Appendix Table C3a. Intervention characteristics for VAP which control for secular trend or confounding

| **Study** | **Infection** | **Intervention Specifics** | **Positive or Negative Incentives** | **Feedback or consequences given to interveners/intervenees** |
| --- | --- | --- | --- | --- |
| Apisarnthanarak, Thailand - 2007 | VAP | Feedback of baseline data was first given to the MICU staff and an action plan was developed. In period 2, an educational program began and was continuously monitored throughout period 3. A 10-page self-study module was given to the MICU staff to be completed. Before and after administration of the self-study module a 20 question exam was given. Staff who scored below an 80% were required to retake the module. The self-study module was encouraged for all nurses and respiratory staff, but not deemed mandatory. In addition to the educational module, posters, fact sheets, and in-service training sessions for nurses and respiratory therapists were used. The educational program was repeated every 6 months during periods 2 and 3 for the nurses and respiratory therapists. In-service sessions were provided for the first 3 months during period 2, then during month 6, and then every 6 months after that by the infectious disease specialist and focused on VAP prevention practices. Attendance was highly encouraged, but not mandatory. The surgical ICU and coronary care unit were used as controls and did not receive any new interventions for reducing VAP. |   | The baseline data was given to the MICU staff as feedback. The intervention team required MICU staff who scored under 80% to retake the educational module |
| Berenholtz, United States - 2011 | VAP | Toolkit was provided along with a slideshow to educate and engage all ICU staff. The VAP bundle implemented included HOB elevation > 30 degrees, appropriate sedation, stress ulcer prophylaxis, deep vein thrombosis prophylaxis, and daily assessment for extubation. Local ICU Improvement teams were trained through semimonthly conference calls, coaching by study investigators, and semiannual statewide meetings. Improvement teams were instructed to partner with their hospital’s infection preventionist to help with data collection. ICU Improvement teams posted compliance and VAP rates in the ICU to engage ICU staff. Study investigators reviewed published guidelines for VAP prevention and other supportive evidence during conference calls to educate local ICU teams. The toolkit given to the teams also included a one page “fact-sheet” summary and references to be used to educate their staff. ICU staff used a standardized tool, “Daily Goals” checklists to execute the intervention. Teams were advised to make protocols and standard order sets. Families were told to ask whether the patient was receiving the bundle items. Teams received monthly compliance and VAP rates for their ICU and all other participating ICUs. The reports were de-identified. |   | Monthly compliance and VAP rates were supplied to the ICU improvement teams. ICUs received de-identified reports from other participating ICUs as well to compare their performance. |
| Bouadma, France - 2010 | VAP | A multidisciplinary task force was formed which included five physicians and five nurses. They reviewed the literature and recent guidelines for preventing VAP and designed an educational program to promote 8 target recommendations among ICU nursing staff. The task force developed a 3-hour mandatory slide presentation with interactive discussion. Each participant was given a booklet with summary information. This was repeated for every 24 new employees. Screen savers were used as reminders and posters were put up around the ICU. Oral care, HOB elevation, and hand hygiene were some of the targeted preventive measures. A simple color-coded visual reminder was placed at the head of the bed to help staff visualize the optimal bed position. |   | Five performance assessments took place at baseline, 1 month, 6 months, 12 months, and 24 months. They were conducted by ten MICU physicians, nurses, and head nurses not affiliated with caring for ICU patients. After each assessment feedback was given to the MICU staff during regular meetings in the form of graphs documenting compliance and VAP rates. Screensavers also displayed these rates. |
