitment to a nearly perfect safety work environment.

Including nursing staff in the planning and promotion of a safety culture focused work environment creates buy-in for staff. According to Meneghetti Baratto et al., (2016), to establish safe nursing care there must be a connection between professionals and managers. These authors also note that proactive attitudes for improving work processes, a change of culture with evaluation of events for possible causes and a focus on improving the quality of care provided to patients in health institutions can be a result of collaboration of frontline staff and leadership.

For this project, it will be imperative to work closely with not only the inpatient nurse managers, but also work on establishing relationships with frontline staff during the implementation and evaluation phases of the project.

Summary of Literature Review

Healthcare workers have an increased risk of occupational exposure to blood and body fluids which can be associated with transmission of hepatitis B, hepatitis C and HIV. Use of PPE, while providing patient care with an increased risk for occupational exposure to blood borne pathogens, can significantly reduce the incidence of accidental blood and body fluid splashes. Several studies indicated use of PPE was significantly higher when PPE was easily accessible and readily available. The literature showed staff should be educated and aware of the risks of accidental exposure and employers are responsible for providing safe work environments and ensuring healthcare workers receive adequate education and training. Belachew et al., (2017), indicated a correlation between a higher incidence of occupational exposures among nurses who lacked training and education on occupational risk. This study supports the need for staff education with a focus on occupation risk for blood and body fluid accidents. The healthcare worker also has a personal responsibility to follow standard precautions when providing patient care with an increased risk for accidental blood and body fluid exposure.

Framework

Quality improvement is a multifactor process in healthcare success of quality improvement projects relies on multidisciplinary approach to identify and implement evidence-based solutions to the challenges affecting healthcare practice (Loftus et al., 2015) Healthcare workers are involved, directly or indirectly, with providing services to individuals. These services occur in a variety of work settings, including hospitals, clinics, dental offices, out-

patient surgery centers, birthing centers, emergency medical care, home healthcare, and nursing homes. In the healthcare setting, there are a variety of serious safety and health hazards including bloodborne pathogens. Employees have the right to receive training and education to increase their knowledge and awareness of the potential hazards and methods to prevent occupational exposures (Momani et al., 2016). In order to make the training programs effective and sustainable, it will be necessary to evaluate the programs. The Six Sigma DMAIC (Define-Measure-Analyze-Improve-Control) approach assists with this approach (Momani et al., 2016). Loftus et al. (2015), note the DMAIC framework can guide healthcare workers through a quality improvement process. The Define-Measure-Analyze-Improve-Control process requires five steps followed in this order:

1. Define the project purpose, identify issues/concerns that need to be addressed.
2. Measure current issues – provides a baseline.
3. Analyze the root cause of the problems, set goals for performance.
4. Improve the process, remove any obstacles.
5. Control/maintain the process by monitoring progress periodically after implementation.

DMAIC/Define

The first phase of DMAIC is Define; this phase sets the plan for the improvement workgroup. In this initial phase the improvement process is defined, the key stakeholders are identified, and the purpose of the project is determined (Loftus et al., 2015). For this DNP quality improvement project, the problem was identified as increasing trends in blood and body fluid splashes in an academic healthcare system, located in northeast Florida. In 2018, it was noted 21.2% of the occupational exposures were mucous membrane/mucosal related. Nursing

leadership was made aware of this increasing trend by the EOH nurse supervisor in early 2019. The target audience identified as inpatient nursing staff performing tasks that have increased risk for occupational exposure to blood and body fluids. For the project, this DNP student collaborated with a Nursing Education Specialist who created an educational learning module for the nursing staff in this academic healthcare system campus. The objectives of the educational learning are outlined:

1. Recognize blood and body fluid exposure risk in the clinical environment and select appropriate PPE (completion of scenarios).
2. List the three main blood borne organisms that pose the greatest risk to healthcare workers following an accidental occupational exposure.
3. Identify the various types of body fluids in which HIV, hepatitis B and Hepatitis C can be found.
4. Locate Employee Health resources to prevent and respond to blood and body fluid exposures.

DMAIC/Measure

The second phase of the DMAIC model is Measure; according to Dreachslin and Lee (2007), well-designed performance measures should be easy to understand, and include outputs and inputs that are defined and understood by those who will use them. The 2018 baseline data and the 2019 and 2020 pre-implementation data, used for this project, was obtained from Employee/Occupational Health to identify problematic areas/units on the campus of this academic healthcare organization. The data was reviewed to determine if there were any similarities or trends in accidental occupational exposures; this data was pulled from the incident reports filed at the time of the employee exposure. All employee identifiers were removed by

Employee/Occupational Health staff prior to sharing with this student. The spreadsheet includes the following information necessary for trending the exposures, injury date and time, job category (RN or PCT), department of exposure, source risk status, exposure (mucosal), body fluid (biliary, blood/blood product wound drain), safety device attached (Yes/No/NA), safety device used as advise (Yes/No/NA), task appropriate PPE (Yes/No), gloves, gown, eye protection, mask, general location of exposure (hospital or specified building if outpatient), department of exposure, casual factor and narrative/comments, follow-up/prevention counseling and treatment. This pre-implementation data served as the baseline data for trending accidental occupational exposures post-implementation of the online educational module. The education module was created to enhance staff knowledge and increase awareness regarding risk assessment and appropriate PPE selection when there is an increased risk of accidental blood and body fluid exposure of blood and body fluid exposure. Accidental exposure report data was collected for three months post implementation of the online education module, to determine if the information in the module had a positive impact on nursing staff knowledge and awareness to increase the use of PPE. The aim is to reduce blood and body fluid accidents by 50%, when compared to the same three-month period in previous year.

DMAIC/Analyze

The third step of the DMAIC model is analyze; the pre-implementation data was used to determine the focus of the training and educational modules for the inpatient hospital nurses. The project workgroup was formed to review trends and determine root causes for occupational exposures to blood and body fluids. The training and educational module was based on the academic healthcare organization's educational requirements and evidenced based practice recommendations.

DMAIC/Improve

The next phase of the DMAIC model is the Improve phase. This phase is designed to identify and implement interventions to remedy/reduce the problem (Carboneau et al., 2010) Based on the literature review, many research studies indicate training and education should be provided to enhance HCW awareness of safety and the safety of others and reduce accidental occupational exposures (Auta et al., 2017; Bijani et al., 2018; Cristina Da Silveira Chagas et al., 2013). Some authors suggest after initial training and education, regular in-services should be offered to reinforce enhanced awareness. In addition, to education and training, established standardized preventive measures should be in place and used by staff who provide care requiring handling of blood, secretions, and excretions, in addition to maintaining a culture of safety when staff report occupational exposures (Cristina Da Silveira Chagas et al., 2013; Yi et al., 2018). The educational intervention planned for this project aimed to enhance staff knowledge and increase awareness of risk assessment and appropriate PPE selection, blood borne organisms that pose the greatest risk to healthcare workers, various types of bloody fluids HIV, hepatitis B and Hepatitis C can be found in, and steps that nursing staff/employees should be take post-exposure to blood and body fluids.

DMAIC/Control

The final phase of DMAIC is the Control Phase. In this phase, ongoing surveillance of monthly reported accidental occupational exposures to blood and body fluids were reviewed and tracked to determine if the education intervention was successful in reducing the incidence of accidental exposures by 50% three months post-education intervention. Post-education intervention, this DNP student attended inpatient hospital unit staff meetings to discuss and reinforce safe and effective PPE selection and use and infection control and prevention practices.

There was also a planned intent to complete monthly walking rounds on inpatient units, however, this was not permitted during the COVID-19 pandemic. For the three months post-education intervention, data submitted through incident reporting following an occupational exposure was reviewed monthly to determine if there was any reduction in accidental mucosal blood and body fluid exposures. A post-intervention blood and body fluid awareness survey was sent to inpatient RNs and PCTs to determine if there is a significant change in level of concern to BBF exposures and frequency of PPE use, availability of PPE and staff confidence and knowledge of reporting processes.

Project Description/Design

Occupational exposures to blood and body fluids (BBFs) present a great risk to health care workers. Since 2015, at an academic health care facility in northeast Florida, there has been an increasing trend in the number of accidental blood and body fluid exposures reported. The nursing supervisor of EOH formed a workgroup, Blood Borne Pathogen Exposure Reduction (BBPER) to review and discuss these trends. This DNP project was the result of discussion focused on reducing the number of accidental blood and body fluid exposures at this facility. The project specifically focused on the accidental blood and body fluid incidents reported by the inpatient RNs and PCTs in the facility. The DNP student collaborated with a Clinical Nurse Educator to develop an online education module. The online module was assigned to RNs and PCTs in the inpatient setting. The desired outcome of this project was to reduce the accidental blood and body fluid exposures by 50%, when compared to the same three-month period in the previous years.

Project Purpose

The purpose of this quality improvement project was to implement an online education module to enhance staff knowledge and increase awareness regarding risk assessment and appropriate PPE selection when there is an increased risk of accidental blood and body fluid exposure. The intent of the online education module was to assist staff in selecting appropriate PPE and increasing the use of PPE among inpatient nursing staff, with a goal of reducing blood and body fluid accidents by 50%, three months post-education intervention when compared to the same three months in previous years. The focus of this project was based on nursing staff (RNs and PCTs) in the inpatient setting.

Project Setting

This Blood and Body Fluid Exposure Reduction project was conducted at a 304-bed academic healthcare system in northeast Florida. There were 728 RNs and 239 PCTs (total 967 inpatient nursing staff) currently employed in the inpatient setting at the facility, according to a report obtained from Data Management Department in Human Resources, in January 2020. The RNs and PCTs work in interventional radiology, gastroenterology procedure suite, emergency department, cardiovascular unit, abdominal medical hematology/oncology unit, transplant unit, medical intensive care unit, surgical intensive care unit, medical unit, neurosciences unit, pulmonary/gastroenterology unit, progressive care unit, orthopedic/urology unit, and the surgical/bariatric unit. All the units listed were included in the DNP project.

Facility Support

In January 2019, a meeting was held with a multidisciplinary workgroup including the Employee/Occupational Health (EOH) nurse supervisor, one EOH staff nurse, nursing education specialists from the operating rooms and inpatient/outpatient services, nurse administrator, nurse

managers from the operating room, instrument processing and outpatient setting, Consultant Chair of Surgical Practices, Consultant Anesthesiologist, Infection Control and Prevention Specialist and a Health & Safety Specialist. The meeting was held to bring awareness of the significance of blood and body fluid exposures on campus. The EOH nurse supervisor provided a summary of the 2018 data, reflecting the incident reporting at this academic healthcare system. She expressed a desire to reduce the number of accidental blood and body fluid exposures on campus by 50%. Because of the significant number of needle stick injuries in the operating room setting, this committee determined the OR multidisciplinary team would focus on the needle stick injuries and blood and body fluid exposure specific to that operating room and peri-operative department. The mucosal blood and body fluid exposure accidents reported by nursing staff (RNs and PCTs) in the inpatient hospital setting was the focus of this DNP project.

Intentions of Blood and Body Fluid Reduction Project

The intentions of this project follow:

1. Collaboration with nursing education specialist to develop an education module focused on enhancing staff knowledge and awareness regarding risk assessment and appropriate PPE selection, blood born organisms posing the greatest risk to healthcare workers, various types of bloody fluids HIV, hepatitis B and Hepatitis C can be found in, and steps that nursing staff/employees should be take post-occupational exposure to blood and body fluids. Although this project was focused on the RNs and PCTs in the inpatient hospital setting, this education module may be used by other disciplines and nursing staff in the ambulatory outpatient setting.
2. Deliver the pre- and post-intervention surveys and education module electronically, to inpatient hospital nursing staff (728 RNs and 239 PCTs). The pre-intervention survey

was sent via email to the RNs and PCTs, two weeks prior to the assignment of the online education module. The nursing staff in this academic healthcare facility were given three weeks to successfully complete this online education module. The administrative assistant supervisor tracked nursing staff completion through electronic reports available in the learning system data base. These reports identified staff who had not completed the education modules by the specified due date; the nursing staff respective nurse managers were notified of delinquencies by their individual administrative assistants (AAs). This academic health care system has an initial/required expectations and corrective action algorithm which serves as a guide for managers when addressing license, certification, and education delinquencies. The algorithm specifies the level of corrective action and is dependent on the length of time for completion. This algorithm guides the manager for education that is required by the enterprise. This online education module was not required by the enterprise; therefore, staff will not be subject to the algorithm specifications/requirements.

3. The Blood and Body Fluid post-education survey was emailed to inpatient RNs and PCTs, two weeks following the education due date. This survey was the same survey staff completed prior to beginning the online education module. Staff were given two weeks to complete the post-intervention survey. The post-education survey results were compared to the pre-education survey results to determine if inpatient RNs and PCTs had a negative/positive change in level of concern regarding blood borne pathogen exposure, availability of PPE on individual units, support of manager/supervisor in exposure prevention, support of manager/supervisor post-

exposure follow up care, and employee knowledge/awareness in locating Employee Health Resources to prevention and response to blood and body fluid exposures. The survey will also determine if inpatient RNs and PCTs had a decrease/increase in the rate of frequency for use of PPE including gloves, mask and goggles/eye shield, doffing gloves and performing handwashing, availability of PPE on units, knowledge/awareness of process to report BBF exposure to Employee Health during business hours and knowledge/awareness of the process to report BBF exposure on weekdays after 3:30 and/or on weekends.

