CAUTI Prevention: A Team Insertion Strategy

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Abstract

Catheter associated urinary tract infections (CAUTI) are the most prevalent hospital acquired infections worldwide (Malvin & Gillian, 2015). In 2008, the Centers for Medicare and Medicaid Services (CMS) mandated hospitals to report on their infections and ultimately held them financially accountable when they occurred.

The purpose of this project was to determine if a team insertion approach to urinary catheterization decreases CAUTI infections as compared to a one-person technique. It is believed that having another person to monitor the aseptic technique process throughout the procedure enhances patient safety and decreases infection when the insertion is stopped should a breech occur.

The study site was a 281-bed acute care facility located in coastal New Jersey. An eight month retrospective chart and insertion checklist review was completed to identify if a team insertion approach has less CAUTI infections as compared to a one-person technique.

Demographic data was collected from the insertion checklist including age, sex, and month of urinary catheter insertion. Chi square testing was completed to compare CAUTI outcomes between the one-person versus team insertion technique. Multivariate analysis was completed to compare other checklist data points including use of castile soap/soap and water for perineal cleansing, standard kit used, (smallest) catheter size, strict hand hygiene, and was catheterization accomplished with one attempt. Outcomes of this study will be shared with the study site and system CAUTI committee.

Keywords: Catheter associated urinary tract infections (CAUTI), urosepsis, and team approach to urinary catheterization.

CAUTI Prevention: A Team Insertion Strategy

Background

Catheter associated urinary tract infection (CAUTI) is the most prevalent hospital acquired infection worldwide (Mavin & Mills, 2015). In 2008, the Centers for Medicare and Medicaid Services (CMS) mandated hospitals to report on hospital acquired conditions, including CAUTI, in order to receive reimbursement for care. Following a specific reporting period, CMS then implemented the Hospital Acquired Conditions Initiative, also known as the no-pay rule, where CMS would not pay for care associated with a hospital acquired CAUTI (Meddys, Sanjay, & McMahon, 2010). The hospital would be responsible for absorbing the cost of care based on the evidence that these types of infections are preventable and should not occur.

Identification

There are many organizations that are involved in preventing, identifying, defining, and providing guidance on CAUTI strategies. These organizations include the Society for Healthcare Epidemiology of America (SHEA), American Hospital Association (AHA), Centers for Disease Control (CDC), and The Joint Commission (TJC). The earliest interventional guidelines were published in 2010 by the Infectious Diseases Society of America (IDSA). The guidelines include recommendations for acceptable insertion reasons, proper catheter care, when to discontinue the catheter, and how to prevent infections (Lo et al., 2014).

Significance

The prevalence of healthcare associated infections in the United States overall is 4% and CAUTI contributes to 24% of those infections (Tandogdu & Wagenlehner, 2016). CAUTI may

progress into the bloodstream causing urosepsis. The most common bacteria associated with urosepsis is Escherichia coli. The overall mortality for urosepsis in hospitalized patients is 2.3% (Schneeberger, Holleman, & Geerlings, 2016).

Risk Factors

The number one risk factor for developing a CAUTI is having a urinary catheter placed followed by the duration of usage (Lo, et al., 2014). The earlier the catheter is removed, the less likely one will get an infection. CAUTI may still be classified up to 48 hours after a catheter has been removed for symptomatic patients according to the National Healthcare Safety Network definitions (NHSN, 2014). Additional risk factors are dependent upon the type of system used (closed versus open), female sex, and age. Risk factors for developing urosepsis include those that are immunocompromised and/or renal disease (Lo, et al., 2014).

Prevention

The best way to prevent CAUTI is to avoid inserting the catheter. Clinical indications, such as neurogenic bladder, may warrant usage. Sterile technique must be observed during insertion and the catheter should be removed as soon as possible. Maintaining a closed system and daily meatal hygiene with soap and water is key to preventing bacteria exposure (Malvin & Gillian, 2015).

PICOT Question

The PICOT question for this final DNP project is "Do patients with urinary catheters inserted during their hospital admission using a one-person versus two-person insertion technique have a higher incidence of CAUTI?"

P = Patients with urinary catheters

I = Team (two-person) technique for catheter insertion

C = One-person technique for catheter insertion

O = Catheter associated urinary tract infections

T = Eight months (retrospective)

Definition of Terms

Throughout the body of this paper, the following definitions are provided for the most common referenced concepts:

- *CAUTI:* A urinary tract infection that is associated with an indwelling urinary catheter that was inserted during an acute care hospitalization.
- *Urosepsis:* A bloodstream infection that was associated with a urinary tract infection.
- *Team approach urinary catheter insertion:* A strategy utilized by having a minimum of two people present to insert a urinary catheter. One person is inserting the catheter and the second person is observing that sterile technique was utilized. In the event sterile technique is broken, the second person notifies the inserter to stop the procedure.

