Appendix Table C3-LQ-b. Intervention characteristics for CLABSI which do not control for secular trend or confounding

| **Study** | **Infection** | **Intervention Specifics** | **Positive or Negative Incentives** | **Feedback or consequences given to interveners/intervenees** |
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| Assanasen, - 2008 | CLABSI; VAP | During phase 2, the nurse managers and physician directors received unit-specific quarterly feedback on compliance and infection rates via email from the hospital’s infection control professionals. It also contained trends and compliance targets for each process measure. The nurse director of epidemiology and infection control provided informal feedback to unit leaders. During phase 3, dashboard-like posters were hung in ICU staff only areas. They displayed quarterly compliance and infection rates. Compliance was color coded. Poor compliance was red, borderline compliance was yellow and adequate compliance was green. The poster also had a brief summary of infection control practices to improve compliance. Target compliance rates were also displayed. A self-administered questionnaire was given at the end of the study to assess changes in behavior. |  | During phase 2, the nurse managers and physician directors received unit-specific quarterly feedback on compliance and infection rates via email. It also contained trends and compliance targets for each process measure. The nurse director of epidemiology and infection control provided informal feedback to unit leaders. During phase 3, dashboard-like posters were hung in ICU staff only areas. They displayed quarterly compliance and infection rates. Compliance was color coded. Poor compliance was red, borderline compliance was yellow and adequate compliance was green. |
| Berriel-Cass, United States - 2006 | CLABSI; VAP | The infection control department met with the senior vice president of quality and the hospital CEO to describe the process to improve patient care and reduce costs. Senior leadership’s support was key to ensuring availability of resources and enhancing the visibility of the initiative. The infection control department put together the educational component for physicians and nurses, with its medical director providing education to physicians, and the infection control practitioners (ICPs) providing it to nursing. ICPs educated rotating resident physicians in the ICU monthly. The educational program addressed many issues relating to CLABSI such as best practices, morbidity, mortality, cost, definitions, new tools being used, and potential barriers to implementation. Best practices that were included in the bundle were avoiding femoral lines, use of chlorhexidine for skin preparation, hand hygiene, and maximum sterile barrier use. A checklist was developed for CL insertions that would be utilized to assess compliance with this protocol. The checklist forced compliance with the components of the procedure by not allowing the operator to proceed without following the best practices. The checklist did not allow no as one of the answers. The two options were either yes or yes after correction. Nursing and physician champions were designated. The 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. ICP’s rounded in the ICU daily to collect the checklist and provide feedback if the form was missing information or not completed correctly. All components of the bundle needed to be present or the operator was considered noncompliant. To decrease barriers, a central line cart was also made that contained the necessary supplies for insertion. |  | The ICPs rounded in the ICUs daily to collect the checklist and provide feedback if the form was missing information or not completed correctly. Monthly CLABSI rates were given to each ICU. Unit rates were compared to historical rates as well as NNIS rates. |
| Berriel-Cass, United States - 2006 | CLABSI; VAP | An implementation team was established to develop changes and goals. The team was called the MDR team. The MDR team educated the charge nurses who in turn educated the staff on their shifts. The ICU managers attended nurse orientation to educate the new nurses on MDR, bundles, and other changes in the ICU. The same approach was used with all new employees and with continuing education for staff. Physicians were educated on the changes underway and were encouraged to participate. Impediments to educating all staff included the use of traveling nurses and temporary staff as well as the normal turnover rate among staff nurses. The MDR team designed a daily goal sheet, developed a VAP bundle, defined methodology for data collection and reporting, and determined an implementation date. An IHI VAP bundle was implemented and consisted of HOB elevation, deep vein thrombosis prophylaxis, peptic ulcer disease prophylaxis, oral care every two hours, and hand washing. Sedation vacation and the weaning protocol were implemented later. The ICU staff nurse measured DVT and PUD prophylaxis compliance and reported findings in the daily MDR meeting. If no order was obtained for the appropriate prophylaxis, the staff nurse followed up with the physician to determine why prophylaxis was omitted. Kits containing the material for every-two-hour oral care were placed in the patient room each morning and inventoried the next day by the staff nurse to determine use. Compliance was reported in the daily meeting. |  | The ICU staff nurse measured DVT and PUD prophylaxis compliance and reported findings in the daily MDR meeting. If no order was obtained for the appropriate prophylaxis, the staff nurse followed up with the physician to determine why prophylaxis was omitted. The daily goal sheet was used to document recommended changes or feedback that needed to be communicated to the physician and other team members. Staff nurses also reported compliance with oral care at the MDR meetings. |