4. This DNP student attended virtual inpatient unit staff meetings presented the historical data, literature review information and the current facility requirements for PPE use when performing patient care activities which place the HCW at risk for potential blood and body fluid exposure. The meetings provided an opportunity to speak with frontline staff, reinforce online education information, identify if any barriers or challenges with PPE accessibility and supply and answer any questions of concern.
5. Obtain and review post-education/intervention number of blood and body fluid exposure incident reports/data to determine if the educational intervention was successful in reducing the number of exposures on campus by 50%, three months post-education intervention when compared to the same three-month period in previous years. Post-intervention data collection of accidental blood and body fluids will begin immediately after the online education module completion due date and continue for a total of three months.

Timeline for this project from the initial delivery of the pre-education/intervention survey to the completion of 12-week post-education data collection, was 18 weeks.

Privacy and Confidentiality

To maintain confidentiality, all personal employee identifying information was removed from the data obtained by the EOH nurse. Once the personal employee identifying information was removed, the EOH nurse sent the data to this DNP student for review and use in this project. It should be noted, this DNP student does not have access to the electronic system used in EOH for reporting occupational exposures. All employee identification will remain private and confidential and unknown to this DNP student. The data was saved and stored on an encrypted share drive that is only accessible on-site or through the healthcare facility's Virtual Private Network (VPN). VPN software provides an encrypted connection for employees working off campus and enhances privacy and security (Bruno, 2018).

Education Content – Online Learning Module

This academic healthcare facility has a required annual education module which must be completed by new hires and annually by all employees, including those with direct patients care, laboratory personnel, limited direct patient care (face to face care with patients, with exposure risk from patients and the environment), no patient care (may perform activities/service level with exposure risk) and these who work in an office setting (no patient interactions/risk to accidental exposure similar to public setting). The annual required education was created by the enterprise human resources department and addresses standard precautions, hand hygiene, personal protective equipment, isolation precautions, blood borne pathogens and tuberculosis; this new employee and annual education is required by Occupational Safety and Health Administration (OSHA) and The Joint Commission (TJC). The required annual education is

administered by the enterprise, at a specified time of the year, to all employees. Employees are given two months to complete the required annual education; failure to do so can result in corrective action and per enterprise and/or local policy.

The education module, created specifically for this DNP project, was developed by a nursing education specialist after collaboration with this DNP student and the Employee/Occupational Health department. This education module was created with the primary focus of conveying specific information and statistics on the recent BBF exposures on campus, infection control and prevention of occupation exposures and to increase staff awareness of immediate first aid measures and steps necessary for reporting BBF accidents. The module, titled, Blood and Body Fluid Exposure, was created specifically to address the number of accidental BBF exposures that have occurred on campus since 2015, despite staff completing a required, annual education. This module can be used by any of the disciplines, on campus, to enhance staff knowledge and awareness of BBF exposures. The educational module begins with a pre-module survey has four interactive lessons with knowledge checks and a post-test. The online educational module contains the following pertinent information:

1. Current state: How blood and body fluid exposures impact nursing staff
2. Recognize blood and body fluid exposure risk
3. Blood Borne Organisms: Types
4. Stopping the Splash: A closer look at prevention

The educational module was interactive and requires the learner to complete knowledge checks imbedded in the module. Each knowledge check must be answered correctly to successfully complete/master the learning. The following table, Table 1, provides an outline of the education material reviewed in the module and the teaching methods used to enhance staff

knowledge and increase awareness regarding risk assessment and appropriate PPE selection when there is an increased risk of accidental blood and body fluid exposure.

Topics	Outline (subject matter)	Methods	Evaluation methods
Identify sources in the clinical environment with high exposure	Current State: How are blood and body fluid exposures impacting our teams?	-Statement defining various types of exposures - "Tales from the Splash Zone" video - reviews various scenarios where splashes have occurred during clinical care -Statement reinforcing rational for proper PPE selection -Provide splash statistics -Visual interaction with flash card effect – covers tube/drains, urinary collection device and venipuncture	Knowledge check before progressing to next lesson: Scenario – RN is assisting with a drain being pulled
Assess clinical scenarios for exposure risk and select appropriate PPE	Recognize blood and body fluid risk and implement correct precautions	-Visual interaction with flash card effect: Eye shields introduced, and retention statement placed; access to prescription glasses/goggles addressed -Information – location of PPE	-Knowledge check before progressing to next lesson: Match nursing activity with minimal appropriate PPE requirements

		-Wearing PPE not a personal nor optional decision, but a professional requirement	
Recognize impact of BBF exposure physically and psychologically	Review Blood Borne Organisms: Types and how transmission can impact healthcare professional	-Interactive lecture -Blood borne pathogen exposure "chat" -Identify three most common blood borne pathogens HCW may be exposed to -Identify other types BBF that there is a high potential for possible transmission of blood borne disease -Information regarding employee follow-up post BBF exposure	-Knowledge check for this lesson: Included in next session knowledge check
Locate Employee Health resources to prevent and respond to BBF exposure	Stopping the Splash: A closer look at prevention Review responding to splash	-True/false questions -Identify ways BBF exposures can occur -Observed behaviors – Speak Up Proper PPE selection	-Knowledge check questions cover material from all sections: -Ten questions – nursing staff must obtain 100% passing score

Table 1

There was a 10-question post-test at the end of the module; the learner was required to obtain a 100% in order to successfully complete this learning exercise. There was a total of 14 questions in the online learning module; four of the questions are knowledge checks embedded in the first three sections of the education module. When staff answered each question, a knowledge check feedback rationale was provided within the module in real-time, before successfully advancing to the next section. The educational module was estimated to take

approximately 25-30 minutes to complete. Nursing staff (RNs and PCTs) were given three weeks to complete the module. This online learning module content focused solely on blood and body fluid exposures, prevention and follow-up and differed from the annual required education for this academic center which address several safety topics.

Content Validity and Reliability

The educational module was created by a nurse education specialist in collaboration with this DNP student. The education is based on accidental BBF exposure incidents and trends on campus beginning January 1, 2015, and an extensive literature search. The nurse education specialist was considered an expert in clinical education at this academic healthcare facility. The education module addressed potential sources in the clinical environment with high exposure risk, asked the learner to assess clinical scenarios for exposure risk and select appropriate PPE for each specified scenario, and asked the learner to recognize the impact of BBF exposures, both physically and psychologically.

This academic healthcare facility does not consult a third party to validate education material. According to Sylvia and Terhaar (2014) validity is the degree to which something is intended to be measured, is measured. Simon and White (2016), recommend the use of a validation rubric for surveys and interviews to overcome common weaknesses in often noted. The education module and the pre/post surveys were created using the Rubric for Expert Validation of Survey or Interview**,** Simon and White (2016), as a guide; terminology used in the education module and the pre/post surveys will be understood by the target audience, inpatient RNs and PCTs at the academic healthcare facility. The questions in the education module and in the pre/post surveys are concise, required the learner to use critical thinking, do not lead the learner to the answers, and relate to situations of daily practice. The education module contained

14 questions which were specific to the material presented each of the four sections in the module. The pre/post survey questions addressed topics related to blood and body fluid exposures and aim to determine the level of concern staff have related to blood and body exposure and also the rate of frequency staff perform certain activities which increase the risk of blood and body fluid. Acronyms were not used in the education module or the pre/post surveys.

External expert review was obtained from three internal sources, the EOH nurse supervisor, EOH staff nurse and an MD Consultant, Board Certified in Internal Medicine, and Infectious Disease. The expert reviewers recommended the education module specifically outline if an employee experiences a BBF splash of the eyes, the eyes are flushed for 20 minutes. Originally the education module indicated the need to flush the eyes, however, did not specify the length of time. After review of the academic healthcare facility's EOH web site and the facility's Algorithm for Employee Blood/Body Fluid Exposure, neither source outlines a specific amount of time to perform flushes/eye washes, only instructs the employee to irrigate/flush mucous membranes with water. A literature search was also performed using key words eye wash, eye flush, occupational exposure, eye wash stations; the search did not successfully locate any peer reviewed literature indicating a specific time for eye flushes following accidental blood/body fluid exposure. In lieu of the information on the web site and the algorithm, the education module was not changed from the verbiage, several minutes.

In addition, the EOH staff nurse suggested the EOH office hours be specifically listed in the module, instead of only indicating "after hours the employee should contact the house supervisor". The EOH office is open Monday through Friday, 7:00-3:30. The education module was updated to reflect the EOH specific hours and advises employees to contact the hospital house supervisor, Monday through Friday, after 3:30 PM and on weekends and holidays.

Although this information is available on the EOH website, both the EOH staff nurse and the EOH nurse supervisor suggested specific hours be noted in the module.

The EOH nurse supervisor suggested information regarding the Hepatitis B vaccine be included to advise the nursing staff of the protection the vaccine offers against exposure to the pathogen post exposure. Hepatitis B is a very serious disease and can be prevented with vaccination. Employees should contact EOH if they are unsure of their immunization status. She also suggested information about HIV exposure to include awareness that for optimal outcome after HIV exposure, prophylactic medication should be started within two hours of the exposure. She also indicated the education should advise the employee there is no treatment or prophylaxis to Hepatitis C. The recommendations from both the EOH RN staff nurse and the EOH nursing supervisor were added to the education module.

External expert review was also obtained for the pre-/post-education survey, from two internal sources. The EOH nurse supervisor and a nurse education specialist who had not participated in the development of this online education module. The EOH nurse supervisor did not have any improvement recommendations. The nurse education specialist suggested rewording the last two questions in the pre-/post-education survey be reworded. His suggestion was reviewed and as a result, the last two questions in the pre-/post education survey were revised.

Data Collection and Analysis Plan

Quality improvement projects are an integral part of healthcare and serve to identify workflows to improve outcomes by assessing and adjusting workflows (Cheung et al., 2012). The projects generally include the review of a process, data analysis and the implementation of an intervention to introduce change and improve outcomes. These authors noted control charts

provide a distinction between meaningful change and random variation; control charts are easy to interpret and suited for use in QI projects. Control charts guide staff on the QI projects in determining if a change is an improvement (Williams, 2018).

The accidental occupational exposures data, in this academic healthcare setting, was obtained from incident reports submitted in 2018, through the Employee/Occupational Health department electronic reporting system. The 2018 data served as the baseline data and the need for an intervention. Data was collected in 2019, 2020 and 2021 for ongoing review and trend assessment for this project.

The following information was collected on every reported accidental blood and body fluid splash incidence among inpatient nursing staff at the academic healthcare facility in northeast Florida, from January 1, 2018 through April 22, 2021 and post-education intervention (April 23, 2021-July 23, 2021): date of incident, time of incident, status (i.e. employee), job category (RN or PCT), home department of injured, source risk status (i.e., low risk), exposure (i.e. mucosal), type of body fluid, safety device attached (yes, no, not applicable, or unknown), task appropriate PPE (yes or no), gloves (yes, no), gown (yes, no, or not applicable), eye protection (yes, no, or not applicable), mask (yes, no, or not applicable), general location of exposure, department of exposure, causal factors, narrative of the event, and follow-up treatment. The data was reviewed by a statistician in the Health Sciences Research department on campus.

Given the rarity of these blood and body fluid splashes, rare event t-charts were used to examine potential trends in these events. Each point on the t-chart will represents the number of days since the last blood or body fluid splash occurred. The t-chart was constructed with the horizontal axis representing the incidence number and the vertical axis representing the number

of days since the last reported blood or body fluid splash. The RAREEVENTS procedure in SAS® / QC software will be used to construct the t-charts (SAS Institute Inc, 2018). A point on the chart above the upper control limit (133.372) will be considered a desirable effect because it signals an increase in the time between blood and body fluid splashes beyond typical variation. A point on the chart below the lower control limit (0.41) will be considered an undesirable effect because it signals a decrease in the time between events beyond typical variation.

The following table, Table 2, and chart, Figure 4, created by the Health Sciences Research Statistician, represents the number of days between the reported blood and body fluid exposures beginning January 1, 2018, through April 22, 2021, at this academic healthcare center in northeast Florida. This data represents the accidental blood and body fluid exposures reported at the healthcare facility, prior to the post-intervention data collection period.

Exposure Date	Event Number	Days Between
Pre-intervention		
01/02/2018	1	
01/20/2018	2	18
02/26/2018	3	37
04/04/2018	4	37
04/10/2018	5	6
04/16/2018	6	6
05/26/2018	7	40
05/27/2018	8	1
06/18/2018	9	22
06/24/2018	10	6
10/09/2018	11	107
11/03/2018	12	25
01/02/2019	13	60
02/26/2019	14	55
04/02/2019	15	35
04/04/2019	16	2
04/26/2019	17	22
05/23/2019	18	27
06/04/2019	19	12
06/17/2019	20	13
08/02/2019	21	46

09/27/2019	22	56
12/3/2019	23	67
12/27/2019	24	24
01/12/2020	25	16
01/14/2020	26	2
03/09/2020	27	55
03/20/2020	28	11
03/28/2020	29	8
08/07/2020	30	132
09/22/2020	31	46
11/23/2020	32	62
02/26/2021	33	95
Online education module April 1-22, 2021		
04/09/2021	34	42

Table 2

The event number is on the horizontal axis (starting with second BBF splash in 2018) and the number of days from the last event is on the vertical axis. The first accidental exposure was not plotted because the y axis represents the number of days since the last event. Since only 2018-2021 data is included, days since the last event (in 2017) for the first event are not plotted.