Aim

The aim of this project was to determine if there is a difference in CAUTI outcomes when comparing a one-person versus team approach to urinary catheterization.

Objectives

The objectives of this project are to gather and utilize data obtained from urinary catheter insertion checklists to evaluate outcomes with two different insertion strategies. The project plan was to advocate for team resources pending study findings. Currently within the

organization that the study was completed in, there are limited indications for a team approach including obese patients, agitated patients, low experience inserter, and nursing judgement.

Hypothesis

Patients whom a team urinary catheter insertion technique is utilized will have an improved outcome with decreased urinary tract infections compared to patients where a one-person catheter insertion technique was utilized.

Literature Review

In terms of search strategies with dates, it was necessary to go back further than five years since the first guidelines surrounding CAUTI prevention were available over 16 years ago. In fact, one of the studies went back to the early 1990s.

After a thorough review of the literature, there are five studies that will be reviewed in this paper beginning with the lowest level of evidence (single site study) to the highest (systematic review).

In 2014, Carter, Retimeier & Goodloe, conducted a single site unit study on a 28 bed medical/surgical telemetry unit, to evaluate the effect of implementing an evidence based bundle of care to prevent CAUTI. A comparison of CAUTI outcomes was evaluated pre and post bundle intervention. This study did not provide clear information regarding the statistical analysis process. The findings reported zero CAUTIs for over 12 months after implementing the program. Although this study was a level V in terms of evidence, it was included because of the insertion checklist intervention. The role of the second nurse was to stop the procedure and start again with a new catheter if aseptic technique was compromised. This article suggested

that a two-person approach would prevent CAUTI which was the basis and PICOT question for this paper.

Alexaitis & Broome completed a study in 2014 at an academic medical center in Florida on a 30 bed neurosurgical intensive care unit. This study included a sample size of 322 patients. The FADE QI methodology was used. FADE QI stands for focus, analyze, develop, and execute a plan for quality improvement. CAUTI rates decreased by 20.5% (from 3.85 to 3.06 per 1000 catheter days; P= .296) after implementing a nurse driven protocol. The protocol focused on education regarding alternatives, routine catheter care, education on the protocol, compliance, catheter rounds, and CAUTI analysis. Data analysis and descriptions were also lacking in this article. This study was a level V for evidence, however, the key difference and rationale for inclusion was the discussion and approach to simulation testing. Nurses were trained on proper catheter insertion and then had to perform return demonstration skills via simulation in which 100% was achieved.

A single site observation study conducted at a 500 bed tertiary children's hospital, by Davis, Colebaugh, Eithun, et al in 2014, noted a decrease in CAUTI rates from 5.4 to 2.49 infections per 1000 catheter days. This hospital participated in the Institute for Healthcare Improvement Initiative to decrease CAUTI. They implemented a care bundle focusing on catheter utilization only when certain indicators were met and using sterile technique at all points of care. The plan, do, study, act (PDSA) model was deployed with retrospective analysis conducted to assess changes in infection rates. This study was descriptive in terms of their analytics. Poisson regression indicated that the intervention was associated with a 50% CAUTI

reduction with a 95% confidence interval. This study noted that females and patients with chronic conditions were more likely to acquire a CAUTI than males.

An evidence based report card that was published in 2009 by Wilde, Webb, Thompson, et al., evaluated CDC, ICI, and Briggs Institute published guidelines. The CDC has a moderate recommendation (category II) for sterile technique adoption. Briggs Institute Best Practice document states that the use of sterile technique does not reduce CAUTI risk. ICI guidelines offer no specific guidance. A key takeaway from this report card is the lack of a clear and consistent definition for aseptic technique which needs to be formally defined moving forward. The 1994 study performed by Carpeti and coworkers was referenced in this study article comparing sterile versus clean technique in elective surgical cases and found there were no decreases in bacteriuria incidence.

A meta-analysis completed by Meddings, Rogers, Krein, et al. in 2014 provided an update to a systematic review (through October 2012). There were 30 studies identified for meta-analysis and 11 studies included. A 53% (95% confidence interval, $P<0.001$) CAUTI reduction was noted with reminders or stop orders for urinary catheter removal or discontinuation. Five of the eleven studies also included interventions such as aseptic technique, maintenance, antimicrobial urinary catheters, and bladder bundle implementation. The updated systematic review included an RCT that identified antimicrobial catheters did not provide significant benefit in CAUTI prevention. The meta-analysis further demonstrated the point that more research in necessary in the area of insertion and maintenance of urinary catheters.

