Normalisation Process Theory: a new paradigm to analyse and interpret strategies to prevent and control healthcare-associated infection

D. J. Gould [a] *, R Hale [a], E Waters [b], D Allen [a]

[a] Cardiff University, UK
[b] Aneurin Bevan Health Board, UK

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* Corresponding author: *. Address: School of Healthcare Sciences, Cardiff University, Eastgate House, Newport Road, Cardiff, UK CF24 0AB

Email address: gouldd@cardiff.ac.uk

Summary

Background: All health workers must take responsibility for infection prevention. Recent reduction in key reported healthcare-associated infections in the United Kingdom are impressive but determinants of success are unknown and not explained by behavioural or organisational theory. It is imperative to understand how infection prevention strategies operate as new challenges arise and threats of antimicrobial resistance increase.

Methods: Effectiveness of an action plan to reduce high rates of *Clostridium difficile* in a health board in Wales was attributed by managers to staff accepting 'ownership' (individual accountability) for infection prevention. Twenty participants were interviewed in an independent retrospective evaluation to explore whether and how ownership contributed to success. Data were analysed inductively into themes. Normalisation Process Theory was applied to the dataset.

Findings: Ownership meant that staff knew their own metrics, contributed to collection and acted on findings. Engagement was promoted by customising infection-related messages to the needs of clinical teams, ensuring that information was accurate and timely. Meetings where infection prevention was discussed were considered important and a climate where staff could learn from adverse events was promoted. Despite recognised challenges to infection prevention, attitudes were positive. Facilitators included clear lines of communication and expectations for infection prevention within the organisation and externally.

Conclusion: Applying Normalisation Process Theory can explain why infection prevention strategies are successful and additional actions needed to secure improvement. Further application could promote systematic comparison between organisations to establish successful practices, barriers and facilitators and help different groups and organisations embed and sustain infection prevention innovations.

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Introduction

Legislation in the United Kingdom (UK) since 1999 requires all health workers to assume responsibility for infection prevention and control (IPC) [1]. Similar initiatives are reported elsewhere. Education and policy implementation remain important features of the work of IPC teams but they are now expected to work collaboratively with clinicians and managers to ensure that IPC is embedded throughout hospitals. IPC is therefore the responsibility of all staff, not the sole preserve of IPC personnel [1, 2]. A recent literature review [3] suggested that a typical approach to devolution of responsibility for IPC requires ward staff to collect audit data and other local metrics. Daily visits by IPC personnel are being replaced by troubleshooting in response to findings [4, 5, 6]. In the more sophisticated models, ward performance is benchmarked against local and national targets [7]. The review [3] demonstrated that little research has been undertaken to evaluate strategies of devolved IPC.

Since 2004 there have been calls to underpin IPC with theory [8] but the focus has been application of behavioural theories to increase compliance with highly specific practices such as hand hygiene [9, 10,11]. Success is sometimes equated with cultural change [11, 12] but this relationship is questionable as the effects of interventions are not sustained unless campaigns are periodically refreshed [13]. Organisational culture is difficult to define and attempts to link it to IPC performance have not been successful [14]. Recent work has explored the structural components necessary for IPC programmes to be effective [15]: adequate staffing, recommended bed occupancy, IPC guidelines, training and link nurse schemes. No work has been undertaken to explore how these key elements are used by managers and clinicians to embed IPC into practice and although in the UK numerous NHS trusts have won awards for IPC excellence, no research has been undertaken to explain their success. The present study contributes to this gap in understanding by providing a new and different lens to examine the actions necessary for IPC recommendations to be implemented.