| Bhutta, United States - 2007 | CLABSI | Stepwise introduction of interventions designed to reduce infection rates, including maximal barrier precautions, transition to antibiotic impregnated central venous catheters, annual hand washing campaigns, and changing the skin disinfectant from povidone-iodine to chlorhexidine. |  | An indicator is displayed, showing status with regard to the desired intervention. A simple color scheme of red, yellow, and green represents various states of compliance with process steps. Red indicates out of compliance, yellow indicates in compliance but the item is coming due, and green indicates compliance. A grace period is built in to each item to allow for patient variability. The dashboard was designed to aid in supporting clinician work flow. Online checklists began in 2007; The nursing staff completed checklists for each ventilated patient at least two times per day to document compliance with VAP reduction strategies. Nursing leadership periodically audited compliance, and followed up with staff if targeted compliance levels were not achieved or if the checklists were not completed. The CAUTI tracking system in early 2008 provided real-time reports of urinary catheter insertion dates and duration on a patient-by-patient basis, with color-coded visual cues identifying those patients having extended duration of catheterization.; Infection control staff reported quarterly data to the nursing and medical directors of the unit. |
| Bizzarro, United States - 2010 | CLABSI | Mandatory yearly lectures, hands-on training sessions, and observed competency assessments for proper CVC placement and management techniques for all new personnel. Those who are formally trained may independently perform and assist in the training of incoming personnel. Mandatory yearly lecture, hands-on training session, and observed competency assessments for proper hand washing and aseptic techniques for CVC placement and management for all new personnel. Povidone iodine with 70% isopropyl alcohol for cutaneous antisepsis and dressing changes. Dressings are not to be changed routinely and are to be changed only under the following conditions: when the integrity of the dressing is compromised; when the dressing is visibly soiled; and/or when the catheter position needs to be readjusted (out only). Daily discussion during attending physician rounds regarding need for CVC; removal of CVC the day before or the day neonate achieves complete enteral feeding; ensure removal of surgical lines within 48 hours of discontinuation of use. Surveillance conducted and made available to the staff quarterly; the CVC Initiative Committee meets semiannually, at a minimum, to review data and new medical literature and to update protocols. |  | Rates of CLABSI were reported quarterly to the staff in graphic and tabular form, and post initiative data were compared with pre-initiative and NHSN data. A daily chart was kept in the NBSCU staff room to display the number of days between consecutive cases of CLABSI in the NBSCU. |
| Galpern, United States - 2008 | CLABSI | Resident physicians and nurses were educated on bloodstream-infection--control practices, which included discussions about proper hand washing, use of full-barrier precautions during the central line insertion, appropriate preparation of the skin with ChloraPrep, avoiding the femoral site if possible, and early removal of all central lines. Organizational change: A central line cart was created that contained all the equipment needed to comply with evidence-based guidelines for central line insertions. A policy was instituted that required nurses to assist in central line insertion. Previously, central lines were placed by the critical care physicians without assistance, unless requested. All central lines were secured using a 3.0 silk stitch. They did not use a noninjurious method, such as the stat lock mechanism. After placement of the central line, a form was filled out by the physician and nurse to ensure the protocol was not violated. On a daily basis, justification for the need of the central line needed to be documented in the chart. If no justification could be found, the central line was removed by the physician. A trained infection-control nurse examined each patient every day to determine whether a bloodstream infection had occurred to remove the possibility that another health-care provider might not report the infection. Data were collected on a monthly basis, which included the number of critical-care beds in use at the time, the number of catheters placed, the number of days the catheters were left in place expressed as catheter days, and the number of line-associated infections. Data were reported to the directors of the surgical and medical ICUs, which allowed for real-time feedback to the staff on how the intervention was proceeding. No change in the materials was used during the time of the study. The catheter kits, drapes, gowns, gloves, and caps were all kept the same during the study period. |  | On a monthly basis feedback to the staff was provided as a means of data on the number of critical-care beds in use at the time, the number of catheters placed, the number of days the catheters were left in place expressed as catheter days, and the number of line-associated infections. |
