Medical News

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CDC Recommendations and Ventilator-Associated Pneumonia

Manangan and coinvestigators, from the CDC's Hospital Infections Program, conducted a study to assess whether selected recommendations in the CDC "Guideline for Prevention of Nosocomial Pneumonia" were being used and having an impact on the occurrence of ventilator-associated pneumonia (VAP) at US hospitals. They surveyed hospitals participating in the National Nosocomial Infections Surveillance (NNIS) System by mailing a questionnaire to the infection control practitioner of each NNIS hospital (in 1995) and using data from the NNIS System to calculate annual rates of VAP.

Of the 188 hospitals surveyed, 179 (95%) returned completed questionnaires. Of these, 175 (98%) had implemented the recommended change of mechanical-ventilator breathing circuits at ≥48-hour intervals. Of 110 hospitals using the hygroscopic condenser-humidifiers or heat-moisture exchangers with ventilators, 102 (93%) changed the hygroscopic condenser-humidifiers or heat-moisture exchangers routinely; of 98 hospitals using bubbling humidifiers, 96 (98%) used sterile water to fill these humidifiers. The frequency with which NNIS hospitals have adopted other measures for which the CDC guidelines provide no recommendation includes use of hygroscopic condenser-humidifiers or heat-moisture exchangers (110/179 [61%]) and use of bacterial filters in anesthesia machines (128/171 [61%]). There was a significant decrease in the VAP rate from 1987 to 1998.

The authors concluded that most NNIS hospitals had implemented selected recommendations in the CDC "Guideline for Prevention of Nosocomial Pneumonia" before the final publication of the revised guideline. Further studies are needed to assess the impact of these recommendations on the occurrence of VAP.

FROM: Manangan LP, Banerjee SN, Jarvis WR. Association between implementation of CDC recommendations and ventilator-associated pneumonia at selected US hospitals. *Am J Infect Control* 2000;28:222-227.

Alcohol-Based Handwashing Agent Improves Hand Washing

Two recent studies, from the Saint Antoine Hospital in Paris,[1] and the Medical College of Virginia, Richmond,[2] showed increased compliance with hand washing following introduction of an alcohol-based handwashing agent.

Maury and colleagues, from the Departments of Critical Care Medicine and Microbiology, Saint Antoine Hospital, Paris, France, investigated whether rubbing with an alcohol solution increases compliance with hand disinfection in a medical ICU.[1] During period 1, hand disinfection was achieved only through conventional washing, whereas during period 2, hand disinfection could be achieved either through conventional washing or rubbing with an alcohol solution. There were 621 opportunities for hand disinfection during period 1 and 905 opportunities during period 2. General compliance during period 1 was 42.4% and reached 60.9% during period 2 ($P<.001$). This improvement was observed among nurses (45.3% vs 66.9%; $P<.001$), senior physicians (37.2% vs 55.5%; $P<.001$), and residents (46.9% vs 59.1%; $P=.03$). Acceptability and tolerance were evaluated through the answers to an anonymous questionnaire distributed to all 53 healthcare workers in the medical ICU.

Rubbing with alcohol solution was easy (100% of responses), and less than 10% of respondents experienced mild side effects. In a complementary study conducted 3 months after the first one, compliance remained better than during period 1 (51.3% vs 42.4%; $P=.007$). The findings suggest that using alcohol solution increases compliance with hand disinfection and that it could be proposed as an alternative to conventional hand washing in the medical ICU.

Bischoff and colleagues, at the Medical College of Virginia, studied the efficacy of an education and feedback intervention and a patient awareness program (cognitive approach) on handwashing compliance of healthcare workers. They compared the acceptance of a new and increasingly accessible alcohol-based waterless hand disinfectant (technical approach) with the standard sink and soap combination.[2] This 6-month observational study was done in one medical ICU, one cardiac surgery ICU, and one general medical ward located in a 728-bed tertiary-care teaching facility. The interventions were implementation of an education and feedback program for staff (six in-service sessions per each ICU) and a patient awareness program (with flyers), followed by a new, increasingly accessible, alcohol-based, waterless hand antiseptic agent, initially available at a ratio of one dispenser for every four patients and subsequently one for each patient. Hand washing was directly observed for over 120 hours and randomized for both time of day and bed locations.

Before any interventions, baseline handwashing compliance before and after defined patient contact events was 9% and 22% for healthcare workers in the medical ICU and 3% and 13% for healthcare workers in the cardiac surgery ICU, respectively. After the education and feedback intervention program, handwashing compliance changed little (medical

ICU, 14% [before patient contact] and 25% [after patient contact]; cardiac surgery ICU, 6% [before] and 13% [after]). Observations in the medical ICU after introduction of the new, increasingly accessible, alcohol-based, waterless hand antiseptic revealed significantly higher handwashing rates ($P<.05$). Handwashing compliance improved as accessibility was enhanced: before patient contact, 19%, and after contact, 41%, with one dispenser per four beds; and before contact, 23%, and after contact, 48%, with one dispenser for each bed.

The authors concluded that the education and feedback intervention and the patient awareness program failed to improve handwashing compliance. However, introduction of easily accessible dispensers with an alcohol-based waterless handwashing antiseptic led to significantly higher handwashing rates among healthcare workers.