Summary of Literature

The plan, do, check, act model was used in most of the studies. One study used the FADE performance model which stands for focus, analyze, develop a plan, and execute. Some studies were clear in their methodologies and other were lacking. In terms of results, there were no real discrepancies between studies. One of the most interesting points of reference was the mention that aseptic technique procedures did not reduce bacteria in the urine. A key take-away was that not all studies defined aseptic technique in the same fashion making the results difficult to generalize. There is more research needed in this area. Each item of the care bundles needs to be evaluated in a more rigorous fashion to be able to represent true cause and effect on decreasing CAUTI.

It was interesting to read articles from as early as 2009, that included actions that were once considered a solid method to prevent CAUTI, now found years later to have zero contribution in decreasing infections. In terms of items for further study in the future, it would be beneficial to have each element of the checklist evaluated independently for correlations to CAUTI outcomes. Also, a clear definition of aseptic technique is needed in the literature along with an increase in randomized controlled studies.

Conceptual Framework

Inductive reasoning was used to guide the framework of this project. Dorothy Johnson, nurse theorist, utilized inductive reasoning in her Behavioral System Model. The model explains how the body is constantly trying to restore balance or stability. Assessment focuses on how the body is impacted by environmental factors. Nursing represents the external force

serving to preserve behaviors that keep the body functioning at the optimal level (Tourville & Ingalls, 2003). The eliminative subsystem, one of the seven subsystems in the theory model, will be the focus of this DNP project.

Data was collected to address the stated PICOT question. The strategy utilized to implement evidence based recommendations into practice was via the use of a urinary catheter insertion checklist. The checklist was revised based on the criteria set forth in the studies that were summarized. The elements include an evaluation of alternatives assessed prior to insertion, rationale for insertion (must meet criteria such as urinary retention, neurogenic bladder, etc.), use of the smallest size catheter, aseptic technique, and the use of a second person to evaluate proper insertion technique. The second person was empowered to stop the procedure if sterile technique was compromised.

Each checklist was reviewed for completion, and outcomes were compared to those procedures where a one-person insertion was utilized. The ultimate goal was to compare CAUTI outcomes based on each insertion technique.

Research Model

Translational research has been defined in the simplest of terms to take knowledge and transform it from the "bench to bedside." Translational research refers to "translating research into practice; ensuring that new research and knowledge actually reach the patient or populations they were intended for and implemented correctly" (Woolf, 2008).

The use of evidence based checklists is an ultimate example of translational research. The evidence available in the literature was brought to the bedside in an organized and purposeful fashion. Each RN that inserted a urinary catheter followed the same standard work.

The use of a second person to verify and call out anytime that sterile technique is compromised is a great demonstration of using high reliability practices.

CAUTI Bundles

Many of the professional organizations highlighted above have developed toolkits for CAUTI bundles to focus on prevention strategies. Hospitals have developed policies to support nurse driven protocols to remove catheters more readily utilizing specific criteria. The quality of evidence regarding the bundle steps range from low to high and are typically referenced as such. Combining steps from the various bundles available in the literature, it was found that all typically include the following:

- Insert urinary catheters only when acceptable clinical indications have been met
- Staff who insert catheters should be clinically competent to do so
- Insert using aseptic technique
- Document insertion
- Continuous surveillance using a standard definition for CAUTI
- Maintain a closed system and unobstructed urine flow
- Daily meatal hygiene with soap and water
- Remove the catheter as soon as possible

Current State-Study Site

The study site was a 281-bed licensed acute care facility located in coastal NJ. The primary patient population is geriatric. Over 70% of the patients served are 65 years old or greater, putting them at a higher risk for CAUTI. In 2015, the study site had 8 CAUTI infections.

The facility reports to the National Database of Nursing Quality Indicators (NDNQI), and three out of eight inpatient units were higher than the national mean for CAUTI infections.

The Acute Care of the Elderly (ACE) nursing unit participated in a state initiative to decrease CAUTI infections. They implemented a toolkit that addressed nursing interventions associated with catheter insertion and maintenance. A specific practice they implemented and was of particular interest is a two-person (team) insertion practice. A second team member was present to observe the compliance with sterile technique and spoke up to stop the insertion if an infraction was noted. This unit went fourteen months to date without an infection based on all the interventions they implemented.

Current State of the Health System

The study site is a member of a six hospital system located in NJ. Due to the pay for performance measures Medicare put in place and also their Magnet status, a system-wide CAUTI bundle was implemented. The bundle includes use of insertion checklists which was at 28% compliance. In addition to the checklists, “people charts” were implemented. CAUTI infections are no longer reported in rates but in number of people impacted. The belief is that this data will be more relevant and easier to understand by the frontline team providing care.

The ACE unit from the study site was a model unit utilized to implement the CAUTI bundle. The goal is zero infections and zero patient harm. The practice of a two-person technique, which was standard on the ACE unit, was placed in the bundle as optional unless the patient was agitated, confused, flailing, obese, or if the inserter was not experienced in this intervention. There were recommendations expressed by the ACE team that this intervention

should be observed on every single insertion. Staffing challenges and the lower level of evidence on this intervention contributed to making the team an "optional" item.

