Brief Report

Integrating infection control and environmental management work systems to prevent *Clostridioides difficile* infection

Julie A. Keating PhD [a,b], Vishala Parmasad MBBS, PhD [b], Linda McKinley RN, PhD [a], Nasia Safdar MD, PhD [a,b,*]

[a] *William S. Middleton Memorial Veterans Hospital, Madison, WI*
[b] *Division of Infectious Disease, Department of Medicine, School of Medicine and Public Health, University of Wisconsin-Madison, Madison, WI*

Effective infection prevention and control within health care settings requires collaboration and coordination between infection control and environmental management teams. However, the work systems of these teams can be difficult to integrate despite their shared goals. We provide results from a qualitative study of *Clostridioides difficile* infection prevention in Veterans Affairs facilities regarding challenges in coordination between these teams and opportunities to improve coordination and maximize infection prevention activities.
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Effective infection prevention and control (IPC) in health care settings require engagement and shared responsibility from all the members of the patient care team. A multidisciplinary team with a particular focus on IPC includes coordinated work from both infection control (IC, eg, infection preventionists, multidrug-resistant organism coordinators, hospital epidemiologists) and environmental management services (EMS). Generally, IC teams are responsible for the higher-level administration surrounding IPC—for example, developing facility guidelines and training materials, educating health care workers on evidence-based IPC practices, surveilling and reporting infection data, advising hospital leadership, coordinating with public health agencies, and serving as an IPC champion for prevention initiatives. EMS teams implement (and modify, where appropriate) environmental cleaning practices as part of effective IPC. While EMS works closely with IPC, the EMS and IC work systems for IPC are often parallel rather than integrated.[1] Maximizing opportunities for work system integration can (1) support effective IPC while (2) laying a foundation for shared decision-making with EMS staff thus supporting engagement and leadership visibility that may improve career satisfaction.[1,2] Our group has previously developed a team science framework integrating IC and antimicrobial stewardship teams to optimize IPC.[3] Given the complexity of effective IPC of

health care–associated infections, it is important to identify integration opportunities for additional discrete teams and work systems—for example, by integrating EMS into these systems.

The Veterans Health Administration mandated a bundle of *Clostridioides difficile* infection (CDI) prevention practices in 2012, including rapid and appropriate diagnostic testing, contact plus precautions (gowning and gloving plus sporicidal environmental disinfections and hand hygiene with soap and water) for patients with suspected or confirmed CDI, and improved health care worker hand hygiene. Environmental management was also included in the bundle, requiring annual EMS trainings, effective daily and terminal room cleaning processes, and monitoring and feedback to EMS staff.[4] EMS teams are thus integral to effectively implementing this bundle yet studies show that they feel less central to IPC processes and less empowered within the patient care team.[1,5,6]

We conducted a qualitative study of Veterans Affairs (VA) health care system personnel engaged in CDI prevention to assess barriers and facilitators to implementing the CDI bundle in VA inpatient facilities.[6] We performed interviews with 29 individuals across 4 VA facilities in a range of roles including IC team members, EMS staff and supervisors, and frontline nurses and physicians not on the IC team.[6] We have previously published overarching findings, including a best-practice recommendation for EMS to be integrated into multi-disciplinary, decision-making teams to support CDI prevention.[6] Here, we draw upon interview-derived perspectives from participants, including both IC and EMS roles, to delve into this recommendation that improved collaboration between IC and EMS teams is needed to effectively implement the CDI prevention bundle. We also identify opportunities to integrate the IC and EMS work systems, leveraging their shared vision and goals to reduce CDI.[3]

* Address correspondence to Nasia Safdar, MD, PhD, Department of Medicine, School of Medicine and Public Health, University of Wisconsin-Madison, 1685 Highland Avenue, Madison, WI 53705.
E-mail address: Ns2@medicine.wisc.edu (N. Safdar).
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Table 1
IC and EMS collaboration in the CDI work system

