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Hospital-acquired Infection

Editorial Comment

Healthcare-associated infections: new challenges looking for answers

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Abstract

Nosocomial transmission of multiresistant bacteria is a growing healthcare issue. In addition, new pathogens and pathogenic mechanisms, associated with therapies based on the use of live microorganisms, can be of importance in the near future. The current issue of CKJ illustrates healthcare-associated infections that go beyond common bacteria. First, the therapeutic use of live BCG mycobacteria is not without risks in the chronic kidney disease patients. Familiarity with these complications will allow their rapid recognition and optimized management. Second, strict adherence to universal precautions and healthcare guidelines is still mandatory in order to avoid undesirable risks such as transmission of hepatitis B virus.

Keywords: BCG; bladder cancer; hepatitis; nosocomial infection; peritoneal dialysis

Since the early days of medicine, infection associated with medical procedures has been a constant companion. Throughout the 19th century, the discovery of microorganisms and their importance in infection led to the introduction of practices aimed at minimizing the risk of infection, notably the introduction of antisepsis by Lister, and the description of the importance of handwashing by Semmelweis. These measures, together with the introduction of antibiotics and vaccines, achieved a dramatic decrease of healthcare-associated infections during the last decades of the 20th century. However, new problems appeared, as organisms became antibiotic-resistant and multidrug-resistance spread throughout the world [1]. The fight against antibiotic-resistant organisms rediscovered the importance of classical universal measures to prevent their spread, notably the use of handwashing as the key procedure in all protocols [2]. However, in recent years, the introduction of new therapeutic procedures, and the recognition of the importance of non-bacterial pathogens as a cause of healthcare-associated infections, has both generated new challenges and reminded of the need for universal precautions.

In this issue, Kliner *et al.* [3] report a case of hepatitis B virus contagion in an inpatient renal ward. Hepatitis B has been considered a major risk among haemodialysis patients and healthcare workers since the early times of the technique. Recommendations and guidelines stress preventive measures in dialysis units [4–7], including serological testing before starting chronic dialysis and monitoring thereafter, vaccination of all patients and healthcare personnel, physical separation of hepatitis B virus dialysis monitors and universal precautions. Vaccination is currently recommended for all chronic kidney disease patients [7] and has a rate of protection higher than 70% [4]. However, it should be reminded that a high vaccine dose is required, as well as annual post-vaccination serology follow-up and booster vaccinations if needed. In the case of infection, serological markers become positive a few weeks after contagion. The published case illustrates the need for a full epidemiological work-up in the case a recent hepatitis B infection is diagnosed. Thus, careful research following a new case of hepatitis B virus infection uncovered many failures, including poor vaccination status of patients and many violations of universal infection control measures, such as poor hand hygiene and visible contamination of blood glucose testing equipment [3]. It was concluded that patient-to-patient transmission was likely to have occurred on the renal ward due to multiple failures in infection control. The lesson to be learned is that, despite the existence of an effective vaccine, no relaxation with universal precautions should be allowed, because a false safety sensation can lead to a potential disaster. In this regard, potential transmission of hepatitis B virus is not limited to haemodialysis units. Since there is no vaccine for other blood-transmitted diseases, such as HIV or hepatitis C, strict adherence to universally recommended measures must be mandatory in the management of all patients even for those immune to hepatitis B virus [6].

Iqbal *et al.* [8] illustrate another uncommon cause of healthcare-associated infection, the development of infection secondary to the use of a live microorganism (*Mycobacterium bovis* BCG strain) as an immunomodulator for the treatment of bladder carcinoma. *Mycobacterium bovis* BCG was originally developed as a vaccine against tuberculosis, but has been used recently as an inducer of an inflammatory response that leads to destruction of bladder cancer cells. Since *M. bovis* BCG is a live—although attenuated—organism, there is always a risk of development of a disease that can be as severe as disseminated tuberculosis [9]. To treat BCG infections, it should be remembered that, like all *M. bovis* strains, BCG is always resistant to pyrazinamide, but susceptible to all other first-line antituberculous drugs. The peritoneum is a site of mycobacterial infection in peritoneal dialysis patients [10]. Tuberculous peritonitis may present as repeated peritonitis episodes in which usual peritonitis-inducing bacteria may grow, thus delaying the diagnosis. This is troublesome since late diagnosis and therapy is associated with adverse outcomes, including death. This preference of mycobacterial infection or reactivation for the peritoneal cavity points to a local immune deficient state. Indeed, components of peritoneal dialysis solutions, such as the glucose degradation product 3,4-dideoxyglucosone-3-ene (3,4-DGE), promote death and dysfunction of leukocytes [11–14]. Indeed, 3,4-DGE was originally described as an immune suppressant derived from seaweed [15]. Peritoneal dialysis patients also develop biofilms over the peritoneal dialysis catheter. Biofilms may impact the efficacy of therapy, since they increases the antimicrobial resistance of the embedded organisms. Although biofilm has a minor role in mycobacterial infection, the relevance of this pathogenic mechanism will increase in the near future, because of the increasing number of patients with implants and biomaterials [16, 17].

This healthcare-associated infection opens the field of problems associated with the use of live organisms as part of the treatments for different diseases, even infections. Research into the use of probiotics and/or live intestinal microbiota to treat conditions such as *Clostridium difficile*-associated diarrhoea [18] is likely to grow. Thus, recent research emphasizes the importance of gut organisms in the development of different diseases [19–21], and this issue may be approached through live bacteria therapy. These procedures may lead to the development of infectious complications, as it is the case with the BCG strain, so we should be prepared to identify and correct them early in order to avoid more severe problems.

The fight against healthcare-associated infection is an endless one. In this sense, the development of new therapeutic and diagnostic procedures (some of them involving the use of live microorganisms) will be followed by the description of infectious complications. As they are described, dissemination of knowledge about these complications may allow early identification, implementation of preemptive measures and therapy that limits morbidity and mortality. Until then, remember to wash your hands frequently and disinfect potentially blood-stained surfaces, because these are still the main and most important measures to fight healthcare-associated infections.

Conflict of interest statement. None declared.

(See related article by Kliner *et al.* Identification, investigation and management of patient-to-patient hepatitis B transmission within an inpatient renal ward in North West England. *Clin Kidney J* (2015) 8: 102–106.)

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