How to use this guide
This guide gives actions and resources for creating and sustaining safe practices for hand hygiene.
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Executive Summary

The Problem
Hand hygiene compliance in most hospitals is less than 50%, a significant contributor to the annual healthcare-associated infection (HAI) rates of 7.1% in Europe and 4.5% in the United States. This translates to 37,000 deaths in European countries (Hand Hygiene, 2020) and nearly 99,000 deaths in the US each year (Stone, 2009; Patient CareLink). Thorough hand hygiene is the single most important, least costly, and most basic method of reducing HAIs in hospitals (Mathur, 2011). A 10% improvement in hand hygiene is associated with a 6% decrease in HAIs (Sickert-Bennett, et al. 2016).

The Cost
HAIs are the most common adverse event in hospitalized patients globally (WHO, n.d.) and cost $28-$45 billion annually (Stone, 2009). The annual European financial losses due to HAIs are approximately 7 billion Euros with an estimated 16 million extra days in the hospital. In the US, that number is estimated to be $6.5 billion annually (World Health Organization, 2009; Appendix A). It is estimated that every $1 spent on hand hygiene compliance improvement is associated with a $23.7 benefit for hospitals (Chen, et al. 2011; WHO, n.d.). Additionally, in 2008, Medicare opted for non-payment to US hospitals in which patients acquired a predetermined set of eight HAIs (Peasah, McKay, Harman, Al-Amin, & Cook, 2013; CMS, 2008). HAI prevention efforts via hand hygiene are estimated to save nearly $35 billion annually (CDC, 2018).

The Solution
Many healthcare organizations have successfully implemented and sustained improvements to increase hand hygiene compliance. These organizations have focused on projects that included implementing a “secret shopper” program, installing equipment in the right locations, and implementing the WHO’s “My Five Moments for Hand Hygiene” through the electronic medical record.

This document provides a blueprint that outlines the actionable steps your organization should take to successfully improve hand hygiene compliance and summarizes the available evidence-based practice protocols. This document is revised annually and is always available free of charge on our website. Hospitals who make a formal commitment to improve hand hygiene compliance and share their success on the PSMF website have access to an additional level of consulting services.
**Leadership Checklist**

On a monthly basis, or more frequently if a problem exists, the executive team should review hand hygiene practices and compliance. Use this checklist as a guide to determine whether current evidence-based guidelines are being followed in your organization:

- Measure and report hand hygiene rates monthly (observed or measured hand hygiene events/number of events required). Note trends in areas with low compliance but high HAI rates. Routinely reassess outcomes.
- If hand hygiene rates indicate room for improvement, initiate a PI (performance improvement) project. If a problem is not indicated, routinely reassess to identify gaps, and ensure integrity of the data collected.
- Ensure frontline involvement in hand hygiene compliance improvement activities. Maintain their engagement and remove barriers to progress.
- If a PI plan is put in place, measure the associated process outcomes.
- Ensure that hand hygiene protocols are embedded into clinical workflows, whether electronic or paper.
- Ensure there are enough staff to effectively manage hand hygiene compliance.
- Ensure adequate training and documentation of competencies and skills.
- Eliminate barriers to making rapid changes to documentation templates and order sets.
- Debrief on a regular basis to solicit team feedback about barriers to sustained compliance. Adjust the plan quickly and nimbly as needed.
- Hold staff accountable for providing the standard of care and reward success.
- Ensure that leaders have a simple process to oversee hand hygiene compliance improvement work while also considering how it aligns with other initiatives across the organization.
- Ensure there are hand hygiene stations near all entrances, and encourage everyone to cleanse their hands upon arrival and when leaving.
- Model effective hand hygiene behaviors yourself.
- Embed hand hygiene in the organizational culture. Establish the concept of "professional conscience" among all leaders, staff, and physicians.
Adopted from the World Health Organization’s "My 5 Moments for Hand Hygiene". Hand hygiene should be performed at all of the stages outlined above to prevent infection and complications.

