

# Pushing Beyond Resistors and Constipators: Implementation Considerations for Infection Prevention Best Practices

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**Abstract** Despite increased knowledge in the science of infection prevention, the implementation of evidence-based best practices remains a challenge. The dissemination of infection prevention risk reduction best practices should be approached with flexibility and a collaborative perspective. High-quality evidence and cost assessments to support interventions are important initial considerations. An implementation framework should be contextually appropriate, take into account an organization's culture, and be mindful of an approach that minimizes complexity. Trialing an intervention within a specific unit may later lead to increased uptake organization wide. Highly functional collaborations with effective leaders are needed for successful implementation. Leadership for infection prevention initiatives may include upper level management; however, hospital epidemiologists and infection preventionists often play this role. Although published data fail to identify a single best integrative strategy for infection prevention practice change, success has been associated with education initiatives and seminars, audit and feedback, distribution of educational materials, marketing, mass media, positive deviance, and the employment of champions, facilitators, role models, and opinion leaders. Local personnel, such as organizational resistors and constipators, can be barriers to idea dissemination and implementation. In addition to a thoughtfully conceived implementation strategy, dealing with infection prevention resistors and constipators includes getting their buy-in early in the dissemination process, working around them, or terminating their employment. More data are needed to best define which infection prevention dissemination strategies are most effective.

**Keywords** Infection prevention · Implementation science · Quality improvement · Patient safety

## Introduction

More than ever, the science of infection prevention defines health-care associated infection (HAI) risk reduction interventions and best practices. The Society for Healthcare Epidemiology of America (SHEA) recently published an evidence-based compendium on HAI best practices, with a focus on limiting morbidity and mortality from central line associated bloodstream infections (CLABSI), ventilator-associated pneumonia (VAP), catheter associated urinary tract infections (CAUTI), and *Clostridium difficile* associated diarrhea (CDAD) (SHEA Compendium reference). The implementation of evidence-based infection control practices is critical yet challenging for all health-care institutions. The mere existence of published guidelines does not translate into immediate uptake by frontline providers and health-care systems. We review key barriers, considerations, and strategies to optimize the implementation of HAI best practices in health-care systems.

## Active Resistors and Organizational Constipators

Using qualitative methods such as in-depth and in-person interviews, Saint et al. explored barriers to the implementation of evidence-based practices to prevent HAIs across 14 hospitals [1]. Eighty-six participants (31 physicians) were interviewed, including chief executive officers, chiefs of staff, hospital epidemiologists, infection prevention specialists, intensive care unit directors, nurse managers, and frontline physicians and nurses. The study reported the presence of "active resistors" across all 14 hospitals. Active resistors were defined as hospital personnel who vigorously and openly oppose various changes in infection prevention practice [1].

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The first type of active resistance was the near universal difficulty in implementing change with practices and habits that are the result of prior clinical training. The proposed change in best practices seemingly goes against the grain of “how they were trained.” The second type of active resistance was competing authorities on whether to implement an infection prevention intervention. Under this framework, a respected physician mentor or nurse supervisor dismisses the infection prevention recommendation by either a national authority or the local infection prevention service.

Similarly, across all 14 hospitals surveyed, Saint et al. identified the presence of “organizational constipators.” These individuals were characterized as mid- to high-level executives who prevented or delayed certain actions without active resistance, thereby acting as insidious barriers to change [1]. Organizational constipators identified included nursing chiefs and chiefs of staff, both resulting in obstacles to infection prevention change through passive and evasive strategies that undermine implementation strategies.

### Considerations for Infection Prevention Implementation Efforts

No single best strategy exists for the implementation of evidence-based infection prevention best practices. The process is multifocal, involves the inclusion of diverse stakeholders, and requires careful attention to implementation opportunities and thoughtful response to barriers such as active resistors and organizational constipators. Several key points, considerations, and collaborative roles should be considered in the implementation process (Table 1).

