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Major Article

Barriers and facilitators to *Clostridium difficile* infection prevention: A nursing perspective

Caitlyn Ngam MPH [a], Ann Schoofs Hundt PhD [b], Nicholas Haun MD [c], Pascale Carayon PhD [b,d], Linda Stevens RN [e], Nasia Safdar MD, PhD [c,f,*]

[a] *University of Wisconsin School of Medicine & Public Health, Madison, WI*
[b] *Center for Quality and Productivity Improvement, University of Wisconsin-Madison, Madison, WI*
[c] *Department of Medicine, Division of Infectious Disease, University of Wisconsin School of Medicine & Public Health, Madison, WI*
[d] *Department of Industrial & Systems Engineering, University of Wisconsin-Madison, Madison, WI*
[e] *Department of Nursing and Patient Care Services, University of Wisconsin Hospital and Clinics Authority, Madison, WI*
[f] *William S. Middleton Memorial Veterans Affairs Medical Center, Madison, WI*

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Background: *Clostridium difficile* infection (CDI) is a critical patient safety issue. Consistent and regular performance of appropriate practices is effective in preventing CDI. Variation in adherence to these practices can impede their effective implementation and weaken CDI prevention.

Methods: Using the Systems Engineering Initiative for Patient Safety (SEIPS) framework we convened a focus group of 10 nurses to identify barriers and facilitators to compliance with a CDI prevention bundle that includes (1) prompt diagnostic testing, (2) empirical isolation for patients with suspected CDI, (3) consistent and appropriate contact isolation, (4) hand hygiene, and (5) disinfection of the patient room and objects in the room. On completion of transcript coding, analyses were performed based on bundle intervention and the work system element of the SEIPS model.

Results: A total of 58 excerpts were coded. Work system barriers or facilitators were associated with nearly every bundle intervention. The work system elements raised in over half of the excerpts were task (n = 31) (eg, amount of additional effort required to don and doff gloves and gowns) and organization (n = 30) (eg, recognition by all staff of the severity of CDI). Contact isolation was the most frequently discussed bundle intervention (n = 24).

Conclusions: The SEIPS systems engineering framework is useful to evaluate infection prevention practices for CDI and identify opportunities for improvement. Addressing the work system barriers and facilitators identified in this study is essential to effective implementation of infection prevention interventions, specifically for CDI.

BACKGROUND

Clostridium difficile infection (CDI) is a critical patient safety issue because it is responsible for as many as 25% of cases of hospital-acquired diarrhea.[1] CDI is associated with substantial morbidity, mortality, and cost.[2] Consistent and regular performance of appropriate infection prevention practices is effective in avoiding a large proportion of CDI; however, variation regarding adherence impedes effective implementation of these practices.[3]

Current guidelines[4] on prevention of CDI recommend the following bundled interventions (ie, a CDI bundle): (1) prompt appropriate diagnostic testing of patients with suspected CDI, (2) prompt empirical isolation of patients with suspected or confirmed CDI, (3) consistent use of contact isolation (gowns and gloves) by everyone entering a CDI patient's room, (4) hand hygiene performed with soap and water on room exit, and (5) disinfection of patient rooms and other objects using chlorine-containing cleaning agents or other sporicidal agents.

Effective implementation of a CDI bundle requires an in-depth understanding of the system barriers and facilitators of adherence to the bundle interventions. The Systems Engineering Initiative for Patient Safety (SEIPS) model is an innovative approach to patient

