

# HOSPITAL ONSET BACTEREMIA

Hospital leaders' attitudes  
on HOB sources, prevention  
and treatment

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## EXECUTIVE SUMMARY

Clinical studies have determined that hospital onset bacteremia (HOB) and false-positive blood cultures can have significant impacts on outcomes, length of stay and cost of care. For example, one study found 17% higher mortality among patients with noncentral line-associated bloodstream infection bacteremia and \$20,000 in additional costs.<sup>1</sup> The Centers for Disease Control & Prevention (CDC) is developing a quality measure reflecting HOB rates. The Centers for Medicare & Medicaid Services (CMS) included the HOB measure on its 2021 Measures Under Consideration list, which means the agency could propose the measure in future CMS hospital quality-reporting and value programs. With these developments, hospital leaders have a timely opportunity to give renewed consideration to how HOB is prevented, detected, treated and reported.

In October 2022, the American Hospital Association (AHA) and Becton Dickinson (BD) held the “AHA Virtual Think Tank: Systematic approaches to health care-associated infection prevention,” an event for hospital and health system leaders in infectious disease, laboratory, nursing and other roles. In this workshop, AHA Senior Director of Quality and Patient Safety Policy Akin Demehin, and Calvin Yu, M.D., Becton Dickinson’s vice president of medical and scientific affairs for the U.S. region and Canada, briefed participants about the latest policy and clinical developments related to HOB. Demehin and Yu facilitated breakout sessions on HOB prevention, identification, treatment and surveillance in which participants exchanged best practices and had frank discussions about clinical and administrative challenges related to HOB.



**DEFINITION:**  
The survey and report define hospital-acquired bacteremia and fungemia as any bacterial or candidemia pathogen that is isolated on Day 4 or more of admission.

# EXECUTIVE SUMMARY

The discussions identified additional information needs, which informed a survey to develop baseline data and additional insights about how various roles within hospitals view sources of HOB, its identification, how effectively HOB can be prevented and considerations for quality metrics. Results and commentary are presented in this report, which hospital leaders can use to assess their organizations, inform improvement efforts and prepare for potential reporting requirements.

The AHA and BD want to help hospitals identify opportunities to improve HOB prevention, identification and treatment at their facilities. Major findings from the workshop and survey include:

- 1** | When surveyed, 45% of respondents already were tracking HOB and another 20% planned to do so as soon as possible. The rest were waiting for specific developments (e.g., from CMS, CDC, the National Healthcare Safety Network [NHSN] or measure endorsement by the federal consensus-based entity).
- 2** | Most HOB cases are considered preventable or partially preventable, especially those from central-line catheters and urinary sources, which are viewed as major contributors to HOBs.
- 3** | Several resources are considered impactful for mitigating HOB given the perception that currently reportable health care-associated infections (HAIs) are thought to be significant sources of HOB. Therefore, current HAI bundles may help inform any new HOB bundle. Respondents identified best practices they would like included in an HOB bundle; these include visibility to HOB sources and respective prevention measures, timely pathogen identification if HOB occurs, and improvement in definitive therapy for HOB cases.
- 4** | Streamlined microbiology lab workflows and communication with antimicrobial stewardship programs (ASPs) also may help facilitate faster identification and therapy for HOB events.
- 5** | Respondents are optimistic that an HOB quality metric will improve patient safety and care, but expressed concerns about how metrics should be structured, achieving reporting consistency and the potential resources needed for reporting.
- 6** | Nearly three out of four respondents (73%) believe future reporting metrics should consider patient demographics that may have predisposing clinical risk factors for HOB. However, respondents were split as to whether some populations should be excluded from HOB reporting, with 30% favoring some exclusions, 49% saying there should not be exclusions and 21% unsure.
- 7** | Other opportunities for education differed by professional role, which will be important for leaders to consider when formulating plans and policies.