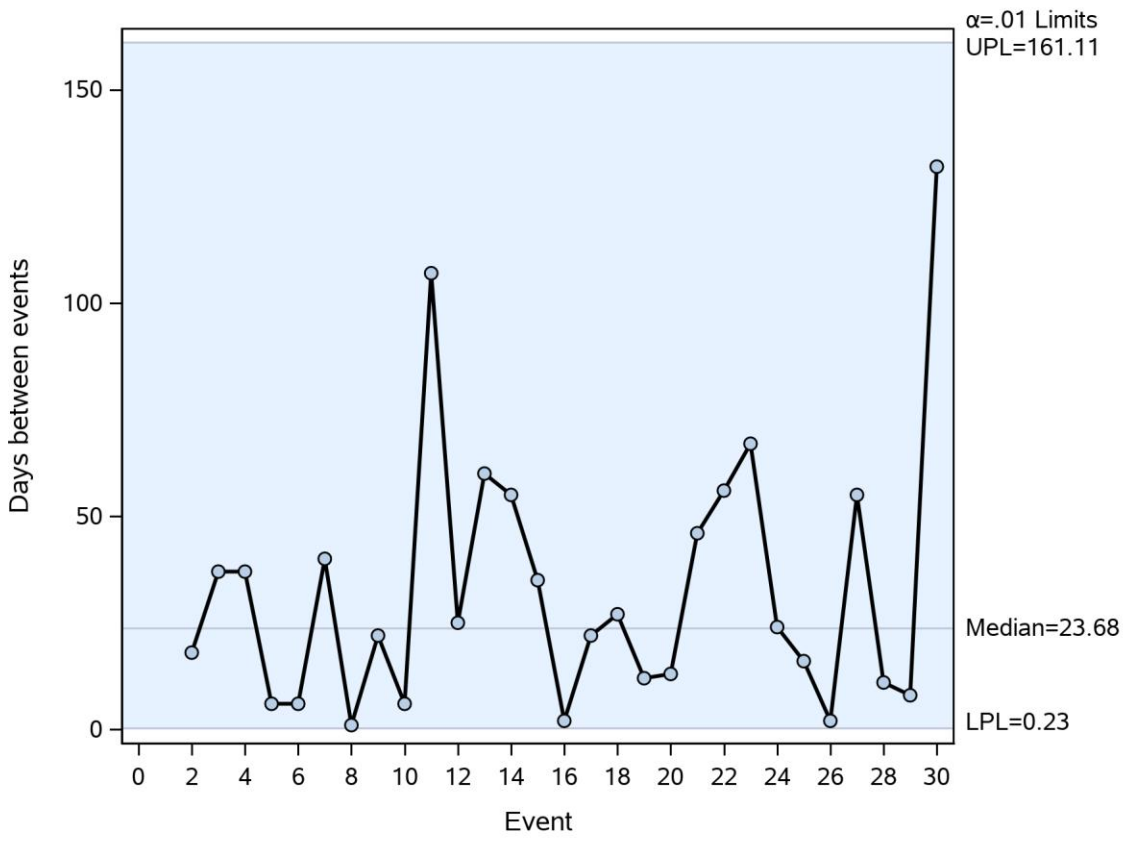


Figure 4

Plan for Implementation/Timeline

The timeline for this Blood and Body Fluid Exposure Reduction project was based on final approval of project proposal, Institutional Review Board (IRB) approval from both the academic university and on-site academic healthcare system. A pre-education/intervention survey was delivered via email to staff to complete. Staff had two weeks to complete the survey. An online educational module was assigned and available for staff to review and complete beginning April 1, 2021. Nursing staff at the academic healthcare system were given three weeks to complete the online learning. The post-education intervention survey was delivered to staff via email; staff had two weeks to complete the survey. The post-intervention data collection began April 23, 2021, and was monitored until July 23, 2021, for this DNP project. The Blood

Borne Pathogen Exposure Reduction (BBPER) workgroup has set the goal of a 50% reduction in occupational exposures in a three-month period post-intervention, when compared to the same three-month period in previous years. The total timeline for this project was March 17 – July 23, 2021. Future/ongoing accidental blood and body fluid exposure data collection and review will continue to be tracked by the EOH department post DNP project.

Stakeholder Assessment - Readiness for Change

This blood and body fluid exposure reduction project was identified as a need by the Employee/Occupational Nurse Supervisor after reviewing the 2018 occupational exposure incident report. She raised awareness and brought her concerns forward to her nurse administrator and suggested the formation of a multidisciplinary workgroup to focus on campus wide reduction of blood-borne pathogens exposure accidents. This DNP student communicated the desire to be part of this workgroup. The BBPER workgroup initial meeting took place in January 2019 and included the following members EOH Nurse Supervisor, EOH staff nurse, nursing education specialists from the operation room and inpatient/outpatient services, nurse administrator, nurse managers from the operating room, instrument processing and outpatient setting, Consultant Chair of Surgical Practices, Consultant Anesthesiologist, Infection Control and Prevention Specialist and a Health & Safety Specialist. The EOH staff nurse presented the 2018 blood-borne pathogen exposure data and the significance of percutaneous and blood and body splashes on campus. This workgroup discussed the significance of this report, and all agreed the total number of blood-borne pathogen exposures in this academic healthcare system during 2018 was significant and trending upwards when compared to previous years. Further review of the data indicated a great number of the exposures, percutaneous and blood and body fluid splashes, occurred in the operating room; in lieu of this finding, the OR multidisciplinary

team decided to focus on the needle stick injuries and blood and body fluid exposure specific to that operating room and peri-operative department.

The BBPER workgroup has the support of nursing leadership and presented the data to the inpatient and outpatient nurse managers during a monthly meeting, in January 2019. The inpatient nurse managers are supportive and agreed that occupational exposure reduction is warranted. Inpatient nurse managers have the potential to influence and support staff acceptance of PPE use through their own actions, leadership, and visibility (Momani et al., 2016). For this project to be successful, it will be important to keep the inpatient nurse managers updated and informed of the project status and plans to implement the electronic online education module. Following the completion of this DNP project, it will be important for the inpatient nurse managers to remain proactive with unit frontline staff, to maintain a reduction in the number of accidental BBF exposures. Collaboration between EOH and the inpatient managers and ongoing report/data surveillance and follow-up will be necessary for continued success, increased PPE use compliance and ongoing reduction in accidental blood and body fluid splashes.

Financial Costs

The financial cost of this DNP student's project was related to creation of the education module by the NES, staff (RNs and PCTs) completion of the education module and the cost of the unit Administrative Assistants (AA) tracking staff completion of the education module via an electronic report in this healthcare system's learning system. All time spent creating the education module was completed during working hours. Once the education module was implemented, staff were required to complete the material during working hours; staff do not have access to onsite learning modules when off campus, therefore they are not be able to complete the module while at home. The time spent, by the NES, creating the learning module is

estimated to be a total of 30 hours, two hours for each of the 11 AAs. The time estimated for RNs (728) and PCTs (239) to complete the online learning modules is 30 minutes. The following table summarizes the estimated cost for this project. The wages per hour figures are the mid-range hourly rate for each role listed in Table 3; these figures were obtained from the Human Resources Department of this academic healthcare system in Northeast Florida.

Staff Role	**Number of staff**	**Task**	**Estimated time to complete task**	**Wage/hour**	**Subtotal**
NES	1	Create online module	30 hours	$49.34	$1480.20
RN	728	Complete online education module/survey	30 minutes	$34.62 ($17.31/30 minutes)	$12,601.68
PCT	239	Complete online education module/survey	30 minutes	$15.37 ($7.69/30 minutes)	$1,837.91
AA	11	Track staff education completion	2 hours/AA	$22.09	$485.98
DNP student	1	Sustainability x 3 months post-intervention	6 hours/week x 12 weeks	N/C	N/C
					Total Cost **$16,405.77**

Table 3

Although the cost of this project was estimated to be $16,405.77, this cost is not an additional cost to the academic health care system. All required learning must be completed by staff during working hours. Frontline staff do not have the benefit of remote access when off campus; therefore, any tasks required by the academic healthcare system are completed during working hours. Staff generally complete required online learning modules during slow/down

times on the unit; staff work together to cover assignments so colleagues can complete the modules without interruption. The cost for this DNP student in this project is valued at no charge since students are not reimbursed for work completed in the academic health care setting.

Sustainability of Project

Once the online education module was implemented and the three-week allowance passed, this DNP student collaborated with inpatient nurse managers to attend virtual unit staff meetings. Attending unit staff meetings provided an opportunity to reinforce the online education, discuss the current state of BBF on campus, current practice workflows, and reinforce risk assessment and proper PPE and learn of any barriers to PPE use. Due to the COVID-19 pandemic, students have not been permitted to return to clinical rotations in the inpatient setting at the academic inpatient setting, this DNP student was not able to complete individual unit walking rounds.

Accidental blood and body fluid exposures will continue to be tracked in the inpatient setting; this DNP student obtained monthly exposure reports, from EOH, for three months following the implementation of the online education module. This data was reviewed to determine if there has been a 50% reduction in the number of accidental BBF exposures in the three months following the education module expected completion date, when compared to the same three months in previous years.

Post completion of this DNPs project, accidental BBF exposures reported on campus will continued to be tracked by EOH. The EOH department will collaborate with individual nurse managers to review the exposure report summary and determine if any trends on specific units. The BBPER will continue to meet on a quarterly basis and discuss current trends and additional initiatives, if warranted.

Evaluation Plan

Following the educational intervention roll-out, the number of reported occupational exposures will continue to be monitored by EOH. The data was reviewed to determine if there is a downward trend or reduction of accidental occupational exposures.

Data Collection

As with the pre-intervention data, post intervention data was pulled from the incident reports filed at the time of the employee exposure. The data spreadsheet included the injury date and time, job category (RN or PCT), department of exposure, source risk status, exposure (mucosal), body fluid (biliary, blood/blood product wound drain), safety device attached (Yes/No/NA), safety device used as advise (Yes/No/NA), task appropriate PPE (Yes/No), gloves, gown, eye protection, mask, general location of exposure (hospital or specified building if outpatient), department of exposure, casual factor and narrative/comments, and any follow-up/prevention counseling and treatment provided. This data served as the comparison data for trending accidental occupational exposures post-intervention. EOH and this DNP student remained hopeful the post-intervention will show a 50% decline in occupational exposures, in the specific three-month time frame when compared to the same time frame in previous years, after the nursing staff have completed the online educational module.

Intervention Steps, Evolution and Modifications

Following IRB approval, this DNP student presented the project proposal to the inpatient nurse managers, during the March 2021 monthly meeting, at the academic healthcare facility in Northeast Florida. The presentation included a data review of the five-year trend in BBF exposures on campus. The DNP project objectives and plan to administer the pre- and post-surveys and the required education to inpatient RNs and PCTs was presented to the inpatient

nurse manager during the meeting. There were not any questions or concerns voiced by the inpatient nurse managers during the meeting. The inpatient nurse managers were supportive of this project.

The pre-intervention survey was sent via email (Appendix A) on March 17, 2021, to the inpatient RNs and PCTs. Email addresses were obtained from the facility online Directory, in January 2021, and individual unit distribution lists (DLs) were created. The DLs were created by this DNP student and each unit contained only the RNs and PCTs on each unit. The specific DLs did not include any other unit roles since this project specifically focused on inpatient RNs and PCTs. The 14 inpatient units included in this project included radiology, gastroenterology procedure suite, emergency department, cardiovascular unit, abdominal transplant unit, neurosciences unit, medical intensive care unit, surgical intensive care unit, progressive care unit, surgical/bariatric unit, medical hematology/oncology unit and orthopedic/urology inpatient units. The RNs and PCTs totaled 967 inpatient staff for this project. Inpatient staff were given two weeks to complete the pre-intervention survey, any pre-intervention surveys submitted after March 31, were excluded from this project.

On April 1, 2021, the individual unit AAs assigned the online module, Blood and Body Fluid Splashes to inpatient RNs and PCTs. An end date of April 22, 2021 was assigned to the module, staff had three weeks to complete the online education. The AA supervisor obtained a report from the online learning application on April 27, 2021**,** which indicated 52.9% of the inpatient RNs and PCTs completed the online learning module by the assigned due date.

Two weeks after the online education due date, the post-intervention survey was emailed via the individual inpatient unit created DLs. Staff were given two weeks to complete the post-intervention survey, the survey end date was May 20, 2021. A total of 21 inpatient RNs and

PCTs submitted a post-intervention survey. Four of the surveys submitted had matching unique personal codes to the pre-intervention surveys.

Methods and Instruments

The survey was administered through Research Electronic Data Capture (REDCap), a web-based application which can be used to capture data for clinical research and building and maintaining surveys and databases/projects; REDCap is a secure application (Health Measures, 2020; Patridge & Bardyn, 2018). Completing the survey was optional, an online consent (Appendix A) was emailed to the RN/PCT recipients. This consent was created using the Informed Consent – Reviewer's Guidelines (IRBNet, 2019). At the bottom of the survey consent email, the following statement was present, clicking on the "agree" button below indicates that you have read the information above, you voluntarily agree to participate, and you are at least 18 years old. If the recipient selected YES, the selection took them to the 10-question pre-intervention survey (Appendix B). If the recipient selects not to participate, they could delete the email. The RNs and PCTs were given two weeks to complete the survey. Any pre-intervention survey results received after the two-week period and immediately following the implementation of the Blood and Body Fluid education module, were excluded from the data for this QI project.

