Title: The Evolution of an audit and monitoring tool into an Infection prevention and control process

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Summary

Background

In 2010, an Infection Prevention and Control Team in an acute Trust integrated an audit and monitoring tool (AMT) into their management regime for patients with *Clostridium difficile* infections (CDI). This approach evolved into a daily review process (DRP) that became an essential aspect of the management of all patients with CDI

Aim

To examine the mechanisms through which the implementation of an AMT impacted on the care and management of patients with CDI.

Methods

A constructivist grounded theory approach was used employing semi-structured interviews with ward staff (n=8), IPCPs (n=7) and matrons (n=8) and subsequently a theoretical sample of senior managers (n=4). All interviews were transcribed verbatim and analysed using a constant comparison approach until explanatory categories emerged.

Findings

All participants recognised that the DRP had positively impacted on the care received by patients with CDI. Two main explanatory themes emerged which offered a framework for understanding the impact of the DRP on care management; firstly education and learning and secondly the development and maintenance of relationships.

Conclusion

The use of auditing and monitoring tools as part of a daily review process can enable ward staff, matrons and IPCPs to improve patient outcomes and achieve the required levels of environmental hygiene because they act as a focal point for interaction, education and collaboration. The findings offer insights into the behavioural changes and improved patient outcomes that ensue from the implementation of a DRP.

Key Words

Clostridium difficile infection; daily review process (DRP); education and learning; developing relationships; behaviour change

Introduction

Clostridium difficile (C.difficile) remains one of the main causes of infective diarrhoea in hospitals[1;2] being the majority in persons ≥75.[3] Since 2007/2008 (55,498) there has been a 74.5% reduction in the numbers of patients with *C.difficile* infection (CDI) (2014/15 14,165) in the UK.[3] This national reduction in CDIs was mirrored between 2008 and 2010 by the incidence of CDI in a UK NHS hospital Trust (study Trust).

This local success was due to a range of national initiatives, for example the use of a care bundle for CDI which included amongst other things guidelines for antibiotic prescribing.[4]Following a period of increased incidence in 2010, the local Infection Prevention and Control Team (IPCT) of the study Trust devised and introduced an audit and monitoring tool (AMT) for use with in-patients with CDI. The tool was designed to assess both patient and environmental indicators that could impact on the recovery from, and the spread of CDI. The contents were based on the care bundle for CDI[3], the Department of Health (DH) guidelines for *C.difficile*[5] and the epic 2[6] guideline (epic 3[7] has now replaced epic 2[6]). The assessment was undertaken on a daily basis for all inpatients with CDI by an Infection Prevention and Control Practitioner (IPCP) and the Matron responsible for the ward area in conjunction with ward based staff. The original AMT [8] is shown in table i.

Audit and monitoring and CDI

Current opinion on the use of audit, surveillance or monitoring tools for patients with CDI suggests that infection prevention and control strategies and interventions can contribute to the overall reduction in CDI rates and help to reduce the incidence of outbreaks.[9, 10, 11, 12]The High Impact Intervention (HII) introduced for patients with CDI[3] provided a framework for auditing practice using a series of prompts: antimicrobial prescribing, hand hygiene, environmental decontamination, isolation and the use of personal protective equipment. Comments on disease severity and complications of CDI included in the DH[5] advice stressed the importance of patient assessment. These recommendations were combined and incorporated into the AMT used in this study.

Behaviour change and infection prevention and control.

Behaviour change initiatives and infection prevention and control are often linked to a lack of sustainability[13; 14; 15] and a lack of assessment into the effectiveness of the different strategies used[16.] Successful change involves planning a series of outcomes that are expected to originate from an intervention and evaluating whether or not these outcomes

actually occurred[17]. The AMT was designed to audit and monitor environmental compliance and the assessment of patients with CDI. Following the implementation and application of the AMT, a documentary analysis of AMT records (n=928) was completed that identified a number of questions about the AMT. This led to recognition that a process involving interaction between an IPCP, Matron and ward staff in the clinical context was being undertaken that integrated both patient and environmental assessments. These interactions appeared to contribute to the acceptability, normalisation and effectiveness of the AMT. The underlying mechanism of what was occurring during these interactions however was not understood. An exploratory study focusing IPCPs', matrons', ward staff and subsequently nurse managers' understandings of this review process was undertaken with a view to determining the behavioural features and mechanisms responsible for this added value.

