Outbreak Column 20: are outbreaks man-made disasters that display intertwined errors of human judgement and behaviour?

Evonne T Curran

Abstract

Man-made disasters are reported to have five intertwined errors of human judgement and behaviour. As outbreaks are essentially man-made disasters, the cited intertwined errors of engineering overreach, smooth sailing fallacy, insider view, risk-seeking incentives and social-herding were looked for in five notable outbreaks of *Clostridium difficile* infection. Engineering overreach was found to be the most identifiable error. The purpose of this reflective exercise was to turn hindsight into foresight and determine the intertwined levels of safety behaviour needed to prevent any future pathogen emerging to produce healthcare disasters.

Keywords

Behaviour, outbreak, error

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Introduction

‘This disaster – and many other man-made disasters – was the result of five intertwined errors in human judgement and behaviour.’ (Rumelt, 2011)

Clostridium difficile infection (CDI) emerged from case reports in the 1970s to become one of the most significant nosocomial pathogens in the 2000s (Rupnik et al., 2009). Between 2003 and 2008 there were several notable outbreaks in the UK and worldwide (He et al., 2013; Healthcare Commission, 2006, 2007; MacLean, 2014; Regulation and Quality Improvement Authority, 2008). The current guidance, surveillance and controls in place make the re-emergence of this pathogen to its once pre-eminent status remote, although outbreaks still occur (van Beurden et al., 2016). However, the history of nosocomial infections suggests that other pathogens will (re)emerge and present new challenges. The extent to which these early CDI outbreaks were due to poor structural environments and/or poor practices remains unknown – that the environments and practices were poor and outbreak-provoking is uncontested (Healthcare Commission, 2006, 2007; MacLean, 2014; Regulation and Quality Improvement Authority, 2008).

The CDI surveillance data during this time period (2003–2008) are difficult to interpret with confidence. The data undoubtedly contain ascertainment bias, as more specimens were tested, and the testing methods were improved and standardised (Health Protection Agency, 2009a). Also in this period new hyper-virulent strains were recognised (He et al., 2013). This increasing awareness of the problem pathogen may have added to the number of laboratories voluntarily reporting positive results – further adding to the difficulties in data interpretation. Despite this ‘noise’ within the data, there is no dispute that nosocomial CDI as it became known was a growing problem. In the first year of mandatory surveillance (2004), there were 44,563 reports

Honorary Senior Research Fellow, School of Health and Life Sciences, Glasgow Caledonian University, Independent Infection Prevention Nurse Consultant, UK

Corresponding author:

Evonne T Curran, Honorary Senior Research Fellow, School of Health and Life Sciences, Glasgow Caledonian University, G4 OBA, UK.
Email: evonne.curran@ntlworld.com

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Table 1. The outbreaks, their impact and dates reports published.

Facility	Outbreak	Cases	Deaths	Report published
Stoke Mandeville	October 2003 – June 2004	174	19	June 2006
Stoke Mandeville	October 2004 – June 2005	160	19	
Maidstone Tunbridge Wells	October 2005 – September 2006	500	60	October 2007
Northern Ireland	June 2007 – March 2008	375	31	August 2008
Vale of Leven	December 2007 – June 2008	63	28	November 2014

of patients with *C. difficile* in patients aged over 65 years (Health Protection Agency, 2009a). Just 10 years before, the then voluntary surveillance included 7470 reports (Health Protection Agency, 2009b). The surveillance data peaked in 2007 with in excess of 57,000 reports (Health Protection Agency, 2009b).

The five outbreaks took place in NHS hospitals in the UK between 2003 and 2008. Table 1 shows when and where they arose, their duration and report publication dates. Of note, the outbreaks took months to conclude but the investigations and reports sometimes took significantly longer. In the current era when two cases of CDI in a month in any given ward is considered an alert signal to be thoroughly investigated, it is important to reflect on the enormity of these previous outbreaks and consider how things went awry. The outbreak reports involved a reported total of 1272 patients of whom 157 patients died (Table 1). Several reports comment on the difficulties in determining the size and duration of the outbreaks they were investigating. Thus, the total number of outbreak cases reported should be considered the best approximation.