An outbreak of *Clostridium difficile* throughout a National Health Service (NHS) Health Board in Wales prompted the IPC team to develop an action plan to increase IPC productivity based on recommendations from an externally commissioned expert and advice from IPC experts of recognised excellence. The aim of the action plan was to increase the profile of IPC throughout the organisation. Its purpose was to enhance individual accountability ('ownership') for IPC because this had been identified as an important component of success in highly performing hospitals, and reduce rates of all healthcare-associated infection, with *C. difficile* a priority. The action plan took a 'top down' approach to improve communication

between the IPC team, clinicians and managers by increasing volume and detail of metrics reported and encouraging clinicians to act on them, reflecting practice in successful organisations. Eighteen months after the action plan there was a 42% decline in rates of *C. difficile* and rates of meticillin-resistant *Staphylococcus aureus* fell below the national average. Ownership of IPC was considered by senior managers and the IPC team to have contributed to these improvements and a retrospective evaluation was undertaken independently to explore whether and how ownership contributed to success employing Normalisation Process Theory (NPT) as a theoretical framework.

Normalisation Process Theory

NPT is a sociological theory that identifies factors that promote or inhibit routine incorporation ('normalisation') of complex interventions into everyday health care practice and explains how they operate [16]. It is an action theory that addresses work undertaken by individual health workers and teams to promote normalisation. NPT does not necessarily address attitudes to change or what health workers say they intend to do to implement an innovation [16]. It comprises four elements that explain how the intervention works: coherence (making sense of the intervention), cognitive participation (engagement), collective action (work undertaken to implement the intervention) and reflexive monitoring (formal and informal appraisal of the benefits of the intervention, its costs and what else is needed to make it effective) [16]. Coherence is about how health workers consider how existing practice must change to accommodate innovation and internalise its value. Cognitive participation is the work undertaken to plan the changes needed to implement and sustain the intervention: establishing new structures and processes, liaising with colleagues to put them in place and ensuring that all staff recognise their contribution. Collective action is the work undertaken to achieve implementation and ensuring it happens. During reflexive monitoring health workers reflect on how implementing the intervention is affecting them as individuals and groups, the availability of resources and further work necessary for success. The four elements of NPT operate simultaneously in conjunction with one another and with contextual factors in the organisation such at its structures, social norms and conventions [17]. NPT has been employed to help explain how a wide range of health care innovations have become integrated into practice but not previously IPC [18]. The aims of the study were to explore what ownership of IPC meant to staff, evidence of ownership, indicators of success and barriers to further improvement.

Methods

The health board serves an urban and rural population of 600,000 people in south Wales and provides a full range of acute, intermediate, primary and community care services. Acute care is concentrated in four hospitals. The population of Wales is aging and a high proportion of inpatients are 65 or older. The organisation employs 10,000 staff directly involved in patient care. Staff turnover is low. The estate dates from the last century and buildings are gradually being refurbished. Single room accommodation is not available on all wards.

Qualitative interviews were undertaken with twenty members of staff employing a topic guide. The opening question asked informants to explain what the term ownership of IPC meant for their work. The following questions were tailored to explore IPC in relation to the work doctors, nurses and managers. Informants were identified through the lead IPC nurse and purposively selected to represent a range of employees from the different occupational groups with different levels of seniority. Each interview lasted about an hour, employed open-ended questions, was recorded with permission and transcribed verbatim. Permission to undertake the study was granted by the university ethics committee. The data were analysed inductively using a recognised approach to thematic analysis [19] to identify how IPC work was being undertaken. Normalisation Process Theory (NPT) [16] was applied to the dataset (not to the raw interview data).

Using NPT we asked:

1. Does the concept of ownership of IPC make sense to health workers (coherence)?
2. What needed to be put in place to implement IPC ownership throughout the organisation (cognitive participation)?
3. What is being done to implement ownership (collective action)?
4. How is success of ownership assessed by health workers (reflexive monitoring)?

Findings

Details of the informants are shown on Table 1. Twelve informants were male and eight were female. All medical staff were male and all nursing staff were female. Three of the managers were male. All had been employed in the NHS for at least five years. There were no refusals to participate. Applying NPT revealed that informants understood the meaning of ownership (cohesion), had thought about and planned its introduction (cognitive participation), knew what was required of them to achieve ownership (collective action) and could assess its effectiveness realistically in relation to their own roles and spheres of responsibility (reflexive monitoring).