The characteristic of the intervention is important and encompasses perceptions about validity, quality and strength of evidence, adaptability, trialability, complexity, and cost [2]. Stakeholder perception is influenced by the legitimacy of the source making the practice change recommendation, including external authorities, research groups, and internally developed guidelines. Sources of evidence may be widespread and include published literature, guidelines, and anecdotal stories [2, 3]. We suggest that the most successful implementation occurs when evidence is robust and high quality. Adaptability is the degree to which an intervention can be adapted, modified, tailored, and refined to meet local needs [2]. The challenge is to balance full implementation with the need for flexibility and nuance at the local level [4]. Trialability is the ability to test an intervention on a small scale in an organization [5]. The ability to trial an intervention is an important implementation consideration and allows for individuals, groups, and teams to test an intervention and promote adaptation and dissemination across the health-care system [6]. Complexity refers to the perceived difficulty of

implementation and reflects scope, size, disruptiveness, and number of steps required to affect change [5, 6]. The more radical the change, the greater the departure from the current standard of care, and the more individuals required to implement change (providers, managers), the more complex the intervention [5, 7]. With increased complexity, there are greater potential barriers to implementation. Lastly, cost is a consideration and includes not only the cost of the proposed intervention, but also the cost of implementation and related opportunity costs.

The culture, context, and climate of the health-care system are important to consider. Organizational culture, while not a static term, generally refers to the norms, values, and basic assumptions of a given organization [8]. Theoretically, a health-care system that openly espouses and advocates a “safety first every day” philosophy to care should be more receptive to the implementation of infection prevention and safety best practices. Context is the setting in which evidence-based practices are implemented, and although an institution may have an underlying culture, the context of care and practice may differ from unit to unit across a health system [9]. For example, the message of enhanced infection prevention safety practices, such as the use of checklists, hand hygiene monitors, and chlorhexidine bathing of patients, may contextually resonate more with a unit that struggles with high health-care-associated infection (HAI) rates versus a more successful unit within an organization. Thus, the challenge is to advocate change such that implementation is congruent with organizational culture, while creating a context that is persuasive and conducive to integrating evidence-based practice.

The local climate for change is nuanced and includes tension for change, compatibility, relative priority, organizational incentives, goals, feedback, resources and leadership engagement, and readiness for change. The tension for change is the degree to which stakeholders perceive the urgency and need for change [2, 5]. Tension for change may also be a reflection of the scope of a problem and the perceived urgency for action. Compatibility is the degree of fit between the proposed intervention, the values of the personnel, and the institutional culture [5]. Relative priority is the shared perception of the importance of the implementation within the health-care system [2, 6]. Clear goals with feedback of outcomes and process measures facilitate the implementation of evidence-based interventions [2, 7, 10–12]. Incentives such as recognition awards, performance reviews, promotions, raises in salary, and increased respect may further the implementation of change within an organization [2, 13]. Lastly, organizational readiness for implementation is a function of leadership commitment with accountability of leaders and managers, coupled with the availability of resources and access to key information and knowledge about the proposed intervention [2, 5, 14].

**Table 1** Considerations and collaborative roles in an infection prevention implementation plan

Factor	Comments
Tension for change	Tension for change is a reflection of the scope of a problem and the perceived urgency for action. An outbreak of a multi-drug-resistant organism in a unit will heighten the urgency and tension for infection prevention interventions.
Quality of evidence	High-quality, robust evidence to support infection prevention interventions is persuasive and increases the legitimacy of the practice change advocated.
Adaptability and complexity	Adaptability is the degree to which an intervention can be modified to meet local needs. Interventions should balance full implementation with the need for flexibility and nuance at the local level. Complexity refers to the scope, size, disruptiveness, and number of steps required to affect change. With increased complexity, there are greater potential barriers to implementation.
Trialability	Trialability is the ability to test an intervention on a small scale in an organization. Successful trials at the unit level may later translate into greater uptake across an organization.
Cost	Cost includes not only the cost of the proposed intervention, but also the cost of implementation and related opportunity costs.
Organizational culture	Organizational culture generally refers to the norms, values, and basic assumptions of a given organization (“The way we do things here”).
Organizational context	Context is the setting in which evidence-based practices are implemented. Infection prevention safety practices may contextually resonate more with a unit or service that struggles with high HAI rates versus a more successful unit within an organization.
Leaders	Hospital epidemiologists and infection preventionists often play a significant leadership role. Effective leaders promote a culture of clinical excellence, effectively communicate with frontline staff, and are focused on overcoming implementation barriers.
Champions	Champions are change agents who navigate barriers, build organizational support, facilitate the use of strategic resources, and assist in building coalitions supportive of change. Successful champions must be intrinsically motivated, enthusiastic, and well interconnected through quality organizational networks.
Facilitators	Facilitators support the change process and are not meant to serve as an opinion leaders or content experts. Facilitators may assist by provision of resources and materials to achieve a specific task or using methods and prompts that enable individuals or teams to assess practice and work behavior.
Role models	Role models are respected physicians, nurses, or other hospital personnel who help trainees acquire values, attitudes, humanism, and ethical practice and shape clinical practice. Role models performing infection prevention best practices will positively influence the safety behaviors of others.