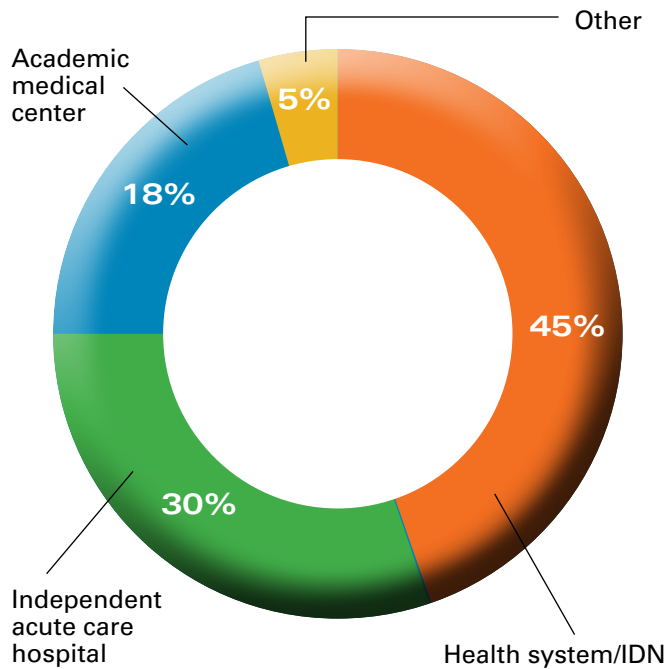
# ABOUT THE REPORT

This report combines survey results, input from workshop participants and expert insights from policy, infection prevention and infectious disease specialists at the American Hospital Association and Becton Dickinson. The survey was intended to provide baseline data about HOB monitoring, metric awareness, perceptions of HOB sources and preventability, monitoring and detection methods and challenges, desired resources for HOB prevention and treatment, and more. The survey and workshop identified potential best practices, including process changes and new uses of technology that clinical professionals believe will be effective in addressing the clinical entity of HOB.

The survey was administered by Sage Growth Partners from Nov. 16-30, 2022. On Oct. 27, 2022, the AHA and BD co-hosted the executive workshop that presented a primer on HOB and an update on the Centers for Medicare & Medicaid Services' efforts to develop HOB policy, including quality metrics. The event included two breakout sessions in which participants discussed a range of issues related to HOB.

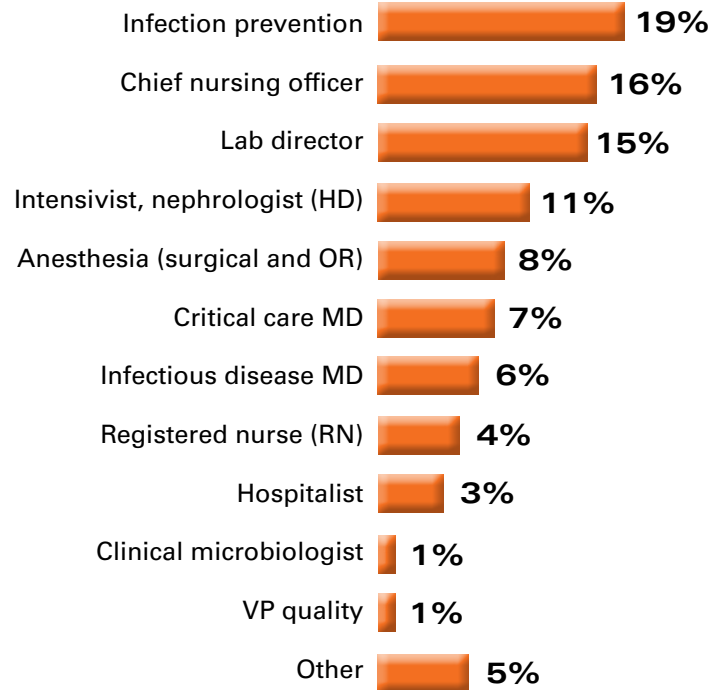
The survey produced 201 qualified respondents. Respondent demographics are shown in Figures 1 and 2.

Figure 1:  
**Respondents by organization type**



Note: Categories do not total 100% because of rounding.