Coherence (making sense of the intervention)

There was a consensus that ownership meant that staff were familiar with IPC metrics, were reporting local data to the IPC team and managers and could use them as part of continuous service improvement. Regardless of informants' occupational group or seniority they agreed that IPC was an organisational issue:

'Ownership is recognising IPC challenges in your own clinical area, coming up with solutions and feedback to the IPC team' (Informant 15: ward sister)

'Ownership … is about identifying local issues, being provided with your own local data and knowing that data, recognition and early management of problems, trying to get people to be accountable through understanding.' (Informant 9:senior doctor)

'Ownership … is our problem and we need to address it. It's what we can do collectively.' (Informant 12: ward sister)

There was one divergent opinion. A cleaner (informant 19) believed that responsibility lay with the IPC team and taking ownership meant health workers protecting themselves against infection risks.

Ownership meant different things to different groups. For managers, especially those at senior level, it was described in relation to the whole organisation. For medical staff it related to clinical teams while for nurses ownership was usually described in relation to the ward or unit. Informants were clear that all staff needed to accept responsibility:

'IPC is the responsibility of everybody who takes part in patient care – a team approach.' (Informant 3: manager)

Cognitive participation (engagement)

The need to relate IPC to patient outcomes was frequently expressed as necessary to achieve IPC work. Appreciating the impact of IPC was perceived as more difficult for frontline than senior clinicians and managers and the solution was to encourage them to consider what they would like for patients, especially if members of their own family were in hospital:

‘Bringing IPC back to the patient is the tool, the way to get people to feel that what they do about IPC matters.’ (Informant 12: ward sister)

Being able to demonstrate a clear link between patient outcome and need to take action to improve IPC was also helpful:

‘If an outbreak occurs, your change the antibiotic. You can see an impact much more easily … if the outcome is concrete.’ (Informant 6: consultant)

The importance of achieving balance between corporate messages for IPC while customising information to make it relevant to the individual was an issue:

‘The message may be more pertinent for some groups than others – bare-below-elbow doesn’t mean much to staff who seldom touch patients directly and this dilutes the message. There is a danger of broad-brush messages getting watered down.’ (Informant 6 consultant)

As well as being tailored, information needed to be shared promptly and regularly and to be accurate, valid and complete. Informants were aware that hand hygiene compliance would be inflated during formal audit and that changes to data reporting could affect surveillance findings.

Collective action (work to achieve implementation)
Collective action meant having access to information and being able to act on it:

‘We use charts for feeding back bare-below-the-elbow and hand hygiene so local teams can visualise how well they are doing.’ (Informant 6: consultant)

Nurses usually mentioned hand hygiene audits, while for doctors the most frequently offered example was conducting and adhering to antibiotic prescribing policy.

Metrics enabled staff to compare implementation of IPC between individuals and wards or teams but it could also demonstrate need for resources to reduce infection risks. An inventory of ward furniture provided a ward sister with evidence that new chairs were needed to replace those with damaged upholstery and there had been a hospital-wide drive to replace soiled mattresses.

The second most frequently mentioned way of achieving the work of IPC was attending meetings where it would be discussed. To be effective it was considered that meetings needed to be multidisciplinary and well-attended with targeted agendas and generate clear action plans:

'Meetings to share ideas between managers and the IPC team, plan interventions for the coming year, go back to the action plan and see what's missing.' (Informant 7: senior manager)

Being open about mistakes and the associated learning took courage, persistence and attention to detail. Ward staff were required to attend meetings to present details and discuss actions being taken towards resolution when a case of *C. difficile* was reported. Taking ownership of local IPC failures was perceived as challenging but not resented. It was viewed as an opportunity to explore avenues for improvement:

'It's identifying local issues, being provided with your own local data and knowing that data, recognition and early management of problems, trying to get people to be accountable through understanding, not the stick' (Informant 9: senior doctor).

