

Challenging suboptimal infection control

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Abstract

Healthcare associated infections are the most commonly reported complications affecting patients in the global healthcare environment. The rate is increasing. A substantial proportion is attributable to suboptimal infection prevention and control practice of healthcare workers. This paper discusses the current status of healthcare associated infections, the strategies used to date to improve suboptimal practice, and applies a social psychology perspective to provide insight into resistance to changing suboptimal practice.

Keywords: Infection control; cross infection and prevention and control; Health knowledge, attitudes, practice; Health personnel

Introduction

Healthcare associated infections (HCAIs), that is infections acquired from medical or surgical treatments, are the most commonly reported complications affecting patients in healthcare, and the rate is increasing.^{1,2,3} Infection prevention and control (IPC) is serviced by a series of policies, procedures and guidelines for application in clinical settings that provide the structure in which the process of IPC occurs. There is evidence that a significant

proportion of HCAIs is preventable by improving the compliance of healthcare workers (HCWs) with IPC policies, procedures and guidelines.^{4,5} At present compliance is reported as unacceptably poor, that is suboptimal, worldwide and resistant to change.⁶ This paper describes the current status of HCAIs, extent of suboptimal IPC practice, and effectiveness of strategies used hereto to change practice. A social psychology perspective is applied to provide new insights into suboptimal IPC practice. This perspective

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considers the influence of the system (healthcare culture), requirements of the behavioural field (clinical situation) and the disposition of HCWs for IPC practice (decision making readiness).

Current status

Healthcare associated infections (HCAIs)

HCAIs are among the most frequent adverse events in healthcare.^{2,7} Approximately 8.7% of the global hospital population is affected annually,⁸ 5% to 15% in developed and 14.8% to 19.1% in developing countries.⁹ The rate has increased by 36% in the last decade.¹⁰ The annual associated mortality is estimated to be 99,000 in the USA, 50,000 in Europe,⁹ and 5,000 in the United Kingdom (UK).¹¹ The financial burden is substantial. For example a study capturing associated expenses showed the cost to US hospitals of HCAIs was 28 to 45 billion dollars in 2009.¹⁰

Research suggests a significant proportion of HCAIs can be prevented.^{12,13} For example a study identified 12% of HCAIs at a university hospital and 17% at a community hospital were easily preventable, with 55% and 52%, respectively, preventable under certain conditions.¹³ The preventable proportion of HCAIs is considered a consequence of suboptimal IPC practice.¹⁴

Suboptimal infection prevention and control practice (IPC)

Global compliance with IPC policies, procedures and guidelines is unacceptably low.^{15,16} This is well documented in the literature and of serious concern to HCWs and patients. Between December 2010 and November 2011, 37% of papers published in the *American Journal of Infection Control* and 22% in the *Journal of Hospital Infection* addressed compliance. HCWs specifically claim compliance is the main challenge when implementing IPC initiatives.⁷ Nurses on clinical placement report failure to clean equipment and to change personal protective equipment between patients, unsafe handling of intravenous lines and urinary catheters, poor isolation precautions, presence of contaminated equipment in the clinical environment, breaches of aseptic technique, and exposure of staff to blood and body fluids.² Doctors visiting a patient in hospital noted: "...we donned

gowns and gloves following...the signs announcing the patient's...MRSA colonisation. The encounter took ...30 minutes. In that time five additional individuals visited the patient: two family members, a registered nurse, a nurse aide, and a food services provider. None donned a gown or gloves."^{17, p.260} Patients when asked how they had acquired their infections said HCWs were not vigilant, wound dressings were not frequently changed, poor infection control and hygiene existed on the wards, and surgeons did not wash their hands during ward rounds.¹⁸ The practice that most contributes to HCAIs is non-compliance with hand hygiene (HH) requirements, estimated to cause 80% of HCAIs.¹⁹ Globally HH compliance rates below 50% are reported, the lowest in intensive care units.^{20,21} Examples of other suboptimal IPC practices are presented in Table I.