To begin the survey, staff were asked to indicate their role, RN or PCT and their unit/work area, last two digits of birth year and first two digits of current home address. The records of this study will be kept private and confidential to the extent of the law. The survey will have five statements asking the staff to rate the level of concern on a scale between 1 and 5, where 1 represents *Not at all concerned*, 2- *Slightly concerned*, 3- *Somewhat concerned*, 4- *Moderately concerned*, and 5- *Extremely concerned*. These statements addressed the level of concern to blood borne pathogen exposure, availability of PPE on individual units, support of

manager/supervisor in exposure prevention, support of manager/supervisor in post-exposure follow up care and employee awareness in locating Employee Health Resources to prevention and response to blood and body fluid exposures. The remaining five statements asked staff to rate the frequency on a scale between 1 and 5, where 1 represents *Never*, 2- *Rarely*, 3-*Sometimes*, and 4-*Often*, and 5-*Always*. These five statements addressed patient care activities and use of PPE including gloves, mask and goggles/eye shield, doffing gloves and performing handwashing, availability of PPE on units, knowledge/awareness of process to report BBF exposure to Employee Health during business hours and knowledge/awareness of process to report BBF exposure on weekdays after 3:30 and/or on weekends. This survey was estimated to take participants approximately 5-6 minutes to complete.

Two weeks following the education completion due date, the post-education 10 question blood and body fluid awareness survey was administered to the nursing staff (inpatient RNs and PCTs) via email and through REDCap, to determine if there has been a change in level of concern and rate the frequency of topics as addressed above. The post-intervention survey was also optional and as with the pre-intervention survey, an informed consent was included in the email. This post-intervention survey used the same 10 questions as the pre-intervention survey. Staff were given two weeks to complete this survey. Any post-intervention survey results received after the two-week time frame (May 20, 2021) were excluded from the QI project. The post-intervention blood and body fluid awareness survey was estimated to take participants approximately 5-6 minutes to complete.

Both pre- and post-surveys were anonymous. Responses were descriptively summarized with number and percentage. Project leaders used the role, staff unit/work area, last two digits of birth year and first two digits of current home address as the participant unique code to compare

pre- and post-intervention survey results. Any survey results that do not have pre- and post-intervention submissions will be excluded from the QI project. The Likert-type responses were reviewed, by a Statistician in Health Sciences Research at this academic healthcare facility and presented using diverging stacked bar charts. Since the pre- and post-surveys were anonymous, the responses were descriptively summarized with numbers and percentages. In addition, the number of exposures reported were tracked and the number of days between the reported blood and body fluid exposures were noted and included in the rare event t-chart (see Figure 7). The results of these surveys were shared with the BBPER workgroup.

Data Analysis

Individual BBF splashes were reported with the date of the event and the number of days between events and presented in a rare event chart. Responses from the pre-intervention survey and post-intervention survey were downloaded from REDCap. Survey responses before and after the educational intervention were summarized with the number and percentage of respondents. To ease interpretation, we additionally summarized level of concern questions as the number and percentage of respondents who selected "*Not at all concerned*" or "*Slightly concerned*" and the frequency-related questions were summarized as the number and percentage of respondents who selected "*Always*" or "*Often*". Data was summarized overall and separately for RNs and PCTs. Because there were only four participants' pre- and post-intervention surveys matched, paired comparisons were not performed. Data was analyzed using R version 4.0.3 (R Core Team, 2020). The rare event chart was created, by the statistician, using the qichart2 package.

Results

Through email and using REDCap, 967 pre-intervention and post-intervention survey were distributed. Forty-one responses to the pre-intervention survey and 21 responses to the post-intervention surveys were submitted by participants.

Results of the pre- and post-intervention surveys were reviewed by this DNP student and a statistician at the academic healthcare facility. There was a total of 41 pre-intervention surveys submitted by inpatient RNs or PCTs. One participant did not completely answer every question; therefore, the unanswered responses were excluded from the project results. Ninety percent of the pre-intervention surveys were submitted by RNs (37), 10 percent by PCTs (4). There were 22 post-intervention surveys submitted, fifty nine percent of the post-intervention survey responses were submitted by RNs (13), and 41 percent (9) by PCTs. The total number of surveys submitted overall, was a disappointing for this project. As a result, the pre- and post-intervention surveys with matching unique codes were not numerous enough to use for comparison for the project. Instead, an individual review and summary of the pre- and post-intervention was completed.

Pre-intervention Survey Review All Individual (RNs and PCTs) Responses Summary

In summary, the review of individual pre-intervention survey responses, about level concern, indicated 56% (23) of staff were *Not at all concerned* or *Slightly concerned* about the level of blood borne pathogen exposure in their daily work, 90 % (37) of staff were *Not at all concerned* or *Slightly concerned* about the availability of PPE on their work units, 98% (40) of staff were *Not at all concerned* or *Slightly concerned* about the support of their manager/supervisor in exposure prevention and also support of manager/supervisor in post-exposure follow up care. Ninety three percent (37) of the individual pre-intervention survey

responses indicated staff were *Not at all concerned* or *Slightly concerned* about their personal awareness in locating EOH resources to prevent and respond to blood and body fluid exposures.

In review of the pre-intervention survey questions asking staff to rate the frequency, 98% (40) indicated they *Always or Often* wore PPE when performing direct patient care activities such as whole blood glucose finger stick, insertion of IV catheters, emptying drains, etc. Eighty percent (33) of the individual responses indicated staff *Always or Often* washed their hands after providing patient care and doffing gloves. One hundred percent of the individual survey responses (40) indicated PPE including gloves, masks and goggles are *Always or Often* available on their work unit. Eighty percent (32) of the individual responses indicated if a blood/body fluid exposure happens, staff *Always or Often* knew how to report the incident during EOH business hours (7:00AM–3:30PM) and 68% (28) of the individual responses indicated if a blood/body fluid exposure happens, staff *Always or Often* knew how to report the incident after EOH business hours (after 3:30 PM and/or on weekends).

Post-intervention Survey Review All Individual (RNs and PCTs) Responses Summary

In summary, the review of individual post-intervention survey responses, about level concern, indicated 41% (9) of staff were *Not at all concerned* or *Slightly concerned* about the level of blood borne pathogen exposure in their daily work, 68% (15) of staff were *Not at all concerned* or *Slightly concerned* about the availability of PPE on their work units, 72% (16) of staff were *Not at all concerned* or *slightly concerned* about the support of their manager/supervisor in exposure prevention and also support of manager/supervisor in post-exposure follow up care. Eighty two percent (18) of the individual post-intervention survey responses indicated staff were *Not at all concerned* or *slightly concerned* about their personal awareness in locating EOH resources to prevent and respond to blood and body fluid exposures.

In review of the post-intervention survey questions asking staff to rate the frequency, 91% (20) indicated they *Always* or *Often* wore PPE when performing direct patient care activities such as whole blood glucose finger stick, insertion of IV catheters, emptying drains, etc. Ninety one percent (20) of the individual responses indicated staff *Always* or *Often* washed their hands after providing patient care and doffing gloves. One hundred percent of the individual post-intervention survey responses (22) indicated PPE including gloves, masks and goggles are *Always* or *Often a*vailable on their work unit. Ninety one percent (20) of the individual post-intervention responses indicated if a blood/body fluid exposure happens, staff *Always* or *Often* knew how to report the incident during EOH business hours (7:00AM–3:30PM) and 68% (15) of the individual responses indicated if a blood/body fluid exposure happens, staff *Always* or *Often* knew how to report the incident after EOH business hours (after 3:30 PM and/or on weekends).

Overall Summary of Pre- and Post-intervention Survey All Individual (RNs and PCTs) Responses

There was an overall decline in the number of survey responses regarding level of concern, after the online education intervention due date. The percentage level of concern from *Not at all or Slightly concerned* declined in response to blood borne pathogen exposure in daily work, support of the manager/supervisor in exposure prevention and post-exposure follow-up care, employee awareness of locating EOH resources to prevent and respond to blood and body fluid exposures. Ideally, after the online education intervention, it was hoped there would be an improvement in the level of concern, with more staff indicating they were *Not at all or Slightly concerned* with the subject questions.

Regarding the frequency-related questions, there was a slight decline in the first question about wearing PPE. This decline could be related to the diminished number of responses

submitted, post-intervention. In the four-remaining frequency-related questions, an increase in percentage was noted and may indicate staff who completed the post-intervention survey are now more aware of the importance of hand washing post doffing gloves and reporting BBF exposures during, before/after EOH business hours. It must be noted since the post-intervention survey did not yield the quantity of responses anticipated, these results may be insignificant.

Since the pre- and post-surveys were anonymous, the responses were descriptively summarized with numbers and percentages. A summary of these results can be seen in Table 4 and Table 5. The Likert-type responses of the pre- and post-intervention surveys were presented using diverging stacked bar charts. The results of the Likert-type responses are shown in Figure 5 and Figure 6. Each diverging stacked bar chart represents one survey question and the pre- and post-survey responses. A review of the bar charts reveals whether the responses improved, declined or stayed the same.

Survey responses regarding level of concern before and after educational intervention.

	Pre-Intervention (N=41)	Post Intervention (N=22)
The level to blood borne pathogen exposure in my daily work.		
1-Not at all concerned	8 (20%)	4 (18%)
2-Slightly concerned	15 (37%)	5 (23%)
3-Somewhat concerned	7 (17%)	5 (23%)
4-Moderately concerned	9 (22%)	5 (23%)
5-Extremely concerned	2 (5%)	3 (14%)
The availability of personal protective equipment (PPE) on my unit.		
1-Not at all concerned	32 (78%)	12 (55%)
2-Slightly concerned	5 (12%)	3 (14%)
3-Somewhat concerned	2 (5%)	2 (9%)
4-Moderately concerned	2 (5%)	2 (9%)
5-Extremely concerned	0 (0%)	3 (14%)
The support of my manager/supervisor in exposure prevention.		
1-Not at all concerned	33 (80%)	15 (68%)
2-Slightly concerned	7 (17%)	1 (5%)
3-Somewhat concerned	0 (0%)	2 (9%)
4-Moderately concerned	0 (0%)	2 (9%)
5-Extremely concerned	1 (2%)	2 (9%)

The support of my manager/supervisor in post-exposure follow up care.		
1-Not at all concerned	35 (85%)	15 (68%)
2-Slightly concerned	5 (12%)	1 (5%)
3-Somewhat concerned	0 (0%)	2 (9%)
4-Moderately concerned	0 (0%)	2 (9%)
5-Extremely concerned	1 (2%)	2 (9%)
My awareness in locating Employee Health resources to prevent and respond to blood and body fluid exposures		
1-Not at all concerned	28 (70%)	13 (59%)
2-Slightly concerned	9 (22%)	5 (23%)
3-Somewhat concerned	3 (8%)	0 (0%)
4-Moderately concerned	0 (0%)	1 (5%)
5-Extremely concerned	0 (0%)	3 (14%)
No response	1	