Punitive attitudes were avoided:

'I use gentle reminders if there is something untoward in the sluice. If there's a specific problem with somebody I will speak to them … think about whether it's a lapse or a deep-seated problem through lack of education.' (Informant 15: ward sister)

The need to learn from the *C. difficile* outbreak and other serious adverse events was repeatedly mentioned. A senior doctor described a major change in outlook since the death of one of his patients from *C. difficile*-associated disease. He worked now closely with ward staff and the IPC team, orchestrated local audits and monitored the behaviour of junior doctors:

'It's noticing what we do and discussing ways of improvement … insisting on bare-below-elbows, antibiotic prescribing policy.' (Informant 2: senior doctor)

He was conversant with the Five Moments for Hand Hygiene [20] and promoted adherence by junior doctors and ward nurses. Across the organisation doctors who had been involved in

serious incidents were required to complete a learning log and reflect on what had gone wrong.

Reflexive monitoring (reflection)

Success of the action plan was illustrated by informants' ability to state precise IPC metrics for their own clinical areas and for the organisation overall. The number of cases of *C. difficile* was cited most frequently but informants were aware of other successes: better surveillance for Caesarean surgical site infections than in the rest of the country, effective control of meticillin-resistant *Staphylococcus aureus* and progress reducing central line catheter infections. Celebrations were held jointly between clinical and IPC staff when no new cases of *C. difficile* were reported for 12 months. Occupational groups appraised success in different ways but all informants could give examples of how behaviours, attitudes and IPC devolution were operating: IPC was no longer regarded primarily as a nursing activity, medical staff were attending meetings regularly and root cause analysis was undertaken and used to find solutions for adverse incidents involving IPC. A database of cases and their outcomes was maintained and audited by the IPC team. There was awareness that some parts of the organisation had taken responsibility for devolved IPC to a greater extent than others and informants could name areas where progress was less good. A need to return to the action plan and refine it to foster greater ownership was identified:

'The action plan is structured and needs to go to parts of the organisation where it can make a difference, where it will make things happen.' (Informant 7: senior manager)

Although informants recognised their responsibility towards IPC they remained aware of the role of the IPC team:

'It's about being participatory and leading … investigations or being supportive if the IPC team is leading an investigation. It's having access to information. We shouldn't have to look to the IPC team for information.' (Informant 10: senior nurse)

Challenges

Frequently mentioned challenges were age and condition of the estate, pressures of high bed occupancy and patient turnover, freeing staff to undertake education including mandatory training, and poor division of labour between nursing and domestic staff for some aspects of cleaning. Difficult decisions had to be made in the face of conflicting NHS priorities:

'It's unusual to have two consecutive C. diff cases in a clinical area and if we do, it's a serious event and our actions change. We deep clean, the ward has to be shut … a hard decision to take when there are people waiting on trolleys in A&E.' (Informant 6: consultant)

Staffing issues included heavy workload, the amount of administration that ward managers and senior nurses undertook, issues with adherence to IPC precautions among peripatetic and agency staff and maintaining adequate leadership when key staff were absent for prolonged periods (e.g. maternity leave). Lack of a sound evidence base to underpin IPC was raised, especially by medical staff:

'IPC is not evidence-based, the interventions sound like good ideas, sound reasonably sensible but have not been conclusively proven and having an evidence base is considered important in modern health care.' (Informant 11: microbiologist)

Despite identifying a large number of challenges to the work of IPC, attitudes were positive:

'It's difficult times but you just have to get on with, embrace it … or the patients suffer (Informant 8: divisional nurse)

'We can all make a difference. It's having the belief that you can actually change things for the better.' (Informant 15: ward sister)

Facilitators

Facilitators included having clear lines of communication and expectations for IPC within the organisation and externally: reference was frequently made to the report that had initiated the action plan, the role of the media prompting high public awareness of IPC and imperatives to meet national standards.