The CDI guidance published in 1994 (DH/PHLS, 1994) was still being referred to in 2005. Considering the trend in reported cases, either the guidance was being inconsistently implemented or it was insufficient to prevent cross-transmission. Although many scientific publications were published in the interim; the guidance itself was not replaced until December 2008 (Department of Health and Health Protection Agency, 2008) by which time the incidence had at last began to fall. From notable increase in CDI incidence to notable decline took approximately 14 years – which is too long. The task for the IPC community is to prepare and act so that such graphics are never again produced for a nosocomial pathogen.

Rumelt's (2011) statement at the top of this section is going to be explored in Outbreak Column 20 with reference to the system failures identified in these major CDI outbreak enquiry reports. The rationale for reflection is this: if it can be shown that major outbreaks have similar intertwined error characteristics, then it should be possible to turn hindsight into foresight and produce a tool with which to assess an organisation's vulnerability to a major outbreak – any major outbreak; and as a consequence act to prevent.

One of the goals of the IPCT is to change the shape of outbreak epi curves – collectively our actions should affect any national epi curve of a nosocomial pathogen. Before looking for the system errors, consideration as to how a health-care system should operate is provided.

The role of the healthcare system and of the IPCT within

A healthcare system should be designed for, and centred around, patients and their safety. The system itself is recursive in nature with feedback loops operating to provide intelligence, scrutiny and optimise performance at each level (Nelson et al., 2008). The smallest unit in a healthcare system, e.g. a single ward or a clinic, has been defined as a clinical microsystem (CMS) (Nelson et al., 2008), above which the first level of management will have oversight of several inter-dependent CMSs, e.g. male and female general surgical wards and an intensive care unit. A second higher level of management will then have oversight of several first level management units. Depending on the size of the healthcare system, there may be two or more additional management layers before the highest level – the executive board. There is still further oversight by both national organised health services and ultimately the government's department of health. In addition to the levels of management, there are clinical support microsystems (CsMSs) of which the IPCT is one (Curran, 2011). The CsMS provides intelligence to both the management and CMSs. Each of these levels (CMSs, CsMSs and management) are systems in their own right, comprising people, an environment, methods, equipment, information and importantly – but more ethereal – their culture. Information on the quality of care, requirements, resources, risks, expenditure and safety should flow in feedback loops from, and between, all levels of the healthcare system. The scrutiny and actions of each feedback loop determines the extent to which the healthcare system provides optimal care (safety), effectiveness, efficiency and assurance to the board, and external stakeholders. These feedback loop communications should also include the specifics of current, emerging and diminishing threats, and the actions needed to improve safety and avert disaster. For the healthcare system to be

safe, each recursive layer of the healthcare system must itself be safe. It is valuable to consider the healthcare system as such because when a system fails it is necessary to look at all component parts for the previously undetected or ignored fault lines. Mindful of how things should/should not operate, let us now look for Rumelt's intertwined errors in the four outbreak reports.

Five intertwined errors in human judgement and behaviour in man-made disasters

The intertwined errors described by Rumelt (2011) are: engineering overreach, smooth sailing fallacy, insider view, risk-seeking incentives and social-herding. These will be explained in turn along with examples from the outbreak reports where they have been found.

Engineering overreach arises when the different ways in which a system is capable of failing (its failure modes), and the consequences of these failures should they occur, are greater than the system's ability to comprehend and analyse them (Rumelt, 2011). If the failures are erroneously considered unlikely, then the necessary actions to prevent, detect and react will be absent. If engineering overreach was present, then the outbreak reports will contain neglected factors that provoked the outbreak, factors that disabled its detection and indications of an absence of preparedness.