A floor map outlining the current state of hand hygiene related equipment could offer insight into hand hygiene barriers and opportunities for all. Additionally, this internal evaluation could shed light on opportunities to customize hand hygiene into role-specific routines to increase compliance by removing covert barriers.
Both patients and healthcare workers may be unaware of the pathogens that live on hands that can cause serious infections, including C. diff and UTIs. This visual representation can be posted in bathrooms, on doors, and in lounges as an eye-catching, bold reminder of the importance of hand hygiene.
Performance Improvement Plan

Follow this checklist if the leadership team has determined that a performance improvement project is necessary:

- **Gather the right project team.** Be sure to involve the right people on the team. You’ll want two teams: an oversight team that is broad in scope, has 10-15 members, and includes the executive sponsor to validate outcomes, remove barriers, and facilitate spread. The actual project team consists of 5-7 representatives who are most impacted by the process. Whether a discipline should be on the advisory team or the project team depends upon the needs of the organization. Patients and family members should be involved in all improvement projects, as there are many ways they can contribute to safer care.

<table>
<thead>
<tr>
<th>RECOMMENDED VAP IMPROVEMENT TEAM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurses</td>
</tr>
<tr>
<td>Respiratory therapists</td>
</tr>
<tr>
<td>Physicians</td>
</tr>
<tr>
<td>Engineering staff</td>
</tr>
<tr>
<td>Information services</td>
</tr>
<tr>
<td>Physical and occupational therapists</td>
</tr>
<tr>
<td>Environmental service staff</td>
</tr>
<tr>
<td>Engineering staff</td>
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<td></td>
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</tbody>
</table>

*Table 1: Understanding the necessary disciplines for a hand hygiene project improvement team*

- **Understand what is currently happening and why.** Reviewing objective data and trends is a good place to start to understand the current state, and teams should spend a good amount of time analyzing data (and validating the sources), but the most important action here is to go to the point of care and observe. Even if team members work in the area daily, examining existing processes from every angle is generally an eye-opening experience. The team should ask questions of the frontline during the observations that allow them to understand each step in the process and identify the people, supplies, or other resources are needed to improve patient outcomes.

<table>
<thead>
<tr>
<th>HAND HYGIENE PROCESSES TO CONSIDER ASSESSING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placement of sanitizing stations</td>
</tr>
<tr>
<td>Level of alcohol or hand soap in dispensers</td>
</tr>
<tr>
<td>Processes for gathering and reporting hand grabage compliance rates</td>
</tr>
<tr>
<td>Groups who struggle with the problem disproportionately</td>
</tr>
<tr>
<td>Hand hygiene within the routine workflow for all groups</td>
</tr>
<tr>
<td>Floor map of hand hygiene equipment (i.e. placement of trash cans)</td>
</tr>
</tbody>
</table>

*Table 2: Consider assessing these processes to understand where the barriers contributing to hand hygiene may be in your organization*

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**Complete this Lean Improvement Activity:**

Conduct a [SIPOC](https://www.ihi.org/resources/Courses/Process-Improvement/Lean/Lean-Management/Pages/Lean-Guide.aspx) analysis to understand current state and scope of the problem. A SIPOC is a lean improvement tool that helps leaders to carefully consider everyone who may be touched by a process, and therefore, should have input on future process design.

**Create a process map** once the workflows are well understood that illustrates each step and the best practice gaps the team has identified ([IHI, 2015](https://www.ihi.org/Content/33098/PDF/IHI%20Lean%20Blueprint%202015%20v8%20pdf.pdf)). Brainstorm with the advisory team to understand why the gaps exist, using whichever root cause analysis tool your organization is accustomed to ([IHI, 2019](https://www.ihi.org/Content/33098/Product/Pages/Root-Cause-Analysis-Pages.aspx)). Review the map with the advisory team and invite the frontline to validate accuracy.
Prioritize the gaps to be addressed and develop an action plan. Consider the cost effectiveness, time, potential outcomes, and realistic possibilities of each gap identified. Determine which are a priority for the organization to focus on. Be sure that the advisory team supports moving forward with the project plan so they can continue to remove barriers. Design an experiment to be trialed in one small area for a short period of time and create an action plan for implementation.