Method

Overview

A constructivist grounded theory approach[18] was used to explore the social processes involved in the AMT. Qualitative research methodologies are used to discover rather than test existing theories.[19]

Data collection

Semi-structured interviews were used for data collection. Potential participants were invited via email to explain the nature and purpose of the study[20]. Following an agreement to participate, participants were provided with an information sheet, a consent form and an invitation to attend an interview at a mutually agreed date, time and venue. The interviews were conducted by one interviewer (the first author).

Originally participants were recruited from staff groups with direct involvement in the AMT: IPCPs, matrons and ward staff. Purposeful sampling was employed, an approach commonly used in investigations of this kind.[21] This enabled the targeting of participants who had been exposed to the AMT. IPCPs and matrons were the first groups of staff to be interviewed as they were the main players involved, with ward staff and senior managers undertaken concurrently (linked to availability). Data analysis drove data collection and theoretical sampling prompted the inclusion of senior managers to obtain a strategic view of the AMT across the organisation.

The final sample included seven IPCPs, eight matrons and eight ward staff in addition to four senior managers. The number of participants recruited from each staff group was inductive not prescriptive. As concepts began to emerge through concurrent data collection and

analysis, they were explored in subsequent interviews until eventually the point of theoretical saturation was reached when no new concepts were emerging.[19]

Interview guides were adapted to explore emergent codes and themes with participants (see figure 1). Grounded theory characteristically integrates flexibility into design as in this study where interviewing was adapted in response to emergent concepts elicited from participants accounts.[19] As the researcher was involved in the AMT reflexivity was important and a process of constant comparison[16] was adopted to ensure that data was constantly compared with emerging data, concepts and themes.[16]

Data analysis

In line with grounded theory[19] data collection and analysis were carried out concurrently. Initially a period of 'Open coding' [19] categorized segments of data word by word, line by line and incident by incident with codes being applied to each discrete segment. These codes were generated from the interview data e.g. '*approachability'*. The adequacy of these open codes was then determined by a process of more detailed focused coding[22] which allowed the categorization of the data into themes. Finally axial coding was employed to highlight relationships between themes and concepts[23]. The coding and analysis of data was supported using the qualitative analysis package NVivo®. An example of the process can be seen here: Approachability was seen as an important antecedent to establishing and building relationships, providing an opportunity for interaction and being able to ask questions and discuss issues. This excerpt highlights some of these key areas:

"…again it is back to who it is and what it is about; some are easy to speak with and discuss things with ….". ***Ward Staff (WS) participant.***

Other examples of open coding are included in figure 2.

Results

The AMT was initially undertaken on a daily basis and then less frequently depending on the patient's condition, disease severity and any concerns regarding infection prevention and control precautions and the environment. This involved IPCPs, matrons and ward staff undertaking a tripartite patient focused review and environmental assessment. Two main themes emerged from the data analysis that offer insights into the mechanisms that contributed to the integration of the AMT into a daily review process (DRP) as part of the care and management of patients experiencing CDI. These were: *Education and Learning* and *Developing and Sustaining Relationships.*

Theme 1: Education and Learning

Staff perceived that the DRP had improved their knowledge and understanding of the care and management of patients with CDI. Situated practice based learning was perceived as one of the main benefits of the DRP linking CDI to the care of patients experiencing the infection. Situated learning can be referred to as 'legitimate peripheral participation'[24] . Ward based staff recognised the educational value of the DRP since it provided an opportunity for the IPCP and matron to explain and reinforce key points whilst completing the process alongside staff. This strategy of providing explanations and demonstrating expected standards rather than telling staff what to do was deemed as significant. It is recognised that educational input around infection prevention and control is not always embedded in actual practice, especially in relation to more formal based education[25]. Delivering education through doing and showing, however, meant infection prevention and control practices became more readily embedded in practice because they were understood:

"But if you come onto the ward and are working amongst staff and are educating the staff and raising awareness and they understand it more, it then becomes embedded in practice". ***WS participant***

All participants recognised the increased understanding of *C.difficile* and CDI since the introduction of the DRP. Staff, and in particularly ward based staff, no longer perceived CDI as just 'diarrhoea'. They expressed a greater awareness of the potential implications and complications, viewing CDI as a real illness and disease process and a greater understanding and appreciation of what that illness might mean:

*"Yes it has definitely improved our knowledge (*referring to the DRP*); we knew it was diarrhoea and C.diff but didn't realise that it could potentially be life threatening… Yes it has helped us to understand it ….. It has definitely improved our knowledge".* ***WS participant.***

Lave and Wenger[24] maintain that 'abstract representations are meaningless unless they can be made specific to the situation at hand...' (page 33). The DRCP provided opportunities to ensure that the information and knowledge imparted to staff, was relevant and contextual.

