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Blood Culture Staff Education to Improve Knowledge and Contamination Prevention

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Walden University

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Walden University

College of Nursing

This is to certify that the doctoral study by

Christina Harvey

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

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Walden University
2021

Abstract

Blood Culture Staff Education to Improve Knowledge and Contamination Prevention

by

Christina Harvey

MSN, Walden University, 2015

BSN, University of South Carolina-Aiken, 2009

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Nursing Practice

Walden University

August 2021

Abstract

There was an underlying issue with nurses improperly drawing blood cultures resulting in false results that impact patient care. The project examined the question whether a staff education program for Veteran's Affairs Registered Nurses on the effects of correct blood culture specimen collection can demonstrate an increase in knowledge in the VA's collection procedure leading toward increasing compliance. The purpose was to correct a knowledge deficit leading to a lack of compliance of the VA nurses on the target unit. The project was directed by the principles of the Knowles' adult learning model. The sources that generated evidence for the project were problematic daily nursing behaviors observed directly for data collection in three different patient care locations at the veterans' medical center. An educational presentation based on clinical environment observations and 28 de-identified registered nurse participants who completed an implemented educational in-service were means of data collections consisting of 10 questions pre- and post- tests based on VA specimen collection policies and standards. A basic *t*-test determined the number of participants' pretests scored 80 or better compared to the number of participants' posttest scored 80 or better after education was provided to determine a positive or negative improvement. The results show that there was an educational improvement in nursing practice that will be beneficial to participants, patients, and lead towards the long-term goal of increased compliance. The project contributes to a positive change by strengthening nursing skills and self-knowledge; improving costs and delivery of appropriate care to a vulnerable population within the community.

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Dedication

This project is dedicated to my husband Brandon, and my children Rashad, Kristiana, Cristen and Chase and lastly a divine dedication to my grandmother Clara who without her inspiration this would not have been executed.

Acknowledgments

I would like to thank my mother Queen, father Sylvester, and siblings Natasha and Omari who encouraged me throughout this journey. I would like to thank Dr. Robert McWhirt, my committee chair, who was my motivator to continue to apply myself to complete this task.

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Section 1: Nature of the Project

Introduction

Blood cultures collection is a simple and important nursing practice in acute clinical settings. Approximately one in every 23 clients have been identified with blood stream infections in clinical settings which has accumulated a national expense of about 15 billion dollars annually (Snyder et al., 2012). Furthermore, false positives and unnecessary or delayed antibiotic treatments due to contaminations are prevalent at the Veteran Affairs (VA) facility where this project took place (Chief of Pathology and Laboratory Medicine Service, personal communication, November 6, 2019).

Blood culture contaminations can lead to an increase of delayed or missed diagnoses and even death (Snyder et al., 2012). At this local practice site, the percent of blood culture contamination collected by nurses' mistakes, focusing on the three high acuity areas from January 1, 2018 thru December 30, 2018, was 7.8%: this percentage exceeds national standards (Chief of Pathology and Laboratory Medicine Service, personal communication, November 6, 2019).

An element was missing in the Veteran Affairs' (VA) nursing practice regarding blood culture specimen collections but, what educational component was missing that can help improve outcomes and rates? The VA nurses at this local site are given VA standards of care through literature, policies, and practices and deem the sole clinical staff who draw blood culture laboratory specimens in the VA medical center and specialty clinics. Blood culture specimens' contamination are preventable and a program of education on specimen collection skill competency for nurses in clinical settings fills

the variance, improves nurses' self-knowledge and skillset, and reduces the rate of the VA's clinical contamination.

Reducing the rate of contamination through nursing educational instruction helped the nurses' driven clinical sites improve self- knowledge and skills and, at the same time, it was speculated that this may increase compliance and save money and veterans lives. This project aligned with the Veterans Affairs mission for veterans accessibility to care, advocate, and promote positive social change by helping to improve the VA's nursing skillset and self-knowledge through strengthening weakness of antiseptic specimen collection techniques, properly completing standard specimen labeling, and completing lab collection worksheets which improved nursing standards and techniques in the Veterans Affairs which were currently weak. The current standards would help patients' health outcomes and improve our veterans' community. Farmer et al. (2016) noted that veterans represent a disparity vulnerable group with complex illnesses and limited accessibility, and who are closely monitored through governmental entities; the mission of the VA is to meet the veterans' patient needs and improve nursing practice.

Problem Statement

The local nursing practice problem that was addressed was the nursing skillset and knowledge breakdown in blood culture specimen collections which caused a delay in care, duplicate nursing orders, poor time management, and frustration an unresolved issue in local clinical settings in the VA. Blood culture specimens often are unknowingly corrupted in the action process of collection (Halstead et al., 2020). This corruption

process of specimen collection highly affected the results and the suspect could be human error related.

In daily practices at the VA, nurses are assigned with many tasks which are grounded on standards of quality care and patient safety including specimen collections which can impede patient care if an error occurs which is relevant. In reviewing academic controlled trials, were several organizational infection control interventions for nursing staff to implement including different microbials solutions, venous puncture exchange methods, and improving culture containers to prohibit false positives with failed results (Rupp et al., 2017). However, despite careful VA processes and standards nurses' specimen collection mishaps continue to be documented in our local clinical practice.

According to the current local facility's contamination benchmark rate of 7.8%: a deficit percentage and despite the current VA's standard of practice of the Joint Commission 2018 National Patient Safety Goals there continued to be a missing link or breakdown in infection control standards and techniques which led to longer hospital stays, duplication of clinical nursing orders; decreased nurse accessibility to patients, and increased costs at this location (Chief of Pathology and Laboratory Medicine Service, personal communication, November 6, 2019). According to the Infection Control Medicine Service, a program of education is needed to refresh nurses on VA's procedural techniques to prevent contamination of blood culture collections (Infection Control Medicine Service, personal communication, November 6, 2019). This project filled the educational gap and strengthened the VA nurses' practice skills, self-knowledge, and improved quality of care for the veterans' population at the practice site.

Dargere et al. (2018) suggested in their study that clients with false positive blood cultures results require additional consultations and a lengthier hospital stay approximately from one day to five days which can lead up to one thousand to eight thousand dollars in additional cost. Increased costs related to false blood culture results may further impact the local VA's expense and deplete valuable resources.

After a comprehensive search of literature reviews, case studies, and meta-analysis, national standards, receiving feedback from Medicine Service's clinical deficits a focus was placed on the needs of the facility including nursing skills deficits that weaken and define an avenue of need in nursing skillset, self-knowledge change, and the gap in practice.

For this project, I addressed staff nursing knowledge, skills, and the ability to correctly draw blood culture specimens using antiseptic techniques in an educational in-service guided by current VA's practice standards and policies to improve the field of nursing practice. The significance of my project was to advocate for the VA nurses by equipping them with self-knowledge and correct blood culture specimen collection techniques to improve clinical behaviors and improve delivery of care for veterans who are a vulnerable population in this area.