Absence of preparedness

It is standard practice today to have a risk register. The register details the potential system failures, an assessment of their likely occurrence/impact, and the actions planned and taken to prevent and mitigate against them. Three of the outbreak reports mention risk registers. Much space was given to a risk register that took over 2 years to produce, was not in place at the time of the outbreak and did not include CDI until the outbreak was over (MacLean, 2014 p. 348). The Maidstone Tunbridge Wells' risk register did not include CDI, and the Stoke Mandeville register did not include a major outbreak until the peak of the second outbreak (Healthcare Commission, 2006 p. 57, 2007 p. 77). As such there is an absence of direct evidence (completed and actioned risk registers) to show that those in charge had recognised that the systems were vulnerable to a major CDI outbreak. The increasing number of CDI cases, the earlier smaller outbreaks and/or published reports of major CDI outbreaks elsewhere all failed to convey to those who managed IPCTs and/or the overall system that their hospitals could, and perhaps would, be next.

'During 2003, in the months before the first main outbreak, there had been a number of small outbreaks.' (Healthcare Commission, 2006 p. 4).

'Between January and September 2006, the trust had the 12th highest rate (of 166) of *C. difficile* per 1,000 bed days.' (Healthcare Commission, 2007 p. 20).

'The Board did not consider the lessons learned from the Stoke Mandeville report or indeed the Maidstone and Tunbridge Wells report as a checklist against which to assess the operation of IPC at the VOLH.' (Maclean, 2014 p. 398)

The context of the above assessment is of the healthcare system, but what of the higher levels? It is worth considering guidance from the Department of Health. The increasing trends in CDI resulted in a letter issued in December 2005 (CMO/CNO, 2005); with hindsight, it can be argued this contained omissions. The letter included three points starting with the need for compliance with national surveillance. National surveillance is imperative for the national 'helicopter view' and risk assessment – but national surveillance is incapable of detecting local outbreaks and local surveillance was not specifically mentioned in the letter (CMO/CNO, 2005). Second, the letter included the need to send strains for typing – but there is an absence of information on detection, preparation and assessment of a trust's vulnerability to a major outbreak. Lastly (and what should have been first), Trusts were instructed to review their policies and procedures for handling *C. difficile* cases. That these policies were being followed was implied, but not specified. The letter omits the obvious. Because major CDI outbreaks had already happened, were continuing to happen and the CDI incidence was continuing to increase, then all hospitals with an increasing incidence should consider themselves vulnerable to a major outbreak and take mitigating actions. The letter was from the CMO/CNO and addressed to Chief Executive Officers (CEOs); the CEOs' task was simple. They had to make sure the Director of Infection Prevention and Control (DIPC) 'actions the letter' (CMO/CNO, 2005). The task for the DIPC was impossible – no individual can solve a problem that involves all aspects of a system. Finally, the letter referred to the 1994 guidance. This lack of an explicit alert that major outbreaks are likely was, I would argue, evidence of national engineering overreach.

Factors that disabled outbreak detection

The slow inexorable rise of CDI led to it becoming an almost ubiquitous infection in many hospitals. This in turn led to the bar that defines an outbreak being raised and becoming blurred. The definition of an outbreak advocated was 'the occurrence of two or more related cases over a defined period agreed locally taking account of the background rate' (CMO/CNO 2005). The problem was that without typing it was impossible to quickly determine strain relatedness – and the background rate just kept increasing. Difficulties in the usability of the definition were noted in one report:

'Detection of new outbreaks of *C. difficile* can be difficult where high or continuously rising numbers of cases are the normal, background rate.' (Healthcare Commission, 2006 p. 15)

Local surveillance is of paramount importance; however, this essential requirement was not functioning everywhere at that time.

'The trust had no effective surveillance system for the surveillance of *C. difficile*. As a consequence, it failed to identify an outbreak in 2005 that involved 150 patients.' (Healthcare Commission, 2007 p. 8).