FROM: 1. Maury E, Alzieu M, Baudel JL, Haram N, Barbut F, Guidet B, et al. Availability of an alcohol solution can improve hand disinfection compliance in an intensive care unit. *Am J Respir Crit Care Med* 2000;162:324-327.

2. Bischoff WE, Reynolds TM, Sessler CN, Edmond MB, Wenzel RP. Handwashing compliance by health care workers: the impact of introducing an accessible, alcohol-based hand antiseptic. *Arch Intern Med* 2000;160:1017-1021.

Heat-Moisture Exchangers and Risk of Nosocomial Pneumonia

Davis and colleagues, at the University of Cincinnati, studied the effect of using a single heat-and-moisture exchanger (HME) for ≤120 hours on the efficiency, resistance, level of bacterial colonization, frequency rate of nosocomial pneumonia, and cost compared with changing the HME every 24 hours. In a prospective, randomized, controlled study in a surgical ICU, the study population included 220 consecutive patients requiring mechanical ventilation for 48 hours. Patients were randomized to one of three groups: (1) hygroscopic HME (Aqua+) changed every 24 hours (HHME-24); (2) hydrophobic HME (duration HME) changed every 120 hours (HME-120); and (3) hygroscopic HME (Aqua+) changed every 120 hours (HHME-120). Devices in all groups could be changed at the discretion of the staff when signs of occlusion or increased resistance were identified.

Daily measurements of inspired gas temperature, inspired relative humidity, and device resistance were made. Additionally, daily cultures of the patient side of the device were accomplished. The frequency rate of nosocomial pneumonia was made by using clinical criteria. Ventilatory support variables, airway care, device costs, and clinical indicators of humidification efficiency (sputum volume, sputum efficiency) also were recorded.

Prolonged use of both hygroscopic and hydrophobic devices did not diminish efficiency or increase resistance. There was no difference in the number of colony-forming units (CFUs) from device cultures over the 5-day period and no difference between CFUs in devices changed every 24 hours compared with devices changed after 120 hours. The average duration of use was 23±4 hours in the HHME-24 group, 73±13 hours in the HME-120 group, and 74±9 hours in the HHME-120 group. Mean absolute humidity was greater for the hygroscopic devices (30.4±1.1 mg of H_2O/L) compared with the hydrophobic devices (27.8±1.3 mg of H_2O/L).

The frequency rate of nosocomial pneumonia was 8% (8:100) in the HHME-24 group, 8.3% (5:60) in the HME-120 group, and 6.6% (4:60) in the HHME-120 group. Pneumonia rates per 1,000 ventilatory-support–days were 20:1,000 in the HHME-24 group, 20.8:1,000 in the HME-120 group, and 16.6:1,000 in the HHME-120 group. Costs per day were $3.24 for the HHME-24 group, $2.98 for the HME-120 group, and $1.65 for the HHME-120 group.

The authors concluded that changing the hydrophobic or hygroscopic HME after 3 days does not diminish efficiency, increase resistance, alter bacterial colonization, or increase the rate of nosocomial pneumonia. Thus, use of HMEs for >24 hours, up to 72 hours, is safe and cost-effective.

FROM: Davis K Jr, Evans SL, Campbell RS, Johannigman JA, Luchette FA, Porembka DT, et al. Prolonged use of heat and moisture exchangers does not affect device efficiency or frequency rate of nosocomial pneumonia. *Crit Care Med* 2000;28:1412-1418.

Semiquantitative Culture of IV Catheter Without Removal

Sensitivity and negative predictive values of combined surface cultures (skin and hub) are high in the presumptive diagnosis of catheter-related infection, but specificity and positive predictive values (PPVs) are poor. Fortun and coinvestigators from Madrid, Spain, conducted a prospective study to evaluate the yield of the semiquantitative culture of the subcutaneous segment in the diagnosis of colonization of the catheter tip without removal of the catheter.

One hundred twenty-four nontunneled central venous catheters were removed because of suspected infection or the end of therapy. Colonization was considered if >15 colony-forming units (CFUs) in the roll procedure or >1,000 CFUs in the quantitative Cleri procedure were recovered from the tip cultures (gold standard). Before removing the catheter, a semiquantitative culture of skin surrounding the point of insertion, a semiquantitative culture of the subcutaneous segment (after removing the catheter only 2 cm), a semiquantitative culture of the hub, and a quantitative blood culture were performed. Receiver operating characteristic curves were calculated to estimate the cutoff points. A culture was considered positive when CFUs were ≥15, ≥15, and ≥5 for skin, hub, and subcutaneous segment cultures, respectively.

Colonization was detected in 51 catheters. The mean duration of catheterization was 14±8 days; the rates of incidence of tip colonization and bacteremia were 2.9 per 100 catheter days and 1.2 per 100 catheter days, respectively. Sensitivity of skin, subcutaneous, and hub cultures analyzed individually were ≤61%; however, specificity and PPVs of subcutaneous segment cultures were significantly higher than skin cultures (94% and 88.5% vs 71.6% [$P=.001$] and 62% [$P=.014$], respectively). Sensitivity of the combined skin and hub cultures and of the combined subcutaneous segment and hub cultures were similar: 86.2% and 84.3%, respectively; how-