Purpose Statement

The purpose of this project was to increase VA nursing staff skillset and self-knowledge and improve compliance on correct technique of blood culture specimen collection process that may inversely improve the local benchmark rates through an educational component. According to the current facility rate of 7.8%, despite the current

standard of practice of the Joint Commission 2018 National Patient Safety Goals, there continues to be a breakdown in infection control standards and/or techniques which has led to longer hospital stays, duplication of nursing orders; and increase costs at this location (Chief of Pathology and Laboratory Medicine Service, personal communication, November 6, 2019.) According to the Infection Control Medicine Service, a program of education fits the need of refreshing nursing staff on correct specimen collection to prevent blood culture contamination errors (infection Control Medicine Service, personal November 6, 2019.) This project will fill the educational gap and strengthen compliance of VA nurses' standards of practice and improve quality of care for the Veterans population at the practice site.

The question that was addressed in this project was: Will a staff education program for VA Registered Nurses on the effects of correct blood culture specimen collection demonstrate an increase in knowledge in the Veteran's Affairs collection procedure leading towards the ultimate goal of increasing compliance?

This project addressed the gap in practice by bridging nursing skillset and self-knowledge with the VA's current standards of care and policies improving overall nursing educational needs in clinical practice. In order to address these nursing VA issues, the Infection Prevention and Control Assessment Tool is an appropriate guide and checklist for inpatient settings (Center for Disease Control and Prevention, 2016). This tool is current and available electronically on employees' intranet and applied into practice for specimen collection and maintaining aseptic standards for nurses within the local VA medical center and a tool that can help address the gap of practice.

Nature of the Doctoral Project

The objective of this project was to improve the science of nursing skills and knowledge which is an ongoing foundation of being a nurse and leader. The nature of the doctoral project was at the Veteran's Affairs population guided by using Mosby's Nursing Manual and Infection Prevention and Control Assessment Tool which included using Personal Protective Equipment (PPE) with the focus on drawing specimen techniques, nurses' techniques weaknesses and strengths, completion of clinical laboratory Veteran Affairs' issued forms for a tracking system. This was the present practice at the Veteran Affairs medical centers. Detection was determined from registered nurses' current level of knowledge of VA's policies and standards with drawing blood cultures provided in the form of a ten-question pretest; in-service; and ten-question posttest with the completion of the training with two question satisfaction surveys with knowledge and compliance improvement.

Sepsis prevalence ranks seventh in hospital preventable mortality in the United States (Lamy et al., 2016). Typically, blood is sterile unless compromised during body culture collections (Snyder et al., 2012). This rate can lead to a delay in care for patients and produce an attitude of inappropriate nursing skills which can have a negative impact on nursing practice. Nursing educational training could be beneficial to this DNP project purpose which would show its significance to improving the nursing gap in practice by appropriate specimen collection which would improve the national benchmark clinical rates of less than three percent annually and improve the science of nursing practice.

Significance

The various aspects of staff education application in this project could potentially impact stakeholders (registered nurses, physicians, Chief of Medicine Services, and Infection Control Services) through locally addressing nurses' knowledge deficits, autonomy, skills deficits, clinical outcomes, as well as improving VA's nursing budget cost.

Educational components that have been addressed to improve contamination blood cultures outcomes in multiple ways in various literature reviews in more technical aspects such as seamless bottle vacuum failures, processing failures, environmental influence, and mislabeling patient errors. This project provided a nursing driven change behavioral approach about knowledge and skills weaknesses based on VA policies and practice identified through anonymous skills observation in various clinical settings, anonymous assessment of educational level. This nursing-based intervention of VA policies and standards could be implemented as a direct result of this project throughout the VA medical centers and could improve patient outcomes, provide faster and easier supply availability access for staff, and improve costs/rates.

This project had contributions implemented locally that improved VA's nursing clinical practice of nursing knowledge deficits in blood collections and decreased contamination results. In addition, implementation of improved nursing skills and self-knowledge transferability into other local VA facilities in the surrounding areas such as long term care facilities, dialysis and step down units could aid in vital diagnostic results that would fit the local need for the veterans' vulnerable population.

This project contributed to a positive social change by strengthening nursing skills and self-knowledge; improving costs and delivery of appropriate care to vulnerable populations within the community. The national hospital total economic impact of a patient contaminated blood culture per encounter can average up to \$9,000 using laboratory conservative methods (Skoglund et al., 2019). Therefore, this social change fell in line with positive change within the nursing community by improving nurses' knowledge and skills, avoiding duplication of orders, leading to faster patient treatments, increasing nursing accessibility, and resulting in accurate patient antibiotic treatment; these changes will improve assistance to a vulnerable population within the community and reduce local economic burden.

Summary

Blood culture contamination is preventable with optimal nursing training in educational and skills methods that can help deliver care to a vulnerable population that depends on the VA for healthcare. Improving nursing staff's education through enhancing behavioral practice skills required the motivation of change. This change was clinically and socially sounding to the science of nursing within the VA system. Again, the implementation of an educational in-service intervention based on nursing behavioral change fell in line with improving the VA nurses' skillset and self-knowledge that was in line with the VA's policies and practice standards. In chapter 2, this option explored background and context, relevance to nursing practice, and roles that facilitated this proposal.

Section 2: Background and Context

Introduction

The purpose of this project was to educate VA nursing staff skillset and self-knowledge and improve compliance on correct technique of blood culture specimen collection process that may inversely improve local benchmark rates. The question that was addressed in this project was: Will a staff education program for VA Registered Nurses on the effects of correct blood culture specimen collection demonstrate an increase in knowledge in the Veteran's Affairs collection procedure leading towards the ultimate goal of increasing compliance?

Building VA nurses' by modifying behavioral knowledge and practice skills through an educational component driven by VA policies and standards could result in the improvement of the science of nursing in leadership, nurses' autonomy, patient outcomes and impact the community. Byumbwe & Mtshali (2018) noted that the presence of skilled nursing staff is the cornerstone and building block of a healthcare facility however, there is a delay in professional skills versus evolving demands. The VA nurses are an impactful entity throughout the VA medical center which relies on compliance to the continuum of practice skills and population awareness. This local demand was a health determinant due to veterans' population health care prompted this inquiry to be addressed and provided optimum care to this group.

Concepts, Models, and Theories

The project was accomplished by providing a platform that could provide a rationale for the utilization of its concept, model, and theory based on effective delivery

of a nursing educational paradigm. The level of concept that helped to inform this project initially was to identify within my local medical facility's nursing issues using Knowles' adult learning theory highlighted in grand rounds and town hall meeting statistical trends which resulted in a loss in profits. These VA wide issues displayed a focus on a work setting behavioral change educational need in nursing. Mukhalalati & Taylor (2019) noted that Knowles' andragogy adult learning theory highlights the identification and management of variances among preexisting knowledge versus what is developed during an experimental educational element, which was first conceptualized focusing on children by Alexander Kapp an German educator.