'A significant delay in recognition... contributing factors included a lack analytical support to carry out epidemiological analysis of available data on trends in *C. difficile* in the trust and to present this in a user friendly way.' (Regulation and Quality Improvement Authority, 2008 p. 131).

As stated in a previous Outbreak Column (number 17) this inability to detect an outbreak is a result of poor situational awareness (SA), i.e. being able to determine *the what* (cases are increasing), the *so what* (it is likely to be an outbreak) and *the what next* (unless we act new cases will arise) (Curran, 2015). The key factor that disabled detection was therefore ineffective local surveillance.

Management were relying on a passive *modus operandi* – if no-one tells me there is an outbreak – there is no outbreak. Active assessment of local data outwith the IPCT was absent. Perhaps if the CMO/CNO (2005) letter had a task for the CEO, something akin to a police *Be On The Lookout For...* then they might have engaged in an active pursuit to assess local outbreak risk. Managers were in some instances relying on a local service which, at the time, was incapable of detecting local outbreaks. In this instance, it is not that the system was disabled – it was yet to be enabled.

Factors that provoked the outbreak

Environment: Nightingale wards are an inadequate environment in which to practise safe healthcare. They lack single rooms, wash-hand basins, *en suite* facilities and have beds which place patients in too close a proximity to each other. Modern healthcare has evolved alongside *C. difficile* which survives well in any environment but especially in one that lacks the basics and is difficult to clean. Noteworthy descriptions of environments within the reports include:

'The layout of the wards and the absence of partitions contributed to this problem.' (Healthcare Commission, 2006 p. 25).

'As well as the scarcity of side rooms, there were problems for controlling infection because of the closeness of the beds, poor storage and lack of hand washing facilities.' (Healthcare Commission, 2006 p. 34)

In general, these hospitals were of sub-optimal design to enable safe care to be practised. How healthcare was practised also presented factors that provoked the outbreaks.

Healthcare practices: hand hygiene

One report stated that there was insufficient evidence to assess the potential contribution of deficits in hand hygiene at ward level to the outbreak (Regulation and Quality Improvement Authority, 2008 p. 125). It is difficult to find evidence of hand hygiene audits during the outbreak but key factors that probably impacted on hand hygiene performance were noted, e.g. inaccessible facilities, staff being overly busy and a lack of focus on hand hygiene.

'A lack of wash-hand basins in wards and toilets.' (MacLean, 2014 p. 2)

'Difficulty in accessing hand basins in sluices due to the accumulation of rubbish.' (Healthcare Commission, 2006 p. 26).

'In 2005... 30% of staff at the trust agreed that "the trust does enough to promote the importance of hand washing to staff".' (Healthcare Commission, 2006 p. 5) (Typical scores for an acute trust was 77%.)

'...and complaints indicated that shortages of nurses contributed to the spread of infection because they were too rushed to undertake hand hygiene...' (Healthcare Commission, 2007 p. 6)

Healthcare practices – isolation: Another vital practice to prevent CDI cross-transmission is the separation of patients with diarrhoea (who may have CDI) from those who did not have it. The reports indicate this was not done well.

'The primary factor implicated in the spread of this infection was patients with diarrhoea who were not isolated, leading to contamination of the environment.' (Healthcare Commission, 2006 p. 41)

'Because of the scarcity of single rooms and the pressure on beds, on several occasions they were nursed in an open ward.' (Healthcare Commission, 2007 p. 61).

'Despite the Loose Stools Policy the general practice... was not to isolate patients with loose stools until the diagnosis of CDI was confirmed.' (MacLean, 2014 p. 274)

Healthcare practices: antibiotic usage

Guidance on the use of antibiotics for both treatment and to reduce patient susceptibility to CDI was available – but there were clearly difficulties in its implementation and monitoring.