| Guerin, United States - 2010 | CLABSI | During the intervention period, an IV team was assembled to provide insertion and site care for PICC lines as well as monitoring site care and dwell time for all IVs in the hospital. The nursing staff created and implemented (by each nursing unit’s IV champion) a post insertion care bundle consisting of daily inspection of the insertion site; site care if the dressing was wet, soiled, or had not been changed for 7 days; documentation of ongoing need for the catheter; proper application of a chlorohexidine gluconate-impregnated sponge at the insertion site; performance of hand hygiene before handling the intravenous system; and application of an alcohol scrub to the infusion hub for 15 seconds before each entry. A 4-hour hands-on training class in techniques for accessing and caring for all IV catheters was mandatory for all nursing staff. This training was followed by a competency evaluation, in which each nurse was required to demonstrate competence in catheter insertion site and hub care. |  | The hands-on training was followed by a competency evaluation, in which each nurse was required to demonstrate competence in catheter insertion site and hub care. |
| Gurskis, Lithuania - 2009 | CAUTI, CLABSI, VAP | Patient-based NI surveillance protocol adapted from the Hospitals in Europe Link for Infection Control through Surveillance (HELICS) was used. Patients in the units were assessed by physicians on duty, and standard data collection form was filled out. The multimodal intervention (i.e. an infection control program) was designed depending on the NI surveillance data analysis in the control group and the data gathered from the evaluation form of NI prevention methods. The intervention included education of the ICU staff (6 hours) about NI prevention and implementation or correction of daily routine procedures, according to the evidence-based recommendations.  Prevention of bloodstream infection  •Emphasize hand washing for ICU staff, consultants, and parents  •Use only single use towels in the ICU  •Educate health-care workers regarding the indications for intravascular catheter use, proper procedures for the insertion and maintenance of intravascular catheters, and appropriate infection control measures to prevent intravascular catheter-related infections  •Use of gloves does not obviate the need for hand hygiene  •Record the operator, date, and time of catheter insertion and removal, and dressing changes on a  standardized form  •Observe hand hygiene before and after palpating catheter insertion sites, as well as before and after inserting, replacing, accessing, repairing, or dressing an intravascular catheter  •Encourage patients to report to their health care provider any changes in their catheter site or any new discomfort  •Maintain aseptic technique for the insertion and care of intravascular catheters  •Wearing clean gloves rather than sterile gloves is acceptable for the insertion of peripheral intravascular catheters if the access site is not touched after the application of skin antiseptics. Sterile gloves should be worn for the insertion of arterial and central catheters  •Wear clean or sterile gloves when changing the dressing on intravascular catheters  •Do not routinely use arterial or venous cutdown procedures as a method to insert catheters  •Leave peripheral venous catheters in place in children until IV therapy is completed, unless complications (e.g. phlebitis and infiltration) occur  •When adherence to aseptic technique cannot be ensured (i.e. when catheters are inserted during a medical emergency), replace all catheters as soon as possible and after no longer than 48 hours  •Replace catheter-site dressing if the dressing becomes damp, loosened, or visibly soiled  •Consider reduction of CV catheter utilization |  |  |
| Jain, United States - 2006 | CAUTI; CLABSI; VAP | Physician led multidisciplinary rounds were initiated in October 2002. The team included in these rounds consisted of the patient’s nurse, ICU charge nurse, pharmacist, dietician, respiratory therapist, case manager, social worker, physical therapist, and palliative care nurse. This team would set daily goals and use trigger tools to define adverse ICU events. Daily bed flow meetings were also implemented which happened twice daily. They were 20 minutes long and discussed facility status, intervention priorities, historical data, and daily goal setting. The meeting was led by the administrative house supervisor. After October 2002 bundles for VAP, CLABSI, and CAUTI were implemented. The bundles were developed using published guidelines, CDC recommendations, and local staff recommendations. Feedback was provided to the physicians. | Intensivists were reimbursed for doing rounds. | Feedback was provided to physicians. |