In addition, Spies, Seale, and Borma (2015) noted that Knowles' andragogy or adult learning model consists of adult educational assumptions: self-concept: (learners are autonomous and self-directed); adult learner experience: (self-drawn to their own pool of experience rather than outside elements); readiness to learn: (what is needed to complete the task); orientation to learning: (problem solving process and immediate application of new knowledge); and motivation to learn: (self-driven curiosity and self-improvement). This model defined the teaching strategies to apply to nursing educational needs: self-concept (strengthening nursing blood cultures specimen collection breakdown in policy, knowledge, and skills benefits); role of experience (professional skills level in practice setting); readiness to learn (VA nursing staff accountability and receptiveness to VA policies and standards in blood cultures specimen collection); orientation to learning (a call to action for nursing staff education on prevention of blood specimen contamination); and motivation to learn (nursing staff willingness to change and improve practice

outcomes). In nursing at the VA, a continuum of learning was the core and strength of its craft. The essence of this project was based on the utilization of the referenced VA's standard and policies along with the selected theory which solidified that improving nursing education and skills may help improve patient outcome and nursing satisfaction. This brought light and relevancy to the science of nursing and practice.

Relevance to Nursing Practice

Currently, veterans' populations locally are living longer and sometimes presented to our health care facilities needing prompt care by nurses who are expected to manage identification and collection of precise data for their providers to interpret correctly. Poorchangizi et al. (2017) noted that in the public's eye, nurses are expected to be abreast with the latest standards delivery of care. Empowering VA nurses with educational enhancements of skillset and self-knowledge driven by VA's policies and standards in turn deliver high quality care to their vulnerable population, and efficient skills are determined as favorable nursing practice performance.

Additionally in an effort to improve local practice, experienced VA nurses were expected by the public to be competent and able to manage complex veterans' health demands, abide by VA's competencies, and complete daily tasks with a higher level of proficiencies and standards of knowledge, and skills. Garzonis et al. (2015) suggested in their mixed systematic literature review that a continuum of training utilized to teach techniques and knowledge is essential to patient care practice. In the VA's clinical settings, it was imperative that VA policies and standards educational in-service intervention provide a continuum of proficient skills and self-knowledge at its nurses'

optimal level by empowering, improving outcomes quality and safe care to the veterans' community that they served.

Successful in-service interventions based on VA policies and standards to improve a deficient clinical VA nursing technique and knowledge with correct blood culture specimen collections are important by entailing appropriate antibiotic management, reducing facility cost, avoiding delay in care, and decreasing duplication of laboratory resources. Al-Hamad et al. (2016) proposed in their study that enhanced educated nurses' phlebotomy who draw complex blood specimens and their accurate techniques results in improved outcomes; contrasting, that inaccurate blood culture results causes avoidable increased use of lab resources, inaccurate or delayed medical decisions, and prolong inpatient stay. These educational enhancements opportunities generate positive patient care outcomes. According to Al-Hamad et al., educational enhancements may be difficult to achieve due to staffing issues and clinical demand, hindering effective learning processes. Inadequate VA nursing specimen collection techniques can be prevented with appropriate stable staff and stable learning conditions.

This doctoral project fulfilled an educational gap in practice by reducing a VA nursing practice weakness through the engagement of learning in a style of an in-service behavioral approach that focused on deficits tailored by VA's policies and standards. Kiernan (2018) suggested that learning in a practicing clinical skill setting promotes self-reflection, improves motor skills, and provides an environment of direct observation with the ability to assess skill competency and highlight areas that need improvement. Assessing the VA's nursing knowledge and critical dexterity performance based on

current VA's policies and standards enhanced practice and improved the educational gap in practice in this area and improved nursing skillset, self-knowledge and advances performance compliance requirements.

Local Background and Context

The setting this project helped justified the relevance of the nursing driven problem validated by means of the primarily registered nurses who staff a 48 bed inpatient (ICU and one step-down Med surgical unit) and 22-bed outpatient (ED) Medicine Services located in a small rural town in the southeastern region of the United States. This project attempted to justify the problem statement guided by the Doctor of Nursing Practice (DNP) Staff Education Manual by means of a nursing staff in-service application. VanderKooi et al. (2018) noted that the DNP projects are comprehensive appraisals that are representations of the Doctor of Nursing Practice Essentials by the American Association of Colleges of Nursing (AACN), and it must emphasis change that can impact healthcare thoroughness and backing of scholarly knowledge. The DNP project model was an important platform that I used for this project to evaluate nurses' needs change with expectations of an intervention of knowledge and skills outcome that is suitable in nursing practice and aligns with the VA's mission for its population.

As previously stated, the VA's mission was to improve veterans' population through accessibility to care, nursing advocacy, and promote positive social change by helping to improve the VA's nursing skillset and self-knowledge. In addition, this was achieved by providing a continuum of staff education for VA nurses concentrating on in-service techniques and guided by identified practice measures deficits of evidence based

on practice which strengthen nursing knowledge and skills in this local clinical practice. Bluestone et al. (2013) noted that in-service teaching denotes an important monetary investment for sustaining critical competencies which leads to enhanced understandings, proficiency results, and improvement of medical practice behaviors. The VA embodies a learning environment for its nursing staff through an educational enhancement platform.

The Veteran Affairs medical center is a hospital with various medical services and specialty clinics however, for this project the VA nurses working in the emergency department, intensive care unit, and medical surgical units which are inpatient and outpatient focus areas.

The Veterans Affairs medical center provides health care to the veterans' population in this area and is a federally run entity that is governed by national standards including the current VA's blood contamination national benchmark rating of less than three percent which is currently not met at a current 7.8%: a 4.8 percentage excess. Self et al. (2014) suggested that the Clinical and Laboratory Standards Institute endorses a national standard for blood culture contamination incidents to lean to less than three percent in any medical organizational setting. Previously mentioned at the local practice site, the current percent of blood culture contamination incidents in three areas of practice (intensive care, emergency department, and medical surgical unit) from Blood Culture Contamination from January 1, 2018 thru December 30, 2018 report was a rate of 7.8%, which exceeds the national benchmark (Chief of Pathology and Laboratory Medicine Service, personal communication, November 6, 2019). Since nurses are using their skills

in drawing blood culture specimens, they are a contributing factor in missing the national benchmark and this created a gap in practice that was addressed.

Role of the DNP Student

I am a master's degree prepared licensed family nurse practitioner and I am one of the providers at the clinic driven facilities of the main medical center where the project was conducted. The creation of an educational driven in-service included a return demonstration from direct observation and collaboration of the facility's infection control nurse. All statistical findings were solely collected by me. My plans for this project was a bi-weekly data collection schedule of weekly laboratory trend results and specimen forms completed by nurses in the project focused areas.

I did not have any personal relationship with nurses however, a direct prescriber for blood culture specimen results. I attempted to improve veterans' outcomes through strengthening nurses' self-knowledge and skillset which in turn provided a favorable outcome of care.