### Key Stakeholders and Allies for the Implementation of Infection Prevention Strategies

The implementation of evidence-based infection prevention requires a broadly collaborative movement across diverse specialties within a health-care system. Key roles, associations, and stakeholders include hospital leadership, infection prevention practitioners, physicians, nurses, pharmacists, employee health, champions, facilitators, role models, and effective collaborations.

The importance of leadership in preventing HAIs has been previously explored [15]. Using a sequential mixed-methods approach including both telephone interviews and on-site visits across 14 hospitals, Saint et al. explored qualities of effective leadership with respect to HAI prevention. Successful leaders cultivated a culture of clinical excellence and effectively communicated it to frontline staff. In addition, successful leaders focused on overcoming barriers and directly dealt with resistance and barriers to implementation of HAI prevention efforts. Lastly, effective leaders were inspirational, thought strategically, and acted locally by politicking for

crucial committee votes, leveraging personal prestige to move forward implementation, and forming strong, cross-disciplinary partnerships [15]. Lastly, with respect to infection prevention efforts, it was noted that hospital epidemiologists and infection preventionists often played a greater leadership role than senior hospital executives [15].

Champions are change agents who shape practice implementations through various strategies, including navigation of barriers, building organizational support for new practices, facilitating the use of strategic resources for implementation, and facilitating the development of coalitions supportive of change [5]. The role of infection prevention champions was recently studied. Damshroeder et al. employed a qualitative, mixed methods assessment of infection prevention champions across Veterans Affairs and non-Veterans Affairs hospitals across the U.S. [16]. The authors concluded that it was possible for a single well-placed champion to implement a new infection prevention technology; however, more than one champion was typically necessary when behavior change was in order [16]. In addition, hospitals with reportedly low-quality working collaborations across units proved more

challenging for champions, particularly when behavior change was the goal [16]. Furthermore, the impact of champions is subject to contextual factors. Top-down appointment of champions is generally ineffective. Rather, meaningful and successful champions must be intrinsically motivated, enthusiastic about the infection prevention practices advocated, and well interconnected through quality organizational networks [16]. As was stated by Schon, an intervention “either finds a champion or dies” [17].

Facilitation is a key factor in getting evidence into practice. Facilitation is a broad term that has been applied across multiple disciplines, including health care, education, quality improvement, and audit [18]. In general terms, facilitation is a “technique by which one person makes things easier for others” [19]. Facilitators are individuals with the appropriate roles, skills, and knowledge to assist individuals, teams, and organizations apply evidence in practice [18]. Thus, the role of a facilitator is to support the change process and is not meant to serve as an opinion leader or content expert. In this fashion, the facilitator’s role is about helping and enabling, rather than informing or persuading [18]. A facilitator’s focus can be broad and can include a provision of resources and materials to achieve a specific task or using methods and prompts that enable individuals or teams assess practice and work behavior. From an infection prevention perspective, a facilitator assists in the implementation of infection control efforts. Examples include a nurse unit manager advocating for increased number of hand hygiene stations, encouraging infection prevention education for staff, and promoting the placement of high-visibility infection prevention poster reminders and prompts in a floor.