<table>
<thead>
<tr>
<th>TYPICAL GAPS IDENTIFIED IN HAND HYGIENE</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Lack of accountability</td>
</tr>
<tr>
<td>• Little organizational focus on hand hygiene</td>
</tr>
<tr>
<td>• Lack of leadership oversight</td>
</tr>
<tr>
<td>• Inconsistent communication</td>
</tr>
<tr>
<td>• Inconsistent education of new protocols</td>
</tr>
<tr>
<td>• Complex work environment with many distractions</td>
</tr>
<tr>
<td>• New or visiting staff members</td>
</tr>
<tr>
<td>• Staffing needs</td>
</tr>
<tr>
<td>• Emergent patient needs</td>
</tr>
<tr>
<td>• Lack of adequate supplies</td>
</tr>
<tr>
<td>• Environmental cleaning</td>
</tr>
<tr>
<td>• Hands full</td>
</tr>
<tr>
<td>• Misperception of the need for hand hygiene when wearing gloves</td>
</tr>
<tr>
<td>• Skin irritation/dryness</td>
</tr>
</tbody>
</table>

Table 3: By identifying the gaps in hand hygiene compliance, organizations can tailor their project improvement efforts more effectively

Evaluate outcomes, celebrate wins, and adjust the plan when necessary. Measure both process and outcome metrics. Outcome metrics include the rates outlined in the leadership checklist. Process metrics will depend upon the workflow you are trying to improve and are generally expressed in terms of compliance with workflow changes. Compare your outcomes against other related metrics your organization is tracking. Routinely review all metrics and trends with both the advisory and project teams and discuss what is going well and what is not. Identify barriers to completion of action plans, and adjust the plan if necessary. Once you have the desired outcomes in the trial area, consider spreading to other areas (IHI, 2006).

It is important to be nimble and move quickly to keep team momentum going, and so that people can see the results of their labor. At the same time, don’t move so quickly that you don’t consider the larger, organizational ramifications of a change in your plan. Be sure to have a good understanding of the other, similar improvement projects that are taking place so that your efforts are not duplicated or inefficient.

<table>
<thead>
<tr>
<th>HAND HYGIENE COMPARATIVE OUTCOMES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• HAI Rates</td>
</tr>
<tr>
<td>• Length of Stay (LOS)</td>
</tr>
<tr>
<td>• Transfers to ICU/Higher Level of Care</td>
</tr>
</tbody>
</table>

Table 4: Consider evaluating related metrics to better understand hand hygiene compliance and contributing factors
What We Know About Hand Hygiene

Hand Hygiene

“Hand Hygiene means cleaning your hands by using either handwashing (washing hands with soap and water), antiseptic hand wash, antiseptic hand rub (i.e. alcohol-based hand sanitizer including foam or gel), or surgical hand antisepsis” (CDC, 2020). Research shows that microbes causing HAIs are most frequently spread between patients on the hands of healthcare workers. Patients may carry microbes without any obvious signs or symptoms of an infection. This can happen because microbes have an impressive ability to survive on the hands—sometimes for hours—if hands are not cleaned. The hands of staff can become contaminated even after seemingly ‘clean’ procedures, such as taking a pulse or blood pressure reading, or touching a patient’s hand (World Health Organization, 2009).

While on any given day, one in 31 patients has at least one HAI (CDC, 2018), this figure is likely to be underestimated as symptoms of an HAI may not come to fruition until post-discharge (Collins, 2008).

Hand Hygiene and Healthcare-associated Infections

The inverse relationship between hand washing and HAIs is established across a number of hospital settings and this relationship sustains after varied follow up times post-intervention. It is estimated that the cost of a hand hygiene program would be approximately $57,000 annually for a 2600-bed hospital (World Health Organization, 2009).

According to the same study, the hand hygiene promotion program would be deemed cost-saving if 1% of the HAIs reduced were due to improved hand hygiene compliance (World Health Organization, 2009).