My goal was to have a personal impact on the veterans' community which my family has served by providing swifter care for illness and error free treatment, strengthening nursing advocacy, and autonomy which was heavily populated with veterans that served this nation. This educational driven intervention for VA nurses was aligned with the VA's mission, policies, and standards. By providing an educational platform for VA nurses to improve their skillset and self-knowledge by using the VA's policies and standards, decreasing VA's cost made a notable impact on my local VA medical center. My end goal was that my educational in-service interventions and

proposal outcome would result in computer-based training applications for nursing staff that could be an educational pathway for neighboring Veterans Affairs medical centers improving behavioral practice with blood culture collection; decreasing patient morbidity rates; and improving their facility's benchmark rates. I did not have any direct patients' interactions to achieve the completion of this project. My project consent was in the form of an anonymous questionnaire to VA nurses that could prevent any biases.

Role of the Project Team

For this project a team consisted of the infection control nurse and the nursing educator who was needed and could provide a formative contribution. The project team approved the curriculum design for the project and made the determination of who could participate in the education. The project team approved the pre and post tests and satisfaction survey. I solicited the help and collaborated directly with the main medical center's Pathology and Laboratory Medicine Service committee which had access to the medical services units, and VA's facility practice standards and policies that were necessary for resources and appropriate educational platforms for my doctoral proposal. I also solicited the infection control nurse to help guide me on unit environment climate. My sole role was the Project Leader along with seeking the assistance when needed Chief of Pathology and Laboratory Medicine Service and the infection control nurse who are committee members. Throughout the doctoral project, leadership data findings were shared with the committee to analyze the relevance and validity for accuracy. My project time frame for this project was proceeded after IRB and proposal approval was achieved.

Summary

The VA provides a platform of educational improvement by various means. Improving VA's nurses' skillset and knowledge would help to support and improve advocacy for the science of nursing in turn, would help a vulnerable population and community wellness. The opportunity to provide an educational element to VA nursing staff clinical practice utilizing theoretical methods focused on strengthening and changing personal practice behaviors to VA's policies and standards of evidence-based practice could have a positive impact on the gap of practice and nursing advocacy. In the next chapter, this option recapped the practice question, provided sources, and explored data collection and analyzed evidence that helped identify this project.

Section 3: Collection and Analysis of Evidence

Introduction

The purpose of the project was to educate VA nursing staff skillset and self-knowledge and improve compliance on correct technique of blood culture specimen collection process that may inversely improve local benchmark rates. The question that was addressed in this project was: Will a staff education program for VA Registered Nurses on the effects of correct blood culture specimen collection demonstrate an increase in knowledge in the Veteran's Affairs collection procedure leading towards the ultimate goal of increasing compliance?

Nurses are the frontrunners and early identifiers of patient wellbeing and societal expectation of them being an expert of their craft. Efficient nursing blood culture specimen collections are needed to manage a treatable bacterial infected sometimes vulnerable population, if not correctly treated could lead to detrimental outcomes. Blood bacterial infections are known as preventable and treatable illnesses which sometimes contributes to mortalities in hospitals' high acuity areas, although, specimen collections are common nursing practice in these areas, reform educational methods are needed for hospital wide improvement due to avoidable operator errors (Lamy et al., 2016). VA nursing training that was concentrated on changing clinical routine or behavioral techniques, knowledge; and evidence based driving reduced the rate of contamination and workload from inexperience and repetitious encounters for this vulnerable population.

Practice-Focused Question(s)

The local nursing practice problem that was addressed was the unresolved issue of nursing skillset and knowledge breakdown in blood culture specimen collections which triggered a delay in care, duplicated nursing orders, increased poor time management, and increased frustration in local clinical settings in the VA. This project fulfilled the educational gap in practice by closing VA nursing practice weakness through the engagement of learning in a style of an in-service behavioral approach focused on deficits that were tailored by VA's policies and standards. The question that was addressed in this project was: Will a staff education program for VA Registered Nurses on the effects of correct blood culture specimen collection demonstrate an increase in knowledge in the Veteran's Affairs collection procedure leading towards the ultimate goal of increasing compliance?

The purpose of this project was to educate VA nursing staff skillset and self-knowledge and improve compliance on correct technique of blood culture specimen collection process that may inversely improve local benchmark rates which could align with the practice question. This approach also aligned to the practice-focused question by strengthening compliance of VA nurses' standards of practice, decreasing contamination result rates, and improving quality of care for the Veterans population at the practice site.

As previously stated, at the local level the mark had been missed with accomplishing the national benchmark rate of less than three percent requirement which was currently at a 7.8 percentage rate comparison and problematic for a federally funded facility. Mullan et al. (2018) noted that national standards for blood culture contamination

rate guidelines for medical facilities is to achieve standards a facility must meet a rating of three percent or below furthermore, incorrect blood culture can cause increased cost avoidable antibiotic administration and repeat of laboratory requirements. Medical facilities must meet national benchmark for blood culture contamination rate; however, effective training must be made available to their nursing staff who are main specimen collectors. Reliable nursing training leads to a continuum of benefits of eliminating repetitive tasks, avoiding therapeutic delays, and saving the hospital supplies and expenses.

For this doctoral project, the educator/trainer was the Doctor of Nursing practice student who managed the project. The infection control nurse was defined as a registered nurse that works in the facility and helped navigate the units. Nursing staff was defined as registered nurses who possess associate and baccalaureate degrees passing the National Council Licensure Examination who are employed in the three areas of investigation. The level of years of experience was not factored for this project. The VA facility's three nursing units of investigation for this proposal were intensive care, emergency department, and medical surgical unit. The VA facility laboratory bank was used to trend results without patient identifiers-only unit specific.

Sources of Evidence

The sources of evidence which this project relied on to address the practice-focused question was the Cumulative Index for Nursing and Allied Health Literature (CINAHL), PubMed, Cochrane Database of Systematic Reviews, and ProQuest. Federal

websites that were used to obtain VA current policies, guidelines, data, and educational avenues related to this project.

The nursing education was created from experiences, improvement needs, and curiosities from dealing with complex populations which strengthens the science of nursing. A noteworthy value of the advancement of nursing education is the ability to increase the scope of one's autonomy and change the behavior of the discipline (Poorchangizi et al., 2019). The advancement of VA nursing through purposeful educational resources and a platform for behavioral improvement was an asset to the nursing profession and strengthened its practice.

Accurate blood cultures specimen results which were collected by the VA's nurses was important and could progress to morbidities if error occurs. A training platform need was identified through various town hall meetings, organizational national benchmark statistical deficits that represented that the facility's mark had not been met. Blood cultures which are the gold standard of practice for bacteria identification at this institution requires a two set collection vials at two different drawing sites with an aseptic solution and in an appropriate timeframe. The total number of weekly blood cultures collected in a six-month period was over 1000 collections by nurses in a various area of the hospital including emergency departments, outpatient clinics, and intensive care units (Chief of Pathology and Laboratory Medicine Service, personal communication, November 6, 2019). The facility utilizes the Blood Culture Worksheet and Infection Prevention and Control Assessment Tool (CDC, 2016). This tool was the VA nurses' collection guide.