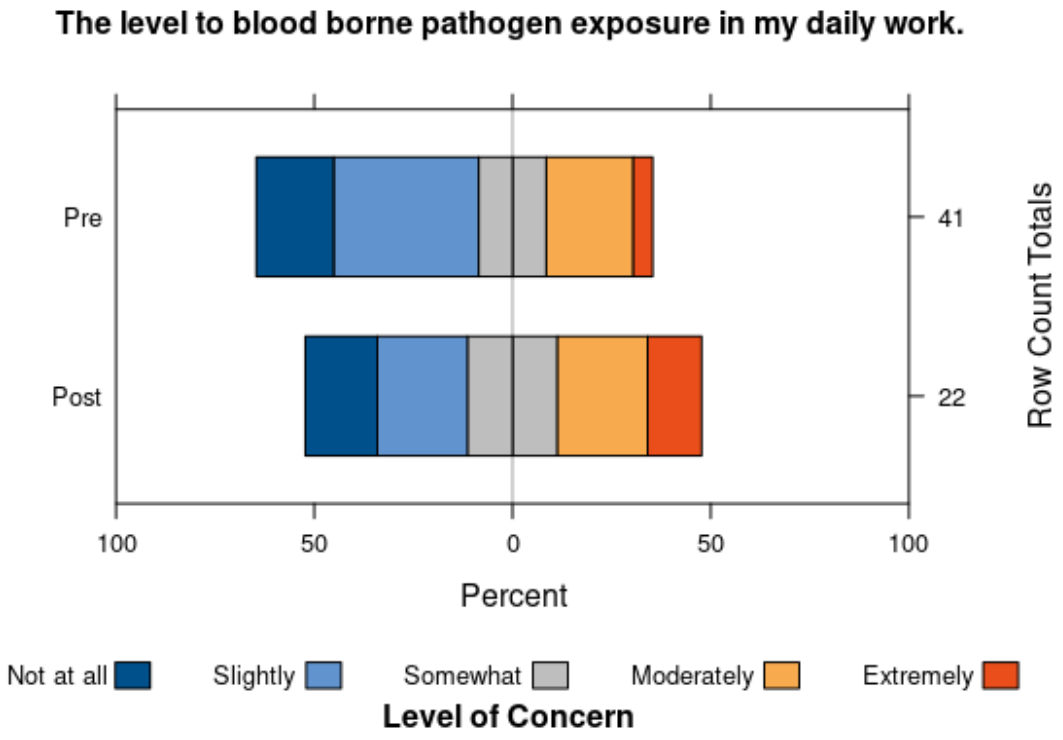
Table 4

Survey responses regarding frequency before and after educational intervention

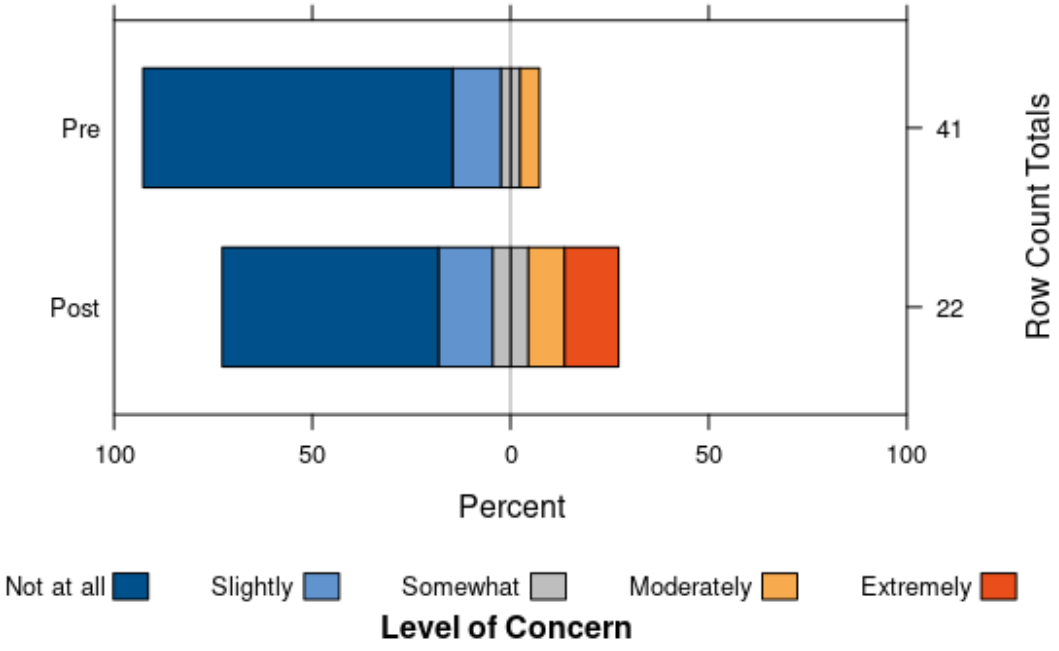
	Pre-Intervention (N=41)	Post Intervention (N=22)
When performing direct patient care activities such as whole blood glucose finger stick, insertion of IV catheters, emptying drains…etc. I wear Personal Protective Equipment such as gloves, mask and goggles/eye shield.		
1-Never	0 (0%)	0 (0%)
2-Rarely	0 (0%)	0 (0%)
3-Sometimes	1 (2%)	2 (9%)
4-Often	6 (15%)	0 (0%)
5-Always	34 (83%)	20 (91%)
After providing patient care and doffing gloves, I wash my hands.		
1-Never	1 (2%)	0 (0%)
2-Rarely	2 (5%)	0 (0%)
3-Sometimes	5 (12%)	2 (9%)
4-Often	6 (15%)	1 (5%)
5-Always	27 (66%)	19 (86%)
Personal Protective Equipment including gloves, masks and goggles/eye shields are available on my unit.		
N-Miss	1	0
1-Never	0 (0%)	0 (0%)
2-Rarely	0 (0%)	0 (0%)
3-Sometimes	0 (0%)	0 (0%)
4-Often	13 (32%)	3 (14%)
5-Always	27 (68%)	19 (86%)
No response	1	

If a blood/body fluid exposure happens, I know how to report it during Employee Health Services business hours (7:00 AM and 3:30 PM)		
1-Never	2 (5%)	0 (0%)
2-Rarely	3 (8%)	0 (0%)
3-Sometimes	3 (8%)	2 (9%)
4-Often	8 (20%)	4 (18%)
5-Always	24 (60%)	16 (73%)
No response	1	
If a blood/body fluid exposure happens, I know how to report it on weekdays after 3:30 PM and/or on weekends.		
1-Never	4 (10%)	0 (0%)
2-Rarely	5 (12%)	0 (0%)
3-Sometimes	4 (10%)	2 (9%)
4-Often	4 (10%)	5 (23%)
5-Always	24 (59%)	15 (68%)

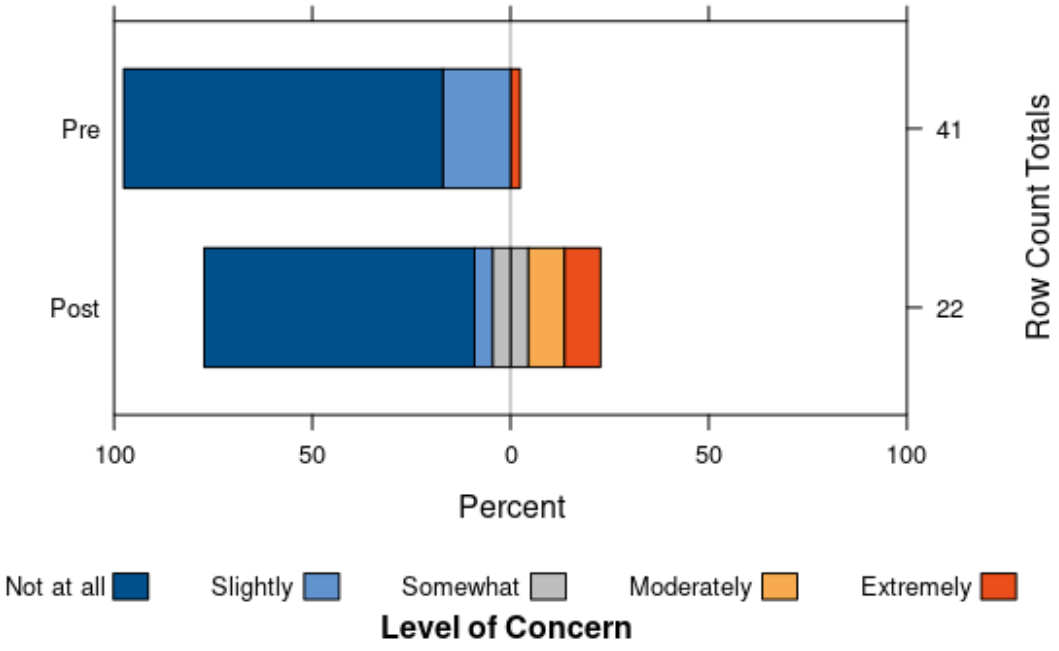
Table 5

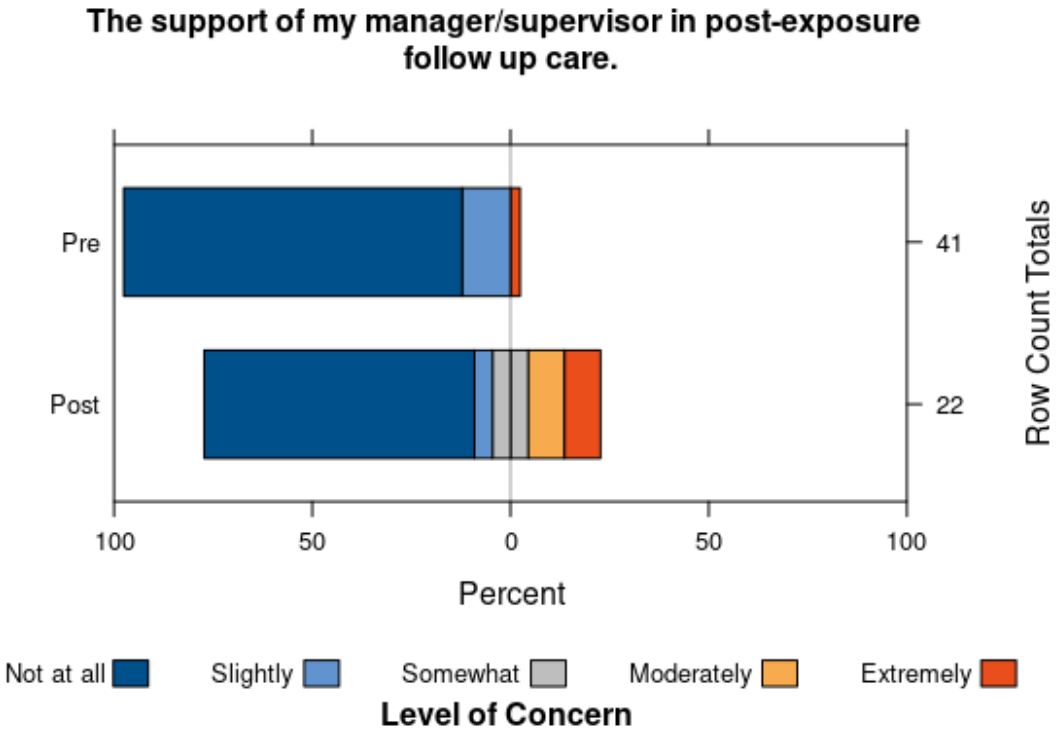


The availability of personal protective equipment on my unit.



The support of my manager/supervisor in exposure prevention.




The support of my manager/supervisor in post-exposure follow up care.
Pre
Post
41
22
Row Count Totals
100
50
0
50
100
Percent
Not at all
Slightly
Somewhat
Moderately
Extremely
Level of Concern

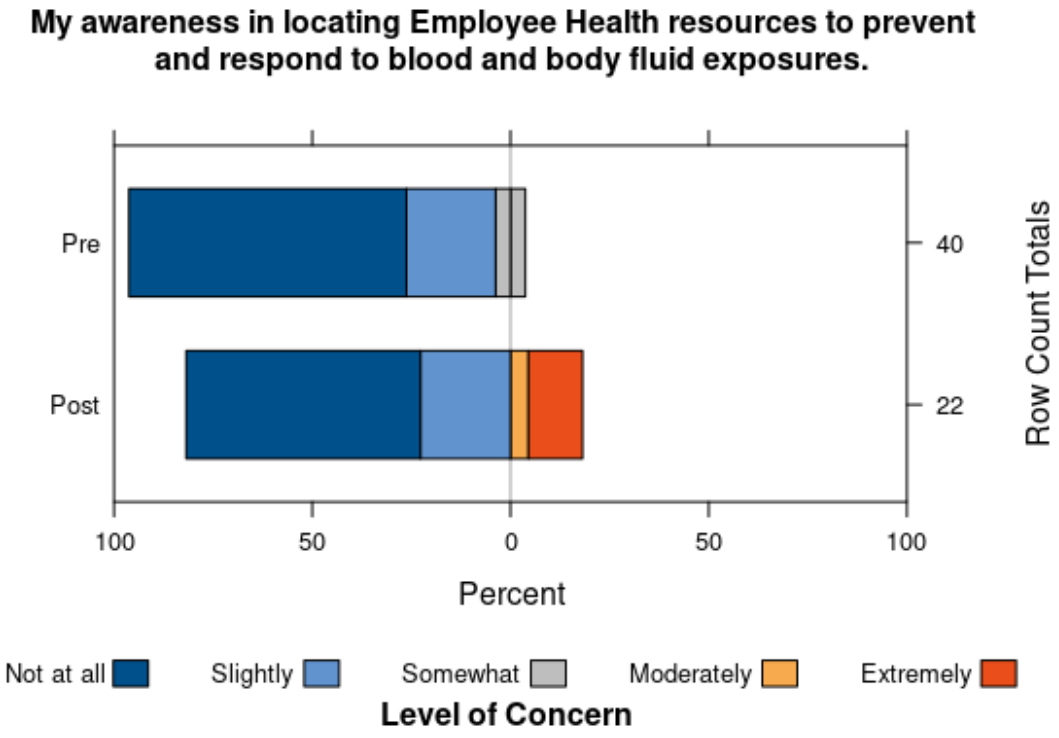
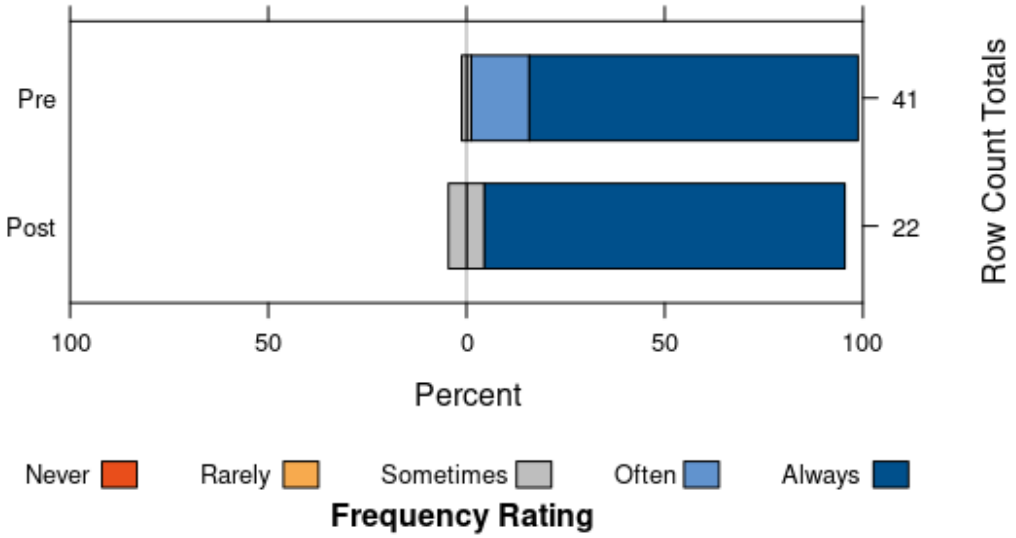
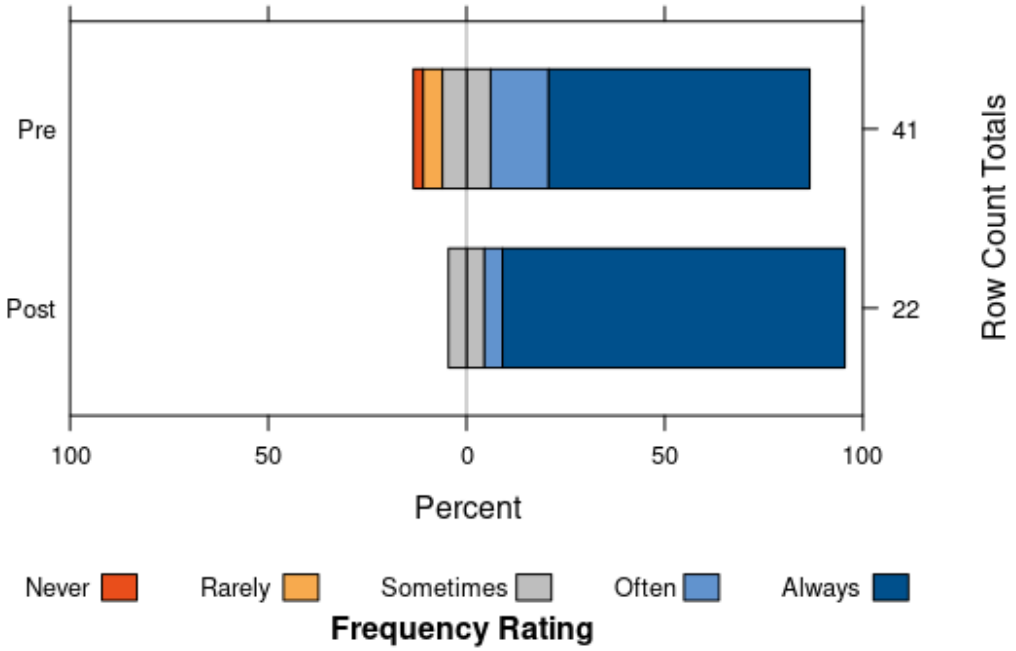

