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Managing patients with Clostridium difficile infection (CDI) in an acute NHS Trust: The development of a daily review checklist process (DRCP)

Introduction

C.difficile is a Gram positive spore producing anaerobe, and is the leading cause of infective diarrhoea in hospitals (Gouliouris et al, 2011; Department of Health [DH], 2010, a). It is also the major cause of antibiotic associated diarrhoea and colitis. *C.difficile* infection (CDI) also known as *C.difficile* associated diarrhoea (CDAD) predominantly affects the colon and can range from minor diarrhoeal type symptoms and abdominal pain to life threatening pseudomembranous colitis (Lyerly et al 1988).

An NHS trust in the North of England has been successful in reducing their CDI rates utilising a range of evidence based interventions and initiatives for example utilising the principles embedded in Saving Lives (DH, 2010, a) which includes prudent antimicrobial prescribing and the High Impact Intervention (HII) audit tool for the care and management of patients with CDI (DH, 2010, a). Since 2010 the Infection Prevention and Control Team in association with staff across the trust undertake a collaborative daily review for all patients with CDI. This review process incorporates completion of a checklist through contemporaneous examination of infection prevention and control practices and a clinical patient review incorporating risk assessment of potential complications and severity of CDI.

Background/Literature review

The early 1990's confirmed *C.difficile* as a healthcare associated infection (HCAI) following the outbreak of CDI in three Manchester hospitals, which resulted in 175 patients being affected and at least 17 deaths attributed to CDI (Cartmill et al, 1994). This outbreak led to a report by the then Public Health Laboratory Service (PHLS) and the Department of Health (DH) into the prevention and management of CDI (DH/PHLS, 1994). The report, whilst acknowledging at the time the lack of established research on the pathogenesis of CDI and the mode of spread of infection, highlighted the importance of prudent antibiotic including the implementation of antibiotic policies, thorough hand washing, environmental cleaning and prompt isolation.

Two further major outbreaks; Stoke Mandeville hospital (Healthcare Commission [HCC], 2006) and Maidstone and Tunbridge Wells NHS trust (HCC, 2007); the latter resulting in excess of 500 cases and over 60 deaths. Learning from these outbreaks combined with increasing knowledge and evidence around pathogenesis and mode of spread and an increase in CDI rates across the NHS from the 1990's through to 2006 prompted a more thorough national review to CDI (DH, 2009).

The marked increase in CDI rates up until 2007 led to proposals to try to reduce the problem. 'Saving Lives' (DH, 2007) included a series of HII's. One of the HII's was designed to reduce the risk from *C.difficile* and outlines the principles around prevention and management of CDI. These include prudent antibiotic prescribing, hand hygiene with an emphasis on the use of soap and water, environmental decontamination with a chlorine based or sporicidal based product, the use of personal protective equipment and prompt isolation or cohorting of patients with CDI. The HII's were updated in 2010 incorporating more comprehensive guidelines (DH, 2010, a).

Additional guidelines on the care and management of patients with CDI (DH, 2009) highlighted infection prevention and best practice clinical management to assist trusts to reduce their CDI rates. Prompt and efficient recognition of cases and potential outbreaks, in conjunction with the guidance in the HII are emphasised in the report alongside recognition and management of disease severity; advocating a multidisciplinary (MDT) approach including infection prevention and control, microbiology, pharmacology and gastroenterology input (DH, 2009).

In early 2011 NHS trusts were given new objectives. NHS Operating Frameworks (DH, 2010, b) introduced a 'minimum standard' for all cases of CDI which had to be implemented from April 2011. The aim being that by 2014 all NHS trusts will have reduced their CDI rates towards the level of the 'current best', which for some is a reduction in more than 50% of their yearly totals (DH, 2011, a). In conjunction with the Health and Social Act (2012) and the introduction of clinical commissioning groups (CCGs) responsible for the delivery of services, the NHS Outcomes framework was introduced (DH, 2011, b). This includes five domains with the fifth 'treating and caring for people in a safe environment and protecting them from avoidable harm' (DH, 2011, b, page 5). Included in this domain are guidelines for the

reduction in Health care associated infections (HCAIs) including CDI. HCAI reductions will be one of the national measures to calculate the quality premium for CCGs (NHS Commissioning Board, 2012).