Figure 2:  
**Respondents by role**



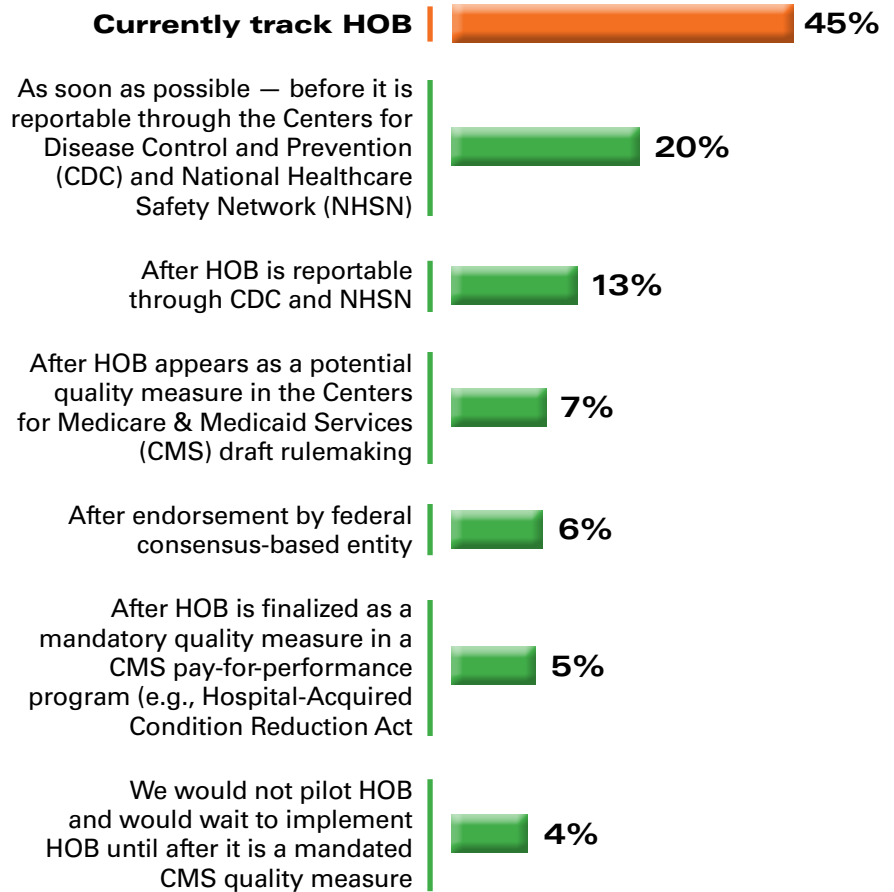
# CURRENT STATE OF HOB TRACKING

Nearly half (45%) of respondents currently track hospital onset bacteremia (see Figure 3) and another 20% plan to track or conduct a pilot as soon as possible — specifically, before it is reportable through the CDC and the NHSN. Once the CDC and NHSN support reporting, 78% of respondents plan to have ongoing or pilot HOB tracking in place. Four percent of respondents don't plan to track HOB unless it is mandated by CMS; the remainder have aligned their tracking plans to other CMS or measure endorsement by the federal consensus-based entity.

Hospitals already have ASPs as required by The Joint Commission and CMS to help guide appropriate treatment of infections. Seventy percent of respondents consider their ASP impactful in treating HOB, including 45% who say they are very impactful. Respondents who do not consider their ASP effective in supporting HOB prevention cited lack of support and more focus on treatment than prevention as the leading inhibitors, which is insight that could be helpful in augmenting current infrastructures when planning HOB prevention and treatment programs. One workshop participant noted that electronic health records (EHRs) could be configured to support staff communication and prevention efforts. For example, he suggested that the EHR could be configured to flag risk factors for specific patients and to encourage adherence or utilization of checklists, and also may be able to collect data on prevention bundle use.

Figure 3:

## What are your plans for HOB tracking?



**“If this metric becomes a national quality measure, there’s going to be more IT involvement and investment needed. Collating infection data in clinically intuitive ways is crucial in generating insights that will help infection preventionists have time to interact with multidisciplinary teams.”**

— Calvin Yu, M.D., FIDSA,  
vice president, medical and scientific affairs, Becton Dickinson