My awareness in locating Employee Health resources to prevent and respond to blood and body fluid exposures.
Pre
Post
40
22
Row Count Totals
100
50
0
50
100
Percent
Not at all
Slightly
Somewhat
Moderately
Extremely
Level of Concern

Figure 5

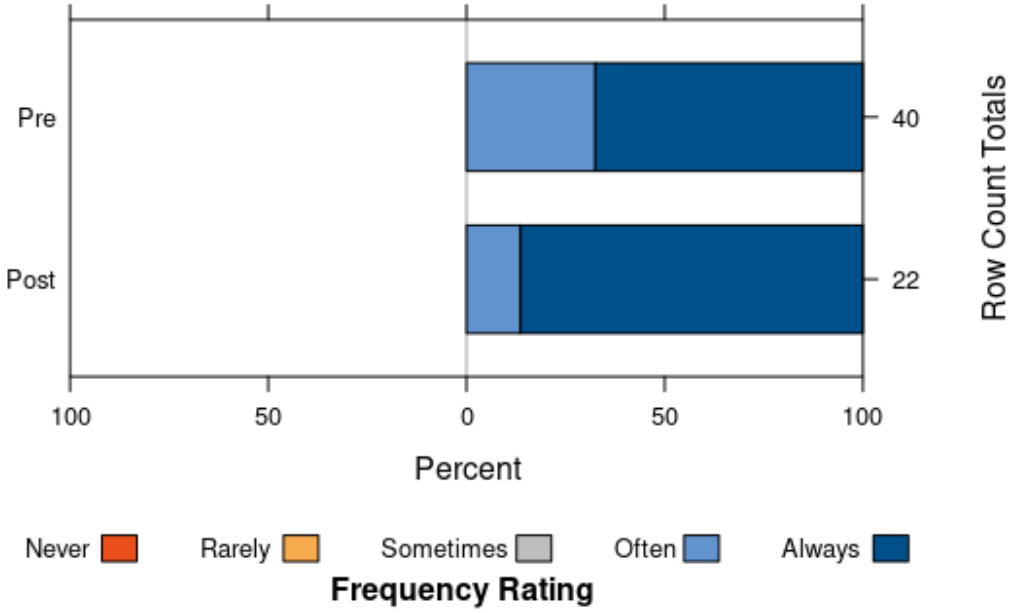
When performing direct patient care activities such as whole blood glucose finger stick, insertion of IV catheters, emptying drains...etc. I wear Personal Protective Equipment such as gloves, mask and goggles/eye shield.



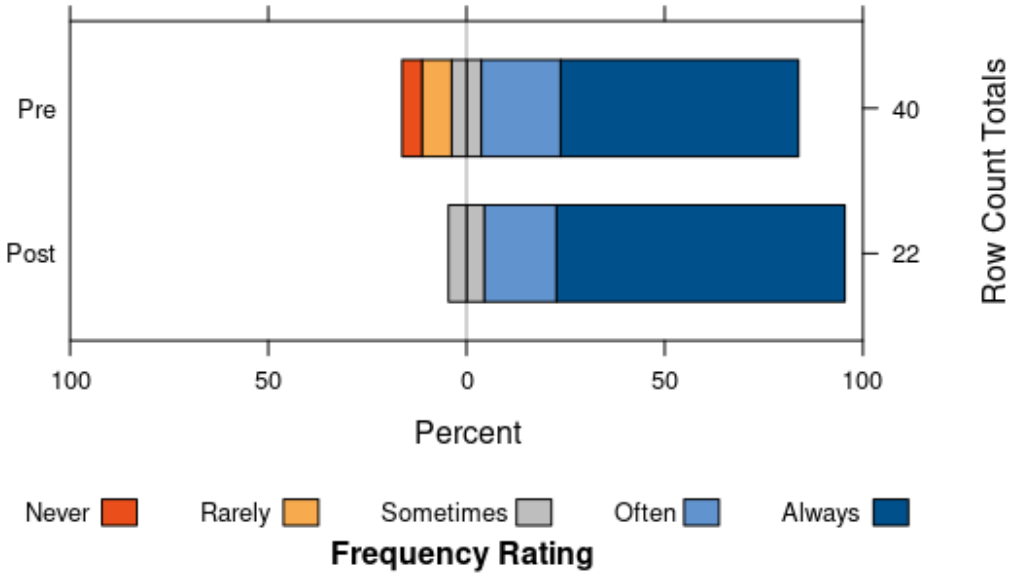
After providing patient care and doffing gloves, I wash my hands.



Personal Protective Equipment including gloves, masks and goggles/eye shields are available on my unit.



If a blood/body fluid exposure happens, I know how to report it during Employee Health Services business hours (7:00 AM and 3:30 PM).



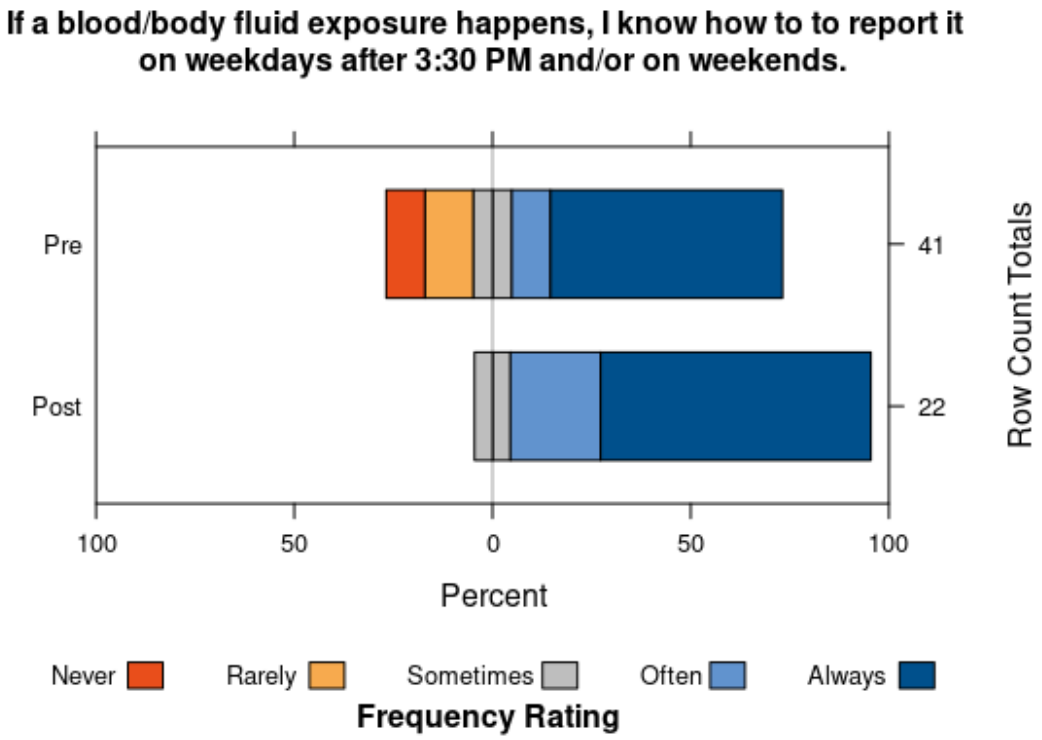


Figure 6

Pre-intervention Survey Review Individual (RNs only) Responses Summary

A closer review of the pre-intervention survey responses indicated 37 RNs responded to the pre-intervention survey. Fifty seven percent (21) of RNs were *Not at all concerned* or *Slightly concerned* about the level of blood borne pathogen exposure in their daily work, 89 % (33) of staff were *Not at all concerned* or *Slightly concerned* about the availability of PPE on their work units, 97% (36) of the RNs who responded were *Not at all concerned* or *Slightly concerned* about the support of their manager/supervisor in exposure prevention and also support of manager/supervisor in post-exposure follow up care. Ninety four percent (34 out of 36) of the individual pre-intervention survey responses indicated staff were *Not at all concerned* or *Slightly concerned* about their personal awareness in locating EOH resources to prevent and respond to blood and body fluid exposures.

Review of the pre-intervention survey questions asking RN staff to rate the frequency, 97% (36) indicated they *Always or Often* wore PPE when performing direct patient care activities such as whole blood glucose finger stick, insertion of IV catheters, emptying drains, etc. Seventy eight percent (29) of the individual RN responses indicated staff *Always or Often* washed their hands after providing patient care and doffing gloves. One hundred percent of the individual RN survey responses (36) indicated PPE including gloves, masks and goggles are *Always or Often* available on their work unit. Eighty one percent (29) of the individual RN responses indicated if a blood/body fluid exposure happens, staff *Always or Often* knew how to report the incident during EOH business hours (7:00AM–3:30PM) and 68% (25) of the individual responses indicated if a blood/body fluid exposure happens, staff *Always* knew how to report the incident after EOH business hours (after 3:30 PM and/or on weekends).

Post-intervention Survey Review Individual (RNs only) Responses Summary

In summary, the review of individual RN post-intervention survey responses, about level concern, indicated 46% (6) of staff were *Not at all* or *Slightly concerned* about the level of blood borne pathogen exposure in their daily work, 92% (12) of staff were *Not at all concerned* or *Slightly concerned* about the availability of PPE on their work units, the support of their manager/supervisor in exposure prevention and also support of manager/supervisor in post-exposure follow up care. One hundred percent (13) of the individual RN post-intervention survey responses indicated staff were *Not at all* or *Slightly concerned* about their personal awareness in locating EOH resources to prevent and respond to blood and body fluid exposures.

In review of the post-intervention survey questions asking RN staff to rate the frequency, 92% (12) indicated they *Always* or *Often* wore PPE when performing direct patient care activities such as whole blood glucose finger stick, insertion of IV catheters, emptying drains, etc. Eighty

five percent (11) of the individual responses indicated staff *Always* or *Often* washed their hands after providing patient care and doffing gloves. One hundred percent of the individual RN post-intervention survey responses (13) indicated PPE including gloves, masks and goggles are *Always or Often* available on their work unit. Eighty five percent (11) of the individual RN post-intervention responses indicated if a blood/body fluid exposure happens, staff *Always* or *Often* knew how to report the incident during EOH business hours (7:00AM–3:30PM) and after EOH business hours (after 3:30 PM and/or on weekends).

Ideally, this DNP student wanted an improvement in responses from participants. However, that was not seen in most of the questions related to concern. In the responses related to frequency, participants reported PPE is available on the units, for staff. There was a slight improvement noted in staff performing handwashing after donning gloves and an improvement in staff awareness for reporting BBF splashes during EOH business hours and after hours or weekends. Perhaps these areas indicated an increased awareness following the completion of the online education module titled, Blood and Body Fluid Splashes. Overall, not the results anticipated or hoped for. It is evident ongoing communication with the unit nurse managers and frontline staff is necessary to keep staff aware of the risk associated with BBF exposure and awareness of selecting the appropriate PPE when performing patient related tasks that place the employee at risk.