Discussion

Although the study involved a single organisation and the findings are not generalisable, the work is important because it is the first time that theory has been used to explain how IPC becomes normalised into health workers' everyday practice, the first research to describe and explain organisational changes following a major enquiry into IPC and the findings contrast with earlier studies [21, 22, 23].

By applying NPT it was possible to distil the meaning of ownership of IPC to clinicians and managers, establish how the action plan was being implemented, identify signifiers of effective IPC, determine how health workers evaluated success and challenges and enablers. As advocated in classic patient safety policy, informants' reports reflect capacity to learn from serious failures in health care and develop measures to minimise risks being repeated [24]. Their positive attitudes contrast with previous studies where health workers attribute shortcomings in IPC to other occupational groups or organisations [21], rationalise their own deviations from IPC protocols and criticise deviations by colleagues [22]. There was little evidence that staff practised IPC precautions to protect themselves rather than patients as in previous studies or that IPC reforms were opposed by employees resistant to change [9, 23] perhaps because implementation was carefully planned, positive, highly participatory and promoted a culture of learning from adverse events. The impact of engaging staff in the implementation of IPC innovation is a new area of enquiry [2,10,12] and from the findings of our study, engagement appears to be an important component of success.

Many of the previously identified challenges to IPC were important here [14, 25], particularly the need to balance the demands of implementing IPC alongside other health service priorities but lack of investment in IPC was not mentioned and there was an expectation that when new equipment or services were required, resources would be made available.

Overall the study demonstrated that a 'top down' approach to implementing IPC can be effective. Improvement in infection rates cannot be attributed entirely to ownership of IPC as the action plan included additional changes to delivery of the IPC service including the introduction of a robust system of root cause analysis and better resources (e.g. creation of more isolation facilities). However our findings indicate that as one component of an intervention to tackle infection rates, increasing individual accountability holds promise.

Study limitations

The study was undertaken in a single organisation, it is likely that staff known to hold positive attitudes to IPC were invited to participate, senior staff were over-represented, probably because there is greater flexibility in their working day, allowing them to participate in data collection more easily than frontline workers and the self-reported actions of informants were not corroborated by observation. However, there was remarkable similarity in the views expressed by informants regardless of seniority and occupational group, suggesting that their

opinions might be taken as representative of the organisation. Moreover, informants' willingness to acknowledge that some clinical areas and teams were performing better than others suggests that the data were trustworthy. The enlightened attitudes displayed by clinicians and managers were compelling. Both groups were open about previous shortcomings and changes still necessary to improve practice although senior clinicians had thought most deeply about the implications of poor IPC and taken greatest care to reduce risks of recurrence. When lapses in IPC occurred, punitive approaches were avoided. This approach is in contrast to warnings and sanctions [26, 27] which are being introduced in some organisations but create poor working relationships between managers and clinicians and are resented [28].

CONCLUSION

The study describes effective devolution of responsibility for IPC from specialist teams to the rest of the organisation as advocated in recent policy in the UK by applying NPT retrospectively. Prospective use of NPT from design of the intervention through implementation and evaluation would allow systematic comparison between organisations to establish successful practices for embedding good practice and barriers and facilitators to improvement. It would also allow systematic comparison between different groups and organisations that could be used in future research and to enable managers and IPC teams to develop strategies to embed and sustain IPC interventions.

Table 1. Staff interviewed

Senior doctor (above level of consultant)	3
Consultant	2
Junior doctor (registrar, house officer)	3
Senior nurse	4
Ward sister	1
Junior nurse	3
Senior manager	1
Manager	2
Cleaner	1
TOTAL	20

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Author contributions

LW and DJG conceived the study. RH developed the data collection instruments and collected data. DJG and DA analysed the data. All authors contributed to manuscript preparation.

Conflict of interest

No conflicts of interest are declared