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Guest editorial

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Principles of infection prevention are notoriously difficult for healthcare workers to grasp and to apply consistently in practice. Moreover, the interpretation of these principles within policies and practice guidelines is not always clear or presented in ways to enable ready application to practice. Often a guideline statement can generate more questions than it resolves. Take, for example, infection prevention guidelines on contact isolation precautions. This topic has generated huge controversy over the years as the underpinning evidence base is limited and ambiguous.

Contact precautions require hand hygiene and the wearing of personal protective equipment (PPE), usually gloves and an apron or gown, for all contact with the infectious patient and their environment. In contrast, the standard infection prevention precautions applied to all patients requires, in addition to hand hygiene, a more selective approach to use of PPE depending on the activity being undertaken. The indiscriminate use of PPE as part of contact precautions implies that standard precautions cannot be relied upon to reduce risks for transmission of potentially infectious organisms. For healthcare workers, this has the potential to undermine the value of hand hygiene, which is paradoxical, since it is so often declared to be the ‘single, most effective’ infection prevention measure. And yet, quite understandably, healthcare workers question this, deducing that hand hygiene cannot be all that effective, otherwise there would not be a need to wear gloves all of the time. In recent years there has been a huge increase in unnecessary glove use in healthcare, which can increase rather than decrease the risk of transmission of infection when gloves are not removed at the points in care when hand hygiene is indicated (Wilson et al., 2015).

It was back in 1996 that the Hospital Infection Control Practices Advisory Committee (HICPAC) in the USA first introduced the concept of contact precautions as part of a major review and update of its guideline for isolation precautions. At that time, Jackson and Lynch drew attention to the difficulties with a two-tiered system of infection prevention precautions. They suggested that the recommendation to use contact precautions perhaps had more to do with the problem of poor adherence to standard precautions and

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'the unstated belief that, if staff are going to be lax with precautions, it is better to be lax with organisms that aren't known to do bad things to patients' (Jackson and Lynch, 1996: 204).

Two decades on this debate is still unresolved and it will remain so until more attention is paid to the situational and contextual factors that influence practice. In particular, we need to better understand how healthcare workers make sense of the infection prevention precautions they are required to take and what else shapes their actions, other than the facts and rationales given in practice guidelines. My own attempt to do this in relation to contact precautions was published in this journal a decade ago (Prieto and Macleod Clark, 2005). The study investigated how nurses and healthcare assistants implemented contact precautions for methicillin-resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile* associated diarrhoea. It revealed there was huge confusion and conflict amongst participants about the correct way to do this, due in part to their misconceptions and irrational beliefs about how infection is spread and the measures required to prevent spread. This was further compounded by anxiety about the personal risk of exposure to infection. Efforts to improve practice were only partially successful as individuals varied in their ability and willingness to accept scientific rationales as the basis for practice.

Part of the challenge is the invisibility of micro-organisms, which makes them difficult to conceptualise, thereby generating uncertainty. As Jenner and colleagues (1999) observed,

The invisibility of germs can result in a lack of a good mental model of what is happening at the microscopic level. (Jenner et al., 1999: 95.)

This can result in inappropriate practice, be it a lapse in hygiene, an unnecessarily elaborate precaution or both. Facts about micro-organisms, how they are spread and ways to prevent infection cannot always be reconciled with people's own beliefs, perceptions of risk, emotions, trust of information and sense of control or lack thereof. This would explain why improved knowledge of infection prevention principles does not in itself lead to improved practice. It also helps to explain why consistent adherence to infection prevention practice is problematic, as healthcare workers' own assessments and interpretations of risk vary in different situations and contexts, as does their practice.

So what can we do about all of this? We certainly need to find more creative ways to visualise micro-organisms and demonstrate risk. A multidisciplinary group in Scotland, including designers, an artist, a nurse and microbiologists, investigated how nurses, domestic staff and patient representatives envisage pathogens in relation to preventing and controlling healthcare-associated infections (Macduff et al., 2013). An interesting finding was that visible dirt was an important cue for action, such as changing linen or cleaning. Whereas for *C. difficile* infection, diarrhoea with its distinctive smell was a symptom that made infection tangible, this was not the case for a patient colonised with MRSA, as there is nothing to actually see. The exact same comments were made in my own study of contact precautions, with nurses explaining how they experienced difficulty when deciding on the appropriate infection prevention measures to employ for MRSA because they were unable to 'see' the effect of their actions, whereas they considered *C. difficile* easier to make sense of due to the visible symptom of diarrhoea.

Given the complex nature of infection prevention behaviours in healthcare, it is clear that we need an interdisciplinary approach to help find new solutions. Novel directions may come to light when clinicians and educators work together with other disciplines. In so doing, we may better explicate our relationship with micro-organisms, including so-called 'friendly' bacteria and hostile foes, so that clinicians and others can discern how best to respond.

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