Response to Society for Healthcare Epidemiology (SHEA) recommendations for ventilator-associated pneumonia (VAP)

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To the Editor—The Society for Healthcare Epidemiology (SHEA) published new recommendations to assist hospitals in prioritizing and implementing strategies to prevent ventilator-associated pneumonia (VAP) and ventilator-associated events (VAE) in adults, children, and neonates.[1] These new recommendations update their published 2014 preventions strategies,[2] and several recommendations have been added, removed, or changed.

According to the new guidelines, although subglottic secretion drainage (SSD) has been shown to lower VAP rates, there is insufficient evidence about its impact on the duration of mechanical ventilation, length of stay (LOS), mortality, and costs.[1] However, 2 recent meta-analyses have demonstrated that use of endotracheal tubes (ETTs) with SSD reduced VAP rates by 44%[3]–50%.[4] Further, routine use of SSD may reduce the risk of postoperative VAP in patients undergoing cardiac surgery, with those undergoing intraoperative continuous and postoperative intermittent SSD reporting a 70% reduction in the rate of postoperative VAP.[5]

Although these findings are very promising, they were not considered when reclassifying SSD recommendations in the new guidelines. Studies that have evaluated reductions in the duration of mechanical ventilation with SSD are limited to patients expected to require >48–72 hours of mechanical ventilation.[1] However, it is difficult to determine, at the time of intubation, which patients will remain on mechanical ventilation >48 hours.[6] Even so, a recent meta-analysis reported that SSD delayed time to VAP by 2.66–4.04 days.[4]

In regard to cuff material, the new guidelines contend that ultrathin polyurethane cuffs are inconsistently associated with lower VAP rates and have no, or negative, impact on duration of mechanical ventilation, LOS, or mortality.[1] The main reference used to make this determination was a study that reported that polyurethane cuffs did not reduce bacterial colonization or VAP compared with cylindrical PVC cuffs.[7] However, tracheal colonization was already present at the time of intubation in several patients, and determining whether the cuff influenced tracheal colonization in these patients was difficult.

Regarding ETT cuff shape, the guidelines suggest that tapered ETTs are inconsistently associated with lower VAP rates and have no, or negative, impact on duration of mechanical ventilation, LOS, or mortality.[1] The only referenced study for tapered cuffs is a meta-analysis that reported no difference in VAP rates or outcomes when tapered cuffs were used.[8] However, additional factors, including cuff underinflation, may influence risk of microaspiration over time. None of the included studies accounted for cuff-pressure management in the prevention of VAP. Underinflation, even when episodic, can lead to microaspiration of secretions regardless of cuff shape.[8] In previous research examining intraoperative aspiration and its association with postoperative pneumonia using dye above the cuff at time of intubation, the use of tapered-shaped cuffs had a protective role against aspiration (ie, no dye leaked into the trachea).[9] This publication was not cited in the new guidelines.

We understand that demonstrating that any of the mentioned ETT characteristics reduces mortality, LOS or days on ventilation, a sample size of thousands would be necessary for a single randomized controlled trial. The prevention of VAP and VAE is achieved through a bundled approach, with a variety of measures and interventions instituted at the same time to reduce the incidence of VAP and VAE. An evaluation of different strategies to reduce VAP and VAE reported that very high compliance rates, >90%, were significantly associated with reduction in VAP rates, with long-term compliance contributing to VAP rates close to zero.[10] No single characteristic of the ETT will result in significant reduction of VAP and VAE; however, neglecting the published information does not justify recommendations to not use the devices.

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Utilizing new subdefinitions to improve the identification of preventable central-line–associated bloodstream infections (CLABSIs)

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To the Editor—The Hospital-Acquired Conditions (HACs) Initiative in 2008 identified CLABSIs as preventable "never events" that would not be reimbursed by Medicare.[1] However, the National Healthcare Safety Network (NHSN) definition for CLABSI is broad and likely leads to overestimates of preventable CLABSIs.[2] This definition does not take into account patients who have unpreventable, noninfectious etiologies for bacteremia, such as advanced obstructive biliary malignancies.[3] We sought to evaluate the number of CLABSIs that were realistically preventable at our institution.