‘...concerned that it took so long to get agreement on an appropriate antibiotic policy and to restrict inappropriate antibiotics.’ (Healthcare Commission, 2007 p. 73)

‘...the failures in the prescribing of antibiotics in the VOLH, failures that persisted until the emergence of the CDI problem in May 2008.’ (MacLean, 2014 p. 29)

‘the use of antibiotics is likely to have contributed to the spread of the outbreak given that audit results from 2006, showed a level of compliance with policies at patient level.’ (Regulation and Quality Improvement Authority, 2008 p. 120)

Healthcare practices: frequent patient movement

If antibiotic prescribing created a vulnerable population, and an absence of isolation and hand hygiene facilitated transmission from those with infection to those susceptible, then what appears to have compounded the situation was the frequent movement of patients with infection to unaffected areas. This ensured that the widest possible dissemination throughout an organisation.

‘It is very likely that the regular movement of patients between wards only served to exacerbate the risk of cross-infection from ward to ward.’ (Maclean, 2014 p. 64)

‘Risk factors for the outbreak as... excessive movement of patients.’ (Healthcare Commission, 2006 p. 26)

‘There were reports of patients, including some with *C. difficile* being moved up to six times in one stay.’ (Healthcare Commission, 2007 p. 71)

‘...led to increased movement of patients within and between hospitals.’ (Regulation and Quality Improvement Authority, 2008 p. 117)

Healthcare practices: cleanliness and decontamination issues

The final procedures to be considered involve cleanliness and decontamination. Today, standards for cleanliness and cleanliness scores measures are available in every ward; this was not always the case. That cleanliness and decontamination was sub-optimal is evident in the reports.

‘...cleaning took place between 7.30am and midday, with emergency cleaning in the afternoon. There was no arrangement to have cleaners in any of the hospitals at night so any cleaning had to be undertaken by nurses.’ (Healthcare Commission, 2007 p. 47)

‘Because of the high turnover of patients generally, and the closeness of beds on some wards thorough cleaning of beds and the spaces around beds was difficult.’ (Healthcare Commission, 2007 p. 47)

‘The trust’s audit of commodes on 16 wards in September 2006 found that 98% of commodes were soiled.’ (Healthcare Commission, 2007 p. 49)

‘Cleaning at the trust was of a variable standard. There were some serious deficiencies.’ (Healthcare Commission, 2006 p. 40)

Healthcare practices: why they did what they did

It is easy to describe the what did and did not happen but it is less easy to understand why. Just how did things get that bad? One useful framework designates such practice ‘borderline tolerated conditions of use’ (Amalberti et al., 2006). Amalberti et al. (2006) contend that three drivers can push normal ‘legal’ behaviour to behaviour which is illegal but becomes normal over time. These drivers are: time/resources to do the job; technology complicating procedures; and individual social factors. The reports highlight persistent problems which led to illegal behaviour becoming normalised, e.g.

- The difficulty in finding isolation cubicles led to the illegal-normalised behaviour of not isolating patients.
- Needing a patient moved now, led to the illegal-normalised excessive and unsafe patient movement.
- Constant bed/time pressures, led to illegal-normalised inadequate cleaning of bed-spaces between patients.
- Not having sufficient time to decontaminate a commode (coupled with commodes that were difficult to clean) led to the illegal-normalised deficits of inadequate cleaning and dirty commodes.
- Difficulties in accessing a wash-hand basin, encouraged the illegal-normalised deficiency of poor hand hygiene.

Driving this pressure were not only resource issues but also social norms – over time it happened so often it became socially normal to be illegal. The unacceptable had become acceptable. This fits with Banja’s (2010) theory that disasters often have a long incubation period, and the longer the situation continues with only ‘low level harm’ the more downgraded becomes the assessment of risk. Banja (2010) states that healthcare disasters involve multiple people, committing multiple, often innocuous, mistakes that breach an organisations defences and only eventually result in frank disaster. Such normalisation of deviance in behaviour can arise when workers are afraid to speak up and when leaders fail to act (Banja, 2010). I would also argue that in such situations there is an absence of awareness of what ‘excellence’ is; it becomes difficult if not impossible to believe that another and better way is achievable. A constant example of excellence provides a care-compass direction finder that reminds every one of its attainability and

informs just how far from it they are. What is clear is that the system failed to prevent infection possibly because conditions were poor for such prolonged periods of time. The communications and feedback loops essential to a functioning and safe healthcare system described earlier did not happen. Information on the changing risks and the care exposing patients to risk was either not collated, not communicated or ignored.