SEIPS element	Opportunities for collaboration	Quotes
Person	■ IC and EMS leadership—including C-suite where possible—prioritize CDI prevention and demonstrate collaborative relationships.	■ "Normally I do an in-service with environmental management, environmental services to go over C diff and the C diff cleaning and how important their job is." [IC] ■ "I think infection control is pretty actively engaged with coming down and specifically talking about C diff." [EMS]
	■ Offer additional IC trainings or certifications for EMS staff for more advanced professional development.	■ "I had all of my supervisors take this certified executive housekeeping training. So, all of them got certified… So, it pretty much prepared us for COVID before it came here. We was already experimenting on things we need to do better, and that training provided to my supervisors and my housekeeper, it really let my housekeepers know what their jobs are and how important it is." [EMS]
	■ Develop and communicate clear and documented responsibilities for CDI prevention for each role.	■ "Usually, the EMS cleans the bed and bed rails and the call light and all that surface. Any equipment, IV, pumps, those are cleaned by nursing." [IC] ■ "If I don't know how to clean it, [IC] will show me how to get up the stuff that was there. They'll show you how, the procedure and everything, because you want to contain." [EMS]
	■ Include EMS as stakeholders during development to ensure role-specific trainings and instructions are clear, understandable, and at an appropriate reading level. Build opportunities for hands-on learning and review.	■ "Outline education for our EMS workers. Because, of course, they're all different levels of knowledge and understanding and sometimes it's really hard to get through to them." [IC] ■ "Practice makes perfect. Hands on." [EMS]
Organization	■ Maintain CDI prevention documentation and protocols; regularly communicate changes to materials and where to find them. Include electronic and hard copy access if possible.	■ "I think everybody being on the same page of the original isolation precaution policy, and then also just getting updated when stuff is announced, because nobody gets notified and it's 4 months later…if not everybody's here and it just gets thrown in a book, there needs to be more than 1 visit when different shifts are here." [Frontline Clinical]
	■ Apply team science principles and strategies to engage EMS as a key member of the health care team, capitalizing on shared goals for reduced CDI.[3,8]	■ "We have multiple different services lines whether it be nursing, or EMS… so there's multiple stakeholders in any process and you have to get approval from the nursing union if you want to change any workflow. Or you have to get approval from a subspecialist. So it is a process. It's a challenging process." [Frontline Clinical]
	■ Ensure broader organizational culture fosters psychological safety.[9] Keep open communication and collaboration between EMS, IC, and other health care teams.	■ "So the cleaning part of it, it's a mystery. We have never been told what our EMS people clean. I know it exists somewhere, but it's buried. And I'm sad about that because I feel like if I ever ask about cleanliness, that I'm… accusatory." [Frontline Clinical]
	■ Offer avenues for feedback or raising questions and concerns regarding IC outside of the direct supervisor. ■ Engage champions for CDI prevention across IC and EMS roles.	■ "I don't need nobody to monitor me. I know my job and I do it efficiently… I don't need the micromanagement." [EMS] ■ "I don't know if there's like a specific person that's like, oh, there's the C diff champion. I can't answer that." [EMS] ■ "I know we have quite a few of our unit-based educators…I know I can contact [them] and say, hey, I think we need some more education and [they're] like, I'm on it." [IC]
	■ Empower staff to support continued training, monitoring, and adherence to infection prevention strategies outside of the more formal programs.	■ "Always ensuring that you're watching other people as well as yourself and washing your hands and proper disposal of PPE is important too." [EMS] ■ "They look around. You get more housekeepers mainly in the hospital than in the other services so we're more out, our eyes are watching others. If someone is up then we feel that we can say, hey, could you excuse me—very professional—asking them could you wash your hands. They bring it to them, soap or hand sanitizer, and ask them." [EMS]
Environment	■ Include IC and EMS in facility and unit design planning, including placing supplies/equipment (eg, supplies for hand hygiene, isolation, and cleaning) and evaluating how unit and room layouts impact supply access and processes for environmental cleaning.	■ "They try to change a lot of things, but it would be nice if they could get an input on the housekeeping. Their input on it, besides a higher up, because we work with it." [EMS] ■ "What I dislike about the Tru-D is the cycle. It's a little long. It depends how big that room is… It could take 30-45 minutes to run. The Xenex machine does it all in 5 minutes. But you have to move that machine around in the room to the front of the bed, left and right side, and then you have to take it into the restroom." [EMS]

Table 1 (*continued*)