Disposition of HCWs to suboptimal IPC practice

HCWs in infection risk situations are apt to display certain dispositions that can result in suboptimal practice. These dispositions are: inadequate knowledge, practice dissonance, insufficient assignment of significance to risk, errors of clinical judgment, incorrect practice assumptions, and rationalisations.

Inadequate knowledge

Knowledge of IPC measures after healthcare training is repeatedly shown to be inadequate.¹⁴ A review found technical knowledge of *Clostridium difficile*, especially among doctors and nurses, to be poor related to microbiologic aspects, risk factors, diagnosis, treatment, and prevention.²⁸ Up to 53% of HCWs surveyed were unable to identify several important IPC principles.²⁹ Some HCWs do not actively demonstrate they know what to do in infection risk situations.³⁰ For example: "... a doctor...was with a [suspected] SARS patient and came out with gown and gloves on... He was in there touching everything and he hadn't de-gowned and gloved"^{31 p. 113} A study showed 40% of medical residents did not know how to prepare the skin correctly before insertion of central venous catheters (CVC) and nurse technicians answered questions about the use of alcohol based antiseptic during CVC manipulation and CVC dressing correctly only 35% and 26% respectively.³²

Table I. Examples of IPC practices and percentage of compliance.

IPC practices	Compliance (%)		
Preventative procedures			
Preoperative procedures	63% non-compliance ²²		
Personal protective equipment			
Masks for respiratory protection	44% to 97% compliance ²³		
Gloves for blood, body fluids, non-intact skin or mucous membranes exposures	29%* non-compliance ²⁴		
Management of sharp instruments			
Reporting of needlestick injuries	24%* compliance ²⁵		
Use of equipment			
Contact isolation instructions	Compliance on room entry	exit	
	with: Hand Hygiene	19%	48%*
	Gloves	57%	64%*
	Gowns	68%	77%* ²⁶
Negative pressure in isolation rooms	32% compliance with requirement of -2.5 Pascals ²⁷		

* Percentages have been rounded to nearest whole number.

Practice dissonance

IPC practice is guided by policies, procedures and guidelines. HCWs complain IPC policies are unclear and not appropriately implemented,³¹ and hospitals have different IPC practices, even among wards within the same hospital.^{30,33} Specifically, nurses express confusion regarding HH and use of gloves and aprons resulting from frequently observed inconsistent practice of healthcare professionals.²⁸

Insufficient assignment of significance to risk

There is evidence of insufficient attribution of significance to risk of infection transmission to patients by HCWs. For example a doctor said "It happens almost every day. I walk into a patient's hospital room, and I'm thinking about what I have to tell him concerning his operation...I completely forget about getting a squirt of that gel into my palms, no matter how many laminated reminder signs have been hung on the walls."^{34, p.23} Perception by HCWs of infection risk to themselves is also inadequate. They have been shown to re-sheath needles, persist with poor compliance with self-protection measures such as use of gowns/aprons, eye protection, and masks.¹⁶ A HCW stated, for example: "We'd always go in and out of his room [MRSA patient]. After a while...you'd just forget that,

you thought, well he's alright, there's nothing wrong with him, I won't catch anything from him."³¹

Errors of clinical judgment

In infection risk situations there is evidence of overconfidence, base rate neglect, and estimation errors by HCWs. Overconfidence, for example, was displayed by a surgeon when, running late and not washing his hands said, "...what difference does it really make what I do this one time."^{34, p.23} Base rates can be neglected when background frequencies are ignored in favour of biases. For example staff considered the likelihood of MRSA transmission within their setting to be less than in others units.³⁵ Overestimation was demonstrated by doctors who claimed to be familiar with guidelines and knowledgeable about hand hygiene but were identified to have significant knowledge gaps.³⁶ Underestimation was shown by HCWs who, uncertain of actual MRSA prevalence in their clinical area, claimed rates were higher in other clinical areas.³⁵

Incorrect practice assumptions

All practice has embedded underlying assumptions on which HCWs base their clinical actions. Assumptions in suboptimal IPC practice situations have been shown

at times to be incorrect. Jackson *et al.*,⁵ found nurses believe full compliance with IPC is the default position, even though their behaviour deviates from policy. Doctors are not immune to incorrect assumptions. They have been found less likely than other HCWs to think HCAs are preventable.³⁷