Education was also valued as it was consistent, context situated and informal. This helped to reinforce important messages and information:

"I think we do things a lot differently; I think when you guys come up you are educating us all the time – reinforcing things each time". ***WS participant.***

The informal nature of the learning during the DRP was seen to be valuable. Eraut[26] describes informal learning in the workplace and learning from others as an important aspect

of all individual learning. Informal workplace activities can account for about 70-90% of overall learning[26]. Working alongside a colleague, asking questions and being involved in shared activities assists with understanding and enables individuals to learn, especially contextual based information and knowledge.[26]

This was relevant for matrons working alongside the IPCPs as they also asked questions whilst undertaking the DRP. The excerpt below illustrates the impact that this had on one of the matrons in terms of increased awareness and being able to share that information outside of the DRP:

"For me I think I am learning more about it and I can pass things on to my ward areas when I go on without the IPCPs". ***Matron participant.***

The DRP involved daily attendance on ward areas to review the patient (s) with CDI. Time spent on the ward would depend on a number of factors including number of patients with CDI, disease severity, the environment and the staff and patient needs linked to CDI. This regular attendance helped to reinforce key messages and provided an opportunity to clarify any issues or concerns:

"Because it's done on a regular basis it's not just a one off education it's a 'drip drip' approach which I think is of real benefit. I think that is the major benefit". ***IPCP participant.***

The repetitive nature of the DRP provided the reviewers (IPCPs and matrons) with an opportunity to embed and reinforce key messages regarding the care and management of patients with CDI. In this context the DRP became a conduit for learning by repetition or 'routinisation'[27]for ward staff and the reviewers (IPCP and matron).

Theme 2: Developing and sustaining relationships

This repetition of key messages and role modelling best practice through demonstrating of required standards also contributed to enhancing collaborative working relationships between the IPCPs and matrons and also between IPCPs, matrons and ward staff:

*"I think that it (*the DRP*) has improved the relationships".* ***WS participant.***

"It (the DRP) *has helped with relationships; it's not just about infection control, it has helped with positive working relationships generally".* ***IPCP participant.***

Another feature of the DRP is that it demands frequent interaction between members of the team, which improved relationships through regular, purposeful contact. The DRP would be undertaken by the same IPCP and matron for a number of days which helped to build relationships out of a shared purpose:

"*Yes it has certainly helped relationships; you have something in common, certainly with matrons; we can talk to them now more and discuss things. ....."* ***IPCP participant.***

It is noteworthy that the improved relationship between the IPCPs and matrons was also one of the benefits of the DRP perceived by senior managers:

"It wasn't the intention when we embarked on this (the DRP) *that a benefit of it would be improved relationships between IPCPs and matrons".* ***Senior Manager (SM) participant.***

Whilst the relationship between the IPCPs and matrons was perceived as a positive one, this had been developed during the DRP. Initially there had been problems undertaking the review as a joint venture between IPCPs and matrons, often due to practical issues and workload demands. Solutions suggested by participants (IPCPs and matrons) during the study included having pre-designated times to meet to undertake the DRP. Others included the IPCP undertaking the review daily with the matron undertaking the review with the IPCP on a less frequent basis during the week depending on patient and risk assessment.