| DePalo, United States - 2010 | CLABSI; VAP | 11 hospitals with 23 ICU units total; one of the hospitals have 4 ICU units and another have 10 units. The JHQSRG served as consultants communicating content for the educational sessions and conference calls. The content and coaching calls reinforced strategies. Education program content: educating staff on the science of safety, identifying hazards, identifying senior executive partners, learning from defects and implementing teamwork tools. Team members were empowered with the ability to stop procedures if safety was compromised. The CLABSI best-practice strategies targeted the clinician’s use of five evidence-based behaviors recommended by the CDC, identified as being the most effective at reducing CLABSI. These behaviors included hand-washing, using full barrier precautions when inserting central access catheters, chlorhexidine skin-cleansing, avoiding the femoral site if possible and removing unnecessary catheters. All unit teams educated their bedside staff to best practice strategies and implemented processes by the end of the first quarter. |   | Throughout study period, teams received feedback on infection rates by accessing database reports and review with the project manager. Subcommittees had quarterly conference calls with physician champions. |
| Dubose, United States - 2010 | VAP | A multidisciplinary team reviewed best-practices data and chose 16 prophylactic measures, 4 of which were for VAP. Then a tool was designed, the Quality Rounds Checklist (QRC), to quantify these prevention measures. The on-duty trauma ICU fellow and ICU team used the QRC daily during rounds to assess if compliance to the VAP bundle was being met. Nurses were in charge of pain assessment, restraint need, oral care, and daily CVC site evaluation. The nurse manager was in charge of checking completion of these measures. The QRC was also used to check compliance. Any components that were deemed non-compliant were highlighted for immediate correction. New fellows were trained in the appropriate use of the QRC. Regular in-services were conducted for the nursing staff discussing the importance of the prophylactic measures. A monthly multidisciplinary meeting was held to assess systemic deficiencies and develop strategies to improvement those areas. The fellow was in charge of presenting the data at the monthly meetings. From these meetings changes such as nursing and staff education on HOB elevation, laminated signs in patient rooms reminding providers of HOB elevation were initiated. |   | Monthly feedback meetings were conducted by the multidisciplinary team and used to relay compliance and VAP rates from the previous month as well as discuss changes that could improve compliance and infection rates. |
| Hawe, United Kingdom - 2009 | VAP | Educational workshops started in March 2007 and covered various topics pertaining to VAP. The evidence base for the bundle was discussed. Written material was distributed for self-study. Compliance and VAP rates were displayed on the walls of the ICU and at multidisciplinary educational meetings. The pattern of VAP acquisition was frequently updated and discussed at educational meetings as well. When barriers to providing the bundle were met an iterative process to improve these took place. Adherence to the bundle was also promoted during daily rounds to increase collective ownership. |   | Compliance rates and VAP rates were hung up around the ICU as well as presented at educational meetings. |
| Kulvatunyou, Thailand - 2007 | VAP | The educational program was modeled after Zack et al’s paper, Crit Care Med 2002; 30: 2407-12. A 1-hour formal lecture was given to the ICU nursing staff. They were also given a handout with information about VAP. A 10 question pre-, post-lecture exam was given before and after the initial lecture and the second formal lecture six months later. Daily formal discussion rounds were also implemented and posters were hung up around the ICU. |   |   |
| Marra, Brazil - 2009 | VAP | During phase 1, a CDC VAP bundle was implemented and audited twice annually by the study staff. The bundle included HOB elevation, no routine changing of humidified ventilator circuits, periodically draining and discarding condensate, and changing the heat-and-moisture exchangers. Study staff provided compliance feedback to all ICU staff through email. During phase 2, immediate correction of non-compliance was added to the aspects of phase 1. Feedback was still being provided. During phase 3,the hospital CEO decided zero tolerance for VAP. In response, the study staff intensified QI efforts monthly. The IHI VAP bundle (HOB elevation, daily sedation vacations, peptic ulcer prophylaxis, deep vein thrombosis prophylaxis, and daily assessment of extubation) was also implemented, staff education was initiated, and posters were hung around the ICU displaying compliance rates. In October 2007, oral care was added to the bundle. In February 2008, continuous aspiration of subglottic secretions was implemented. The bundle was monitored each weekday by an ICU nurse. The nurse would intervene at the same time if the bundle was found to be non-compliant. |   | Monthly feedback on compliance was given during all three phase. Posters around the ICU also provided feedback on VAP rates and compliance |