Ninety percent of the pre-intervention surveys were submitted by RNs (N=37), 10 percent by PCTs (N=4). Fifty nine percent of the post-intervention survey responses were submitted by RNs (N=13) and 41 percent (N=9) by PCTs. As a result, in differences in the type of respondent for the pre- and post-intervention survey (pre: 90% RN, post: 59% RN), data was summarized overall and according to role (RN and PCT) in Table 6. The table also summaries

the PCT only responses, since the response number was low, four total, they were included for the readers review and not individually summarized.

Survey responses before and after educational intervention

	All Responses		RNs Only		PCTs Only	
	Pre (N=41)	**Post (N=22)**	**Pre (N=37)**	**Post (N=13)**	**Pre (N=4)**	**Post (N=9)**
The level to blood borne pathogen exposure in my daily work: *not at all concerned or slightly concerned, n (%)*	23 (56%)	9 (41%)	21 (57%)	6 (46%)	2 (50%)	3 (33%)
The availability of personal protective equipment (PPE) on my unit: *not at all concerned or slightly concerned, n (%)*	37 (90%)	15 (68%)	33 (89%)	12 (92%)	4 (100%)	3 (33%)
The support of my manager/supervisor in exposure prevention: *not at all concerned or slightly concerned, n (%)*	40 (98%)	16 (73%)	36 (97%)	12 (92%)	4 (100%)	4 (44%)
The support of my manager/supervisor in post-exposure follow up care: *not at all concerned or slightly concerned, n (%)*	40 (98%)	16 (73%)	36 (97%)	12 (92%)	4 (100%)	4 (44%)
My awareness in locating Employee Health resources to prevent and respond to blood and body fluid exposures: *not at all concerned or slightly concerned, n (%)*	37 (93%)*	18 (82%)	34 (94%)*	13 (100%)	3 (75%)	5 (56%)
When performing direct patient care activities such as whole blood glucose finger stick, insertion of IV catheters, emptying drains…etc. I wear Personal Protective Equipment such as gloves, mask and goggles/eye shield: *always or often, n(%)*	40 (98%)	20 (91%)	36 (97%)	12 (92%)	4 (100%)	8 (89%)
After providing patient care and doffing gloves, I wash my hands: *always or often, n(%)*	33 (80%)	20 (91%)	29 (78%)	11 (85%)	4 (100%)	9 (100%)
Personal Protective Equipment including gloves, masks and goggles/eye shields are available on my unit: *always or often, n(%)*	40 (100%)*	22 (100%)	36 (100%)*	13 (100%)	4 (100%)	9 (100%)
If a blood/body fluid exposure happens, I know how to report it during Employee Health Services business hours (7:00 AM and 3:30 PM):	32 (80%)*	20 (91%)	29 (81%)*	11 (85%)	3 (75%)	9 (100%)

always or often, n(%)						
If a blood/body fluid exposure happens, I know how to report it on weekdays after 3:30 PM and/or on weekends: *always or often, n(%)*	28 (68%)	20 (91%)	25 (68%)	11 (85%)	3 (75%)	9 (100%)
Data are shown as number and percentage of respondents that selected either not at all concerned or slightly concerned for the level of concern questions and either always or often for the frequency questions. All response levels are shown in Tables 4 and 5. *Data were not reported for 1 respondent.						

Table 6

Table 7 and Figure 7 display the BBF incidents from January 1, 20218 – July 23, 2021. The median time between BBF exposures prior to the educational intervention was 26 days (range 1 – 132 days). The accidental blood and body fluid reported were tracked throughout this DNP project. There were no BBF exposures reported in the three-month post-intervention data collection period.

Exposure Date	Event Number	Days Between
Pre-intervention		
01/02/2018	1	
01/20/2018	2	18
02/26/2018	3	37
04/04/2018	4	37
04/10/2018	5	6
04/16/2018	6	6
05/26/2018	7	40
05/27/2018	8	1
06/18/2018	9	22
06/24/2018	10	6
10/09/2018	11	107
11/03/2018	12	25
01/02/2019	13	60
02/26/2019	14	55
04/02/2019	15	35
04/04/2019	16	2
04/26/2019	17	22
05/23/2019	18	27
06/04/2019	19	12
06/17/2019	20	13
08/02/2019	21	46
09/27/2019	22	56

12/3/2019	23	67
12/27/2019	24	24
01/12/2020	25	16
01/14/2020	26	2
03/09/2020	27	55
03/20/2020	28	11
03/28/2020	29	8
08/07/2020	30	132
09/22/2020	31	46
11/23/2020	32	62
02/26/2021	33	95
Online education module April 1-22, 2021		
04/09/2021	34	42
Post-intervention April 23 – July 23, 2021		
No events in 105 days since last event		

Table 7

The number of days between events is shown from January 1, 2018, through July 23, 2021. There were 33 events in the pre-intervention period (median days between events is equal to 26 days. There was one event during the intervention (online education) period (42 days between exposures); it was not known whether this RN had completed the online educational module prior to this accidental blood and body fluid splash. There were no exposures in the three-month post-intervention period.

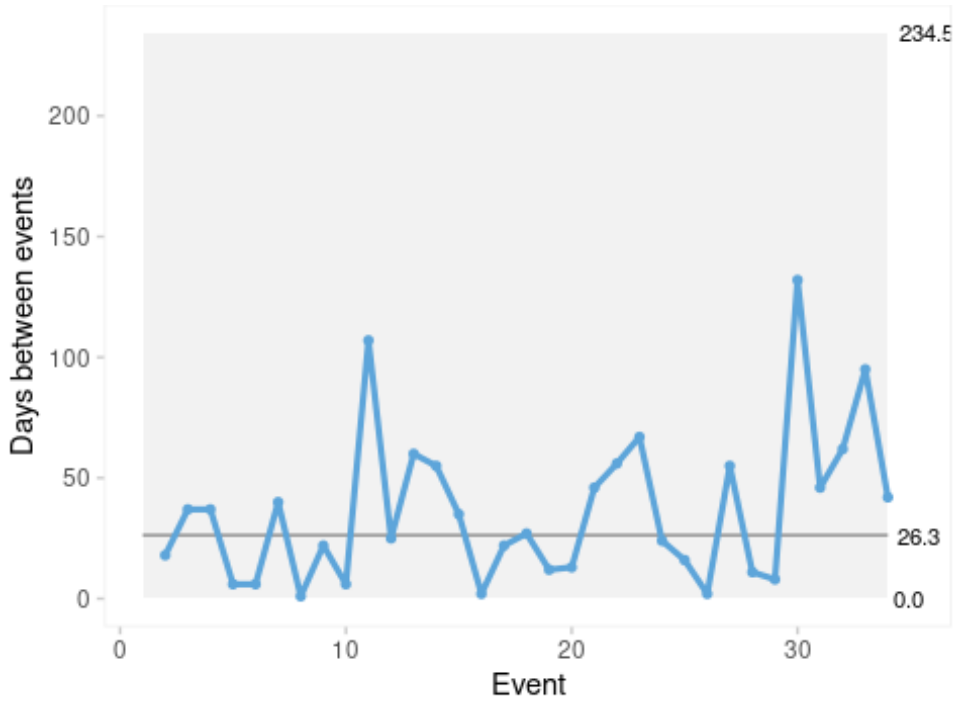


Figure 7

Process Measures and Outcomes

The following graph, Figure 8, shows the BBFs reported, monthly, for April – July 2019 and April 23, 2020 – July 23, 2020, and April 23, 2021 – July 23, 2021. The 2019 data was included for comparison of previous years. Although in 2020 there were eight blood and body fluid splashes reported, none of them were reported during the comparison months for this DNP project. In addition, for 2021, no accidental blood and body fluid splashes were reported during the April 23-July 23 reporting period. The goal of this quality improvement project was to achieve a 50% reduction of occupational exposures, three months post online education intervention, when compared to the same three months period of previous years. For the two consecutive years, there were no accidental blood and body fluid splashes reported during the time frame of April 23-July 23. This DNP project was approved for implementation in February 2021. After approval, this DNP student arranged to attend the inpatient nurse manager monthly

meeting in March 2021. Timing of this project implementation, delivery of the pre-intervention survey, online education assignment to staff and post intervention data collection, the previous year three-month data comparison months yielded no accidental blood and body fluid splashes in the same period of 2020. This project therefore did not see a 50% reduction in reported events, however, did show zero reported accidental splashes during the data collection period. Zero reported accidents during the collection period could be attributed to the successful implementation and review of the education module and attributed to the status of the COVID-19 pandemic at the time of this project. Although there were eight accidental BBF exposures reported in 2020, through then end of this project reporting period, there have only been two reported BBF exposures at the facility in 2021. Of interest will be the total number of accidental BBF exposures reported on campus for the year 2021. This data will be shared by the EOH nurse supervisor at the quarterly BBPER workgroup meetings.

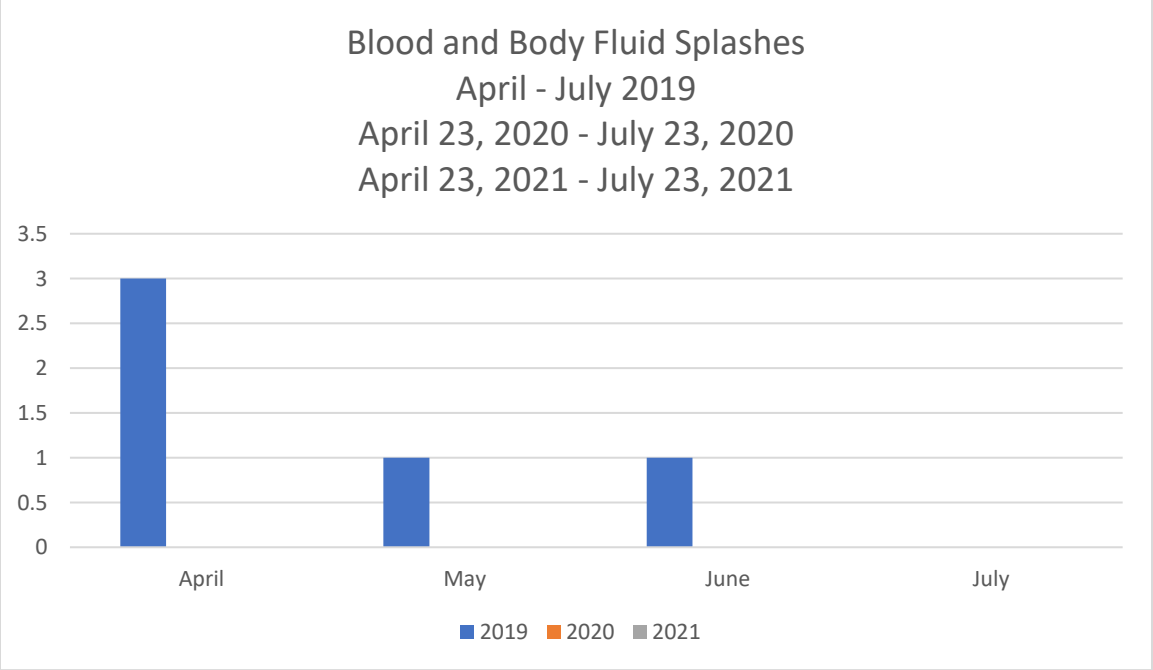


Figure 8

Unintended Consequences/Limitations

Shortly after the pre-intervention survey was sent to the 967 inpatient RNs and PCTs, this DNP student recognized there was not a plan to send email reminders to the inpatient RNs and PCTs at regular intervals. There is a possibility the email reminders would have positively influenced the number of pre-intervention surveys submitted. In addition, lack of email reminders after the post-intervention survey was emailed may have also had an impact on the low response of the post-intervention surveys. Email reminders to staff following the delivery of the pre-intervention survey, online education and the post-intervention survey may have had a positive increase on the total survey responses and the percentage of staff who completed the online education by the due date in April.

The plan to do walking monthly rounds in the inpatient units was impacted by the COVID pandemic and the restriction of students in the academic facility during the April-July 2021 timeframe. At this time, the BBPER subcommittee has not made scheduled walking rounds on the units due to the COVID pandemic and workload because of the pandemic.

In addition, attending specific monthly/quarterly inpatient staff meetings was challenging and impacted by date/time of the specific unit meetings and this nurse managers work/meeting schedule; this DNP student was able to attend every inpatient unit meeting invited to. During the initial inpatient nurse manager meeting when the DNP Project was introduced, the inpatient managers were asked to send calendar meeting notices to this DNP student to attend their unit staff meetings as an opportunity to present an overview of this project to individual unit frontline staff. Immediately following the meeting, two nurse managers reached out to this DNP student and arranged for this presentation to staff. Email reminders were sent to the inpatient nurse managers on three different occasions. Overall, this DNP student was able to attend/present the

project overview, data, and a review of the literature to eight individual departments. This DNP student did not receive any responses from any of the email reminders from three of the inpatient managers. Another unit was in transition from a departing nurse manager to a newly hired nurse manager, therefore this DNP student was not able to present to this unit. One manager responded to the last email reminder and indicated the department combined two units for their staff meetings and they just recently met, there was another meeting scheduled in August, however, the project end date would have passed, therefore this DNP student declined the August invite to attend the combined unit staff meeting. For the two units that had a delayed response and the three units that no response was received, an email was sent to the unit nurse manager providing an overview of the project and included the online education course title and number for assignment to onboarding staff in the future.