Engineering overreach was present because the systems, as presented in the outbreak reports, all contained: an absence of preparedness; factors that disabled detection; and factors that provoked the outbreak. The CMSs were providing unsafe care in unsafe environments and were allowed to do so until the problem became known to all.

The second of Rumelt's intertwined errors is risk-seeking incentives for which there is evidence in the reports.

Risk-seeking incentives: Competing priorities can sometimes provoke risk-seeking incentives in healthcare. The prioritised incentives at the time were to meet targets that could only be achieved by compromising on infection prevention resulting in the frequent patient movement and non-isolation of patients with CDI.

'...senior managers were still reluctant to implement major infection control measures, such as closing wards or using buffer beds to separate infected patients from others on a ward. They said this was because of the shortage of beds and the need to meet targets.' (Healthcare Commission, 2007 p. 60)

The final three of Rumelt's behaviours are difficult to evidence from the reports; however, they were not specifically looked for by the authors. *Smooth-sailing fallacy:* is an erroneous assumption that because it has not happened 'here' before, and there is no warning of it happening, there is no risk. In addition, early signs of small failures are not seen for what they are – cautionary notices of potentially worse to come. So instead of seeing outbreaks in neighbouring hospitals as harbingers of what could happen here – comfort is taken from the situation that they are not happening here (yet). This error relates to another of Rumelt's behaviours of *social-herding* where people look to the behaviour of others to justify and confirm they are on the right path. Having worked throughout this period, I personally experienced this. In trying to get others take the data on CDI increasing as a sign of a problem I was 'reassured' that it is OK, it is going up everywhere and no-one else is doing anything special. There were many presentations and publications at the time which emphasised the problem – it is difficult to recall people demonstrating they were winning the war. At that time, there was an absence of confidence in the solutions that would eventually bring control (infection control and antibiotic stewardship).

The final behaviour is an *insider view*. An insider view is an opinion that makes people judge what is happening in their hospital as something different to reality; e.g. '...ah

but our patients are different...', '...it is not an outbreak, it is an increase in cases...', 'it's a blip – it will be down next week...', '...it's just that we test more specimens...'. Such data deniers provide themselves with an 'erroneous justification' to believe that the problem is not as the data suggest.

From this examination of past systematic errors, it can be seen that the most important of Rumelt's intertwined errors is that of engineering overreach, though it is likely that the other intertwined errors played a role. None of the reports indicate that the systems were prepared for the outbreaks that arose. It is clear that to negate intertwined errors of behaviour and judgement there needs to be intertwined levels of safety – such that if one level fails another will defend against failure resulting in harm. High-reliability theory advocates that for mindfulness, we must be pre-occupied with trying to find the most important next failure (and then the next and the next) (Weick et al., 1999).

Improving the systems

Looking for evidence that the overall system has improved is easy to find as the responses to less ubiquitous but no less challenging organisms shows. The notable outbreaks of *Pseudomonas aeruginosa* in Northern Ireland resulted in alerts and advice on preparedness and surveillance – *P. aeruginosa* itself became an alert organism included in both local and national surveillance (Department of Health Estates & Facilities, 2013). These responses were acted on UK-wide. Similarly, alerts following the identification of *Mycobacterium chimaera* from heater-cooler units during cardiac surgery (Sommerstein et al., 2016) show evidence of an improved and integrated system with early warnings given and heeded. However, I would argue that there can be no assurance that the system is now fool-proof to future local or national infection control disasters. Other alert organisms continue to increase (Public Health England, 2015).