This project was guided by the Walden University's Doctor of Nursing Practice (DNP) Staff Education Manual. Additionally, the Mosby's Nursing Manual and Infection Prevention and Control Assessment Tool including using Personal Protective Equipment (PPE) focusing on drawing techniques, identifying a completed Blood Culture Worksheet, and tracking system of positive contamination reports provided by infection control that provided project resources. These resources were present practices at the Veteran Affairs Medical Center. Identification of professional nursing staff's (associate degree or baccalaureate degree only) current level of expertise/training of drawing blood cultures solicited from the VA's policies and standards was provided in the form of a pretest; once identification was established an in-service based on knowledge deficits ensued; and finally posttest defined training interventions effectiveness without personal patient interactions.

This project was mainly guided by the principles of the Knowles' adult learning model. The sources of evidence for this project consisted of routine nursing behaviors observational data collection gathering and centering in three different patient care settings at the veterans' medical center periodically up to a three-week period. Leadership selected the sample size (limited due to Covid), pre and post assessments with survey after educational in-service implementation based on VA specimen collection policies and standards, and clinical environment observations were means of data collections that were used for this project.

This educational component analyzed nursing knowledge and skillset pre assessments and post-assessment results and compared them with the VA's current

standards and policies and determined if the educational portion was effective enough to improve nursing skills, self-knowledge, behavioral compliance, and adoption into practice to reduce blood culture contamination and addressed the practice-focused problem at an aggregated level.

In addition, data collection confidence was achieved, and all assessments were kept de-identified. Walden University's IRB approval was obtained and maintained for safeguarding of this project with anonymous assessments of nursing staff that ensured confidentiality. I did not need to interact with patients during this educational project or access any patient records or identifiers. I did not release any participants' names and use de-identified data throughout the entire data collection process.

Analysis and Synthesis

Analysis and synthesis of data defined the systems utilized for tracking, organizing, recording, and analyzing the findings of this project that was determined in two summative measures. I collected the ten question pre- and post-tests educational component for up to three weeks. Evaluation of this project was based on the collection of a two-question end of project survey on project satisfaction on the anonymous attitude towards their self-improvement of skillset using feedback: of *strongly agree*, *moderately agree*, *strongly disagree*, and *moderately disagree*. I left out the middle choice "*neither agree nor disagree*" to even my choices and to drive a selection from the participants. During the conclusion of the project, the survey was distributed for completion for up to three weeks.

The aforementioned de-identification process was utilized to protect the integrity of the evidence. The data was compiled into an educational presentation for nursing leadership and staff for review. The education and training were offered to all registered nursing staff and remained available for the nurses to complete for a period of up to three weeks to account for staff members that may be on vacation.

I recorded the data into Microsoft Excel spreadsheets tool in columns. I labeled each worksheet as “pretest” “posttest” and “survey.” Due to the simplicity of the practice focused question, a basic *t* test statistical analysis was needed to determine if there was a difference or increase in scores before and once education is provided. The pre- and post-test data scores were represented in a figure, a table, and the satisfaction survey data was displayed in a pie chart.

Comparison of pre knowledge and performance comfort level data versus post knowledge and performance comfort level identified the gaps and improvements of the project. This staff education project final data was evidenced by a significant difference in increase of nursing knowledge and compliance with correct blood specimen collection procedure data which compared the *t* test scores pre project education with post project augmentation of education of nursing knowledge.

Summary

Nursing education is an important continuum component to the field of nursing. This project provided an avenue for VA nurses to help improve their skillset and self-knowledge increase compliance that would directly impact veterans who are a vulnerable population. The benefits of the completion of this project were aimed at the improvement

of nursing education through providing a learning environment that helped shorten the gap in practice by the promotion of building skills, knowledge, nurses' autonomy, nursing integrity, and decrease costs through compliance improvement which all could lead to a positive social change within the community in which nurses serve. In the next chapter, this option recapped the local problem, the gap-in practice, the practice-focused question, the purpose, and summarized the sources: evidence, obtainment, and analytical strategies that were used for the doctoral project.

Section 4: Findings and Recommendations

Introduction

The findings of the project results helped structured the recommendations of this educational project. In the VA, nurses are a key source of collectors of blood culture specimens, they are a contributing factor in missing the national benchmark, which created a gap in practice that was addressed through educational enhancement. At the local level nurses are at the forefront of blood culture collections and failure to meet the national benchmark rate of less than three percent has been missed when compared to the VA's rate of 7.8% and 4.8 percentage excess which was troublesome to a federal governed facility. Mullan et al. (2018) noted that blood culture contaminants contribute to unnecessary patient errors, delayed care, and wasted services. Avoidable nursing errors increased the need for educational avenues for improvement. The practice-focused question that led the project was: Will a staff education program for VA Registered Nurses on the effects of correct blood culture specimen collection demonstrate an increase in knowledge in the Veteran's Affairs collection procedure leading towards the ultimate goal of increasing compliance? The purpose of this project was to increase VA nursing staff skillset and self-knowledge and improve compliance on correct technique of blood culture specimen collection process that may inversely improve local benchmark rates through an educational component.

The educational project setting was held in a critical/acute unit in a VHA nationalized healthcare center in North Carolina. Data was gathered by direct observation and failure rates pre-implementation for one week including meetings with leadership

and the infection control committee. Participants were given Walden University IRB's Anonymous Consent reference approval number 12-21-20-0302650 and a request to complete a ten-question pretest prior to the PowerPoint in-service presentation. Once the in-service was completed, I requested that the participants complete a ten-question posttest and two question survey to assess their knowledge and skillset. Leadership decided the timeframes for the in-service, and it was implemented at 7AM prior to the end of night shift and beginning of day shift and 4:30 PM during shift changes of night/day and 7 PM evening to maximize participants attendance. Participants were limited by leadership to maximum of 30 participants to avoid pandemic exposure and 28 registered nurses' total participants from ICU/ED/Med Surgical units volunteered for data collection during the educational in-service implementation duration.

Findings and Implications

The ten-question pretest, ten-question posttest, and two question survey guided by Knowles' Adult Learning Model (Appendix A) helped to guide the project. Mukhalalati and Taylor (2019) noted that Knowles' adult learning model is appropriate for the development of healthcare evidence practice knowledge for professional learners and suitable for the adaption of evaluation and application approaches geared for clinical setting training.

Participants were welcomed to complete the pre-printed pretest, posttest and survey. The ten question "True or False" pretest (Appendix B) entailed ten questions about blood culture collection knowledge including bottle identification, collection form, infection control techniques, and comfortability of the collection process. The pretests

were collected in a folder by the infection control nurse on the unit in the nursing conference room. There were no instances where the identity of participants was compromised. A total of 16 participants comprised a mix of night and day shift registered nurses, or approximately 53% of my goal for participants was achieved within the first session of implementation.

