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Infections, particularly pneumonia, in patients in the Intensive Care Unit (ICU) are common and are associated with significant mortality (Alberti et al., 2002; Heyland et al., 1999a). Patients with different types of lower respiratory tract infections may be managed in the ICU, including those with severe community-acquired pneumonia (CAP), hospital-acquired pneumonia (HAP), healthcare-associated pneumonia (HCAP) and ventilator-associated pneumonia (VAP) and thus the range of pathogens that may be associated with these infections is vast (El-Solh et al., 2001; Heyland et al., 1999a,b; Reimer and Carroll, 1998; Rello et al., 2003). In most ICUs, much effort is placed on the diagnosis and treatment of bacterial agents causing pneumonia with very little effort being placed on the detection and management of viral agents except in specialized situations (ATS/IDSA, 2005). In fact, recent guidelines have suggested that the incidence of HAP and VAP due to viruses is low in immunocompetent hosts although outbreaks of HAP, VAP and HCAP due to viruses have been reported (ATS/IDSA, 2005). Thus little emphasis has been placed on trying to make a viral diagnosis. To some extent the perception that viruses are uncommon in this setting is due to the difficulty in detecting such agents in the clinical microbiology lab and the lack of available treatment for most viruses causing infections of the respiratory tract (Holladay and Campbell, 1995). However, the development of molecular diagnostic techniques such as the polymerase chain reaction (PCR), particularly when it can be multiplexed to detect multiple different viruses in a single reaction, has the potential to provide new insights into the epidemiology and management of patients with pneumonia in the ICU setting (Mahony et al., 2007). As many as 30% of bronchoalveolar lavage (BAL) specimens and 63% of bacteria-negative BALs collected from adult patients with acute pneumonia in an intensive care unit may be positive for respiratory viruses (Legoff et al., 2005). The rates may be even higher in children (Stratiolitto et al., 2004). Others have suggested that despite finding a respiratory virus in 25% of the tracheobronchial aspirates collected from patients ventilated for more than 48 hours, nosocomial viral VAP is likely to be rare in the ICU (Daubin et al., 2005).

Because of their greater sensitivity over traditional laboratory techniques, these assays can detect viruses that previously would have been missed and can thus help re-define the spectrum of disease and contribution these agents have to the morbidity and mortality of patients in the ICU. Traditional viral techniques such as culture, antigen detection and immunofluorescence staining have the capability of detecting agents such as influenza viruses A and B, respiratory syncytial virus, parainfluenza viruses, and adenovirus. Molecular techniques have expanded the range of viruses that can be rapidly detected in the laboratory including many newly identified agents such as human metapneumovirus, bocavirus, coronaviruses and others (Mahony et al., 2007). Molecular techniques may also aid in preventing nosocomial spread of these viruses within the ICU by allowing for the appropriate infection control measures to be implemented quickly once an agent is identified. Some molecular assays can also subtype viruses which can help in determining the relatedness of strains during an epidemiological outbreak investigation.

Although these assays have the potential for reducing unnecessary antibiotic use and overall costs associated with managing patients, this was not the case in a recent study of patients admitted to hospital for the management of their lower respiratory tract infection (Oosterheert et al., 2005). In this study, Osterheert et al. showed that although the use of real-time PCR for the detection of viral and atypical bacterial pathogens in patients with lower respiratory tract infections increased the diagnostic yield considerably, it did not reduce the number of diagnostic procedures, antibiotic use, length of hospital stay or costs (Oosterheert et al., 2005). This likely reflected the fact that clinicians were reluctant to change their clinical management based on the results of the PCR test and preferred to continue antibiotics because of concerns of missing a bacterial agent. The increased use of molecular diagnostic techniques may actually result in increased costs, not only because these
tests are relatively expensive, but also because a positive result (e.g. influenza virus) may lead to the addition of an antiviral agent such as oseltamivir, rather than a replacement of a patient’s current antibiotic regimen. This is based on the well-recognized association of co-infection with bacteria and viruses in the respiratory tract (de Roux et al., 2004). If this can be shown to improve clinical outcomes, then the added cost may well be worth it.

Studies using rapid, but less sensitive tests such as direct immunofluorescence assays (DFA) and antigen detection assays for the diagnosis of respiratory viruses have suggested that these tests can have significant impact on decision-making, antibiotic use and overall costs (Barenfanger et al., 2000; Bonner et al., 2003; Byington et al., 2002; Sharma et al., 2002). Most of these studies, however, have been done in infants and children in the emergency department, outpatient setting or hospital ward. Similar studies are needed using the newer multiplex molecular assays in the ICU setting to determine if the same potential benefits can be achieved in this sicker and more complex patient population.

Another issue with the use of multiplex assays for the detection of respiratory viruses in the ICU is the seasonality of these agents. Studies looking at the optimal time when these assays should be performed are needed. It will take some time and more research before clinicians are comfortable in using the results of these assays to modify their decision-making and management strategies in the ICU. At the moment, guidelines for the management of CAP, HAP, HCAP and VAP have not recommended the routine use of molecular techniques for the detection of viruses because of the lack of information on their clinical utility (ATS/IDSA, 2005; Mandell et al., 2007). This could change if well conducted studies can demonstrate the benefits of these assays in the ICU setting and clinicians are educated regarding their use.

Conflict of interest statement

None declared.

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