Table one: Associations between increased hand hygiene compliance and HAIs from the World Health Organization (2009)

<table>
<thead>
<tr>
<th>Year</th>
<th>Authors</th>
<th>Hospital setting</th>
<th>Major results</th>
<th>Duration of follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977</td>
<td>Caswell &amp; Phillip14</td>
<td>Adult ICU</td>
<td>Significant reduction in the percentage of patients colonized or infected by Klebsiella spp.</td>
<td>2 years</td>
</tr>
<tr>
<td>1989</td>
<td>Cony et al.16</td>
<td>Adult ICU</td>
<td>Significant reduction in HCAI rates immediately after hand hygiene promotion (from 33% to 12% and from 33% to 10%, after two intervention periods 4 years apart, respectively)</td>
<td>6 years</td>
</tr>
<tr>
<td>1990</td>
<td>Simmons et al.17</td>
<td>Adult ICU</td>
<td>No impact on HCAI rates (no statistically significant improvement of hand hygiene adherence)</td>
<td>11 months</td>
</tr>
<tr>
<td>1992</td>
<td>Doebeling et al.18</td>
<td>Adult ICUs</td>
<td>Significant difference between rates of HCAI using two different hand hygiene agents</td>
<td>8 months</td>
</tr>
<tr>
<td>1994</td>
<td>Webster et al.19</td>
<td>NICU</td>
<td>Elimination of MRSAs when combined with multiple other infection control measures. Reduction of vancomycin use. Significant reduction of nosocomial bacteremia (from 2.5% to 1.1%) using tetracycline compared to cefotaxime for handwashing</td>
<td>9 months</td>
</tr>
<tr>
<td>1995</td>
<td>Zater et al.20</td>
<td>Newborn nursery</td>
<td>Control of a MRSA outbreak using a triclocaraben preparation for handwashing in addition to other infection control measures</td>
<td>3.5 years</td>
</tr>
<tr>
<td>2000</td>
<td>Larson et al.21</td>
<td>MICU/NICU</td>
<td>Significant (84%) relative reduction of the vancomycin-resistant enterococci (VRE) rate in the intervention hospital; statistically insignificant (314%) relative reduction in control hospital; no significant change in MRSAs</td>
<td>8 months</td>
</tr>
<tr>
<td>2000</td>
<td>Pittet et al.22</td>
<td>Hospital-wide</td>
<td>Significant reduction in the annual overall prevalence of HCAI (42%) and MRSAs cross transmission rates (87%). Active surveillance cultures and contact precautions were implemented during some time period. A follow-up study showed continued increase in handrub use, stable HCAI rates and cost savings derived from the strategy.</td>
<td>8 years</td>
</tr>
<tr>
<td>2003</td>
<td>Hillburn et al.23</td>
<td>Orthopaedic surgical unit</td>
<td>30% decrease of urinary tract infection and SSI rates (from 8.2% to 5.3%)</td>
<td>10 months</td>
</tr>
<tr>
<td>2004</td>
<td>MacDonald et al.24</td>
<td>Hospital-wide</td>
<td>Significant reduction in hospital-acquired MRSA cases (from 1.9% to 0.9%)</td>
<td>1 year</td>
</tr>
<tr>
<td>2004</td>
<td>Swoboda et al.25</td>
<td>Adult</td>
<td>Reduction in HCAI rates (not statistically significant)</td>
<td>2.5 months</td>
</tr>
</tbody>
</table>

Patients with HAIs in the hospital or post-discharge are at higher risk for readmission and a greater length of stay (Arefian, et al, 2019; Emerson, et al, 2012).

Hand Hygiene and Healthcare-associated Infections

The inverse relationship between hand washing and HAIs is established across a number of hospital settings and this relationship sustains after varied follow up times post-intervention. It is estimated that the cost of a hand hygiene program would be approximately $57,000 annually for a 2600-bed hospital (World Health Organization, 2009).

According to the same study, the hand hygiene promotion program would be deemed cost-saving if 1% of the HAIs reduced were due to improved hand hygiene compliance (World Health Organization, 2009).
Interventions

A range of interventions have proven the temporal association between hand hygiene compliance improvement and a reduction in HAIs across a variety of hospital settings. See table below from World Health Organization (2009). This evidence lends to the importance of conducting a SIPOC to identify the most appropriate, effective, and feasible intervention for your institution.

