Appendix Table C4-LQ-a. Study context for VAP which do not control for secular trend or confounding

| **Study** | **Infection** | **Location/Size** | **Influence of context on outcomes** | **Theory behind Patient Safety Practice** | **Existing Patient Safety Infrastructure** | **External Factors** | **Patient Safety Culture at Unit Level** | **Availability of Intervention materials** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Abbott, United States - 2006 | VAP | Southwestern United States/ | Hospital 2 had added a dentist and dental hygienist to their team and may have contributed to the significant increase in oral care adoption while Hospital 1 did not see much of a change. | The researchers used the ACE star model, PRECEDE-PROCEED model, and diffusion of innovation model to develop the protocol in this study. |   |   | A multidisciplinary education team was developed and consisted of clinical nurse specialists, staff physicians, infection control officers, staff nurse team “champions,” critical care educators, respiratory therapists, and unit clinical staff as process facilitators. |   |
| Assanasen, - 2008 | CLABSI;VAP | Richmond, VA/820 bed hospital |   | Literature suggests that medical practitioners are more likely to change their behavior if they have received feedback |   |   | Infection control professionals were responsible for observing compliance and providing feedback. Nurses were responsible for HOB elevation while nursing directors oversaw compliance of this. CVCs were done by house staff and monitored by the attending physician. |   |
| Berriel-Cass, United States - 2006 | CLABSI;VAP | Detroit, Michigan/607 bed hospital | Physician support was greater for the CLABSI center than the VAP center. |   |   | Ascension Health issued a call to action for decreasing preventable injuries among patients of their hospitals. Hospital participated in the IHI Critical Care Collaborative. | ICPs helped with educating the ICU staff. Nursing champion was defined as a nurse well known in the ICU who was involved in training nurses on his or her unit on using the checklist to document the correct placement of central catheters and was responsible for compliance with the checklist on all lines placed. The unit nurse manager acted as the nurse champion and supported the nurses’ stopping of the procedure at any time if the physician was not complying with the established protocol. The physician champion was chosen based on being well known in the ICU, being involved in training residents for catheter placement, directing in-services for resident physicians (medical and surgical) on appropriate line placement and the use of the tool, and serving as a contact person if problems occur between operator (physician) and nursing. | Physician champions are available if problems occur between operator (physician) and nursing. The hospitals used a system wide website to share their experiences, educational materials, and tools they developed with other Ascension Health hospitals. |
| Berriel-Cass, United States - 2006 | CLABSI;VAP | Birmingham, Alabama/338 bed hospital | VAP hospital does not have an intensivist program, most patients on mechanical ventilation are managed by pulmonary physicians. VAP hospital had less physician support. |   |   | Hospital participated in the IHI Critical Care Collaborative. | Multidisciplinary rounds team consisted of nursing staff, pharmacy, infection control, case management, social workers, dietary, respiratory, chaplain, transporters, quality managers, and a representative from CVICU, who would eventually spread the process changes to that unit. Charge nurses educated the staff on their various shifts. Nurses were asked to document compliance and discuss at the MDR daily meetings. | Complete oral care kits for every two hours of care were placed in the patients room each morning. The hospitals used a system wide website to share their experiences, educational materials, and tools they developed with other Ascension Health hospitals. |
| Bigham, United States - 2009 | VAP | Cincinnati, OH/475 bed hospital |   | The respiratory therapists and nurses used rapid cycle tests of change (Plan-Do-Study-Act) to establish the best methods to achieve high reliability compliance for each bundle component. This cycle promoted ownership and buy-in to the project by the bedside practitioners. |   | Authors mention HAIs as a means of disqualifying providers from receiving Medicaid or Medicare reimbursements. | A VAP Prevention Collaborative was established to oversee the changes to decrease VAP rates. The collaborative included physicians, nurses, respiratory therapists, infection control staff, and quality improvement consultants. |   |