Checklists and human factors

Checklists and human factors are not a new phenomenon and have been utilised by the airline industry and other non-medical industries for many years in order to reduce errors and improve safety (Worrall, 2008). Checklists act as reminders ensuring procedures have been undertaken and help to standardise individual and collective actions. (Pronovost et al, 2009). They are also described as a 'work system to support human performance and safety' (Russ, et al, 2013 page 802). Gawande (2009) maintains that checklists are not new in healthcare and argues that they are an everyday part of the healthcare professionals' daily routine, for example recording the vital signs of temperature, pulse, respirations and blood pressure measurement and suggests that the original chart to record vital signs was instigated by nurses as a checklist to ensure that an important element in the patients' assessment was not forgotten amongst the busy routines of caring for patients.

Healthcare related checklists have also found favour in both pre and peri-operative surgical procedures. In 2009 The World Health Organisation (WHO) launched guidelines on Safe Surgery aimed at improving surgical safety by reinforcing accepted safety measures and improving communication between the relevant disciplines involved (WHO, 2009). The checklist provides key prompts or triggers thereby helping to reduce the risk of major complication and potential subsequent death.

In infection prevention related areas, a study undertaken by Pronovost et al (2009) found that the introduction of a checklist helped to reduce catheter related blood stream infections by up to 66%. Whilst there was recognition of the limitations of the study, including a lack of randomisation of implementation across the Intensive care units, the authors believed that there was a strong association between the use of the checklist and the reduction in infection rates (Pronovost et al, 2009).

Exponents of the checklist argue that a human factors approach can provide a comprehensive guide to help protect against failures and provide a minimum set of

standards (Gawande, 2009; WHO, 2009). Others maintain that healthcare is often complex and checklists can reduce the need for clinical judgement and can have limited impact if they produce unthinking routines; especially if they function as simple reminders of what to do and are not accompanied by attitudinal change (Bosk et al, 2009). McNellis (2010) reiterates the importance of change and maintains that there has to be recognition of the need to utilise checklists in order to help maintain safe practice.

Checklists and Infection prevention and control

There is no current literature, guidelines or research into the use of a specific 'daily review checklist' approach by an IPCP and matron for patients with CDI. The Saving Lives HII for *C.difficile* (DH, 2010, a) provides an auditable standard for the care and management of patients with CDI using a series of prompts (not dissimilar to a checklist) on antimicrobial prescribing, hand hygiene, environmental decontamination, isolation or cohorting symptomatic patients and the use of personal protective equipment. However HII's are often used as an audit tool by the staff on the wards or areas themselves and usually on a monthly basis and the HII does not include any assessment or monitoring of disease severity or complications of CDI. The DH (2009) highlights the importance of documentation of stool frequency, fluid and electrolyte balance, nutritional status and pressure ulcer risk assessment when caring for patients with CDI in order to prevent or early recognition of complications of CDI.

Other planned programmes of interventions, care bundles and checklists have been used in the past but these have mainly focused on reducing the incidence and managing specific outbreaks of CDI. Studies where a checklist style approach has been utilised have demonstrated that infection prevention and control strategies contribute to the overall reduction in CDI rates and help to reduce the incidence of outbreaks (Aldeyab et al, 2011; Hardy et al, 2010; Abbett et al, 2009; Salgado et al, 2009; Weiss et al, 2009; Gerding et al, 2008). However other than Hardy et al (2010), these studies focus on the checklist being used by the actual staff on the ward, unit or hospital as a prompt for the staff themselves. In the case of the DRCP, the checklist was devised as a tool to assist in reviewing patients with CDI, but predominantly for the IPCP and matron undertaking the review to be used as a

prompt and a reminder of important aspects around CDI management. The DRCP's original inception wasn't based on a human factors approach, but the principles of promoting quality and patient safety and identifying problems and possible solutions as highlighted by Russ et al (2013) when describing human factors and healthcare have become inherent in its application.