Methods/Implementation Discussion

All patients who had urinary catheters inserted during the study period (December 2015-July 2016) with a completed urinary catheter insertion checklist were included in the study. Exclusion criteria were patients who had urinary catheter insertions that had incomplete or absent checklists or patients under the age of 18. Also excluded were those patients during the study period that did not have urinary catheters inserted.

Data was collected to address the stated PICOT question. The strategy consisted of implementing evidence based recommendations into practice via the use of a urinary catheter insertion checklist. The current checklist was revised based on the criteria set forth in the studies that were summarized. The elements included an evaluation of alternatives assessed prior to insertion, rationale for insertion (must meet criteria such as urinary retention, neurogenic bladder, etc.),use of smallest size catheter, aseptic technique, and the use of a second person to evaluate proper insertion technique. The second person was empowered to stop the procedure if sterile technique was compromised.

Each checklist was reviewed for completion and outcomes were compared to those procedures where a one-person versus team insertion was utilized.

The intent was to use Chi-square testing but due to the low number of CAUTIs during the study period further testing was needed. Fisher's exact test was performed to evaluate the outcomes associated with a one-person versus team urinary catheter insertion technique.

Multivariate logistic regression testing was performed to identify relationships of the other checklists variables including castile soap/water used, strict hand hygiene, smallest catheter used, use of standard kit, and if the catheter insertion was accomplished on one attempt.

Findings/Evaluation

The Fisher's exact test showed no correlation between the one-person versus team approach to urinary catheter insertions and the outcome of CAUTI (P= .706). The multivariate analysis was performed using binary logistic regression and it demonstrated no statistical significance to the development of CAUTI.

Descriptive statistics were also performed. There was a total of 1,694 patients included in this study. There were 1029 females (61%) and 665 males (39%). The age range of the participants was 19 years to 100 years old with a median age of 72. There were sixteen patients excluded from the study due to age less than 18 (n=2) and no patient information (n=14). There was a total of seven CAUTIs included in the study period for which there was an available checklist. Of note, there were two additional CAUTIs excluded from the study due to a lack of insertion checklist availability.

The average number of insertion checklists per month was 212. The range of insertions was 156 to 249 per month. CAUTI infections for the total study time was 7. The range of infections per month was 0 to 2. There were two consecutive months with no infection during May and June. The total number of one-person insertions were 711 (42%) and team insertions was 983 (58%). The total number of CAUTIs for one-person insertions was 2 (0.281%) and for team insertions was 5 (0.509%). The total CAUTI rate as compared to insertions was 0.413%.

The DNP student will share study results via a PowerPoint presentation to the study site via their nursing leadership meeting as well as at the system level via their CAUTI committee meeting.

Strengths and Limitations

The strength of the study was that all patients who had catheters inserted were included in the study unless the documentation was missing or lacking on the checklist. There were minimal exclusions (n=16). In addition, this study could contribute to the current body of literature that is lacking on the various insertion techniques.

One limitation to the study included the fact that it was a single site study for an eight month period of time. There were seven CAUTIs during the study period. It may be beneficial to evaluate a longer period of time. Another limitation includes the fact that there are many other elements that contribute to CAUTI and insertion technique is not the only rate limiting factor.

Protection of Human Participants

Due to the fact that this was a retrospective review of urinary catheter insertion checklists there was no anticipated harm to human subjects. The Institutional Review Board (IRB) at Meridian Health approved the study as exempt on October 12, 2016. The IRB study number was documented as 2016100710. The approval document was shared with the project chairperson, Dr. Al Rundio, and also shared with the Drexel IRB department.

Clinical Implications and Summary

CAUTI infections impact the quality of life for our patients and should not occur in the hospitalized patient. A team urinary catheter insertion approach is believed to enhance safety

by empowering healthcare providers to stop the insertion when breeches in aseptic technique take place. Outcomes of this study will be shared with the study site and system CAUTI committee.

Future Plans

There was an anecdotal finding noted when evaluating insertion checklists. All surgical patients who had urinary catheters inserted during surgery, did not have them removed in the recovery room. The first question is, “Do these patients need to have the catheters inserted?” and if they are needed, “Can the catheter be removed in a timely manner in the recovery room?” The DNP student as a result of this study findings will next investigate further opportunities in the perioperative areas.