| Jeffries, United States - 2009 | CLABSI | Based on Associates in Process Improvement model. Included recommendation from CDC guidelines, published studies, and IHI save 100,000 lives campaign. Baseline data was collected and shared with the teams at each hospital. Qualitative feedback on hospital-specific improvements were distributed monthly. 9 month improvement project followed by 12 month follow up. 2 bundles insertion and maintenance each composed of 5 categories of improvement. Insertion: Hand hygiene Hand hygiene consistent with local guidelines and/or policies, Dressings Apply transparent semipermeable dressing (use gauze only with bleeding and/or oozing), Sterile barrier Maximum sterile barrier (large sterile drape, sterile gloves, sterile gown, cap, and mask), Sterile technique throughout, Prepare skin with antiseptic and/or detergent chlorhexidine gluconate 2% except for patients with a contraindication. Maintenance: Hand hygiene consistent with local guidelines and/or policies, Replace dressing if it becomes damp, loosened, or visibly soiled; apply transparent semipermeable dressing (use gauze only with bleeding and/or oozing), Aseptic gloves and sterile dressing, Aseptic technique throughout, Prepare skin with antiseptic and/or detergent chlorhexidine gluconate 2% except for patients with contraindication. |  | Feedback was given to teams with monthly qualitative reports including: self-assessment, barriers, success, lessons learned, next steps and hospital-specific feedback providing information on next steps. |
| Koll, United States - 2008 | CLABSI | Needs assessment identified need for regional, systematic improvement in central line practices. Buy-in from hospital leadership was a requirement for participation in this intervention. A real-time question and answer web portal for study participants and staff was created to share information and technical resources. On-call technical experts were available to provide clinical guidance and inform practitioners why these central line procedures were being adopted. Site-visits were conducted to monitor compliance with the bundle. Interdisciplinary teams met weekly initially and then monthly to discuss implementation of CLABSI bundle and to reassess strategies (or in place of meetings some hospitals had monthly or weekly goals posted). HICPAC CLAB central line bundle (hand hygiene, maximal barrier precautions, chlorhexidine skin antisepsis, optimal catheter site selection, daily review of line necessity). Data were reported to hospital CEOs quarterly and to the CLABSI teams monthly. |  | Data were reported to hospital CEOs quarterly and to the CLABSI teams monthly. |
| Lobo, Brazil - 2010 | CLABSI | 3 study periods: baseline, pre-intervention and intervention. Survey was administered to ICU staff covering hand hygiene, cvc insertion, dressing, handing and replacement. Observation of hand hygiene practices was conducted by nurses with a checklist. ICUs were assigned to one of two groups, an individual lecture or continuous lectures on the infection control practices observed to be lacking in each ICU. |  | Feedback was given monthly during the intervention period and provided staff with information on BSI rates; during the pre-intervention period staff were informed about problems found during the nurses’ direct observation |
| Marra, Brazil - 2010 | CLABSI | Study consisted of two phases, the first phase included insertion of catheters through a new venipuncture into the subclavian, jugular, or femoral vein using full sterile-barrier precautions and 2% chlorhexidine preparation for antisepsis. The next phase continued the processes in phase one and randomly audited a small sample of patients monthly undergoing central line insertion. A central catheter insertion cart, hand hygiene intervention, maximal barrier precautions, chlorhexidine skin antisepsis, optimal catheter site selection with avoidance of the femoral vein for central venous access in adults and a daily review of line necessity. This bundle was monitored by nurses and doctors and nurses had the opportunity to stop any procedure deviating from the bundle guidelines. |  | Phase 1: Each year, a convenience sample of patients was chosen for whom catheter insertion and catheter dressings were directly observed by assigned nurses. Feedback was provided via e-mail on compliance with these processes for the ICU team (doctors and nurses). Phase 2: Interventions were audited once monthly at random intervals in a small sample of patients undergoing central line insertion and the IHI bundle and feedback was provided via email. In addition, posters were provided in the ICU and SDU with bar graphs displaying compliance with process of care measures. |