Role models play a potentially important role in clinical practice and teaching. Role models include attending physicians, nurses, and pharmacists. The qualities of effective role models are diverse, particularly in teaching hospitals, and include duration of time spent with house staff, formal training in teaching, teaching style and methods, and attitudes toward teaching [20]. In this fashion, role models help trainees acquire values, attitudes, humanism, and ethical practice and shape clinical practice [21]. Similarly, role models may impact practice and attitudes with respect to infection prevention. Lankford et al. assessed the influence of medical staff role models and the number of sinks for hand hygiene compliance before and after a new hospital design [22]. Despite an increased number of sinks in the newly designed hospital, hand hygiene was significantly influenced by other health-care workers. Specifically, health-care workers in a room with a senior ranking medical staff person or peer with poor hand hygiene adherence were also less likely to wash their hands [22]. Likewise, Erasmus et al. reported that the lack of positive role models negatively influenced hand hygiene in a Dutch hospital [23]. In a cross-sectional survey of barriers for enhanced safety practices in an operating room, lack of role

modeling and promotion of hands-free techniques for passing surgical instruments by surgical leadership was identified by resident surgeons as a challenge for implementation [24]. For infection prevention efforts, role models who adhere to infection prevention best practices and believe in a culture of safety are critical for influencing behavior change.

Lastly, as health-care figures, physicians play a unique and important role in driving clinical practice. At the provider level, physicians can impact infection prevention efforts by participating in the orientation and performance management of their clinical team, ensuring that infection prevention and safety issues are addressed at clinical meetings and by supporting safety and quality improvement programs [25]. In addition, physicians can also advocate for awareness and training about HAI prevention at undergraduate and postgraduate levels [25].

### Strategies for Implementation: Beyond Resistors and Constipators

No single recipe exists for the successful implementation of evidence-based infection prevention interventions. Table 2 summarizes key strategies for dissemination. The art of infection prevention implementation lies in thoughtful consideration of multifocal strategies across a broad range of potential collaborators. Although numerous strategies exist to support the dissemination and implementation of new ideas across organizations, it is unclear what particular strategies will be of most use in any given setting [26]. The diffusion and adoption of new ideas is a complex process and is affected by numerous parameters, from the quality of evidence upon which the ideas are based to the nature of the environment in which the idea is being disseminated and how dissemination is facilitated [19, 27].

Educational efforts are one of the core strategies that have been employed to help disseminate new ideas across organizations. Education programs can take many forms. Educational materials may be distributed in either paper or electronic format; meetings such as conferences, workshops, and lectures can be held, and outreach visits with trained individuals meeting with clinicians in their workplaces can occur [26]. Although education is commonly used for idea dissemination, it is not clear what educational modalities will be of most use for any given idea or setting [16].

Other strategies that have been utilized for implementing new ideas and guidelines include the use of local “opinion leaders” (individuals, identified by colleagues as being particularly influential, who champion new ideas), audit and feedback of performance directed at individual clinicians, and “reminders” about various practice elements that can be deployed in a number of ways, including in the medical record [26]. Additionally, local marketing can be employed (using

**Table 2** Key strategies for idea dissemination

Strategy	Comments
Education	Education through distribution of printed materials, electronic media, and meetings
Performance audit and feedback	Evaluation of individual- and unit-level performance with feedback on best practices (e.g., compliance with hand hygiene, checklists, chlorhexidine patient bathing, head of bed elevation)
Reminders	Specific prompts designed to influence behavior via electronic medical record (EMR), posters, or peer to peer interactions (e.g., electronic reminders in the EMR for catheter discontinuation, highly visible posters as HH reminders)
Use of local opinion leaders	Utilization of local providers deemed as influential by peers to influence behavior
Positive deviance	Recognizing and engaging individuals who demonstrate the ability to find solutions and strategies for behavior uptake in a given environment

personal interviews, focus groups, and other techniques to identify local barriers to change, with subsequent implementation strategies being tailored accordingly), and mass media campaigns utilizing a host of different media (digital, print, radio, television, etc.) can be utilized [26].