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Appendix A-Table of Evidence

Author/Date	Purpose	Methodology	Results/Findings	Limitations/Conclusions	Level of Evidence
Moe Bell, M., Alaestante, G., & Finch, C. 2016	To address and eliminate CAUTI in Scottsdale Healthcare.	A quality improvement project with no patient-identifiable data. Study was exempt from IRB. A CAUTI bundle was implemented based on current best practice guidelines including indications for catheter use, appropriate maintenance care, catheter securing device, and use of alternatives. Education was completed and some IT enhancements were made such as mandatory insertion indications prior to	CAUTI numbers fluctuated during the study period Jan 2014-First quarter 2015. ED catheter insertions decreased from 600 in 2013 to 100 in 2015. (Noted as greatest success in article. Data outside of ICU showed a reduction in urinary catheter days by 40% during the 7 quarters of data collection.	-Single site study -CAUTI definition changed in 2015 -Trauma patients excluded No historical data available for patients outside of the ICU prior to this study. Conclusion: Due to fluctuating CAUTI rates, the CAUTI bundle-including sterile insertion, cath care, securement device failed to	Level: III Single site case study

		ordering a catheter. Daily tracking of patients with catheters and prompts to remove them.		demonstrate a reduction in CAUTI.	
Finn Davis, K., Colebaugh, A., Eithun, B., et al. 2014	To assess the impact of a CAUTI bundle. Decrease CAUTI rates by 50%. Decrease urinary catheter utilization.	Single site observational study conducted at a 500 bed tertiary children's hospital. Poisson regression was used to determine the impact of the bundle implementation on CAUTI rates. The hospital, CHOP, joined the IHI initiative to reduce CAUTI and focused on two items: using catheters only when indicated and using sterile technique at all points of care. The PDSA (plan,	CAUTI rates were 5.41 infections per 1000 catheter days and reduced to 2.49 infections per 1000 catheter days. No pre data was available on utilization but during the study period a 90% reduction was noted. Analysis by Poisson regression indicated that the intervention was associated with a 50% reduction in the rate of CAUTI with a 95% confidence interval and p	-Single site study -Although there is a correlation between variables it does not mean causation. -No process data was available before measuring aseptic technique. There was an assumption that improved adherence to aseptic technique played a role in CAUTI prevention. -Retrospective study that is subject to misclassification bias -Assumption made that the pathogenesis of adult and pediatric CAUTI is similar. Conclusion: A reduction in CAUTI was noted with the bundle implementation.	Level: III Single site case study. Analytic component stronger than Bell, Alaestante, et al study.

		do, study, act) model was deployed. Retrospective analysis was done to assess changes in infection rates.	value of 0.02. Statistically significant.	Females are more likely than males to acquire CAUTI. Chronic conditions were prevalent among patients who developed CAUTI.	
Carter, N., Retimeier, L., Goodloe, L. 2014	To answer the question, "Is there an effective evidence-based bundle that will reduce the incidence of CAUTIs on an acute care general medicine/telemetry unit?"	Single site study comparing CAUTI rates prior and post implementation of an evidence based bundle. No statistical methodologies were shared other than the comparison of rates. Interventions included education, insertion checklists (which highlight a two-person technique with clear roles defined), and also a competency	Zero CAUTIs were attributed to the study unit 12 months post implementation of the bundle. EMR changes were made to prompt criteria for insertion and removal. This is an intervention shared in many articles.	-Single unit study -Small patient population-Unit has 28 beds -No statistical analysis was done to compare variables Conclusion: Zero CAUTIs were associated with this unit for over 12 months. The insertion checklist and competency defines the role of the second person present during insertion. "STOP the procedure and START again with a new catheter if aseptic technique is compromised. This article suggests what I hypothesize would help prevent CAUTI but still does not provide sound evidence that it has	Level: V Single unit study with a combination of literature review summaries stated in article.

		checklist with return demonstration of skills.		a direct impact on CAUTI outcomes.	
Alexaitis, I., Broome, B. 2014	To reduce monthly CAUTI rates, catheter utilization, number of CAUTIs per month, cost of supplies and medications, length of stay, education on bladder scanning and nurse driven protocol, and achieve compliance with catheter care.	Comprehensive review of the literature to find the best evidence for CAUTI prevention. The FADE QI methodology was used. FADE stands for focus on the problem, analyze the data, develop and execute a plan. 183 patients and 107 nurses included. Nurse driven protocol implemented with six objectives: education on alternatives and routine cath care, education on the protocol, compliance, cath rounds,	Data was collected on 322 patients during the study period and 497 patients prior to protocol. CAUTI rate decreased by 20.5% (from 3.85 to 3.06 per 1000 cath days; P=.296) Average number of CAUTIs decreased for the same period by 14.1% (from 2.33 to 2 per month, P=.495) Cost of meds and supplies also decreased with treating CAUTIs.	-Single unit study in academic medical center in Florida. (Neurosurgical intensive care unit- 30 beds) -Conclusion: 3 of 5 of the goals were achieved although statistical significance was not demonstrated -Data analysis descriptions were lacking in this article	Level: V Single unit case study with lacking data analytic descriptions.