SEIPS element	Opportunities for collaboration	Quotes
Tasks	▪ Jointly review policies and existing practices to determine how these procedures compare and opportunities for improvement.	▪ *"I would be curious to see what the protocol is because of how it compares to what we're doing already…. I'm just used to the old ways or whatever so I'm used to doing what we were taught and then it's reiterated every year."* [Frontline Clinical] ▪ [Regarding individual feedback to EMS staff] *"We kind of keep this information to ourself. So that we could actually work to figure out ways of improving our system."* [EMS]
	▪ Include EMS reports in IC meetings (eg, recommendations for best practices or improvements, results of monitoring audits or analyses).	▪ *"I know that the EMS staff have been providing ATP testing and reports to the infection control committee, and I think that's just, you know, where you can see where cleaning might need to be improved or focused on. So that's been helpful."* [IC]
	▪ Report CDI rates (including increases and decreases, and success of interventions) back to staff, including EMS.	▪ [Regarding sharing successes] *"That's how we get the buy-in from the staff."* [Frontline Clinical] ▪ *"I look online and I see you know, we don't have no HAI, or no C diff spread outbreak. Our C diff is low or to almost at zero here. Keep up the good work."* [EMS]
	▪ Gather stakeholder input and decision-making from IC and EMS to standardize cleaning supplies and practices for monitoring cleaning effectiveness.	▪ *"I think a specific toolkit would be really neat to have. I also think upper VA actually standardizing the disinfectant to use."* [EMS] ▪ *"I'm just hoping that all the VAs… get all the same kind of cleaning methods so that we all could be safe."* [EMS] ▪ *"Clear, VA-mandated instruction or policy of 'this is what you do or use,' then there's no choice. It would be something we can refer to."* [Frontline Clinical] ▪ *"One kind of challenge… it's like the second [role] get like a smell makes 'em uncomfortable or something or there's any kind of change then it adds difficulties."* [EMS]
Tools and technology	▪ Gather EMS input on signs/notifications for isolation precautions and environmental cleaning needs.	▪ *"For our isolation signage, I think it should be standardized. The VA could benefit from a lot of standardization."* [IC] ▪ *"A sign that says C diff… but I don't think they want to put that up. But I need to know instead of the isolation. Because you've got MRSA, you have MDRO, you have VRE."* [EMS] ▪ *"We're not doctors or nurses. We don't know who got what."* [EMS]

CDI, Clostridioides difficile infection; *IC*, infection control team members (Infection Preventionists, MDRO Coordinators, Hospital Epidemiologists); Frontline Clinical, physicians and nurses not specifically engaged in infection prevention and control oversight; *EMS*, environmental management service staff and supervisors

In our study, IC team members from participating facilities reported different levels of perceived engagement and collaboration between EMS and IC groups.[6] Integration of these teams through communication, coordination, and collaboration between their IPC-focused work systems was identified as a facilitator for effective CDI bundle implementation.[6] Table 1 highlights recommendations derived from this work, organized by systems engineering initiative for patient safety work system elements.[7] systems engineering initiative for patient safety, often used for analyzing complex health care work systems, breaks the work system into interacting elements (*Organization, Environment, Tasks*, and *Tools and Technology*) with *Persons* at the center.[7]

These results corroborate prior findings about VA EMS staff engagement and perceptions of their role within the sphere of IC, with EMS staff reporting feeling undervalued by other health care workers despite their critical role in health care quality and patient safety.[1,5] Previous work with infection preventionists has correlated high psychological safety (an environment conducive to "risky" interpersonal behaviors like highlighting errors) with improved infection control practices.[9] Opportunities to elevate the EMS role within the IPC work system and reducing perceived hierarchy can create trust and additional pathways for communication and support and thus play multiple beneficial roles in the health care work system—improving IPC effectiveness and enhancing EMS staff engagement and experience in their roles.[10]

Figure 1 illustrates an example of how these recommendations can integrate the EMS and IC work systems involved in health care–associated CDI prevention.

A limitation of these efforts may be lack of resources, including time and staffing. However, effective collaboration can more efficiently leverage existing job responsibilities and amplify efforts, particularly when systems support these collaborative activities. A recurring theme in interviews was a desire for standardized and widely available policies and procedures. For example, specific products for environmental cleaning are selected, tested, and approved at local facilities, requiring each site to make decisions requiring data and multiple stakeholder and service line approvals. Systems may support IC and EMS collaboration throughout the process of standardizing materials and processes:

– Soliciting feedback on processes and materials for decision-making.
– Creating and holding interactive, role-specific trainings on new guidance.
– Monitoring use of products and procedures, and providing feedback to users.
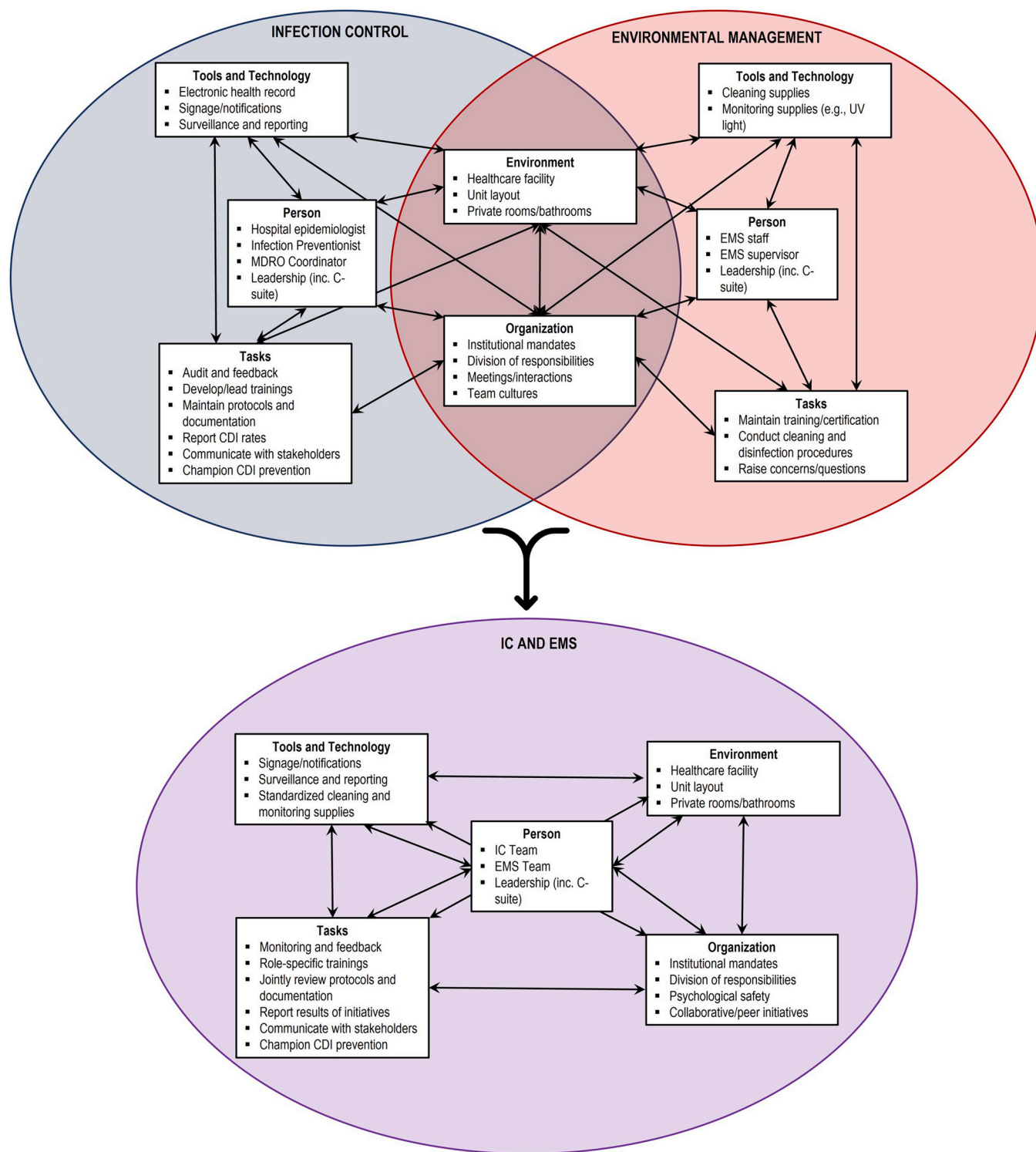– Reporting results of new processes and materials on CDI rates.

Fig. 1. The Infection Control (IC) and Environmental Management (EMS) work systems involved in *C difficile* infection (CDI) prevention demonstrated using the Systems Engineering Initiative for Patient Safety (SEIPS) framework.

This standardization could also reduce burden on IC and EMS leadership. Rather than adding the burden of identifying opportunities for collaboration onto individuals who may already have high workloads particularly due to staffing shortages, management (particularly centralized offices) can seek opportunities to scaffold EMS and IC collaboration throughout systems.

As we have previously discussed with IC and antimicrobial stewardship, independent teams can enhance their independent skills through collaborative goals and activities to reach their shared visions.[3] The shared vision of EMS and IC to reduce infections such as CDI offers similar opportunities to maximize these teams' goals and activities through effective collaboration—ultimately increasing quality of care and patient safety.

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