Rationalisations

In direct care giving situations HCWs are reportedly stressed and overwhelmed by the pressure of work such as interruptions, divided attention, feeling rushed, and understaffing.³⁸ In such situations, when suboptimal IPC practice eventuates, it is typically attributed to overwork, time constraints, limited resources, lack of detail in policies, insufficient education, and inadequate information about patients.^{28,29,37}

In conclusion, the dispositions of HCWs indicate difficulty with decision making in infection risk situations, possibly reflecting insufficiently developed domain specific decision making skills. Further, the dispositions indicate sense-making by HCWs of infection risk situations may be driven by a mindset insufficiently supportive of IPC practice. Weick³⁹ contends sense-making constitutes committed interpretation (mindsets), highly influenced by organizational culture, which creates order and plausibility necessary for stable and reliable behaviour.

Strategies used to change suboptimal IPC practice

Suboptimal IPC practice has to date been addressed by strategies that have generally aimed at externally controlling behaviour and developing intrinsic motivation. These strategies have focused on organizations and staff.

Strategies to control behaviour externally

Organisational strategies

In 2005 the World Health Organisation (WHO) 'Clean Care is Safer Care' document initiated a pilot project in eight sites worldwide to improve HH in healthcare institutions.⁴⁰ During the intervention HH compliance increased from 39.6% to 56.9%. The strategy (system change, training and education, monitoring and reminders) was adopted by 38 countries. As a result HH increased from 60.9% to 72.3% in Germany, 49% to 69% in Belgium, 68% to >90% in Scotland, 55%

to 69% in Italy, 20.7% to 56.6% in Hong Kong, and 43.6% to 67.8% in Australia. The compliance rates however rarely reached the recommended >90%.⁴¹ In UK hospitals the Aseptic Non Touch Technique (ANTT) initiative was introduced consisting of 'Board down' rigidly enforced standards involving training, assessment and monitoring of best practice aseptic technique.⁴² The initiative decreased MRSA bacteraemia cases by 74% in 12 months. In US hospitals the Pronovost project addressed strict control of intravenous catheter insertions through bundling (multiply practice changes implemented together), a checklist, training sessions, and periodic conferences.⁴³ Catheter-related bloodstream infection decreased from 7.7 to 1.4 at an 18 month follow-up in 109 intensive care units (ICUs).

Staff focused strategies

These have involved visual cues, social modelling, auditing and feedback. Visual cues used include attractively designed signs,⁴⁴ wall posters,⁴⁵ and screen savers.⁴⁶ The signs increased compliance with isolation precautions from 37% to 88% and HH from 51% to 94%.⁷ However, the wall posters and screen savers made little difference.^{45,46} Social modelling, the effect of 'champions', has been shown to activate desirable behavior.^{47,48} Multiple champions, however, are required and implementation is complicated by the need for 'inter-professional coalitions' working together, which can be difficult.⁴⁷ Auditing and feedback have shown a small to moderate effect in improving professional practice.¹¹ Feedback on HH in 306 US hospitals increased compliance from 26% to 37% in ICUs and from 36% to 51% in non-ICUs over 12 months.⁴⁹ Overall, strategies to date employing external control of behaviour are procedure specific, costly, dependent on external drivers and have questionable sustainability.

Strategies to develop intrinsic motivation

For adherence to IPC standards self-regulation is essential.⁵⁰ Therefore strategies have been focused on developing intrinsic motivation. These strategies have mainly involved dissemination of information and increasing knowledge didactically.^{8,51} For example dissemination of IPC guidelines in 40 US hospitals resulted in 89.8% of staff members becoming familiar with the information, however, the HH rate

did not increase beyond 56.6%,⁵² and an in-depth education program for nurses on contact precautions did not improve compliance.⁵³ Teaching facts rarely gets someone to jump a skill level.⁵⁴ A HCW clearly articulates this point. "I noticed whenever they have us doing like a corporate day, it kind of motivates you for the next couple of days and you're all gung ho about washing and doing things and then it kind of fades".^{36, p.46}

Overall the strategies used for external control of behaviour and development of intrinsic motivation through routines, monitoring and correction, and didactic education have not sufficiently optimised IPC performance to significantly prevent HCAs. This indicates the strategies used may not adequately take account of the disposition of HCWs practicing suboptimally in infection risk situations and do not sufficiently engage the situational conditions necessary to effect practice change.

