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 \( \leq 120 \) 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+), (2) hydrophobic HME (duration HME), and (3) hygroscopic HME (Aqua+) also. Daily measurements of inspired gas temperature, inspired relative humidity, and device resistance were made. Additionally, 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.

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% [\( P=.014 \)]). 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-