| Bird, United States - 2010 | VAP | Boston, MA/626 bed hospital | TICU had a higher VAP rate than the SICU before the intervention. The authors attribute this to the higher risk of VAP in trauma patients. The TICU had a higher rate of compliance the SICU. The authors say this may be due to the fact that the TICU staff initiated the VAP bundle project. |   | A handwashing campaign, blood glucose control protocols, a chlorhexidine gluconate mouthwash protocol, and continuous aspiration of subglottic secretions were also being implemented. | CMS is no longer reimbursing HAI-related costs. | Respiratory care service was responsible for measuring compliance to the bundle. The infection control team was in charge of diagnosing VAP. Daily assessment of bundle goals and order entry took place by the multidisciplinary team which was comprised of physicians, NPs, SICU nurses, and pharmacists. SICU nurses were responsible for HOB elevation and sedation breaks. |   |
| Blamoun, United States - 2009 | VAP | Paterson, New Jersey/750 bed hospital, 18-beds in MICU. |   |   | Existing infrastructure (see intervention specifics for full list) was maintained at baseline and enforced in study | Institute for Healthcare Improvement’s “100,000 Lives Campaign” | The laboratory technician provides a prompt verbal alert to the nurse caring for the patient on the detection of any pathogens; Respiratory therapists maintained a specialized protocol for procedures. Nurses were involved in procedures however it is not clear as to specific duties. |   |
| Bloos, Germany - 2009 | VAP | Jena, Germany/50 bed surgical ICU |   |   | Handwashing before dealing with patients, daily oral care, and sterile tracheal suctioning were already in place in critical care areas of the hospital. |   | The change team was made up of the ICU manager, ICU consultants (physicians), and interested ICU residents and nurses. Change team designed educational program, conducted the audits, and supplied feedback. |   |
| Cocanour, United States - 2006 | VAP | Houston, TX/690 bed hospital | The STICU nursing staff turnover decreased from 22% in the baseline period to 4% in the follow-up period. |   | Infection control practitioner (ICP) monitored HAIs in the unit a few times a week. | The hospital had joined the IHI and Voluntary Hospital Association (VHA) efforts to improve ICU care. | The multidisciplinary team included the hospital’s director of performance improvement, STICU medical director, infection control practitioner assigned to the STICU, the STICU PharmD, the STICU respiratory supervisor, the STICU nursing director, the STICU nursing manager, and senior nursing leaders from all shifts. After the start of the study the ICP began monitoring infections daily. A tight glucose control project was also taking place in the STICU during this study. | Infection control practitioner, nursing manager or senior nursing leaders were in the ICU on a daily basis and available for clarification of expectations and positive reinforcement. The STICU Infection Control Guidelines were published and made available to the STICU staff. |
| Garcia, United States - 2009 | VAP | Brookdale, New York/427 bed hospital |   |   | Existing standard QI procedures included: Changes in the ventilator circuit every 7 days, replacement of the heat moisture exchange filter every 24 hours, closed suction catheter changes every 24 hours (suctioning performed every 2 hours or as needed), use of a 30º semi-recumbent positioning protocol when medically feasible, administration of stress ulcer prophylaxis, and use of an active weaning protocol. Compliance with these interventions for the full study period ranged from 90% to 100%. |   | The VAP Prevention Task Force was a multidisciplinary team comprised of nursing and physician staffs of the MICU, nurse educators, anesthesiologists, and staff from the emergency, materials management, and performance improvement departments. Nurses were responsible for carrying out the oral care protocol. Infection control professionals conducted staff interviews and observations of practice to identify barriers as well as conducted the education programs. |   |
| Gurskis, Lithuania - 2009 | CAUTI, CLABSI, VAP | Kuanas, Lithuania |  |  |  |  |  |  |