During these individual unit staff meetings, it was noted the percentage of staff who attended each of the staff meetings averaged approximately 29%. Not all the inpatient nurse managers required staff to attend the unit staff meetings. Engagement of staff during the meetings was low, few questions were asked by staff, on most units, after the presentation. In lieu of the pandemic, all the unit staff meetings were held virtually instead of in-person, face-to-face. In addition, it was noted most staff did not have or utilize cameras to easily confirm their presence. In lieu of this, it was difficult to determine staff engagement levels. While virtual meetings are seemingly convenient for leadership and frontline staff, it is uncertain how engaged participants are due to external distractions. When a meeting attendee does not use a camera during the virtual meeting, staff attendance/engagement is uncertain.

Missing Data

One participant (RN) did not answer three questions in the pre-intervention survey; two of the omitted responses were related to EOH and the third was related to PPE availability on the unit. These omitted responses were not included in the data of this project.

Summary

Attending the unit staff meetings provided an opportunity for this DNP student to introduce the project, provide a summary of the literature review and present the number of BBF exposures on campus since 2015, with a focus on the upward trend in 2018 and 2019. This DNP student also shared, despite a facility policy mandating staff wear eyewear/goggles when providing patient care with an increased risk of potential exposure, there were eight accidental exposures reported. The data shared was informative to frontline staff and to some nurse managers who were in their role less than one year.

Key Findings

In one of the inpatient unit staff meetings, a frontline staff member asked when goggles/eyewear could be stocked in patient rooms. As a result of the COVID-pandemic and as recommended by the Infection Prevention and Control (IPAC) team, large quantities of medical supplies were removed from being stored in individual patient rooms. Currently on the one unit, the eyewear/goggles are stored in the main medical supply closet on the unit. Staff indicated this was not convenient for them to access when actively providing patient care. During other unit staff meetings, it was reported the googles/eyewear were stored at the unit nurses' station or immediately outside individual patient room at workstations. Both locations were noted to be convenient by the staff working on each of the units. In all the staff meetings, staff agreed the

PPE supplied was adequate. During the COVID pandemic, as reported by individual units, there is not a standard location for PPE, specifically goggles/eyewear.

In another unit staff meeting, staff cited reasons for not wearing goggles/eyewear to include the eyewear is uncomfortable to wear, some eyewear fall off when the nurse leans over during patient care. In addition, for staff who wear prescription eyewear, the goggles must be worn over the glasses. Employees have an option to request a pair of prescription glasses with side shields. EOH covers the expense of these glasses; the employee must complete a request (available on the EOH website), signed by their supervisor/manager, and have a recent prescription for their eyewear. A staff member also suggested developing/distributing a RedCap survey with a specific focus on determining reasons why staff are not using goggles. This nurse suggested once the reasons were identified, work towards compliance could begin. This DNP student will bring all these suggestions to the BBPER subcommittee future meeting which will be scheduled later this year, during the third quarter. As noted during the literature review, easy access to PPE increases staff compliance for use.

Because each unit was affected by previous reports of blood and body fluid splashes, this DNP student chose to include all 14 units of the inpatient setting in this project. A recommendation, for further quality improvement projects for reduction of blood and body fluid exposures in the inpatient setting, would be to focus the project on two or three units for improved access to frontline staff. When working with many units and staff working to cover 24 hours/day, it was challenging to establish relationships/connections with frontline staff. This may be more readily obtainable if there were only two or three units to work with.

Strengths of Project

This project had the support of and was done in collaboration with the BBPER subcommittee because of an increasing trend of blood and body fluid exposures on campus. Attending the inpatient nurse manager meeting and the individual inpatient unit staff meetings allowed this DNP student to bring an awareness of the past trends in exposure, the current facility policy for PPE use and allow staff to ask questions about the blood and body fluid splashes, data, policy, EOH hours and process for reporting incidents. It is hoped the nurse managers will keep this information on the forefront of frontline staff. This DNP student will recommend the BBPER subcommittee consider an ongoing/proactive relationship with unit nurse managers in the future, in an effort towards continued reduction of blood and body fluid accidents on campus.

Interpretation

Online education is one method that can be used to reinforce proper PPE selection, however, should not be the only method. Throughout this project, this DNP student recognized the value of collaborating with the inpatient nurse managers to establish relationships and to reinforce ongoing frontline staff awareness of PPE selection when performing patient care tasks with an increased risk of BBF exposures. It was unfortunate this DNP student was not able to complete the walking monthly rounds on each of the units; it was hoped the walking rounds would allow the student to speak with staff and reinforce proper PPE selection. To date, there have only been two reported exposures on campus this year. It is uncertain whether the online education had a direct effect on the reduction in exposures on campus or whether the facility policy requiring staff to wear eyewear/goggles when providing face-to-face patient care, had a positive influence in the reduction of reported incidents.

This DNP will recommend, to the BBPER workgroup, when an exposure occurs, frontline staff and unit nurse manager are invited to the quarterly BBPER workgroup meetings to review and provide insight to the exposure incident. Some workgroups on campus use this process of inviting front line staff and the unit manager to meetings to learn more about an incident (falls, medication errors). The discussion focuses on suggestions the frontline staff may have for preventing future incidents, what measures can be put into place to prevent future errors, were there any contributing factors, nurses' perception of why incident occurred, was the incident shared with department staff as a teaching lesson and are there any recommendations learned/implemented from frontline staff or the unit nurse manager following the incident? Including frontline staff and the unit managers that have recently experienced an incident has been successful in other workgroups and can provide insight to accidental incidents on campus and encourage collaboration and improvement towards improved patient and staff safety.

Anticipated Outcomes/Observed Outcomes

This DNP student hoped for a better response rate to the pre- and post-survey delivered electronically. A low response rate to surveys can be affected by the timing and frequency of surveys. This survey was administered shortly after this healthcare facility experienced a COVID surge and increasing staffing needs, therefore it is not known if this impacted survey response. Response rates are calculated by dividing the number of completed surveys by the total number of surveys distributed (Dehghanpour & Herrmann, 2021). These authors also noted research has suggested paper surveys yield the highest response rate, followed by web-based surveys, and then email surveys with the lowest survey response. The survey for this project was administered using RedCap. after the participant received an emailed informed consent and agreed to take the survey. As noted previously, email reminders were not sent to the participants. These authors

also suggest that adding a monetary incentive may increase survey responses; this DNP project did not offer any monetary incentive for survey completion,

Munn and Jones (2020) noted some studies indicated surveys of nurses had the lowest response rates. Yu et al. (2017) noted survey participation overall has declined and may be related to an increasing number of survey distribution. Engaging the nurse managers in proactively encouraging the nursing staff (RNs and PCTs) may have increased response rates. During the inpatient nurse manager meeting, this DNP student presented the overall project and the anticipated dates of pre- and prost-intervention survey distribution and targeted dates the online education module would be assigned. There was not an ask of nurse managers to encourage the inpatient RNs and PCTs to complete the pre- and post-intervention surveys. This may have increased survey responses if the nurse managers were asked to encourage staff participation.

Recommendations

Future projects should include a smaller population focus, for example working with two or three units instead of the fourteen units to maintain a reduction in BBF exposure accidents. Also recommend members of the BBPER workgroup partner with specific inpatient units, collaborate with nurse managers and frontline staff to maintain a reduction in BBF exposure accidents. In addition to the annual required education module, the facility may consider using various venues for delivering education reminders, one source could be the bi-monthly nursing newsletter published on campus. It will be important to keep the topic of PPE selection and BBF exposure reduction in the forefront as ongoing education reinforcement. Although this project has finished, the focus on BBF exposures and work towards BBF reduction should continue.

Conclusion

There are several ways healthcare workers can protect themselves against blood and body fluid exposure. It is important that staff are knowledgeable of the measures that are available to prevent such incidents and how to handle the blood and body incident if one occurs. Staff should be adequately trained to understand the risk at hand, the prevention measure available and ensure compliance to the infection control standards in place to prevent blood and body fluid exposure incidents. Staff education focused on infection prevention and control should include the proper use of PPE and the safe handling and disposal of sharps and fluid spillages; PPE should be readily available and easy to use (Beckett & Bright, 2013). Jain et al. (2013) noted that many factors contribute and support health care worker's adherence to PPE use including adequate stock of PPE in the right place at the right time, awareness and knowledge of proper use, proper education, and administrative support. For successful reduction of blood-borne pathogens exposure incidents in this academic health care setting in northeast Florida, it is necessary to have the support of key stakeholders such as executive leadership, nursing administration and nurse managers. Ongoing staff education, safety of patients and staff, staff and safe work environments are critical factors to the successful and ongoing use of PPE on the units and a continued and sustained reduction of exposure incidents. Collaboration of all key stakeholders is essential in preventing future BBF exposures.

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Appendix A

Online Survey Consent

Dear Email Recipient:

You have been asked to complete this online survey as part of a quality improvement project conducted by Teresa Smoot, Doctor of Nursing Practice student at Jacksonville University and Dr. Hilary Morgan, Faculty at Jacksonville University. The quality improvement project is called Educational Intervention to Enhance Staff Knowledge and Increase Awareness Regarding Risk Assessment and Personal Protective Equipment Selection to Reduce Blood and Body Fluid Exposures and is designed to increase compliance of proper PPE selection and use when providing patient care with an increased risk of accidental exposure and reduce the incidence of blood and body fluid splashes among inpatient nursing staff (RNs and PCTs). You may or may not benefit directly from being in this study.

Completing the online survey may take approximately five to six minutes. The risks associated with the study are minimal, but there is always a chance that a loss of confidentiality may occur. To mitigate this risk, the survey is configured so that your participation is anonymous with no identifying information (e.g., email addresses, names, etc.) being collected by the survey website nor the researchers. As such, responses cannot be linked back to you. Questions posed are not of personal or sensitive nature, but you are free to withdraw from completing the survey entirely. If you decide not to participate or withdraw from the study, you will not be penalized. Participation in this survey is completely voluntary.

By completing and submitting the survey, you affirm that you are at least 18 years old and that you give your consent for Teresa Smoot to use your answers in her quality improvement project. The results of this study will be shared with the Blood Borne Pathogen Exposure Reduction (BBPER) workgroup on this healthcare facility's northeast Florida campus. The information learned from this project may be used in a journal article and presentation.

If you have any questions about this research before or after you complete the survey, please contact Teresa Smoot, tsmoot@jacksonville.edu.

If you have any concerns or questions about your rights as a participant in this research, please contact the Jacksonville University Institutional Review Board at (904) 256-7151 or juirb@ju.edu.

This quality improvement project is being conducted under the direction of

Dr. Hilary Morgan (Faculty Chair)
Jacksonville University
Keigwin School of Nursing
2800 University Blvd. N
Jacksonville, FL 32211
hmorgan@ju.edu
phone # 904-256-7601

This quality improvement project has been approved by the Jacksonville University Institutional Review Board (JU IRB #____-___).

Clicking on the "agree" button below indicates that you have read the above information, you voluntarily agree to participate, and you are at least 18 years of age.

o Agree (https://redcapcln4-prod.mayo.edu/redcap/surveys/?s=T8YLHXH7LX)

If you do not wish to participate in the study, simply delete this email.

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Appendix B

Blood and Body Fluid Survey

Blood and Body Fluid Survey

The purpose of this survey is to obtain an assessment of perceptions of blood and body fluid risk in the hospital and procedural settings. Information will be kept confidential.

Answer all questions to the best of your ability with the instructions provided. Thank you!

1) Role
* must provide value

Registered Nurse (RN)

Patient Care Technician (PCT)

reset

2) Unit/Work Area
* must provide value

3) Last Two Digits of Birth Year & First Two Numbers of Home Address
* must provide value

For the following statements rate your level of concern on a scale between 1 and 5, where 1 represents "Not at all concerned" and 5 represents "Extremely concerned":

	1-Not at all concerned	2-Slightly concerned	3-Somewhat concerned	4-Moderately concerned	5-Extremely concerned
4) The level to blood borne pathogen exposure in my daily work. * must provide value	○	○	○	○	○
reset					
5) The availability of personal protective equipment (PPE) on my unit. * must provide value	○	○	○	○	○
reset					
6) The support of my manager/supervisor in exposure prevention. * must provide value	○	○	○	○	○
reset					
7) The support of my manager/supervisor in post-exposure follow up care. * must provide value	○	○	○	○	○
reset					
8) My awareness in locating Employee Health resources to prevent and respond to blood and body fluid exposures * must provide value	○	○	○	○	○
reset					

For the following action statements, rate your frequency on a scale between 1 and 5, where 1 represents "Never" and 5 represents "Always":

	1-Never	2-Rarely	3-Sometimes	4-Often	5-Always
9) When performing direct patient care activities such as whole blood glucose finger stick, insertion of IV catheters, emptying drains...etc. I wear Personal Protective Equipment such as gloves, mask and goggles/eye shield. * must provide value	○	○	○	○	○ reset
10) After providing patient care and doffing gloves, I wash my hands. * must provide value	○	○	○	○	○ reset
11) Personal Protective Equipment including gloves, masks and goggles/eye shields are available on my unit. * must provide value	○	○	○	○	○ reset
12) If a blood/body fluid exposure happens, I know how to report it during Employee Health Services business hours (7:00 AM and 3:30 PM) * must provide value	○	○	○	○	○ reset
13) If a blood/body fluid exposure happens, I know how to to report it on weekdays after 3:30 PM and/or on weekends. * must provide value	○	○	○	○	○ reset

Submit