| Render, United States - 2006 | CLABSI | The process change-oriented intervention included a CVC insertion checklist that offered binary choices (yes/no) for hand washing, chlorhexidine use, bed sized sterile drape, and use by the operator of a cap/mask/sterile gown/sterile gloves during insertion, as well as date and site of catheter. The checklist was completed by nurses as the physician prepares for the procedure, acting as both a teaching and a measurement tool. The team leaders also modified the prepackaged insertion trays, removing betadine and small drape and replacing them with an “accessory pack” with a large drape, a sterile gown, gap and mask. The pack was accessed with the checklist on a central line cart, making it easy to do it right. To promote sustained practice change, hospital committees at the senior leadership level (clinical executive board) also approved written policies that matched the best practices to codify the practice change. Certain communication strategies were used to enforce the practice changes (but the paper does not state the specifics) such as a reminder poster on CVC insertion used by 5 of the 10 hospitals that were participating in the 2-year CLABSI-SSI prevention project. Project leadership reported outcomes of the project to the GCHC infection control and patient safety committees. Twice a year, project leadership informed the hospital CEOs of the results of the project, which compared local process adherence and outcomes to the mean of the group. The project leaders organized the work-learning-reporting cycles at each site which included at minimum one test of change every month and met monthly with project leadership and reported their experience using presentation slides in small groups to share effective strategies, solve problems together, etc. Then each project leader reported processes and outcomes to the unit staff, posting monthly project presentation slides on a bulletin board throughout the unit. Results were also reported in the hospital newsletter. |  | Then each project leader reported processes and outcomes to the unit staff, posting monthly project presentation slides on a bulletin board throughout the unit. Results were also reported in the hospital newsletter. Feedback reports also included other hospitals. |
| Rogers, Ireland - 2010 | CLABSI; VAP | A multidisciplinary team designed an educational package to promote hand hygiene in addition to current infection control measures. A 3 month education intervention included a presentation of evidence-based hand hygiene guidelines, new infection related posters, and demonstration of a six step hand hygiene technique using Glo Germ. Questionnaires were also sent out to ICU staff before and after the intervention to compare attitudes, knowledge and personal practices associated with hand hygiene. |  |  |
| Sannoh, United States - 2010 | CLABSI | Neonatal ICU central venous catheter database created, new catheter hub policy including: the surface area of the needleless port and the outer surface of the stop cork or Luer-lock threads of the catheter hub were scrubbed in a circular motion with friction using2%chlorhexidine in 70%isopropyl alcohol (ChloraPrep Sepp, CareFusion, Leawood, KS) for 10 seconds and allowed to dry for 30 seconds. The catheter hub care protocol also mandated standard hand hygiene, the use of clean gloves, and the establishment of sterile fields with 4’’ 3 4’’ gauze under the catheter port and the syringes used to access the hub with medications and flushing solution. The new catheter dressing change policy was to change dressings only when soiled, instead of routine weekly changes. A DVD containing 15-minute lectures demonstrating catheter hub care was viewed in multiple sessions by staff and made available on the hospital NICU website. Catheter hub care checklists were present at every bedside to remind the healthcare team of the protocol, and a CVC cart was placed with hygiene materials in each room. Hand hygiene campaigns were reinforced at this time. |  |  |
| Santana, Brazil - 2008 | CLABSI | Healthcare personnel were evaluated with a pre-test first. Next fact sheets and posters were distributed to healthcare personnel. Performance of 1-hour lectures by an expert infection control nurse regarding CLABSI were given to hospital staff. | Audit and feedback of infection rates |  |
| Shannon, United States - 2006 | CLABSI | The AGH working group drew on a local community resource, the Pittsburgh Regional Health Initiative (PRHI) to learn about process improvement techniques rooted in the Toyota Production System (Lean thinking). AGH physicians, nurses, and infection control practitioners received five days of intensive training at PRHI in the improvement system called Perfecting Patient Care (PPC) and then applied those principles in clinical practice. The team, headed by the chairman of the department of medicine, also included unit directors, infection control nurses, ICU nurses, and staff from PRHI. The team began by looking at individual infections, case by case, reviewing charts of the 1,753 persons admitted to the MICU and CCU between July 2002 and June 2003, during which conventional approaches were employed. With a clearer sense of the frequency, types, and consequences of CLABs in its MICU and CCU, the team began observing staff to determine how lines were actually placed and maintained. Each occurrence was examined to its root cause as close as possible to receipt of a positive lab culture (range, 3–24 hours; average, 6 hours, including weekends). The root cause team investigating each occurrence included the infection control nurse, the physician of record, and the residents, fellows, and nurses caring for the patient. The team was headed by the chairman of the department of medicine. The team developed a countermeasure that required new trainees (nurses and doctors) to be educated in a multidisciplinary training exercise using patient simulators with the guidance of physician mentors and nursing staff. |  |  |
