# Implementation of the Theory of Planned Behavior to Promote Compliance with a Chlorhexidine Gluconate Protocol

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## Abstract

***Introduction:*** *Blood cultures are critical values for identifying the source of an infection in patients seeking medical treatment for an acute illness. False-positive cultures can negatively influence patient care when physicians use inaccurate information to prescribe treatment. Inaccurate prescribed treatment negatively influences the quality of patient care related to prolonged medical treatment and hospital stay and unnecessary repetition of diagnostic tests.*

***Purpose:*** *The purpose of this project was to determine if blood culture contamination rates would be decreased if improved availability of CHG products was provided in all emergency department patient care areas would reduce the contamination rates of blood cultures.*

***Methodology:*** *The Theory of Planned Behavior provided the theoretical framework for this descriptive correlational project to examine barriers to following the procedural guidelines to cleanse venipuncture sites with a chlorhexidine gluconate (CHG) product before venipuncture Alcohol preparation pads were removed from the emergency department and a CHG product packaged similar to the alcohol preparation pads was placed in the department procedure trays and bedside carts.*

***Results:*** *During the first 2 weeks of the pilot project, blood culture contamination rates were reduced from 4.5% to 1.5%. The following month, rates remained low at 1.9%.*

***Conclusion:*** *Placement of CHG products at the bedside will improve patient safety and quality of care by reducing the incidence of inaccurate diagnosis and treatment based on false-positive blood cultures.*

***Keywords:*** *blood culture contamination, chlorhexidine gluconate, Theory of Planned Behavior*

## Introduction

According to the College of American Pathologists (CAP),[1] blood cultures are the primary diagnostic procedure to identify bacteremia in patients seeking medical attention for an acute illness. Contaminated blood cultures establish a false diagnosis, which leads to unnecessary medical treatments for patients, increased health care costs, and prolonged hospital lengths of stay.[2] CAP has established a standard for contamination rates to be <3% for laboratory testing. Organizations experiencing contamination rates >3% are required to develop an action plan to reduce the rates and improve patient safety and quality.[1] This project aimed to intervene on the perceived barriers to patient safety and reduce the rates of blood culture contamination to <3%.

## Problem

A community hospital in the southwestern United States has consistently reported blood culture contamination rates >3% for more than 1 year. Continued rates >3% was the impetus for a change project in a community emergency department that realizes 58,000 visits each year.[3] According to the laboratory data on contamination rates provided by the laboratory manager, the emergency department collects the largest portion of blood cultures and experienced contamination rates as high as 4.7% during the first 3 quarters of 2015. Despite consistent reeducation of the organization's procedure to collect blood cultures, there has not been a reduction in contamination rates. Sustained blood culture contamination

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rates >3% cause a hospital lab to fall out of compliance with the CAP regulatory standards. This necessitates prioritization of a process to improve aseptic technique for obtaining blood samples.

Nurses have admitted to occasionally deviating from the established practice standard of cleansing venipuncture sites with chlorhexidine gluconate (CHG) before performing the procedure in urgent situations. A contributing barrier is the lack of ready availability of CHG products at patient bedsides. Patient bedside carts are stocked with alcohol preparation pads, whereas the CHG products are stocked in the central supply room. The Theory of Planned Behavior (TPB) was introduced as the theoretical framework for a proposed project to intervene on the barrier to using CHG 100% of the time by replacing alcohol preparation pads in the bedside carts in the emergency department with CHG 3.15% swabs. Blood culture contamination rates were monitored by the laboratory, as is standard procedure, for the duration of this pilot project to determine whether the rates would improve following the process change.

## Background

The primary diagnostic procedure to identify an acute and serious bloodstream infection is the blood culture.[1,3,4] Contamination of blood culture specimens influences the care decisions made for patients. This error can lead to unnecessary treatment, further diagnostic testing, and extended lengths of stay in a hospital.[4,5] The laboratory data of the emergency department in a community hospital in a large health system has reported contamination rates as high as 4.7% for samples obtained from patients. Knowledge of the organization's policy and procedure for obtaining blood cultures by the staff members was ensured by the education specialist for the emergency department during routine in-services, staff meetings, unit huddles, and competency assessments. Education was disseminated with poster/education materials placed strategically throughout the staff areas to provide visual reminders to use CHG in all situations for a venipuncture. These educational methods did not result in a reduction in contamination rates.

### *Consequences of Contaminated Blood Cultures*

Complications of contaminated blood cultures include the financial burden on health care organizations and the risk of patient complications related to the delivery of unnecessary medical care. The financial burden to health care organizations for contaminated blood cultures is reported in the literature and is attributed to increased lengths of stay, administration of antibiotic therapy, and additional diagnostic testing.[6] Studies indicate the lengths of stay for patients to be between 1 and 5.4 days.[6,7] The reported individual patient expense as a result of the extended lengths range between $4,500 and $8,720.[5,6,8] One cost analysis related to contaminated blood cultures at hospitals in Northern Ireland reported an average organizational cost of $1,905,572 per year due to unnecessary antibiotic therapy and additional laboratory testing.[7] There are a variety of aseptic solutions available for health care providers for preparation of vascular access devices and skin before administration of medication or procedures.

### *CHG*

CHG is a broad-spectrum antiseptic used to control the topical growth of antibiotic-resistant bacteria and prevent hospital-acquired infections (HAIs) after an injury, before an injection, or before a surgical procedure.[9] CHG is available in cloths for bathing, impregnated patches for placement at central line insertion sites, solutions such as Hibiclens® (Mölnlycke® Health Care, Norcross, GA) for bathing and in sepps/bullets, wands, pads, and scrubs for venipuncture insertion site cleansing.[9] CHG is a topical antiseptic recommended by the Centers for Disease Control and Prevention (CDC) to cleanse the skin surface before the insertion of central lines in adults and children.[10] The CDC recommends that organizations consider the use of CHG-impregnated dressings and CHG bathing in an effort to reduce HAIs and central line-associated bloodstream infections.

CHG is recommended for use in health care to prevent and reduce the incidence of contamination and HAIs. The literature has been inconclusive in the recommendations for use in the area of pediatric and neonatal care. The lack of empirical evidence has led to more anecdotal recommendations for this patient population. One study assessing skin irritation and skin complications related to CHG absorption through the skin has provided strong evidence that there is no physiologic effect on the mild absorption of CHG through the skin, nor does it precipitate skin irritation.[11] Although there is evidence to support that there is a lasting effect of CHG on the skin surface, further investigation into the use of CHG in pediatric and neonatal patient populations is necessary.[11] CHG remains on the body surface to provide a continued level of protection against infection, although levels decrease over time.[8] Further empirical evidence promoting the use of CHG on preterm infants and neonates shows the agent does not impair skin integrity, nor does it interfere with the function of the liver as a result of detectable levels of CHG in the bloodstream after use.[11] The evidence demonstrates the use of CHG to prevent infection offers an extended length of protection for infection prevention.

This project aimed to intervene on possible contamination during this step by replacing the alcohol preparation pads with a new CHG product, Prevantix swabs (PDI, Inc, Orangeburg, NY). The product is a 1 × 1-in cloth pad saturated with 3.15% CHG and 70% isopropyl alcohol and is similar in packaging shape to the alcohol preparation pads. This replacement allows clinicians to continue to follow the policy of using CHG products on venipuncture sites without breaking technique when the wands, scrubs, or bullets are depleted.

### *Literature Review*

The literature provides evidence of more than just a financial influence as a result of the contamination of blood cultures. Patients incur an increased risk of additional infection related to administration of unnecessary antibiotics and risk for