A ten-question pretest was completed and collected. I presented a 20-minute in-service PowerPoint presentation (Appendix C) in a 50 -100 maximum capacity nursing education conference room via Microsoft Teams. Microsoft Teams allowed social distancing, followed hospital's infection control requirements, and limited participants which reduced the possible spread of pandemic exposures. I concluded the PowerPoint presentation with a ten question True or False posttest. The ten question "True or False" posttest (Appendix D) assessed the knowledge and skillset learned after the educational element was implemented. The posttest was collected into the folder. The participants were invited to complete the two-question survey (Appendix E). The two-question survey inquired if the in-service was applicable to their practice and if there was an improvement in knowledge and skillset after the in-service compared to before the in-service was implemented. There were no instances where audience questions were addressed. The project implementation process was completed for this session.

The second and final session was identically implemented with 12 evening shift registered nurses. One session was cancelled due to an unforeseen unit emergency. Once I collected the data, I entered and properly labeled each section as "pretest," "posttest," and "survey" in Microsoft Excel Spreadsheet for data analyzing using sort function.

In the final steps, data were analyzed by using a Microsoft Excel Spreadsheet focusing on calculations of the sum of participants that scored 80% or better before and after implementation. There was a positive association when the 25 out of the 28 total participants' posttests 80 or better score improved by a 7% increase after education was provided. Table 1 reflects a basic *t* test statistical analysis determined a slight difference by indicating that the *p*-value is significant at the 0.5 level, a positive outcome. The data found that the staff education project final data was evident by a significant difference when determining if an increase of nursing self-knowledge, skillset, and comfortability level with the correct blood specimen collection procedure in-service when the analysis was depicted from the *t* test scores pre- project education versus the post- project augmentation of education.

Table 1

t test Results

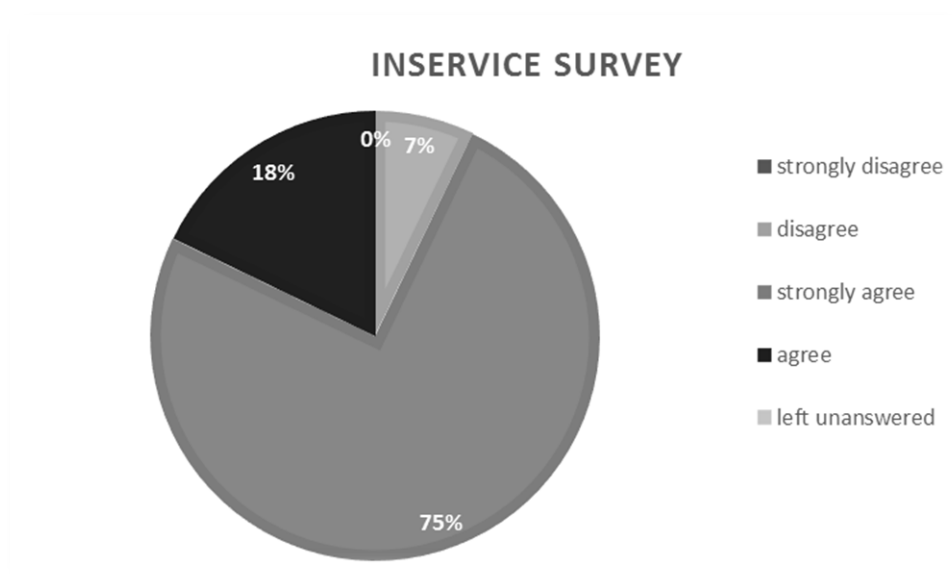
Score	Pretest Score	Posttest Score	P=value
Score above 80 or better	23 > 80	25 > 80	0.5

Figure 1 data found favorable support of the outcome that the total 28 participants' satisfaction of self-knowledge/skillset improved by a 75% increase when the post in-service survey questions of overall satisfaction versus self-knowledge and skillset improvement were compared. These results implied that there can be a potential

improvement in practice that could be beneficial to participants, patients, and the facility including their policies and procedural practices from the implementation of this project.

Figure 1

In-service and Improved Knowledge and Skillset Survey



The potential implications to positive change as a result of this project were the improvement and strengthening of self-knowledge and nursing skillset which could possibly lead to a decrease in facility cost and duplicate service requirements and avoids a delay in patient care in this vulnerable population within the community. The importance of correct blood culture specimen technique played a huge part in a patient's wellbeing and their outcomes that included hospital stay duration, prompt treatment, and financial burden (Ombelet et al., 2012). Effective nursing skillset will help improve community outcomes, improve care, and avoid delay of identification of bacteremia/sepsis.

Recommendations

Reflecting on the statistical outcome of this educational project, providing applications of strengthening nurses through policies and procedure methods, infection control practices, and building knowledge, autonomy, and skills through an educational in-service helped close the gap in practice (Appendix C). Comparison of pre knowledge and performance comfort level data versus post knowledge and performance comfort level identified an educational need that helped filled the gap in practice (nursing knowledge deficit, skillset, and comfortability by implementing this educational project.

Contributions of the Project Team

The goal of this project was to increase the knowledge of VA nurses through the reduction of contamination of blood culture collections and enhance the VA healthcare team's awareness of educating and using the guideline for these patients. The project team was instrumental in the application of this DNP project. The Pathology and Laboratory Medicine Service committee team assisted in guiding the conception of this educational in-service with their expertise and dedication for safety measures for the veterans. The team members including the Chief of Pathology and Laboratory Medicine Service, infection control nurse and educator were presented with a project summary of knowledge, data, and new means to apply learning and enhance self-improvement skills to aid for the benefit of these participants. Partnership with these professionals provided insight into the units' floor environment and how the standards, policies, and practice, and the support of leadership all combine affect practices at the units' level. Due to the

current coronavirus (COVID) pandemic and hospital demands there are no confirm plans to extend the project.

Strengths and Limitations of the Project

There were a few strengths and limitations of this doctoral project. The strengths of the project were the improvement of knowledge, skillset, autonomy, comfortability for the nurses who participated. The limitations of the project were due to the current coronavirus pandemic the fears of exposure; participants schedule conflict, and smaller sum of participants. There were additional limitations with participants being re-assigned to COVID surge units within the facility to meet hospital demand coverage and may not have been a true representation of this project. In addition, a larger sample size of participants and integrate virtual avenues of education through Microsoft Teams for future projects with similar topics and methods. A larger scale of participants can provide a broader indication of success or failure to this type of educational enhancement project.

Section 5: Dissemination Plan

Blood culture collection contamination rates compared to national rates are a problematic factor within the VHA nationalized healthcare system. Nurses play a vital role in patient care including collections of these diagnostic studies and can be the difference between life and death and improving education/training improves outcomes. A summary of the project was provided to key leadership that they can introduce to their teams during monthly huddles and virtual town halls. ICU/ED/Med surgical unit nurses were the key focus due to the large number of blood culture specimen collections. Presenting this project virtually to other units within the organization for example dialysis, infusion, assisted living/long-term care, and other units that may be impacted due to the surge of the pandemic and current community climate would be ideal. Providing electronic handouts and references can provide a broader avenue of training that can reach other non-federal and federal facilities not meeting national benchmark rates nationally.