* Address correspondence to Nasia Safdar, MD, PhD, Department of Medicine, Division of Infectious Disease, MFCB 5221, University of Wisconsin, 1685 Highland Avenue, Madison, WI 53705.
E-mail address: ns2@medicine.wisc.edu (N. Safdar).
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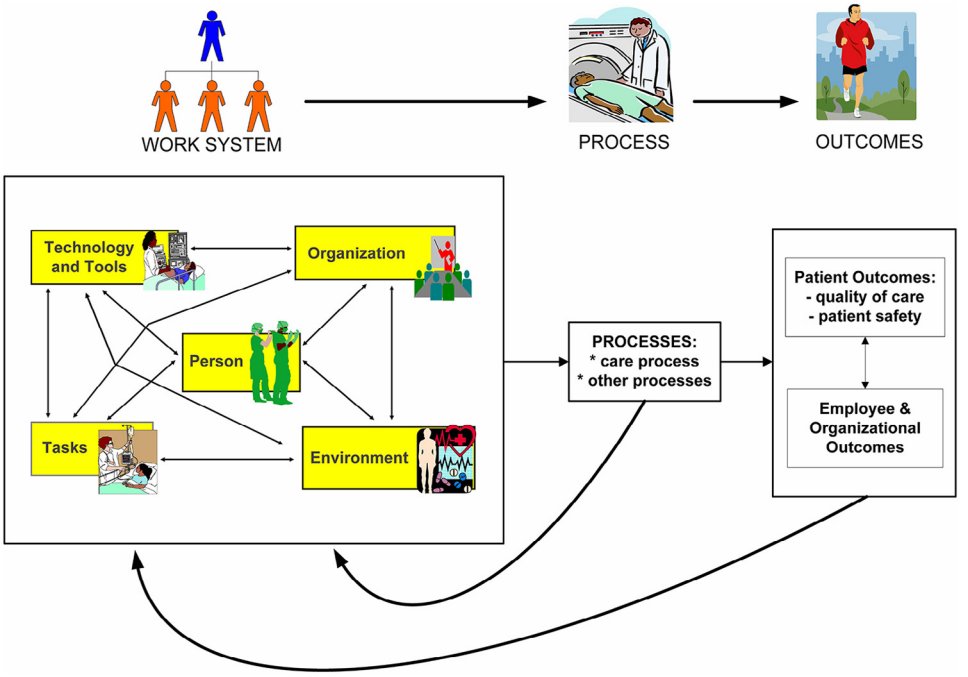

Fig 1. The Systems Engineering Initiative for Patient Safety model of work system and patient safety.[5]

safety originally described by Carayon et al.[5] The SEIPS model has been applied broadly in health care to improve patient safety, and specifically to address health care practices such as infection prevention, including the prevention of CDI.[6] For our purpose, the work system aspect of the SEIPS model (left-most portion of the model)—including the person(s), tasks, tools and technologies, the physical environment, and organization (Fig 1)—is critical to understanding barriers and facilitators to successful ongoing implementation. We undertook a qualitative study using the work system model[5,7] and conducted a focus group of nurses to identify barriers and facilitators to compliance with our institution's CDI prevention bundle.[8,9] We chose to involve a group of nurses because they are involved in all 5 interventions of the bundle. We hypothesized that nurses face both barriers and facilitators[10] to adherence to the bundle with respect to each work system element and CDI bundle intervention. By elucidating these factors, we can then identify possible means to increase compliance with the bundle interventions and therefore improve the management of CDI.

MATERIALS AND METHODS

The focus group described here is part of a larger study examining the CDI prevention bundle currently in place at our institution. During the nursing focus group, we used the work system model (Fig 1) to identify barriers and facilitators to compliance with the 5 CDI bundle interventions previously described.

Prior to the focus group, and as part of another arm of the study, research team members independently observed 90 health care professionals on different inpatient units to record their level of compliance with the contact isolation and hand hygiene interventions while they cared for CDI patients. This afforded the research team members the opportunity to better understand the bundle interventions.

Setting

This study was conducted in October 2015 in a large academic teaching hospital in the Midwest of the United States. A research team member (N.H.) asked nurse leadership from multiple units for permission to recruit staff nurses. He then informed nurses on the respective units of the upcoming focus group, including its location, date, and time. This was probably the least threatening means of recruitment because nurses on the various units were familiar with the team member's infection prevention activities in the hospital. Ten nurses, all women, from inpatient adult medicine units with varying years of experience voluntarily presented to the focus group. The focus group was scheduled for 1.5 hours, held during work hours, and convened in a conveniently located meeting room in the hospital. The nurses received no additional financial remuneration for participating. The session was audio recorded and later transcribed.

The study was approved by the University's Health Science Institutional Review Board (IRB) (Systems Engineering Approach to Reducing *C. Difficile* Infection; protocol no. 2015-0065).

Focus group facilitation

The focus group was facilitated by a human factors engineer with significant experience in health care group facilitation (A.S.H.). Also attending was the project principal investigator (serving as content expert) and a project assistant (a graduate student in public health) who served as logistician and timekeeper. Per IRB approval, information sheets rather than consent forms were distributed to participants prior to and on arrival to the focus group meeting. The information sheets explained the study and risks of participation, and afforded participants the option to excuse themselves from the focus group at any time with no negative consequence. Time was allotted for participants to review the information sheet prior to beginning the focus group. Attendance was not recorded.

The focus group began with participant and facilitator introductions and a quick overview of focus group procedures. The principal investigator then reviewed the objective of the focus group and provided an overview of the 5 CDI bundle interventions prominently displayed in front of the room. The facilitator provided an overview of the work system model and explained how the CDI bundle interventions fit within the context of the model, providing