| Venkatram, United States - 2010 | CAUTI; CLABSI; VAP | 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 directors of critical care met monthly and emphasized the use of the bundle strategies. Data from the participating hospitals was shared both on the critical care collaborative website as well as during learning sessions. Focused learning sessions were conducted by intensivists periodically. The MICU director served as the champion and held monthly sessions for all ICU staff to reinforce the procedures involved in the bundled approach. Nurses collected compliance data and shared it with the MICU team at the performance improvement committee meetings. Data was also shared with other HHC hospitals. ‘Zero Infection Rate’ certificates were given by the infection control staff monthly as positive feedback. A CAUTI bundle was implemented in January 2005. It included daily assessment of need, sterile technique when inserting, and use of silver-coated catheters. In addition nurses monitored for breaches in infection control. The MICU nurse was also empowered to stop a procedure if there was a deviation from the recommendations. Evaluation of the necessity of the urinary catheter was integrated into the daily goals and discussed at bedside rounds daily. |  | The ICU was awarded monthly ‘Zero Infection Rate’ certificates based on outcomes by the infection control staff. Nurses collected compliance data and shared it at the MICU performance improvement committee meetings. |
| Warren, United States - 2006 | CLABSI | The intervention took place in two-folds: 1) updating existing CVC insertion and care policies, and 2) educating staff (didactic lectures for physicians and nurses using a slideshow, self-study module with accompanying 24-question pretest and posttest, and fact sheets and posters highlighting proper techniques for CVC insertion and care placed in the units). The primary messages of the intervention material were as follows: (1) the subclavian vein is the preferred insertion site for a non-tunneled CVC, and the femoral vein is the least desirable site; (2) catheters should be inserted using maximal sterile barrier precautions; (3) catheter insertion site dressings should be kept clean, dry, and intact; and (4) catheter dressings should be properly dated, to ensure regular dressing changes. |  | Before and after the 9-page self-study module, the physicians and nurses were required to take a 24-question pretest and posttest. |
| Wicker, United States - 2011 | CLABSI | NICU staff held an infection control meeting, which consisted of various disciplines within the hospital, and formed an infection control task force. The NICU infection control task force consisted of neonatologists, pediatric infectious disease specialists, respiratory therapists, the NICU clinical director, NICU staff nurses, the NICU educator, and a pediatric surgeon. The task force reviewed the current practice guidelines and the literature for infection control in the neonatal population and, based on best practices, formulated comprehensive infection control measures. Comprehensive control measures included hand hygiene, prevention of catheter-related infections, education, and environmental infection control measures. The hand hygiene portion included: 1. a hand-washing campaign, 2. prohibiting wearing jewelry (except wedding band) or artificial nails. Prevention of catheter related infections included: 1. IV practice guidelines and education program for all NICU staff, 2. dedicated central line management team, 3. limited blood draws through the catheters, 4. daily assessment of Catheter site, 5. reinforce early removal of central lines, 6. limited the number of vascular puncture and heel sticks by clustering laboratory tests. Education included: 1. focused education for new residents, 2. mandatory infectious disease education to all registered nurses in NICU, 3. mandatory learning packets for all pool and agency nurses, 4. reinforce judicious use of antibiotics, 5. early feeding with breast milk. Environmental included1. Applied keyboard covers on all computers 2. Replaced counter-mounted Corian (DuPont, Wilmington, DE) sinks (attached aprons collected standing water) with freestanding ceramic sinks 3. Instituted daily bleaching of all sinks 4. Obtained individual stethoscopes, bandage scissors, and hemostats 5. Removed all stuffed animals from beds 6. Instructed unit secretary/nurse associates on protocol for bedside use and sterilization of instruments between infants 7. Eliminated all food and drink from direct patient care areas 8. Implemented use of Styrofoam containers to warm formula/breast milk with infant’s name identified on container |  |  |
| Yilmaz, Turkey - 2007 | CLABSI | The study involved the following 3 periods: pre-education, education, and post-education. In pre-education, patients were monitored daily. During the education period physicians, interns and RNs were trained to prevent catheter-related infection. And during the post-education period, patients were again monitored. Monitoring followed CDC criteria. | HCWs who scored <80 on the post-education test had to be retrained and retested; | Catheter insertion and follow-up activities were observed and corrections were made on the spot. Monthly CLABSI rates were also provided to the healthcare staff; |