Methodology

In the first quarter of 2009 (April to June 2009), one site in a two hospital site foundation trust, observed an increased incidence in the number of patients with CDI. Whilst the local Northern England NHS trust had seen an overall reduction in the number of CDI cases since 2008 alongside the national picture (PHE, 2013), the increased numbers of cases in spring 2009, led to concerns and a review of the care and management of patients with CDI. At the time of the increase, the Infection prevention and control nurses (IPCPs) used the Department of Health (DH) (2009; 2007) and epic 2 guidelines (Pratt et al 2007) to develop a daily review of all newly diagnosed and current patients in addition to the usual infection prevention and control advice for the management of patients with CDI. This incorporated reviewing individual patients and assisting staff with the recognition and understanding of the severity of symptoms and potential complications of CDI with further advice, referral or liaison with other clinicians where necessary. It also included auditing the general infection prevention and control practices within the ward environment. However, it was perceived that there was a lack of ownership of the review process by staff on the wards. The IPCPs reviewed patients and communicated information and concerns directly to the ward or unit staff but there was no consistent approach to highlight any omissions or areas of concern or indeed areas of good practice. The HCC in their report after the outbreak of CDI at Maidstone and Tunbridge Wells NHS Trust highlighted the lack of any systematic monitoring of patients with CDI (HCC, 2007).

In order to address this, it was felt that the review should include the matron for the area as well as a member of the IPCP team, reinforcing the importance of cleanliness and infection prevention and control and the pivotal role of the matron in these areas (DH 2004). This clinical ownership also allowed sharing, a cascade of good practice and a face to face opportunity to address any concerns especially

associated with cleanliness. Key infection prevention and control principles in conjunction with an evidence base approach from epic 2 (Pratt et al, 2007), the HII (DH, 2010, a) and the DH guidelines (2009) helped to formalise a specific checklist (The daily review checklist is illustrated in figure 1).

Figure 1. The daily review checklist

WARD	DATE	COMPLETED BY		
		YES	NO	Comments or Actions taken
SLUICE				
All bedpan bases are clean and in good condition				
All commodes are clean – check underside, frame and foot rest.				
Apron and gloves are available				
Slipper pans are maceratable and not reusable				
Cleansing foam is single patient use (check cupboards/shelves for part used containers)				
STANDARD PRECAUTIONS				
Staff are washing hands with soap and water after contact with patient with diarrhoea.				
Patients are offered hand washing facilities or hand wipes after using toilet facilities or before meals				
Staff are wearing single use aprons and gloves when in contact with a patient and/or patient environment				
Staff decontaminate their hands prior to putting on PPE and with soap and water after removing PPE.				
All staff decontaminate their hands before and after any patient contact or different patient bed spaces.				
Clean linen stored in the linen store area only (not bathrooms/sluice/bays)				
Infected linen is disposed of correctly and is not left in the side rooms or bays.				
MANUAL HANDLING EQUIPMENT				
All manual handling equipment is single-patient use.				
CLEANING				
Tristel is being used at the correct dilution and is dated and timed (8 hour shelf life once made up)				
Side rooms are clean, free from dust/ spillages (check behind lockers, under beds and curtain rails)				
ISOLATION				
Patients with clostridium difficile are being nursed in the side room with the door closed and appropriate signage in place				
Used linen has been removed from the room				
PATIENT CARE				
Care plan and patient information leaflet provided				
Discuss with Nurse in Charge re. patients condition to include:				
Abdomen				
Temperature				
Nutritional status				
Pressure ulcer risk assessment				
Fluid balance				
Daily bed bath/hygiene care				
Daily bed linen change				
Stool chart – document type of stool				
Medication				