		and CAUTI analysis. Three tests were administered using didactic and simulation testing. Average post education was 90% or more. 100% was achieved on simulation testing.			
Meddings, J., Rogers, M., Krein, S., Fakih, M., Olmsted, R., Saint, S. 2014	To summarize interventions to reduce UC use and CAUTIs.	Updated a prior systematic review (through October 2012) and a meta-analysis regarding interventions prompting UC removal by	30 studies identified for meta-analysis. 11 studies were included and a CAUTI reduction was noted by 53% with use of a reminder or stop order. (95% confidence	-Limited research is available regarding the impact of UC insertion and maintenance. Conclusion: Continues to demonstrate a need for more research in	Level: I Meta-analysis

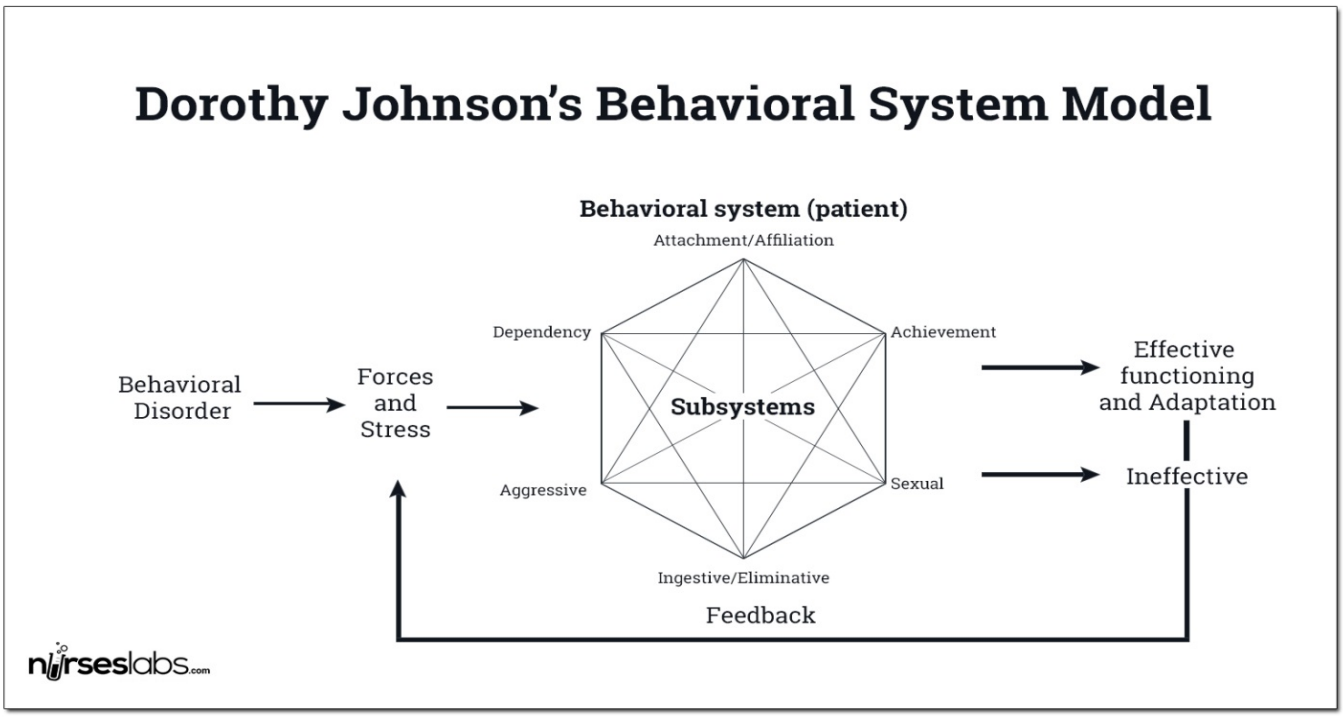
		reminder or stop orders. Narrative review of CAUTI prevention summaries including prevention, aseptic technique, maintenance, antimicrobial UCs, and bladder bundle implementation.	interval, p<0.001) Five of those studies also included interventions to decrease placement. Recent RCT identified that antimicrobial catheters provide not significant benefit in preventing CAUTI.	the area of insertion and maintenance.	
Fink, R., Gilmartin, H., Richard, A., Capezuti, E., Boltz, M., & Wald, H. 2012	To provide baseline data collection for a collaborative CAUTI prevention study.	A descriptive design study using an electronic 25 question survey to examine practices for CAUTI prevention in 3 areas: equipment and alternatives and insertion and maintenance techniques,	255 hospitals surveyed. 35% response rate. Practices commonly followed at NICHE hospitals included: handwashing (89%), wearing gloves (97%), using a no-touch insertion technique (73%). Silver coated cath (59%).	-The study only focused on nursing practices-physician excluded. -Most NICHE hospitals are non-profit organizations -Non-random sample -May overly represent a positive picture in regards to CAUTI prevention -Those responding to survey may not have first- hand	Level: V Multi-site research survey using qualitative and quantitative data.