| Heimes, United States - 2011 | VAP | Kansas City, KN/ |   |   |   | The authors discuss that the reduction in Medicare reimbursement made the study worthwhile. | The study reappropriated responsibilities to existing staff members. The IC officer and ICU case manager were used to track compliance and diagnose VAP. The physicians were not allowed to contest the VAP diagnosis. |   |
| Jain, United States - 2006 | CAUTI;CLABSI;VAP | DeSoto, MS/28 ICU beds |   |   | Hospital administration and nursing leadership pushed for quality improvement initiatives in 2003. No specifics are given. | The hospital joined the IHI project to improve patient safety and outcomes | The house supervisor was relieved of some of her duties with bed flow through the bed flow meetings. Physicians took a more active role in daily patient care through leading the multidisciplinary rounds. |   |
| Jimenez, United States - 2009 | VAP | San Juan, Puerto Rico/232 bed hospital |   |   |   |   | Deep vein thrombosis prophylaxis was already a high priority in the NSICU. |   |
| Landrum, Afghanistan - 2008 | VAP | Air Force Theater Hospital in Iraq/ |   |   |   |   | The infectious disease physician inspected the facility and provided education and reinforcement when needed. | Forms tracking compliance with new practices were added to the patient charts. |
| Quenot, France - 2007 | VAP | Dijon, France/11 bed medical ICU |   |   | VAP bundle was already being used (Oral care, HOB elevation, hand hygiene) |   | The multidisciplinary team consisted of physicians and nurses and were in charge of developing the protocol and training the staff. Nurses were now given more responsibility and control over managing patients’ sedation level. |   |
| Rogers, Ireland - 2010 | CLABSI;VAP | Northern Ireland/53 ICU beds in total | There was a very wide range in staffing (3 units were under-staffed) and bed occupancy (58%-132%). The authors note that these are both associated with increased infection rates and these differences may have led to the non-significant changes in infections rates. |   |   |   | The authors note partnering with lead medical staff, nurse managers, Advanced Neonatal Nurse Practitioners, infection control teams, lab staff, and the regional Neonatal Nursing Benchmarking Group was key to the success of this project. |   |
| Rosenthal, Argentina - 2006 | VAP | Buenos Aires, Argentina/330 bed hospital |   |   | Infection Control Department already existed. A vigorous campaign for hand hygiene was also in place during the study. |   |   |   |
| Ross, United States - 2007 | VAP | Winston Salem, NC/854 bed hospital |   |   | Oral care products were already being stocked in the hospital, but not being utilized by the staff. |   | Critical care nurse specialists trained the educators and also provided the education program in some of the units. They were also in charge of providing feedback to the nurses and CNAs. | The storyboards were posted on the hospital’s intranet to increase accessibility. |
| Sona, United States - 2009 | VAP | St. Louis, MO/1344 bed hospital |   |   | During both the control and intervention period the hospital had implemented the CDC Guidelines for Preventing Healthcare-Associated Pneumonia. |   | CNSs were given the ability to audit oral care orders and make sure nurses were implementing the protocol on eligible patients. | The pictorial of the oral care technique was laminated and posted at every patient’s bedside. |
| Venkatram, United States - 2010 | CAUTI;CLABSI;VAP | New York, New York/20 ICU beds |   | Their model was based on the SMART (Specific, Measurable, Achievable, Relevant, and Time-bound) approach. Authors note this theory may have contributed to the consistent and sustained change and decline in HAIs. |   | The hospital was a part of the Health and Hospital Corporation network. | The HHC collaborative was comprised of participating institution’s medical directors, nursing directors, chiefs of medical and surgical departments, directors of critical care units, and respiratory therapy and nursing supervisors. The MICU director served as the champion and held monthly sessions about the importance of bundles. MICU nurses were given the following responsibilities: collecting compliance data, completing the CLABSI bundle checklist, stopping a procedure if there was a deviation from the recommendations, and monitoring for any breaches in infection control. | Data from all participating hospitals was available on the critical care collaborative website. |