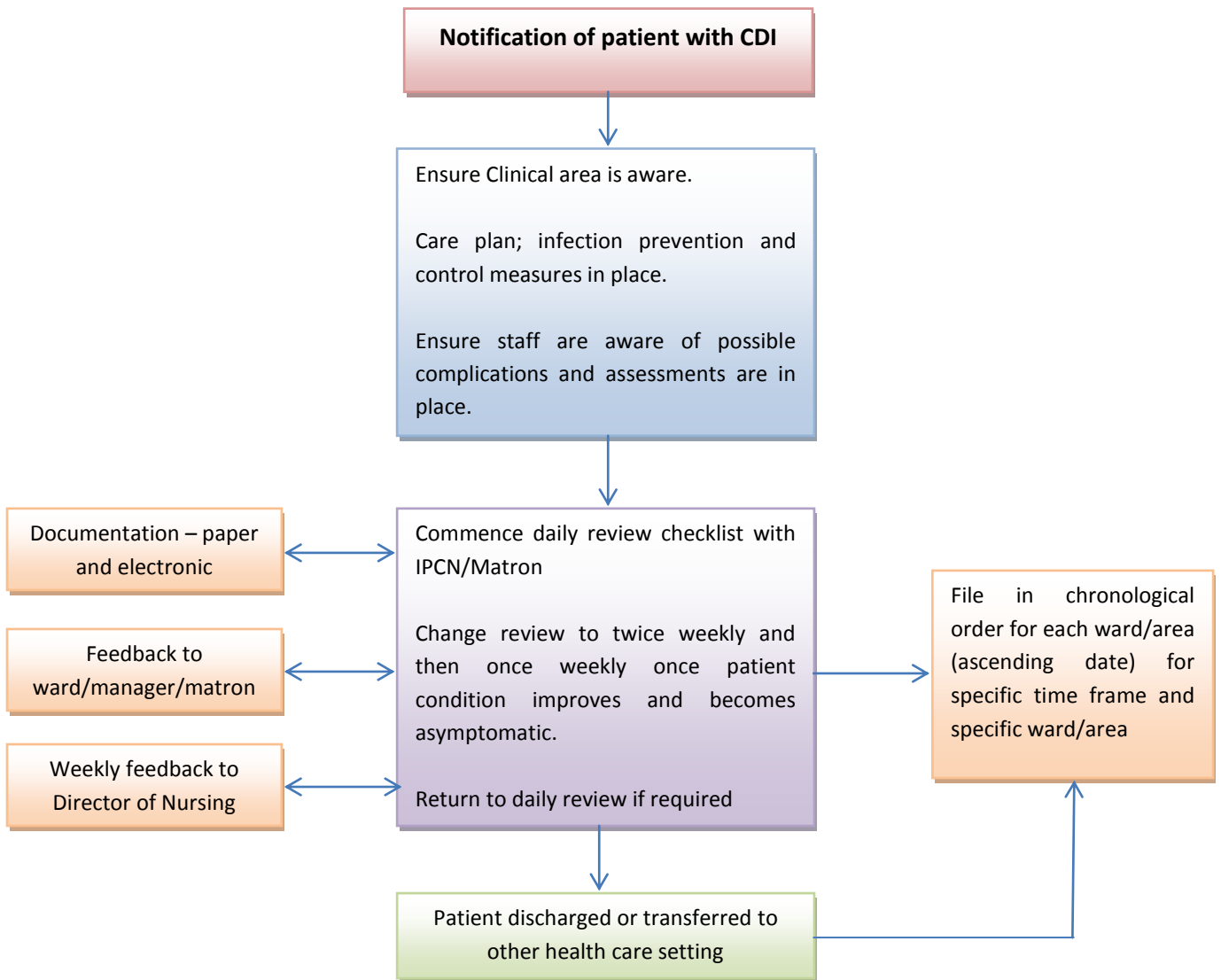
The rationale for the inclusion of an environment section in the checklist was based on the potential transmission of *C.difficile* spores by either symptomatic or asymptomatic carriage (Freeman et al, 2010). Whilst some of the evidence around the environment and asymptomatic carriage is less than robust as more studies are required, optimising environmental and patient measures does help to reduce the incidence of transmission (Freeman et al, 2010).The checklist also incorporated observable general infection prevention and control areas of good practice, which are linked to guidelines and best practice (DH, 2010, a; 2009; Pratt et al, 2007) and are important in helping to reduce outbreaks and overall CDI rates (Hardy et al, 2010).