The characteristics or personality traits and behaviours of the key players appeared to contribute to relationship development. In particular the approach employed by IPCPs and matrons when engaging with ward staff during the DRP was key. Effective communication skills, increased visibility and approachability all contributed positively. Participants highlighted communication skills as particularly important and could describe and differentiate between effective and non-effective communication:

*"Yes it is a skill to communicate with others when you've done something wrong or haven't done something…....Some (*referring to IPCPs/ matrons) *do it better than others in the way that they tell staff; they* (again referring to IPCPs/ matrons) *need to change and do it differently so that staff see the review as learning tool and not as finding fault".* ***WS participant.***

Approachability was seen as an important antecedent to establishing and building relationships, providing an opportunity for interaction and facilitated questioning and the discussion of issues:

"….it is about me and that person working together. The ones that are approachable are the ones that help and we are more likely to engage and tell you what the issues are. The ones that are more aloof tend to be the ones that tell you off rather than working with you". ***WS participant.***

The greater visibility of IPCPs and matrons was perceived to contribute to the development and sustaining of relationships. The DRP had been a catalyst for transforming local perceptions of the role of the IPCP:

"You (referring to the IPCPs) *are a lot more visible than were a few years ago when all we saw you as were folks in an office; I like the increased visibility".* ***WS participant.***

"..Availability and visibility on the ward has improved with the reviews". ***Matron participant.***

"The spin offs around relationships and visibility have been greater than expected. I think visibility is really important and I think it has really raised the awareness of the importance of infection control around C.diff management and other things". ***SM participant.***

"Overall I think it has helped (referring to increased visibility)……. *. Us getting out there has improved things. We go out and are seen on the ward". I****PCP participant.***

Previously the role of the IPCP had been that of surveillance, education and adviser with sporadic visits to wards and areas when there were specific problems to investigate and or monitor. The changing landscape of health care delivery as well as the changing role of the IPCP has dictated a more varied approach to the prevention and control of infections.[28] This was reflected in part by the introduction of the AMT and subsequent development of the DRP especially around visibility and being seen to be part of the team:

"You (referring to the IPCP and matron) *are more part of the team and getting involved.....".* ***WS participant.***

What is hinted at is that IPCPs were seen as part of the team because of their involvement during the DRP. The manner in which key payers (IPCPs and matrons) delivered key messages helped to create a positive environment where learning could take place.[29]

"We don't think that you are coming on to check up on us and victimise us when reviewing patients with CDI. The review is useful; it's an opportunity to highlight areas of good practice and mention areas where things need to be improved upon". ***WS participant.***

Discussion

What began as an AMT designed to help monitor CDI, developed into a process (DRP) that brought key players (IPCPs, matrons and ward staff) into sustained contact to better manage patients with CDI. The introduction of policy driven performance management can result in a culture of fearfulness and generalized anxiety in some healthcare settings[30]. The findings in this study indicate the DRP created opportunities for education and learning and developing and the sustaining of relationships, and became a catalyst for change. Staff saw positive benefits (alongside other initiatives) such as improved outcomes for the patient and for

themselves in terms of their greater understanding of the disease process and implications of caring for the patient. The DRP became seen as an enabling process rather than a means of checking up, reprimanding and '*telling staff*' with the consequence the intervention became embedded rather than resisted. Checklists similar to the AMT examined in this study have been seen as a solution for many healthcare safety failures but are arguably a "weak solution" and possibly even a "distraction"[31]. One of the important lessons from the successful Michigan Keystone ICU project was that an evidence-based understanding of organizational culture and how clinical teams work and interact and importantly utilisation of strategies that foster performance improvement are more likely to bring sustainable change[32].

Fundamental to the DRP were 'Education and Learning' and in particular situated practice based learning. The IPCP and matron provided 'expert' knowledge and advice in the context of the situation at hand. Legitimate peripheral participation focuses on the whole context of the learning experience and the individuals that interact in that experience.[24] The value of the informal contextual learning was the engagement between the IPCP, matron and the ward staff and the opportunities for new understandings to augment existing attitudes, experiences and knowledge. The learning that resulted from those interactions was perceived to be influential in enhancing the care and management of patients with CDI. The DRP brought clinicians together; IPCPs, matrons and ward staff and created a space where they could learn from each other during the review process actively learning whilst doing. There is evidence that infection prevention may not always be best served by educational approaches delivered at a distance from practice and/or dominated by formal classroom based learning.[25]

The DRP was also perceived as assisting in enhancing and developing relationships between the IPCPs and matrons and the IPCPs/matrons and ward staff. The traits that facilitated these were approachability, effective use of communication skills and being visible and available. The manner in which the IPCPs in particular, communicated was seen as important to ward staff. Positive relationship development and the attributes that facilitated this were perceived as fundamental to the effective delivery of infection prevention and control messages during the DRP. These findings resonate with Ward's study[33] that examined student nurses' and mentors' attitudes towards IPCPs. Those IPCPs that appeared approachable, available and offered solutions to problems were seen more positively by both student nurses and mentors and these attributes were considered to contribute to positive collaborative relationship development[33]. Similarly in a more recent study the quality of the relationship between particularly the IPCP and ward staff can add to

conflict and tension and in contrast when based on co-operation and “norms of reciprocity” are more likely to be sustained[30].

