Ergonomics and infection outbreaks

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For most of us in the UK the last few months have been dominated by Government and media reports about the Swine Flu pandemic. Many people will have thought over the consequences of a mass outbreak, particularly those of us with young children or elderly relatives. Not that long ago the subject of hospital-based infections such as *Clostridium difficile* and MRSA was the focus of huge amounts of attention from the newspapers and television.

At first sight infection outbreaks might be thought of purely as a medical or microbiological matter and not a subject to interest ergonomists. In reality quite a lot of recent work, particularly within the domain of systems ergonomics, has sought to explain the underlying factors leading up to infection outbreaks. The aim of this short article is to describe some work focusing on a specific hospital-based infection outbreak which occurred at the Maidstone and Tunbridge Wells NHS Trust between 2005 and 2007. A second aim is to demonstrate the value of using a systems ergonomics approach in order to analyse infection outbreaks and help prevent their occurrence.

The outbreaks which occurred within the Maidstone and Tunbridge Wells Trust represent the combined impact of a complex set of factors extending over several years. In common with most examples of accidents, disasters or large-scale adverse events, the outbreaks are best interpreted as arising through the combination of a number of interrelated systemic factors and influences.

At the very highest level of the system, Government-set targets placed many individuals, particularly those at Trust board and management levels under a great deal of pressure. This pressure in itself may have led them to make purely as a medical or microbiological matter and not a subject to interest ergonomists. In reality quite a lot of recent work, particularly within the domain of systems ergonomics, has sought to explain the underlying factors leading up to infection outbreaks. The aim of this short article is to describe some work focusing on a specific hospital-based infection outbreak which occurred at the Maidstone and Tunbridge Wells NHS Trust between 2005 and 2007. A second aim is to demonstrate the value of using a systems ergonomics approach in order to analyse infection outbreaks and help prevent their occurrence.

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together played a part in the outbreaks. Staffing ratios and levels of staff morale almost certainly contributed to the problem of containing the spread of infection on the wards. In general, the research literature provides some evidence that lower levels of staffing increase the likelihood of infections occurring. For example, researchers have found an inverse relationship between staff downsizing and the rate of hospital-based infection. Curiously, little research has been conducted on the impact of job satisfaction/morale on hospital infection levels. However, findings from other domains (e.g. manufacturing and service industries) suggests that lower levels of satisfaction are clearly linked to lower levels of job performance.

Finally, it might be conjectured that the behaviour of clinicians and other health care professionals within the Trust shares similarities with those of senior managers and Trust board managers. Many individuals at ward level were aware of the poor hygiene and inadequate patient monitoring practices but saw no way to improve the situation. Karl Weick and Kathleen Sutcliffe analysed data from the Bristol Royal Infirmary Report and concluded that hospital staff became locked into particular lines of action or behaviour where they “search for confirmation that they are doing what they should be doing”. These so-called ‘cultures of entrapment’ inhibit an organisation’s ability to break out of patterns of behaviour that, over time, can lead to adverse outcomes.

Many of the issues that have been described in this article have not been researched in much depth within infection control, particularly organisational and managerial behaviour. Most research, alongside interventions designed to improve infection control and limit outbreaks, has focused on individual levels of analysis (e.g. hand hygiene). As a result we are currently in danger of only seeing one part a much larger picture. Adopting a systems approach is one step towards filling in the missing details, particularly as they relate to causal relationships that may exists between system levels such as the interaction between management styles, aspects of hospital design and individual behaviour (e.g. hand washing), and outcomes (e.g. infection rates).

Preventing and minimising the risk of infection outbreaks is likely to be a huge challenge for the future. In order to meet this challenge ergonomists will need to work alongside healthcare professionals and managers, organisational psychologists and other groups e.g. hospital architects, microbiologists and infection control experts. Much remains to be done. However, adopting a systems perspective represents a promising way of mapping out areas worthy of further investigation, as well as scoping the nature of interventions designed to prevent the spread of infections.