Analysis of Self

My self-analysis in the role as practitioner, scholar, and project manager of this DNP project has strengthened my experiences, knowledge, and determination to translate my project into a scholarly body of work. This project was difficult, puzzling, and self-reflecting. The connection of this project enhanced my insight by challenging my ability to adapt through difficulties of change and adjustments in the midst of COVID which included hospital restrictions, limiting access to project population, and adequate education avenues that could of enriched instead of hindered my teaching abilities

through repetitive application. Completing a DNP project during a pandemic was met with challenges within itself and required innovative clinical practice approaches and conversion to virtual aspects such Microsoft Teams meetings and Skype avenues.

Presently, I am satisfied with my work that was produced and hopefully this work will impact the science of nursing futuristically. In turn, the insights that I have gained from this scholarly journey although it was difficult entails will power, professional strengthening development, and the opportunity that goals can be achieved; along with the satisfaction that I may have had a positive impact in fellow nurse's professional development.

Summary

Developing a blood culture specimen collection educational doctoral project to increase nurses' self-knowledge, skillset, and autonomy was designed to improve veteran outcomes morbidities/mortalities to this vulnerable population and possibly lower VA's benchmark rates achieving national guidelines of less than three percent. During this project, findings presented innovative ways to approach this problem in future projects by adapting a virtual de-identified feature to reach a larger demographic. In conclusion, improving nursing knowledge, skillset, and autonomy in the technique of proper blood culture specimen collection through education aligned with Knowles' adult learning model can potentially improve patients, communities, financial, and facility outcomes for this vulnerable population.

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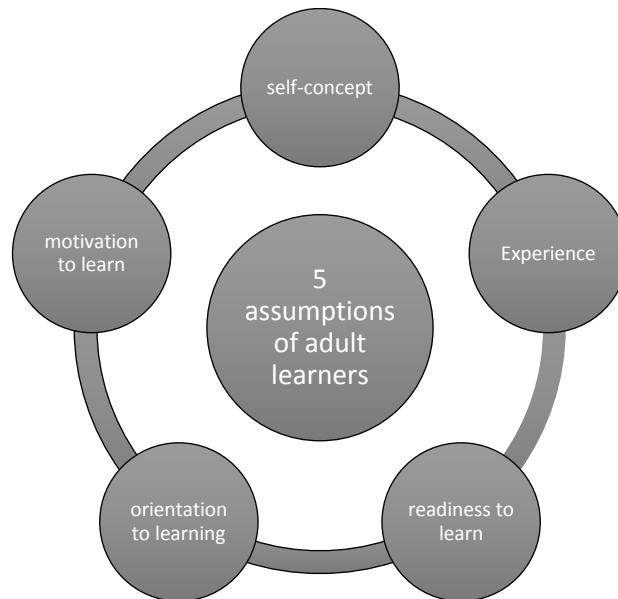
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Appendix A: Concept Map Knowles' Adult Learning Model



Note. Adapted from “Adult Learning Theories in Context: A Quick Guide for Healthcare Professional Educators,” by Mukhalalati, B.A., & Taylor, A. 2019, *Journal of Medical Education an Curricular Development*, 6, p. 1-10
(<https://doi.org/10.1177/2382120519840332>)

Appendix B: Pretest

Blood Culture Specimen Collection Pre-test

The following are True or False answers.

1. Blood culture specimen can be collected whenever a nurse feels like it? True or False
2. Waving your hand or blowing the specimen collection site is okay to hurry up the process of to help avoid delays in specimen collection orders? True or False
3. Two sets collection all from one site is okay for blood culture specimen collections? True or False
4. 2.5 ml is the required amount of blood needed for each collection bottle. True or False
5. Popping of the specimen collection and inoculating the bottle for blood collection is okay without wiping the top off with ChloroPrep? True or False
6. If the collection is needed urgently, using no gloves is permissible and this act will never change the outcome of my patient's results? True or False
7. If I am busy after collecting the blood cultures, I can place the bottles in the refrigerator until lab comes to pick it up. True or False
8. The order of blood culture bottle specimen collection is Aerobic first then Anaerobic. True or False
9. The blood culture set order does not require a set of two blood cultures during collection times at two different sites? True or False
10. Drawing more than 20 ml of blood from one venipuncture and dividing it among greater than two bottles does not increase the ability to detect bacteremia. True or False



Blood Culture Specimen Collection for Nurses

Educational Inservice



Blood Culture Specimen Collection for Nurses

10 question Pre-test Please complete without providing name or any other identification



-Blood cultures collection is a simple and important nursing practice in acute clinical settings

-Although a simple technique false positive due to avoidable contamination results can delay veteran care

-Strengthening standards can help improve self-knowledge, skillset, and increase appropriate clinical care

Objectives:

-increase nursing infection control standards and nursing clinical practice

- to improve nursing skillset, self-knowledge, compliance, and local benchmark rate within the VA system

-



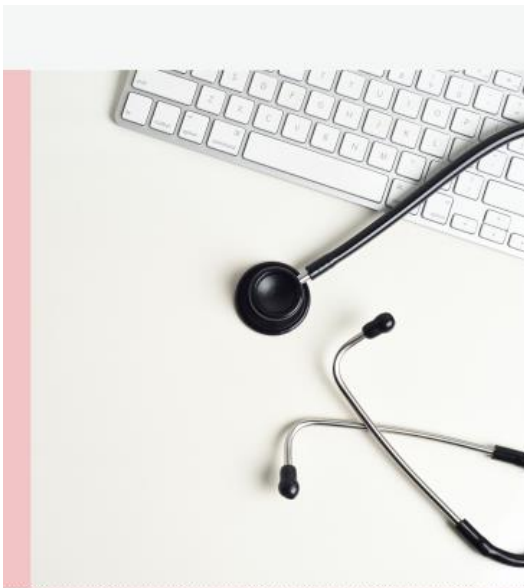
The Importance of Blood Culture Collection Ratio

- Blood is normally sterile

-blood collected for culture should be diluted in broth media with each blood culture bottle inoculated with no less than 5 to 10 ml of blood a 1:5 or 1: 10 ratio

- failure to maintain ratio may result in a False-negative from under filling bottles

- best obtain prior to the initiation of antimicrobial therapy or trough levels antimicrobial agents occur in febrile patients receiving antimicrobials



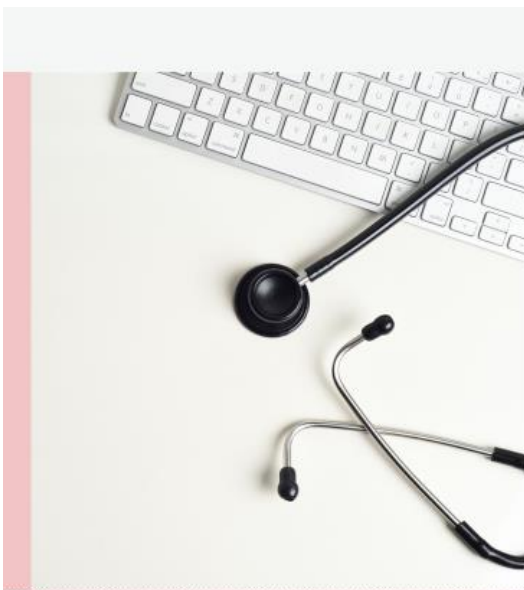
Blood Culture Collection

- using strict aseptic technique
- collect blood from veins not arteries
- collection from indwelling intravascular devices ie. ports, IV catheters are greater contamination rates compare to venipuncture



Blood Culture Collection cont'd

- Although blood may need to be obtained from IV lines and through devices, a culture of blood should be obtained by venipuncture to assist in interpretation in the event of positive result.