# LEADING PERCEPTIONS OF HOB SOURCES & PREVENTABILITY

There is broad diversity of opinion about the leading sources of HOB, but there is consensus that HOB is preventable or partially preventable. That dichotomy illustrates why HOB might seem challenging; without clarity on its leading sources, it is difficult to optimize prevention efforts. Respondents identified multiple sources and contributors to HOB, but no source was cited as the leading contributor to more than 22% of HOB cases. More data are needed to truly understand how various sources contribute to HOB. A key difference between HOB and currently reportable HAIs is that the former has multiple sources while the latter has specific sources, such as urine for catheter-associated urinary tract infection (CAUTI), stool for *Clostridioides difficile*, etc. Several workshop respondents noted that multisource nature of HOBs makes identification and process improvement for prevention more challenging. Therefore, hospitals need to develop a multidisciplinary approach to addressing HOB mitigation, identification and treatment. Demehin also noted that the broad-based nature of an HOB measure would change how hospitals track their overall progress in improving HAI performance.

The workshop discussion revealed that a potential best practice for reducing blood-related HOBs is to have most blood draws conducted by experienced professionals like phlebotomists. Several participants said that this was the policy at their facilities and has produced positive results, including improved process consistency, reduced infections and reduced sample contamination.

As noted, preventing and identifying HOB is a great challenge given the multiple sources of attribution. Figure 4 shows the leading suspected sources of HOB side by side with each source's rank for how well respondents believe HOB from that source can be prevented (the percentages that correspond to these rankings are shown in Figures 5 and 6). Cross-referencing contributing sources and perceived preventability may help inform health care centers when developing HOB-specific prevention bundles. Respondents ranked central-line catheters as the leading contributor to HOB, but also ranked them the most preventable source of HOB infections. Conversely, peripheral intravenous (IV) lines are considered the second-most preventable source of HOB infections and the lowest-ranked source, suggesting that pathways to preventing peripheral IV-related HOBs may be lower hanging fruit when constructing an HOB prevention bundle. Workshop participants were optimistic that a range of measures would be effective in reducing peripheral IV infections.

Figure 4:

## HOB sources ranked by source & preventability

Source	Rank as contributor to HOB	Rank as preventable source of HOB
Central-line catheters	1	1
Urinary-source infections	2	4
Respiratory/pneumonia	3	7
Wounds	4	6
Surgical-site/post-invasive procedure complications	5	3
Mechanical ventilation	6	N/A
Skin and soft tissue	7	5
Peripheral IVs	8	2

**“CMS’ potential interest in the HOB measure reflects its continued focus on reducing health care-associated infections. It also reflects its interest in making more extensive use of EHRs and other digital means to collect and report data.”**

— Akin Demehin, senior director, quality and patient safety policy, American Hospital Association