Suboptimal IPC practice: a social psychology perspective

HCAIs continue to rise partly as a result of persistent suboptimal IPC practice. Application of explanatory theories (for example Health Belief, Health Locus of Control, Planned Behaviour, Reasoned Action, self-efficacy, and Transtheoretical Model) have had limited success in changing practice.¹⁴ The limited success may reflect the assumptions upon which these theories are based, that is that behaviour largely results from conscious intention, rationality and volitional control.⁵⁵ Social psychology suggests that behaviour is driven by a triad of social forces.⁵⁶ The *system or culture* that seeks to maintain itself and dictates expectations for approved behaviour; *situational conditions* that shape behavioural outcomes; *disposition of individuals* such as motives, knowledge base, domain specific cognitive competence. It is contended that suboptimal IPC practice is embedded in an insufficiently supportive healthcare culture, operates in situations where optimal practice is difficult to reinforce, and HCWs in infection risk situations are not sufficiently disposed for optimal IPC practice.

The healthcare culture

Social psychology proposes that behaviour is greatly affected by cultural values and practices.⁵⁶

There is an emerging perception that the healthcare culture plays a part in suboptimal IPC practice.^{57,58,31} MacQueen⁵⁹ contends there is a cultural reluctance to take responsibility for the prevention of hospital-acquired infection with infection being an expected complication of an invasive technical health care system. This according to Weick⁶⁰ constitutes sense-making entrapment. The healthcare culture is trapped in a dominant interpretive mindset that is insufficiently sensitive to IPC and leads to repeated cycles of suboptimal IPC performance. This is augmented by the 'mere exposure effect', that is repeated exposure to stimuli (suboptimal practice) subliminally increases familiarity and repetition of associated behavior.⁶¹ Entrapment can result in HCWs overlooking relevant cues, rationalising behaviour, and resisting change.⁶⁰ Consequentially IPC does not receive the priority it deserves in formative education and practice. Burnett *et al.*²⁸ report that only a few doctors and nurses stated that they had received formal education in IPC. Suboptimal IPC generally goes unchallenged. Student nurses on clinical placement, who observed poor IPC practices, do not challenge these practices out of fear of failing placements and being seen in a negative light, with some admitting to compromising standards to fit in with local practice.³¹ According to Lusardi the evidence suggests "... the value nursing students place on HH declines from the first to the third year of training, probably as a result of their clinical experiences".^{62, p.32} It is clear that any comprehensive universal plan for education and training of HCWs for IPC practice needs to include a strong sociological dimension to provide the potential to engender a cultural shift.

Situational conditions of the IPC behavioural field

Social psychology proposes that actions always occur within a situational context.⁵⁶ The invisibility of microbes and lapse of time between suboptimal IPC and development of HCAs are the contextual constraints in the infection risk setting and fundamental problems for risk perception and management. The invisibility of microbes makes perception of transfer difficult to pinpoint to a particular person, time or site.⁸ An epidemiologist comments: "You're dealing with something you can't see. People go in there and say, 'I don't see the MRSA. I don't see the *C. diff* [*Clostridium difficile*]. I don't see the gram negatives. So what's the big deal?'"^{63, p.557} Additionally, the delay between