### Table I.2.2
Hand hygiene adherence by HCWs before and after hand hygiene improvement interventions

<table>
<thead>
<tr>
<th>Reference</th>
<th>Setting</th>
<th>Adherence baseline (%)</th>
<th>Adherence after intervention (%)</th>
<th>Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preston, Larson &amp; Stamm(^a)</td>
<td>ICU</td>
<td>16</td>
<td>30</td>
<td>More convenient sink locations</td>
</tr>
<tr>
<td>Mayer et al.(^71)</td>
<td>ICU</td>
<td>63</td>
<td>92</td>
<td>Performance feedback</td>
</tr>
<tr>
<td>Donowitz(^80)</td>
<td>PICU</td>
<td>31</td>
<td>50</td>
<td>Wearing overgown</td>
</tr>
<tr>
<td>Conly et al.(^83)</td>
<td>MICU</td>
<td>14/28 *</td>
<td>73/61</td>
<td>Feedback, policy reviews, memo, posters</td>
</tr>
<tr>
<td>Graham(^87)</td>
<td>ICU</td>
<td>32</td>
<td>45</td>
<td>Alcohol-based handrub introduced</td>
</tr>
<tr>
<td>Dubb et al.(^49)</td>
<td>ICU</td>
<td>81</td>
<td>92</td>
<td>In-service first, then group feedback</td>
</tr>
<tr>
<td>Lohr et al.(^45)</td>
<td>Pedic OPDs</td>
<td>49</td>
<td>49</td>
<td>Signs, feedback, verbal reminders to doctors</td>
</tr>
<tr>
<td>Raju &amp; Kobier(^46)</td>
<td>Nursery &amp; NICU</td>
<td>28</td>
<td>63</td>
<td>Feedback, dissemination of literature, results of environmental cultures</td>
</tr>
<tr>
<td>Wurtz, Moe &amp; Jovanovic(^10)</td>
<td>SICU</td>
<td>22</td>
<td>38</td>
<td>Automated handwashing machines available</td>
</tr>
<tr>
<td>Pelke et al.(^11)</td>
<td>NICU</td>
<td>62</td>
<td>60</td>
<td>No gowning required</td>
</tr>
<tr>
<td>Berg, Hershon &amp; Ramirez(^9)</td>
<td>ICU</td>
<td>5</td>
<td>63</td>
<td>Lectures, feedback, demonstrations</td>
</tr>
<tr>
<td>Tlobasli(^99)</td>
<td>PICU</td>
<td>12/11</td>
<td>13/65</td>
<td>Overt observation, followed by feedback</td>
</tr>
<tr>
<td>Slaughter et al.(^80)</td>
<td>MICU</td>
<td>41</td>
<td>58</td>
<td>Routine wearing of gowns and gloves</td>
</tr>
<tr>
<td>Dorsey, Cydulka &amp; Emerman(^11)</td>
<td>Emerg Dept</td>
<td>54</td>
<td>64</td>
<td>Signs/distributed review paper</td>
</tr>
<tr>
<td>Larson et al.(^92)</td>
<td>MICU</td>
<td>56</td>
<td>83</td>
<td>Lectures based on previous questionnaire on HCWs' beliefs, feedback, administrative support, automated handwashing machines</td>
</tr>
</tbody>
</table>

**Legend:**
- ICU = intensive care unit;
- SICU = surgical ICU;
- MICU = medical ICU;
- MSCU = medical/surgical ICU;
- PICU = paediatric ICU;
- NICU = neonatal ICU;
- Emerg = emergency;
- Oncol = oncology;
- CTICU = cardiothoracic ICU;
- PACU = post-anesthesia care unit;
Mandates and Regulation
As of January 1, 2018, The Joint Commission began citing individual failures to perform hand hygiene in direct patient care as a deficiency, prompting a Requirement for Improvement (RFI) – meaning that a medical provider’s accreditation is at risk when staff members are seen as noncompliant.

Centers for Medicare & Medicaid Innovation (CMS/CMMI) and its Partnership for Patients initiative are now promoting the deployment of electronic hand hygiene compliance systems to reduce infections and costs to the Hospital Improvement Innovation Networks (HIINs) via their website and web broadcast (CMS, n.d.).

Education for Patients and Family Members
For and regarding patients and families: Patients and family members should understand that most HAIs are preventable through proper hand hygiene. Healthcare workers should communicate with family members when they visit to ensure that they have performed proper hand hygiene and should continue to reinforce this behavior upon visitation.