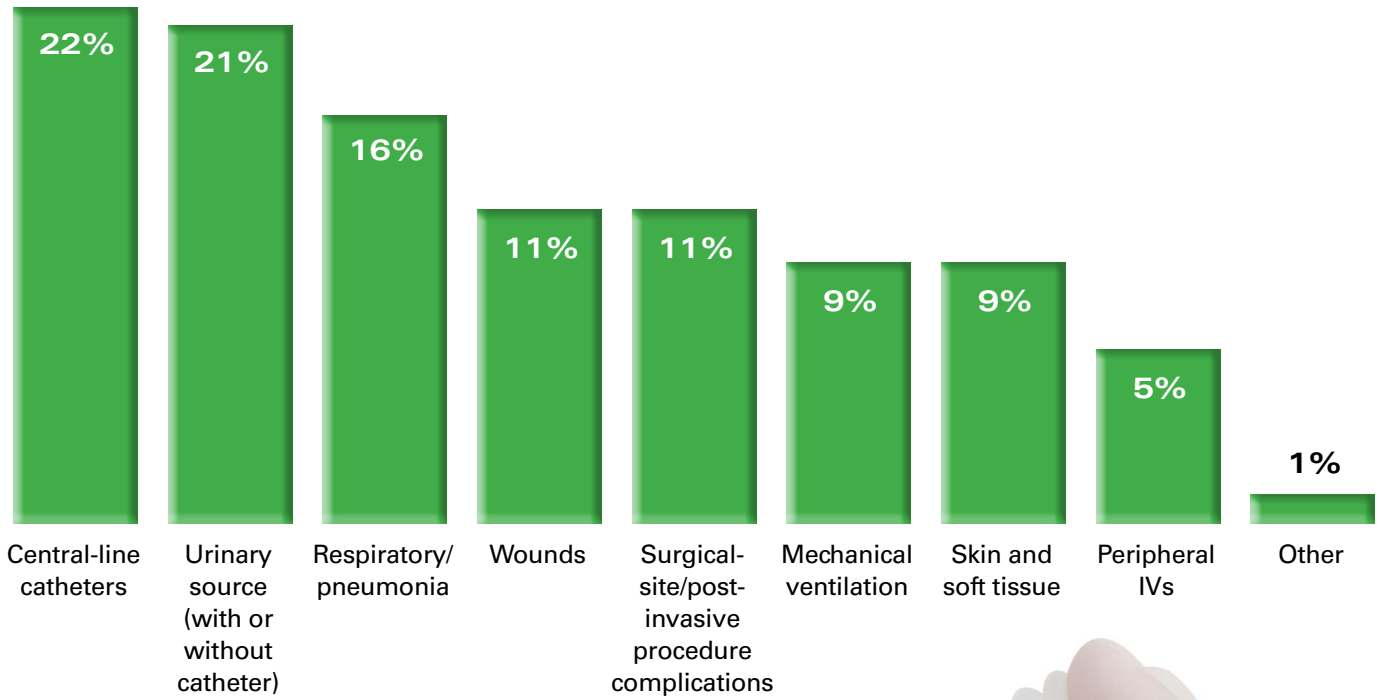


# INSIGHTS ON HOB SOURCES

Central-line catheters and urinary sources (regardless of whether a catheter is used) are at the top tier of perceived HOB sources (Figure 5), followed by respiratory/pneumonia issues, with wounds, surgical-site complications, mechanical ventilation, and skin and soft tissue infection at another level. It is notable that most perceived sources align with The Joint Commission and CMS reportable events and metrics (e.g., CAUTI, hospital-acquired pressure injury, ventilator-associated event and methicillin-resistant *Staphylococcus aureus* bacteremia). This fact may help inform HOB prevention initiatives and may represent an opportunity for existing initiatives and interdisciplinary teams to collaborate on HOB bundle efforts.

Figure 5:

## Perceived leading contributors to HOB



# INSIGHTS ON HOB PREVENTION

Every leading HOB source in the survey is considered preventable by a majority of respondents (Figure 6) and two — central-line catheters and peripheral IVs — each are considered preventable by 74% of respondents. Workshop participants identified surveillance challenges related to peripheral IVs and felt that targeting this potential source could be a productive area for reducing HOB.

As for how HOB can be averted, prevention bundles and ASPs are widely considered helpful. Respondents with successful ASPs are most likely to monitor for antimicrobial de-escalation opportunities, HAI trends and risk factors, and mismatches between infections and the drugs used to treat them. This implies that effective stewardship programs already have auspices over bloodstream infection care and trends.

Prevention bundles are even more widely used, with 92% of respondents saying their facility uses a prevention bundle for at least one type of device. The most common prevention bundles are for central lines (used by 87% of respondents) and urinary catheters (84%), which correspond to some of the leading sources cited for HOB. This is not surprising given that many of the sources for HOB are represented in currently reportable HAIs. Workshop participants believe many organizations could benefit from additional data collection and looking closely at how their bundles are used to identify potential improvements to adherence.

“The bundles are important. We want people to follow them, but if we don’t have the data on how well they’re doing, then we don’t even know which part of it to address. So, it’s IT support, it’s having the data and then it’s being able to go out and talk to people,” says Linda Riley, R.N., infection prevention manager, Cooley Dickinson Hospital.