| Omrane, Canada - 2007 | VAP | Nurses, respiratory therapists, intensivists, and pharmacists were involved in developing and implementing the protocol. The VAP protocol focused on nutrition, patient positioning, hand hygiene, stress ulcer prophylaxis, and ventilator circuit. A laminated copy of the protocol was included in the patient’s chart. At the time of introduction of the protocol an educational session was held. In addition to the protocol, 12 in-service trainings were held for all ICU staff the two weeks preceding the protocol adoption. Additional in-service programs were held throughout the study period. Posters were also hung around the ICU. |   | Two investigators evaluated protocol compliance and provide feedback to the ICU staff. |
| Papadimos, United States - 2008 | VAP | FASTHUG is an acronym for daily evaluation of Feeding, Analgesia, Sedation, Thromboembolic prophylaxis, elevation of the Head of the bed, Ulcer prophylaxis, and Glucose control. Oral care and hand hygiene were also a part of the protocol. In November 2003 an intensivist-led critical care team model was adopted in the SICU. The team consisted of faculty physicians, anesthesiologists, surgery residents, medical students, nurses, a pharmacist, and respiratory therapists. In 2004, interventions were asked to be implemented, but not enforced except for hand washing. Hand washing was highly enforced by ‘secret shoppers’ (infection control department officials pretending to not be from the IC department). In 2005, FASTHUG was added to the daily patient evaluation and emphasized during rounds by the critical care team. Its information was used to adjust daily patient care plans. |   |   |
| Prospero, Italy - 2008 | VAP | In March 2006, the ICU staff contacted the Hospital Hygiene Service for help with improving their infection control practices. In April an educational program on CDC Guidelines for preventing VAP was presented to all physicians and nurses. During April and May alcohol-based hand sanitizer was introduced to the ICU staff. |   |   |
| Scales, Canada - 2011 | CLABSI;VAP | The 15 ICUs were split into 2 groups and were randomized to receive an intervention while acting as a control for an ICU in the other group. There were 3 phases, each phase was 4 months long. Each ICU received a different intervention in each phase. At the end of the trial, the ICUs would receive the interventions that they acted as controls for in 3 month phases. This was called the decay-monitoring period. A central coordinating office conducted the interventions, disseminated the educational and promotional materials, arranged videoconferences, and analyzed the data. All participating ICUs were given videoconference equipment. An expert advisory panel generated a list 15 best practices which were given to the ICU directors. The ICU directors rated which ones they found most applicable and the top six were the ones implemented in this study. For each best practice, a bibliography of relevant literature was generated and presented in easy-to-read bulletins. A content expert provided the interactive educational sessions through videoconference. The presentations were available on a website for reference. ICUs were also encouraged to provide their own in-services and educational programs. Process measures were audited daily and monthly feedback reports were given to the ICU staff. De-identified information for all participating hospitals were included in the feedback reports. ICUs were encouraged to use posters and lapel pins to remind clinicians of the best practices. Examples of pre-printed order sets and checklists were also supplied to the ICUs. The Ontario Telemedicine Network videoconferencing infrastructure was used to provide the educational sessions from the content experts, conduct monthly network meetings, and host training sessions for data collectors and site educators. |   | Monthly feedback reports were provided to each ICU. The report included identified data for the ICU and de-identified data for the rest of the participating ICUs. |
| Zaydfudim, United States - 2009 | VAP | An electronic dashboard was designed to display real-time VAP compliance for each parameter. If the parameter was green then it was in compliance. If it was yellow then the parameter was soon due. If it was red then the parameter was not in compliance. The dashboard was the screensaver for all of the computers in the ICU. Compliance with dashboard parameters were reviewed twice daily at during rounds. Physician and nursing leadership received daily compliance reports. The VAP bundle had been initiated in January 2002 in this ICU, but had poor compliance and no change in VAP rates. The respiratory therapist team was in charge of performing spontaneous breathing trials. The sedation score goal was set by the critical care team. Bedside nurses were in charge of titrating the sedatives in order to achieve sedation score goal. Bedside nurses also implemented HOB elevation, oral care, and hypopharyngeal suctioning. |   | The dashboard allows for instant compliance feedback and ICU leadership were given daily compliance reports. |