		personnel policies, training, and education, documentation, surveillance, and removal reminders at 75 acute care hospitals in the NICHE system. SPSS was used to analyze data. Demographic data was summarized using descriptive statistics and tests of difference and association with alpha set at 0.05.	Urethral meatal care 43%. Training in aseptic technique 64%, however, only 47% validated competency for insertions.	knowledge of practices Conclusion: There is still room for improvement with implementation and compliance with evidence based guidelines at NICHE hospitals.	
Wilson, M., Wilde, M., Webb, M., Thompson, D., Parker, D., Harwood, J., Callan,	Part 2 of an evidence based report card reviewing current evidence pertaining to nursing actions in the prevention of CAUTI	3 clinical practice guidelines used to identify common nursing interventions to prevent CAUTI. The 3	Sterile technique is supported by CDC. It is a category II recommendation-moderately recommended for adoption. Briggs Institute	-Sterile technique is defined differently in most organizations which makes it difficult to compare. -Bacteriuria was the outcome monitored,	Level: III Multiple quasi-experimental reviews

L., & Gray, M. 2009		clinical practice guidelines included CDC, ICI, and Briggs Institute.	Best Practice document states that the use of sterile technique does not reduce CAUTI risk. ICI guidelines offer no specific guidance. A randomized study performed by Carpeti and coworkers, published in 1994, comparing sterile versus clean technique on elective surgical cases found that sterile technique did not reduce the bacteriuria incidence. Pickard and Grundy study, published in 2006, comparing low and high levels of sterile	not necessarily CAUTI. Conclusion: There is lack of supporting evidence that aseptic technique decrease CAUTI. Aseptic technique needs to be formally defined.	

			technique did not reveal any difference in bacteriuria utilizing a no touch technique.		

Appendix B-Dorothy Johnson Behavioral Theory Model



Model image retrieved from: nurseslabs.com

Appendix C- IRB approval Letter

Meridian Health Institutional Review Board
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October 17, 2016

Ellen Angelo, RN MSN CCRN
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EXEMPT APPROVAL

Dear Ms. Angelo:

This is to advise you that the above referenced Study has been presented to Meridian Health IRB Chairperson and the following action has been taken subject to the conditions and explanation provided below.

MH IRB Study # 201610071O
Protocol Title: CAUTI Prevention: A Team Insertion Strategy

MH IRB CPA#: New Appl
Study Status: Open
IRB ACTION: Approved 45 CFR 46.101(4)
Description: IRB grants Exempt Approval for the following period:
Approval Date: 10/12/2016
Expiration Date: 10/11/2021
Full Board Notification Date: 10/11/2016
Pre-Meeting Action: Approved as Exempt
Approval includes:

- Chart Review application approved as submitted for 5-years
- Data Collection Tool dated 9/30/2016 and
- **Approved to collect retrospective data from up to 1700 Charts. This number may not be exceeded without prior IRB Review and Approval.**

Condition(s): This exemption is good for five years as long as the procedures outlined in the original protocol are followed. Once the study has been completed you are required to close the study with the Meridian Health IRB by providing the appropriate paperwork.

Refer to the Initial Submission Checklist for a full list of documents included with this approval.

See additional conditions on the next page included with this approval.

Appendix D. Statistical Analysis

FISHER'S EXACT TABLE

	No Cauti	Cauti	Total Insertions	Pct Cauti
1 person	709	2	711	0.28%
2 person	978	5	983	0.51%
Total	1687	7	1694	0.41%

