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Infectious Diseases Specialist Consultation in the Intensive Care Unit: Worth the Money?

Particularly in an intensive care unit setting, patients admitted with or developing infection during their stay are at increased risk for adverse outcomes, unless presence or onset of infection is diagnosed early and appropriate antibiotics are administered promptly. This brief overview will elaborate on the contributing role of infectious diseases specialist consultation in achieving the aforementioned goals.

Introduction

It is acknowledged that the presence of infection, in particular when the pathogen is multidrug resistant, is a key outcome determinant for critically ill patients (Blot 2008; Depuydt et al. 2008). Two major factors: Early diagnosis and administration of appropriate antibiotics can significantly influence infection prognosis. Conversely, delayed recognition and initial inappropriate treatment are associated with adverse outcomes, including attributable mortality (Vandijck 2008; Blot and Vandewoude 2004). As part of a bundle approach, routine microbiologic surveillance cultures, introduction of antibiotic practice recommendations, and infectious diseases specialist consultation may contribute to achieving prompter diagnosis and appropriate antibiotic treatment of infections.

Establishing an Infectious Diseases Consultation Programme in the ICU

In general, there are different main ways to establish an infectious diseases consultation strategy in an ICU. First, as in our hospital (Ghent University Hospital, Belgium), the attending intensive care physician is able to contact the infectious diseases specialist at any time in conjunction with weekly multidisciplinary meetings attended by the ICU medical team, infectious diseases specialists and microbiologists. A second approach consists of consultation by an infectious diseases consultant, or an attending intensive care physician's request, according to need. Third and lastly, a strategy in which the infectious diseases specialist provides regular advice without any specific request from the attending intensive care physician is possible, considering that more than half of patients suffering critical illness receive at least one antibiotic during their stay in the ICU (Warren et al. 2005).

Impact of Infectious Diseases Specialist Consultation in the Intensive Care Unit

Microbiologic surveillance culturing strategies in patients suffering critical illness have been demonstrated to contribute to improved outcome by increasing knowledge of patients colonisation status, earlier diagnosis and consequently more appropriate choice and timing of antibiotic treatment (Blot et al. 2005; Depuydt et al. 2008a; Rello et al. 1997).

In contrast, few studies have evaluated the potential impact of infectious diseases specialist consultation on the management of patients admitted to the ICU. Raineri et al. investigated all patients suffering critical illness with a possible or definite diagnosis of infection, that received antibiotic therapy in a four year period, and assessed appropriateness of the administered therapy before and after the implementation of a systematic infectious diseases specialist consultation policy (Raineri et al. 2008).

The number of appropriately treated infections increased from 68.8% to 83.7% ($P < 0.001$) when comparing the period before and after implementation of their programme. After introduction of the infectious diseases specialist consultation programme, a significant reduction in the proportion of untreated infections (11.2% vs. 3%, $P = 0.001$), and of inappropriate drug choice (9.8% vs. 2.5%, $P = 0.003$) was observed.

Compliance to local empirical antibiotic recommendations increased from 63.4% to 83.8% ($P < 0.001$), as well as the number of patients who were administered appropriate antibiotics (from 63.8% to 80.8% ($P < 0.001$)).

In the subgroup of appropriately treated patients, significantly shorter duration of antibiotic treatment ($P < 0.001$), mechanical ventilation ($P < 0.001$), ICU stay ($P < 0.001$), and lower ICU (23% vs. 36%, $P = 0.01$), and crude hospital mortality (29% vs. 44%, $P = 0.006$), were demonstrated (Raineri et al. 2008).

These findings confirm other studies investigating the impact of an infectious diseases specialist consultation programme on patient outcomes. Gomez et al. found that the implementation of such a strategy resulted in a significantly increased proportion of appropriate first-line treatments, as well as an increase in correction of first-line inappropriate treatments (Gomez et al. 1996). Two other reports observed that the implementation of an infectious diseases consultation strategy resulted in a higher number of patients receiving appropriate antibiotic treatment (Byl et al. 1999; Nathwani et al. 1996). In the former report by Byl et al. who performed a hospital wide evaluation of patients with community vs. nosocomial-acquired bloodstream infection, a higher degree of appropriate initial empiric antibiotic therapy in the latter group was found when comparing prescriptions of infectious diseases specialists vs. other physicians. Also, significantly lower mortality was found, however, not in the subgroup of

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patients with septic shock due to small sample size (Byl et al. 1999). Fowler et al, who studied a cohort with *Staphylococcus aureus* bacteraemia, reported that patients were more likely to receive appropriate treatment and were less likely to relapse when advice given by the infectious diseases specialist was followed, although more metastatic infections were present at onset (Fowler et al. 1998). An improvement in diagnosis of infection was also obtained through an infectious diseases consultation programme and a prospective microbiologic surveillance strategy in patients admitted to a trauma ICU (Fox et al. 2001). Infectious diseases specialist consultation was associated with 49% higher odds than a diagnosis of infection based on microbiology, and a 57% reduction of antibiotic-related expenditures per hospitalisation day in patients admitted to a medical ICU. The surveillance strategy contributed to both, better identification of patients colonisation status, and high rates of early appropriate antibiotic therapy with more limited use of broad-spectrum antibiotics (Depuydt et al. 2008a).

Critical Appraisal

The available literature demonstrates that the interaction between the infectious diseases specialist and the attending intensive care physician may improve diagnosis of infection and subsequent administration of appropriate antibiotics. Also, an infectious diseases consultation programme may help reduce the duration of antimicrobial therapy, through reassessment of indication. Furthermore, this interaction is associated with more favourable clinical and economic outcome in terms of improved survival rates, and a reduction of resources use including shorter length of stay in both the ICU and hospital, shorter duration of high technological supportive therapy, and decreased consumption of antibiotics, which benefits not only the individual patient but also the collective of patients within the healthcare institution, from an ecologic perspective, through reduced selection and spread of antimicrobial resistance.

It can be argued that the necessary interactions between both disciplines, i.e. infectious diseases and intensive care specialists, is not feasible in all centres because of resource constraints. However, in our opinion, infectious diseases specialist consultation may be cost-effective because the reduced administration of antibiotics and decreased infection-related comorbidities/ therapies counterbalance the extra financial expenses associated with an infectious diseases specialist's time and diagnostic prescription (Vandijck et al. 2008). Additionally, potential future savings because of reductions or control of multi-drug resistance secondary to reduced broad-spectrum antibiotic use should also be taken into account. These issues should be investigated further.

Conclusion

The implementation of an infectious diseases consultation programme may lead to earlier diagnosis of infections, improve the appropriateness of the antibiotic treatment prescription, reducing antimicrobial therapy duration, and the adherence to local antibiotic recommendations. In turn, appropriate therapy is associated with improved patient outcome and may contribute in lowering infection-related costs.

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