Blood Culture Collection Times

- Ordered in CPRS system as Collection Type: Immediate collect
- If orders for multiple blood culture sets are received, timing is at the discretion of the ordering provider. If times are not specified, collection should be 15 minutes apart from a separate anatomic site, which is documented directly onto the bottle.
- should be collected during a limited, short, timeframe



Blood Culture Collection Optimal Collection Number

- Two sets of blood cultures per suspected bacteremia
 - *One single blood culture bottle should never be collected related to difficulty to interpret the significance of an isolate recovered once at a single point in time
- set consists of two vials: one aerobic (purple) and one anaerobic (gray)



Blood Culture Collection Method:

- Observe vials for possible contamination prior to collection:
 - cloudiness, discoloration, bulging/depressed septum, or leakage.

***DO NOT USE VIAL**

Method Cont'd

- Gather all supplies needed for collection including check for patient allergy to Chloraprep.
- Perform hand hygiene and apply gloves
- Apply tourniquet and identify optimal site for venipuncture. Release tourniquet
- After selecting site, prepare ChloraPrep applicator by squeezing the sides together until you hear or feel snap

- Scrub site with the ChloraPrep in an **up and down motion** minimal of **30 seconds** . **Allow site to DRY. DO NOT Re-Palpate the vein.**

Method Cont'd

-Disinfect blood culture bottles: remove metal caps and clean rubber septum a new ChloroPrep applicator. Do not allow excess Chloroprep to pool on the septum to avoid possible seepage into medium and prevent bacterial growth. Allow to dry 30 to 60 seconds

* Allergy to ChloroPrep: use 70% alcohol ONLY. Cleanse w/pad as above and then swab with CONCENTRICALLY w/another unused alcohol pad. Allow site to dry for **ONE MINUTE**.

-Replace the tourniquet. WITHOUT re-palpating site pierce the vein using a 15 to 30 degree angle and withdraw approx. 20 ml of blood using a STERILE syringe

HINT:

- If vein is missed, A **New Needle** is required before a second attempt.



Method Cont'd

- Release tourniquet, place gauze on the needle and withdraw needle, compressing the site.
- Engage the safety needle device and removed needle from syringe
- Using transfer device or clean safety needle on the syringe, inoculate the blood into the aerobic (purple top) bottle FIRST. Introduce 10 ml of blood into the vial and 10 ml into the anaerobic vial (gray top)
- If less than 10 ml of blood is obtained, divide the volume and inject into a paired set, inoculating the aerobic blood culture first , then the anaerobic

Method Cont'd

- Labeling Process:
 - Place bar code label onto each bottle which consists of:
 - * Patient's full name, Full SS#, RN's initial, Body collection site or catheter location, Number of drawer (1st or 2nd), and date and time of collection
 - Complete a Blood Culture Worksheet for each set obtained.
- Transport to Microbiology laboratory

Method Cont'd

-BD Push Blood Culture Collection Set with Pre-Attached Holder:

* If used to collect the specimen, carefully observe the direction of blood flow when starting sample collection. The vacuum in the vial will usually exceed 10 ml. The volume should be closely monitored using the 5 ml graduation marks on the blood culture vial label.

-Prep the skin and media vials as noted above. Perform the blood culture collection site using the winged infusion set.

-As soon as blood appears in the plastic tubing, insert into the vacuum holder attached.

Fill AEROBIC first w/ 5-10 ml using the bottle graduations as a guide. Next, fill ANAEROBIC with 5-10 ml. Follow up with Place bar code label as noted with the above patient information.



Notes:

-A blood culture **SET** consists of TWO blood culture bottles, one Aerobic and one Anaerobic collected from a single venipuncture. 10 ml/bottle (1 Aerobic, 1 Anaerobic) 2-3 sets within a 24-hour period with a maximum of 6 sets. Do not Refrigerate,

ONE blood culture set is the result of one Venipuncture

-Drawing more than 20 ml of blood from one venipuncture and dividing it among greater than two bottles does not increase the ability to detect bacteremia



Thank you

Complete Posttest and Survey

References

- Joint Commission 2018 National Patient Safety Goals (NPSGS)
- Mosby's Nursing Manual
- VA Handbook 1050.01-VHA National Patient Safety
- MCM 659-118-18 Patient Identification
- Other sources include: OSHA FDA, Vista computer Manual, WHO

Appendix D: Posttest

Blood Culture Specimen Collection Posttest

Do not print name on this posttest or any other form of identification

Answer the following statements with True or False. Circle one answer:

1. One blood culture set is the result of one venipuncture. True or False
2. Aerobic bottle is inoculated first and then anaerobic bottle. True or False
3. Placing a bar code label onto each bottle and completing a Blood Culture Worksheet for each set obtained is the correct method of Blood culture specimen collection. True or False
4. While waiting for the Chloraprep to dry on the patient's collection site, pop of the top of the collection bottle, clean with Chloraprep and allow for excess Chloraprep to pool on the rubber septum. True or False
5. If the vein is missed, I can try a different site with the same needle for the second venipuncture attempt. True or False
6. While the site is drying to speed up the process, I can fan the site but, avoid blowing air on the site. True or False
7. Scrub the venipuncture site with the Chloraprep applicator in an up and down motion for a minimum of 30 seconds. True or False
8. Do not re-palpate the vein once the Chloraprep/70% Alcohol has dried. True or False
9. Allow Chloraprep to dry 30 to 60 seconds. True or False
10. For patients with Chloraprep hypersensitivity, the skin is prepared by taking 70% Alcohol and then swab concentrically with another unused alcohol pad, allowing a dry time for one minute. True or False

Appendix E: Nursing Educational Survey

Nursing Educational Survey

Do not submit your name on this survey. Thank you

Thank you for completing this Nursing Educational Inservice. Please Place an "X" one Answer:

1. Overall, I was satisfied with this educational inservice. Strongly disagree []
disagree [] Agree [] Strongly Agree []

2. This educational service advanced my knowledge, attitudes, and skills to contribute to my team improving patient care. Strongly disagree [] disagree []
Agree [] Strongly Agree []