To accomplish this aim, 2 experienced infectious diseases physicians (D.Z.U. and A.dS.M.) reviewed all CLABSI cases that met standard NHSN definitions from 2019–2021 at the University of California, Los Angeles, which consists of 2 hospitals. Based on their expert opinions, CLABSIs were classified into 3 categories: (1) end-of-life CLABSIs (EOL CLABSIs), which were CLABSIs caused by underlying disease processes in patients who were at the end of their lives due to an advanced comorbidity; (2) definition-based (dCLABSIs), which met the NHSN definition for a CLABSI but, based on the pathogen and the clinical situation, were related to factors unrelated to end of life or the patient's central line; and (3) preventable CLABSIs (pCLABSIs), which met the standard NSHN criteria for CLABSI and were not considered EOL CLABSI or dCLABSI. Definitions and examples are provided in Table 1. We performed χ^2 tests to compare categorical variables between the 3 types of CLABSIs. Data were stored and analyzed using Microsoft Excel software (Microsoft, Redmond, WA).

From 2019 to 2021, 147 CLABSIs occurred at our institution. Among them, 100 (68.0%) were classified as pCLABSIs; 20 cases (13.6%) were EOL-CLABSIs; and 27 cases (18.4%) were dCLABSIs. Overall, 66 CLABSIs (44.9%) occurred in an intensive care unit (ICU) setting, and there was no difference in the distribution of CLABSI types in an ICU versus non-ICU setting ($P = .130$). EOL-CLABSIs were significantly more likely to have had an underlying malignancy ($P = .016$), comprising 12 (60.0%) of the 20 cases, compared to 34 (34.0%) of 100 pCLABSI cases and 5 (18.5%) of 27 dCLABSI cases. Additionally, patients with EOL-CLABSIs were significantly older (median age, 68 years; interquartile range [IQR], 56–80) compared to pCLABSIs (median age, 54 years; IQR, 29–65), or dCLABSIs (median age, 53 years; IQR, 19–66).

We detected a microbiologic difference between pCLABSIs, EOL-CLABSIs, and dCLABSIs ($P < .001$) as well. Most pCLABSIs were due to gram-positive cocci (GPC, 63.0%), followed by *Candida* spp (24.0%) and gram-negative bacilli (GNR, 11.0%). Of the GPCs in pCLABSIs, 28.6% were due to *Staphylococcus aureus*. In comparison, GNRs were >3 times more prevalent in EOL-CLABSIs and dCLABSIs. GNRs were the most common organisms found in dCLABSIs (40.7%), and *Candida* spp (50.0%) were the most common in EOL-CLABSIs. Only 20.0% of EOL-CLABSIs and 22.2% of dCLABSIs were due to GPCs; none of these were from *Staphylococcus aureus*.

Using these proposed subgroups for defining CLABSIs, only ~66% of CLABSIs were preventable. The pCLABSI distinction is important. The inability of the CLABSI definition to discriminate causes and risk factors for bloodstream infections likely contributes to a "ceiling effect" in quality improvement. This false sense that a quality measure has been optimized may prevent further efforts toward improvement.[4] Furthermore, some patients with chronic central lines, such as those on total parenteral nutrition for short-bowel syndrome, may have unmodifiable risk factors for recurrent bloodstream infections that will repeatedly contribute to CLABSI rates, even with aggressive prevention strategies.[5] As central-line care optimizes over time, more difficult-to-prevent CLABSIs, such as those identified with the dCLABSI and EOL-CLABSI subgroups, will start to overshadow pCLABSIs, making it increasingly difficult to demonstrate the importance of infection prevention or observe statistical differences when studying novel prevention techniques.[6] Additionally, frontline clinical staff, such as bedside nurses, may feel significant pressure from leadership each time a CLABSI occurs, when a proportion of CLABSIs may not actually be preventable.

The EOL-CLABSI subgroup, in particular, highlights the number of CLABSIs that were diagnosed at the end of a patient's life,

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