Continuous assessment of risk status and preparedness is required within the recursive levels of laboratory, public health and national surveillance. The data from local surveillance systems need to be interrogated for new threats as well as recognised ones. The outputs from local surveillance need secondarily examined for nationally emerging risks that are not evident from locally generated data. The CMSs in which practice is delivered need assessed for their vulnerability to outbreaks and their capability to recognise one. In search of optimal preparedness there are several crucial questions that IPCTs could use as a tool to assess the risk from any current, emerging or re-emerging organism. The assessment examines six factors: the organism; healthcare worker (HCW) resources; HCW practices; the environment; the IPCT (inclusive of its surveillance system); and an assessment of the management (Table 2). The questions of the IPCT and management need to be answered by

Table 2. An outbreak vulnerability assessment tool.

Organism, resource, practice, environment, IPCT and management factors
<p>Is this hospital vulnerable to outbreaks of involving this alert organism:</p> <ul style="list-style-type: none"> • Is it likely to enter this trust/hospital – if yes – where and how is it likely to enter? • Is it likely to be detected on entry? • What are the possible transmission pathways? • How and where is it most likely to survive? • Are there specific disinfection requirements? • Who would be most vulnerable to infection from this organism? • What specific care practices expose patients to risk?
<p>Are the HCWs on this ward sufficiently resourced with:</p> <ul style="list-style-type: none"> • Guidance to prevent transmission is sufficient (effective, clear, accessible, doable)? • Awareness of how to recognise people who are colonised/infected with this organism? • Time to adequately decontaminate environments/equipment between patients? • People, patient equipment, effective disinfection resources and personal protective equipment? • Data that drives the optimisation of local infection prevention performance?
<p>Are the care practices on this ward performed sufficiently well to:</p> <ul style="list-style-type: none"> • Prevent cross-transmission to others (e.g. Standard Precautions [including hand hygiene])? • Recognise people who are likely to be colonised/infected with this organism and take appropriate actions (screening and isolation on suspicion of risk)? • Prevent conditions that could provoke an outbreak (e.g. optimal antibiotic prescribing, safe use of invasive devices)? • Effectively decontaminate environments and equipment between patient usage? • Including the reporting of relevant infection risks to the IPCT?
<p>Is the environment:</p> <ul style="list-style-type: none"> • Of a safe design facilitating effective infection prevention? • Supplied with sufficient single rooms to prevent any ‘failures to isolate’? • Clean, well-maintained with data displaying safe performance measures?
<p>Does the IPCT:</p> <ul style="list-style-type: none"> • Have sufficient resources and function as a team? • Have a surveillance system in place capable of detecting this organism as an alert signal? • Respond promptly to alert signals from surveillance data? • Produce and communicate accurate updated assessments of risk from any identified alert signal? • Give accurate, concise communications, inclusive of the actions needed to reduce/negate risks? • Undertake frequent assessments to ensure the care provided and environments are safe?
<p>Does the management:</p> <ul style="list-style-type: none"> • Know of the current/emerging risk status of this organism? • Support of the IPCT actions and recommendations? • Create a culture centred around patient safety and treat IPC as a priority? • Accept high-intra hospital transfers of people at risk?

people external to it. Answers to all the questions should provide the basis for both an accurate risk assessment and action plan. The IPCT's role, however, involves more than this. It includes the communication of the risk assessment fed forward to management and fed back to clinicians such that those receiving the communicate also recognise the risk and importance of taking any recommended actions.

Finally, to improve preparedness, national health protection agencies should produce (and place in the public domain) a national risk register of current and emerging pathogens of nosocomial outbreak potential inclusive of their status (increasing or declining). Using the national risk register as a guide, the IPCT could use the questions in Table 2 to produce an assessment of their likelihood and significance locally. Rumelt (2011) talked of intertwined

errors of judgement and behaviour – what this review has shown is that we still need to design-in intertwined behaviours for optimal judgement and IPC safety.

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