transmission behaviour (that is suboptimal IPC) and its consequence (development of HCAs) does not facilitate the immediate association of action to clinical effect. It is easier to reinforce a desired behaviour when the consequence is obvious. For example HCWs have been shown to take greater care when handling sharps than with HH as the outcome of a mishap with sharps is immediately apparent.³⁰ Strategies used hereto to change suboptimal IPC practice (external control of behaviour and didactic methods) do not sufficiently account for the unseen risk and delayed consequences in IPC situation. This can be addressed by habit formation and cultivation of emotional associations. Habits, automatic cue-responses, can be activated directly by the environment with minimal decision making or response-reinforcement association.⁶⁴ Experience-sampling diary studies show approximately 45% of everyday actions are habits.⁶⁴ Habit development has high applicability for IPC behaviour. Desired IPC behaviour can also be cultivated by emotional associations. Nurses are more likely to wash their hands when feelings of disgust arise.⁶⁵ Studies show exposure to a patient with an infection creates an emotional impact resulting in sustained improvement in HH.³⁰ Another example of emotional association with IPC behaviour is expressed in the following extract, "... failure to perform adequate hand hygiene tends to manifest as a feeling that something is not right."^{30, p.37} Experiential narratives with emotional content presented in educational programs for HCWs has the potential to accelerate development of effective infection risk management.

The fundamental problems for risk perception and clinical management, that is the invisibility of microbes and lapse of time between suboptimal IPC and development of HCAs, need to be considered when planning strategies for changing behaviour for practice.

Disposition of HCWs and decision making readiness for IPC

Social psychology proposes that personal dispositions affect behavioural responses.⁵⁶ In infection risk situations HCWs are disposed to dissonance, lack of knowledge, insufficient assignment of significance to risk, errors of clinical judgment, incorrect practice assumptions, and rationalisations. These dispositions

indicate inadequate development of domain specific decision making skills.

Evidence suggests the behaviour of HCWs in infection risk situations is apt to lack the rapid responses essential for domain specific routine decision making expertise. Decision making involves slow conscious reflective analytic thinking and fast intuitive thinking.⁶¹ With increasing expertise clinicians decrease their use of slow deliberate thinking and increase their reliance on rapid intuitive automatic processes.⁶⁶ Experienced decision makers quickly recognise a situation, decide which cues are important to prevent overload of information, consider what to expect so they can prepare themselves, and almost automatically implement the course of action most likely to succeed.^{67,53} This is demonstrated by an Emergency Nurse: "I had a young intern...and I was saying to him that this patient is going to arrest.... He said, 'No.' I got the crash cart, and said, 'You've got about 2 minutes, and in 2 minutes the patient arrested."^{68, p. 384} This so called recognition-primed decision making (RPD)⁵⁴ requires an extensive reservoir of domain specific knowledge and skill-base acquired through repeated experiential practice⁶¹ in quality IPC.

Suboptimal practice in infection risk situations, characterised by confusion, judgment errors, and incorrect assumptions, suggests HCWs are insufficiently primed to rapidly recognise and respond to cues, that is do not sufficiently operate under the relevant sense-making mindset. The following example is strikingly illustrative. "People walk round with gloves on...they don't think to change till they get to the coffee room... I've seen blood in our coffee room...on the floor because surgeons forget to wipe their feet when they've been standing in a pool of blood."^{69, p.1051} Domain specific intuitive decision making can be learned by acquiring a repertoire of experience through: (a) realistic scenarios which facilitate sizing up numerous situations very quickly, (b) mental simulation, (c) use of relevant emotion evoking narratives, (d) deliberate practice with goals, evaluation criteria, and focused feedback (accurate, diagnostic, and timely).⁵⁴ These have the potential to form the basis of new strategies for changing IPC practice.

Conclusion

A significant proportion of HCAs results from the suboptimal IPC practice of HCWs which is global, generally resistant to change, and frequently imbued with suboptimal clinical judgments and decisions. The universality of the practice bespeaks its entrenchment in a culture insufficiently sensitive to the need for optimal IPC practice. The resistance to change reflects the inadequacy of behaviour change strategies to address the invisibility of microbes and delay between suboptimal practice and occurrence of HCAs. The disposition of HCWs suggests they are not decision making ready for optimal IPC practice. More effective strategies need to be developed to address suboptimal IPC behaviour. Social psychology has the potential to provide a comprehensive focus for addressing the triad upon which suboptimal practice is predicated, that is influence of the healthcare culture, the needs of the clinical situation, and disposition of HCWs.

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