The patient assessment elements in the checklist (see figure 1) included pressure ulcer prevention, fluid management, nutrition, temperature monitoring and monitoring the patient's abdomen for signs and symptoms of abdominal distension or pain. All are important in the recognition of disease severity and care management (DH, 2009). The DRCP is initiated when diagnosis of CDI is confirmed whether this is on admission or if the patient develops CDI during their hospital stay. Initially the review is undertaken on a daily basis. Frequency of the DRCP is then determined by risk assessment of the patients general condition and response to treatment as well as ensuring infection prevention and control aspects are understood and being practiced. This may result in the DRCP changing to from daily to alternate days and then to twice weekly. Once the patient is asymptomatic, reviews are reduced to once per week. Figure 2 provides an example of the flow chart for the daily review process. Asymptomatic in terms of CDI is a return to 'normal' or as near 'normal' bowel habits.

The daily CDI review checklist process utilises an approach of 'challenge, verify and respond' (Gwande, 2009, p 9). This places an emphasis on auditing whether critical actions have been undertaken; challenging and verifying any issues that arise, for example increased stool frequency or abdominal pain and responding to those issues. Response may be actions undertaken by the reviewers (matron and IPCP) or the ward staff. Hence the importance of educating the ward staff who may lack awareness of the potential complications of CDI as well as the potential issues around cross transmission (Madeo et al, 2008).The IPCP as a specialist nurse or practitioner should have an expert knowledge base alongside clinical competence

and an ability to make complex decisions (NMC, 2005). The matrons' role in infection prevention is centred on cleanliness and appropriate infection prevention and control practices (DH, 2004). The daily review checklist provides an opportunity for both the IPCP and the matron to undertake these roles.

Figure 2: Flow chart illustrating the Daily Review Checklist Process



Findings and discussion

Whilst the DRCP origins may have had an audit and surveillance role and may not have been truly embedded in human factors and ergonomics, its principles and subsequent development lends itself to a human factors approach in promoting quality and safety and identifying and dealing with problems (Russ et al 2013). The DRCP acts as a prompt and a real time audit of current practice. It also provides an opportunity to inform and educate clinical staff on the potential and early recognition of the complications of CDI and an opportunity to ensure that infection prevention and control principles are embedded in every day practice in order to prevent the spread of the disease and to reduce CDI rates.

The DRCP has assisted in reducing the number of cases of Trust apportioned CDI's in this particular Trust from over 150 in 2008/2009 to less than 30 in 2012/2013 alongside other interventions for example prudent antibiotic prescribing (DH, 2010, a). The DRCP has also helped to embed a culture of increased awareness of the potential life threatening complications and recognition of disease severity. It has provided a form of real time monitoring, providing organisational surveillance and reassurance of safe and effective infection prevention and control practices for patients with appropriate responses where care may be suboptimal.

In addition, the review process involves supporting staff and remediating any knowledge or practice deficits which may subsequently result in more formal education or development sessions. In a literature review undertaken by Vonberg et al (2008) examining infection control measures and *C.difficile*, a number of studies were included that highlighted the importance of educating staff by increasing knowledge and awareness and this was found to be one of the most effective measures in reducing the spread of *C.difficile* (Muto et al, 2005; al Barrak et al, 1999; Climo et al, 1998; McNulty et al, 1997; Manian et al, 1996; Foulke et al, 1987). Providing information that is relevant to the situation at the time can help to provide meaning and help staff to understand in the context of patient care. Lave and Wenger (1991) maintain that 'abstract representations are meaningless unless they can be made specific to the situation at hand...' (1991, page 33).

Conclusion

The checklist approach has been found to be useful across a range of professions and specialities including critical care and as well as infection prevention and control.

In the hospital Trust where the DRCP was developed, a checklist and review process has helped in the care and management of patients with CDI. It was developed as a consequence of local increased incidence with the intention of assisting staff to better understand the potential life threatening complications of CDI and assist in the prevention of spread of the disease. The DRCP provides real time monitoring of individual patients with feedback and construction of patient focused action plans and experience shows this is producing results. Research is currently underway to understand more fully how the process helps facilitate improvements in the care and management of patients with CDI.

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