Fisher's Exact P-Value = .706

BINARY LOGISTICAL REGRESSION

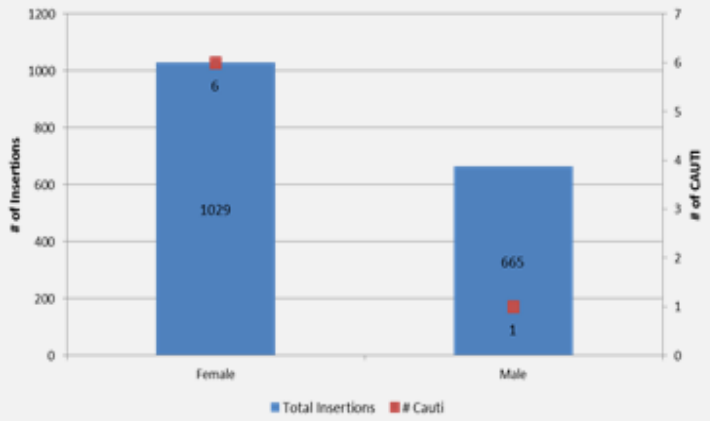
Term	Coefficient	SE Coefficient	Z	P	Odds Ratio	Lower 95% Odds Ratio	Upper 95% Odds Ratio
Constant	-42.476	634.95	-0.067	0.9467			
Age	0.019079947	0.022260206	0.857133	0.3914	1.019263133	0.975749	1.064717975
Sex	-1.431	1.084422087	-1.319	0.1871	0.239185	0.02855325	2.004
Castile soap/soap water used?	10.630	316.06	0.033633764	0.9732	41373	0	4.516E+273
Standard kit?	9.041	316.87	0.028532719	0.9772	8444.1	0	4.502E+273
Smallest cath used?	0.534904	0.842126	0.635182	0.5253	1.707	0.327698	8.895
Strict hand hyg?	5.626	317.49	0.017719165	0.9859	277.47	0	4.998E+272
One person or team insertion	0.398588	0.869150	0.458595	0.6465	1.490	0.271187	8.184
Cath on 1st attempt?	9.823	317.49	0.030938779	0.9753	18447	0	3.281E+274

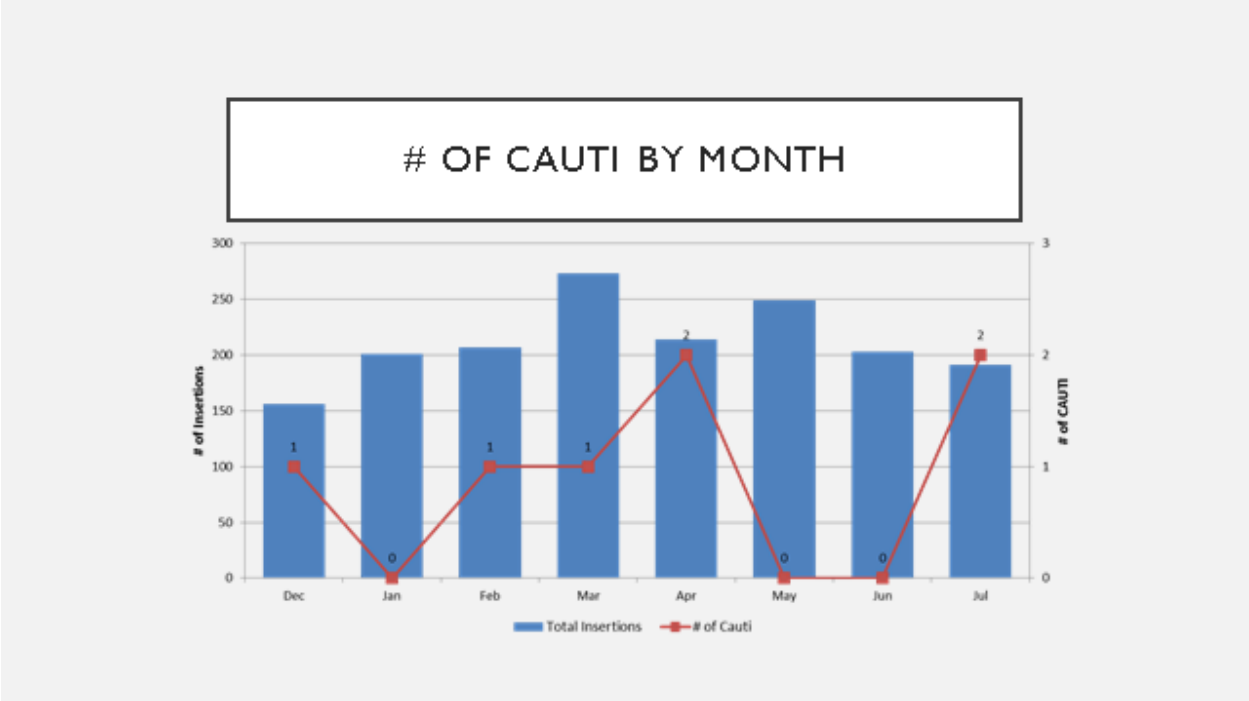
Appendix E- Descriptive Statistics

DESCRIPTIVE STATISTICS

- Total study participants - 1694
- Age range 19 to 100
- Median Age 72

- 1029 Female
- 665 Male




OF CAUTI BY MONTH
300
250
200
150
100
50
0
# of Insertions
3
2
1
0
# of CAUTI
1
0
1
1
2
0
0
2
Dec
Jan
Feb
Mar
Apr
May
Jun
Jul
Total Insertions
# of Cauti


1-PERSON VS 2-PERSON INSERTION
1200
1000
800
600
400
200
0
# of Insertions
6
5
4
3
2
1
0
# of CAUTI
2
5
711
983
1 person
2 person
Total Insertions
Cauti