Lack of approachability and helpfulness by key players (IPCPs and matrons) were perceived as barriers to the success of the DRP and constituted the most negative feedback linked to the DRP. IPCPs and matrons who were less approachable and less helpful also tended to be perceived as having a more authoritarian style and overall were viewed more negatively by all the participants. Senior managers commented in particular on the importance of approach and perceived helpfulness of IPCPs and matrons. Ward staff also commented on the importance of approachability. Ward staff were generally the last group of interviewees and by then approachability had emerged as a key area, consequently it was included in their interview agendas (see figure 2).

Developing relationships is a key component in effective team working. Effective teams tend to be more innovative and deliver higher quality patient care with individuals within those teams reporting less stress and feeling more supported.[34] Helpfulness was also linked with team working with ward staff believing that the IPCPs and matrons who were more approachable when undertaking the DRP, were also more helpful. This was manifested by IPCPs who assisted staff with care rather than just providing information (showing and telling) and illustrated a shift from ‘command and control’ strategies to more facilitative interactive strategies where IPCPs and matrons were working with staff to find solutions facilitated by the DRP.

Relationship development and improved teamwork during the DRP assisted in DRP becoming ‘normalised’. Behaviour change is often linked with social norms[15]. In this case the DRP became the ‘norm’ and staff associated the DRP with improved outcomes for the patient. Behaviour change is also concerned with behaviour and actions associated with blameworthiness. Staff are less likely to get involved in behaviours that can be linked to blame.[14] The DRP promoted a positive approach, defusing rather than fostering a blame culture. This helped to promote shared purpose for all staff involved in the DRP. Shared responsibility to improve the patient experience is important in behaviour change and infection prevention and control.[13,30]

Limitations of the study

The study focused on one English NHS Trust (2 hospital sites) making the findings less generalizable. The DRP was part of a locally devised response to a specific healthcare challenge and may limit transferability because of its specificity. Nevertheless the findings and links to behavioural change and infection prevention and control suggest they may have resonance for other organisations facing similar challenges.

Whilst the AMT was instrumental in increasing visibility of IPCPs in particular on ward areas, other initiatives within the study Trust were also in place at the time of the study, for example collaborative audits involving different staff members. This may also have impacted on staff perceptions of increased visibility.

At the time of the study there were formal mechanisms in place for feedback of the audit and monitoring tool as can be seen from figure 3.[8] There was however no formal feedback mechanism to the matron or ward manager. One of the recommendations from the study was to explore the benefits of providing formal feedback to the ward manager through weekly or monthly summaries. This could be useful in assisting ward mangers and other staff monitoring practice and any deviations or non-compliance.

Patients were not involved in the study, however anecdotal feedback from matrons and senior managers suggest that patients found the DRP useful and particularly commented on the increased visibility of the IPCP and matron. Future studies could explore the patient's perspective on the DRP

Qualitative research is often criticised on the grounds of small non probability sampling and focusing on unique contexts, yet as this study illustrates the in depth nature of qualitative enquiry can provide insight into interventions that might otherwise go unnoticed or unreported.

Conclusion

This study set out to explore the use of an AMT used in the care and management of patients with CDI, the focus broadened once the nature of the interactive process became apparent. The AMT evolved into an intervention, DRP, incorporating active participation and engagement to support improved care for patients with CDI.

For the DRP to be effective it required interaction between IPCPs, matrons and ward staff. The DRP was underpinned by education tailored to meet specific ‘on time’ learning needs. With its audit and monitoring function, the DRP was seen to assist and support staff rather than merely regulate staff behaviour. The key to this change was the approach adopted by the IPCPs and matrons. Positive, approachable, visible and supportive behaviours assisted with the acceptability of the DRP

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