- Patient Safety Institute: Links to Hand Hygiene Resources Worldwide
- Patients’ Hand Hygiene and Reducing Hospital-acquired Infections
- Patient-centered Hand Hygiene: The Next Step in Infection Prevention
- American Journal of Critical Care: Use of a Patient Hand Hygiene Protocol to Reduce Hospital-Acquired Infections and Improve Nurses’ Hand Washing

Resources
For hospital project improvement teams for hand hygiene improvement:
- WHO's: “My Five Moments for Hand Hygiene”
- CMS: Evidence-based Guidelines for the Selected and Previously Considered Hospital-acquired Infections
- The Joint Commission: Sustaining and Spreading Improvement in Hand Hygiene Compliance
- IHI: How-to Guide for Improving Hand Hygiene
- AHRQ: Innovations for Promoting Hand Hygiene Compliance
- AHA: The Hand Hygiene Project
- CMS: Hospital Infection Control Worksheet

For hospital project improvement teams for general improvement:
- CMS: Hospital Improvement Innovation Networks
- IHI: A Framework for the Spread of Innovation
- The Joint Commission: Leaders Facilitating Change Workshop
- IHI: Quality Improvement Essentials Toolkit
- SIPOC Example and Template for Download
- SIPOC Description and Example
Measuring Outcomes

There is no direct calculation for mortality related to the hand hygiene performed in hospitals. Hospitals would need to link mortality to a healthcare-associated infection rate (ex: APSS 2A&2F). The most commonly accepted metric for measuring a hospital’s compliance is offered below.

Key performance indicators

Key performance indicators you can use within the hand hygiene protocol should be:

- Compliance rates at the Unit, Facility and IDN (Integrated Delivery Network) level plus individual when such as technology is employed
- Daily, Weekly, Monthly, Quarterly, Yearly
- HAI rates and changes at the Unit, Facility and IDN level
- Safety Culture Assessment Annually

Based on the WHO’s “My 5 Moments for Hand Hygiene” method (Sax et al., 2007; Sax et al., 2009), you can define moments as:

- Before patient contact
- Before aseptic task
- After body fluid exposure
- After patient contact
- After contacts with patient surroundings

Outcome measure formula

You can use the formula to calculate hand hygiene compliance during all 5 moments (Pittet, et al., 2013). You can apply a similar approach if only the Wash In/Wash Out method is used. However, the “in room” moments provide a high risk of infection (Kelly, et al., 2015) and thus training on, and measurement of all “5 Moments” is indicated. The WHO’s “5 Moments” mirror the CDC guideline so if your facility wants to adhere to CDC guidelines, either the CDC or WHO’s “5 Moments” need to be the standard of care that is taught, measured, and used for feedback.

Numerator: Number of hand hygiene events performed as measured by a validated electronic hand hygiene compliance system

Denominator: Number of hand hygiene events required (hand hygiene opportunities or HHOs) based on how the technology software calculates the denominator:

- The denominator could be based on the WHO’s “5 Moments,” Wash In/Wash Out Method or another algorithm depending on the technology system used

Metric recommendations

Direct impact: All patients

Deploying Use of the Electronic Hand Hygiene Compliance Data - Evidence-based Practice (Son et al., 2011)

1. Share the data with your frontline staff routinely (daily or weekly to start)
   a. Hold short meetings at the beginning and ending of each shift to address important issues and hand hygiene
2. Empower your unit leadership to identify unit based barriers and obstacles along with action plans to eliminate them
   a. Have a box where anonymous surveys and feedback are welcomed. Stress that this is a safe space and that anything someone sees that could potentially be harmful, please report it
3. Enable your units to establish their own performance improvement goals
4. Measure performance improvement against the goals and celebrate all successes
   a. Use DOs to understand lack of improvement
5. Hold your unit leadership accountable to performance improvement goals and make this part of the performance evaluation process
Conflicts of Interest Disclosure

The Patient Safety Movement Foundation partners with as many stakeholders as possible to focus on how to address patient safety challenges. The recommendations in the APSS are developed by workgroups that may include patient safety experts, healthcare technology professionals, hospital leaders, patient advocates, and medical technology industry volunteers. Workgroup members are required to disclose any potential conflicts of interest.

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Appendices

Appendix A

International prevalence of healthcare-associated infections in developed countries from the World Health Organization (2009)

![Prevalence of HCAI in developed countries](https://www.who.int/gpsc/5may/MDRO_literature-review.pdf)