Prevention of ventilator-associated pneumonia in the cardiothoracic intensive care unit: Back to basics

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Ventilator-associated pneumonia (VAP) is the most common nosocomial infection that occurs after heart surgery and is associated with significant morbidity and mortality. He and colleagues performed a contemporary meta-analysis summarizing the prevalence, cause, risk factors, and outcome of VAP after cardiac surgery. Results showed that the prevalence of VAP after cardiac surgery was 6.37%, and that the risk of mortality increased 15-fold in patients with VAP. Several important risk factors associated with VAP were further identified. This study highlights the scope and significance of VAP after cardiac surgery and should redirect attention to basic strategies for VAP prevention.

CLINICAL SUMMARY

VAP is the most common nosocomial infection that occurs after heart surgery and is associated with significant morbidity and mortality. He and colleagues performed a contemporary meta-analysis and literature review of the prevalence, cause, risk factors, and outcome of VAP after cardiac surgery, described in the current issue of the Journal. The study is of high-quality and sound statistical design, and the data effectively summarize the benchmark rates of VAP, responsible pathogens, risk factors for VAP, and impact of VAP on patient outcomes.
Although the results of this exercise are not entirely novel or new, the information presented should be read with interest by the cardiothoracic surgical community. The overall prevalence of VAP after cardiac surgery was 6.37%, but reached 35.2% in patients receiving mechanical ventilation for more than 48 hours. Causative organisms were shown to be *Pseudomonas aeruginosa* or *Staphylococcus aureus* in the majority of cases. Several risk factors were found to be associated with VAP, including preoperative pulmonary disease or other end-organ dysfunction, emergency surgery, intra-aortic balloon pump use, cardiopulmonary bypass time, aortic crossclamp time, mechanical ventilation time, reintervention, and reintubation. Of note, many of these risk factors may be modifiable in the perioperative period. The clinical consequence of VAP was profound: the risk of mortality increased 15-fold and the mean intensive care unit (ICU) length of stay increased 23-fold in patients diagnosed with VAP.

Although the synthesis of several studies into a meta-analysis did not demonstrate any major new prevention or treatment strategies for VAP, the analysis remains timely and important because it reminds us of the scope and significance of VAP after cardiac surgery and should redirect attention to institutional and national guidelines for VAP prevention. At a time when the academic engines of the cardiothoracic community are directed primarily toward the design and optimization of new technologies and emerging therapeutic avenues for the treatment of surgical heart disease, VAP remains an old foe and a quiet killer of patients that should not be forgotten. Prevention of VAP should thus retain an important share of our attention.

Fortunately, several comprehensive guidelines exist to inform the critical care community on best practices for the prevention and treatment of VAP.2,3,4 including an update from the American Thoracic Society published in 2005.5 The problem of VAP can be divided into prevention, diagnosis, and treatment, with prevention being the critical component because treatment of VAP is limited and outcomes are generally poor. However, the key facets of VAP prevention are relatively simple and should be familiar to surgeons and ICU practitioners: These include basic infection control measures, such as hand washing and isolation precautions to prevent the spread of resistant organisms; use of sedation holidays, breathing trials, and standardized protocols to expedite extubation and reduce the duration of mechanical ventilation; semi-recumbent (30°-45° upright) patient positioning; deep venous thrombosis and stress ulcer prophylaxis; oropharyngeal decontamination; and judicious endotracheal tube and respiratory circuit care.

Given that guidelines for VAP prevention are well established and predicated on basic infection control and respiratory care practices, it is somewhat vexing that VAP remains a pervasive clinical problem. Unfortunately, multiple studies have shown that best-practice guidelines proven to prevent VAP are inconsistently followed.5 A single-day study of practice patterns in European cardiac ICUs found poor compliance with basic VAP prevention guidelines and reported that 33.5% of ventilated patients were not maintained in a semi-recumbent position, among other deficiencies.7 Another study similarly estimated that physician adherence to VAP prevention measures varied between 20% and 100% in general ICUs.8 In keeping with this theme, Jacobs and colleagues9 recently queried the Society of Thoracic Surgeons database to examine variation in postoperative ventilation time among patients undergoing isolated coronary artery bypass grafting. Results showed that ventilation times varied approximately 2-fold between participating centers, and this variation could not be attributed to differences in patient characteristics.9 Given that the duration of mechanical ventilation is perhaps the most important contributor to VAP, variation in ventilation time after heart surgery also may lead to variation in rates of VAP. If so, standardization of extubation procedures after heart surgery may represent a major quality improvement opportunity for VAP prevention.9

CONCLUSIONS

Although unglamorous and occasionally overlooked, VAP prevention measures are cheap and simple but require careful attention to detail and a “back to basics” approach in the cardiothoracic ICU. Given that cardiac surgeons continue to oversee or provide the majority of critical care services for our patients, it is important that we remain meticulous enforcers of VAP prevention and champions of quality improvement in our ICUs. The present study by He and colleagues1 reemphasizes the continued importance of this responsibility.

References