Positive deviance refers to the concept that within a given community, a few individuals will follow uncommon practices that lead to beneficial results. By studying these individuals, new interventions designed to change behavior can be identified and implemented [28]. This technique has been deployed in numerous settings, including for infection control issues. Marra and colleagues used positive deviance to improve compliance with hand hygiene in seven hospitals in Brazil, finding a significant increase in compliance following intervention (46.5 % vs. 62 %,  $p < .001$ ) [29]. By studying and engaging individuals exhibiting desired behaviors, key opportunities and barriers for implementing best practices can be identified.

In a large systematic review looking at the effectiveness of guideline dissemination, Grimshaw and colleagues found that across 235 studies, common strategies included the use of reminders, audit, and feedback and the distribution of educational materials. They noted that the majority of interventions were associated with only modest to moderate improvements in care and noted that, ultimately, it is unclear which strategies are most useful for different settings. They also noted that local financial issues can be a barrier to guideline distribution [26].

The implementation of new ideas is affected by numerous elements. Kitson and colleagues argued that there are three core elements that affect this process: the nature of the evidence upon which the ideas are based, the context or environment in which dissemination is occurring, and the way in which idea dissemination is implemented (Kitson, 1998). They argued that these key factors should be treated equally, since it is not clear which is the most important for any given setting [19].

Despite a well-conceived infection prevention plan, local personnel can be barriers to idea dissemination and implementation. As was previously mentioned, both “active resisters” and “organizational constipators” present significant

challenges to idea dissemination and adoption. From the results of their qualitative interviews, Saint et al. summarized strategies to help with idea adoption among this group, including utilizing feedback on local infection rates, as compared with national rates, utilizing feedback on compliance with the new practice within a given group, identifying a local champion to support the new practice, and the utilization of collaboration. Additionally, they noted that practice changes such as bundling supplies for central line insertion could be effective in overcoming active resistance to change, as well. Additional strategies for dealing with these individuals include getting their buy-in early in the dissemination process, working around them (noted not to be the best long-term solution), or firing them [1].

The dissemination and implementation of new ideas is a complex process [27]. Although numerous strategies exist for the diffusion and adoption of new ideas, it is not clear which strategies will be most effective in different settings. Education, provider audit and feedback, and the use of reminders are some of the most commonly used strategies. Local barriers to idea deployment include personnel (“active resisters” and “organizational constipators”) and resource issues [1, 26]. More research is needed to determine which infection prevention dissemination strategies will be most effective in different settings.

## Conclusion

Despite a recent expansion of knowledge in the science of infection prevention, the implementation of evidence-based best practices remains a challenge. Effective infection prevention practitioners and hospital epidemiologists should approach the implementation of risk reduction best practices with flexibility and a collaborative perspective. Important considerations include arguments guided by high-quality evidence and cost assessments. In addition, an implementation framework should be contextually appropriate, take into account an organization’s culture, and be mindful of an approach that minimizes complexity. Trialing an intervention within a

specific unit may later lead to increased uptake organization wide. Broad based, highly functional collaborations are needed for successful implementation interventions. These begin with high-quality leadership. Leadership for infection prevention initiatives may include upper level management. Frequently, however, hospital epidemiologists play this role. Effective leaders promote a culture of clinical excellence, effectively communicate with frontline staff, and are focused on overcoming implementation barriers. Other important members of a collaborative team include champions, facilitators, and role models. Although published data fail to identify a single best integrative strategy for infection prevention practice change, success has been associated with education initiatives and seminars, audit and feedback, distribution of educational materials, marketing, positive deviance, and the employment of champions, facilitators, role models, and opinion leaders. Local personnel, such as organizational resistors and constipators, can be barriers to idea dissemination and implementation. In addition to a thoughtfully conceived, collaborative strategy as outlined above, reported methods for dealing with infection prevention resistors and constipators include getting their buy-in early in the dissemination process, working around them, or terminating their employment. More data are needed to best define which infection prevention dissemination strategies will be most effective in varied settings.

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#### Compliance with Ethics Guidelines

**Conflict of Interest** Dr. Stevens and Dr. Bearman have no conflicts of interest.

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