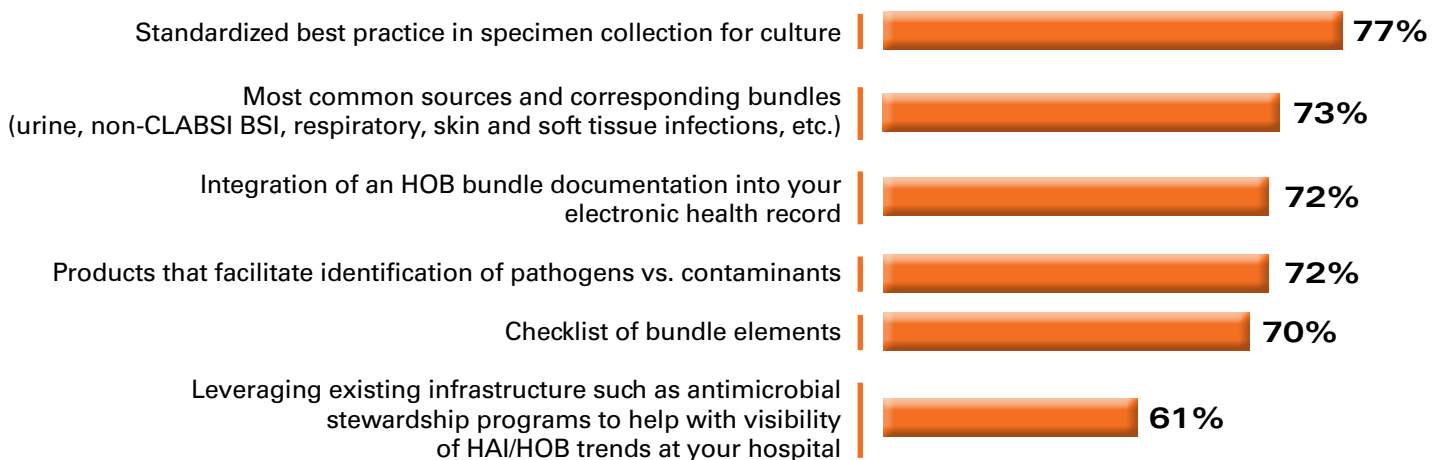
More than 90% of chief nursing officers and 74% of overall respondents said it would be helpful for HOB prevention to have prevention bundles that were informed by data and medical literature. The most-desired elements of an HOB prevention bundle are highlighted in Figure 7. This implies that peer-reviewed manuscripts or consensus expert white papers that shed light on these elements likely would be incorporated into any existing (or “homegrown”) HOB bundle.

There is an opportunity to educate on the value of antimicrobial stewardship’s role in reducing HOB. In the survey, leveraging ASPs ranked relatively lower than other options to address HOB. However, separate questions found that 70% of respondents said ASPs are impactful for prevention and 73% said getting antimicrobial susceptibilities to prescribers would be very impactful to HOB outcomes. This could be an opportunity to optimize ASPs with information from EHRs.

Figure 6:  
**Perceived preventability of leading HOB sources**

	% viewed preventable (mean)
Central-line catheters	74%
Peripheral IVs	74%
Surgical-site/post-invasive procedure complications	67%
Urinary source (with or without catheter)	66%
Skin and soft tissue	58%
Wounds	56%
Respiratory/pneumonia	54%

Figure 7:  
**Top 6 aspects respondents want included in an HOB prevention bundle**





# INSIGHTS ON HOB IDENTIFICATION & TREATMENT

The timely identification of HOB and commencement of appropriate therapy will be critical for hospitals to treat patients with HOB. Respondents believe changes to processes and technology infrastructure at their organizations could lead to faster HOB identification and reduced time to definitive treatment. Improved laboratory workflows, equipment and staffing were cited as the elements most needed to reduce the time from blood culture collection to treatment. Several workshop participants noted that addressing these elements would be difficult because of hospitals' financial challenges and persistent clinical laboratory workforce shortages.

"We were able to get funding to increase or broaden our [antimicrobial stewardship] program by demonstrating the ROI of reducing those broad-spectrum expensive antimicrobials," says Dorine Berriel-Cass, R.N., director, infection prevention, Corewell Health West.

Respondents view time from culture collection to initial pathogen identification and time of pathogen identification to antimicrobial sensitivity test (AST) results as the stages likely to benefit most from process improvements. Workshop participants described a variety of notification processes they have in place to reduce the time to action and said that EHR notifications also could help.

Additional workflow improvements are perceived possible after AST results are available. Most respondents

(61%) say their organizations begin definitive (defined as an antimicrobial that the infecting organism is ultimately susceptible to) HOB therapy within 24 hours of testing for pathogens (see Figure 8). Workshop and survey participants suggested that the ability to improve the start of therapy would depend on resource and workforce availability.

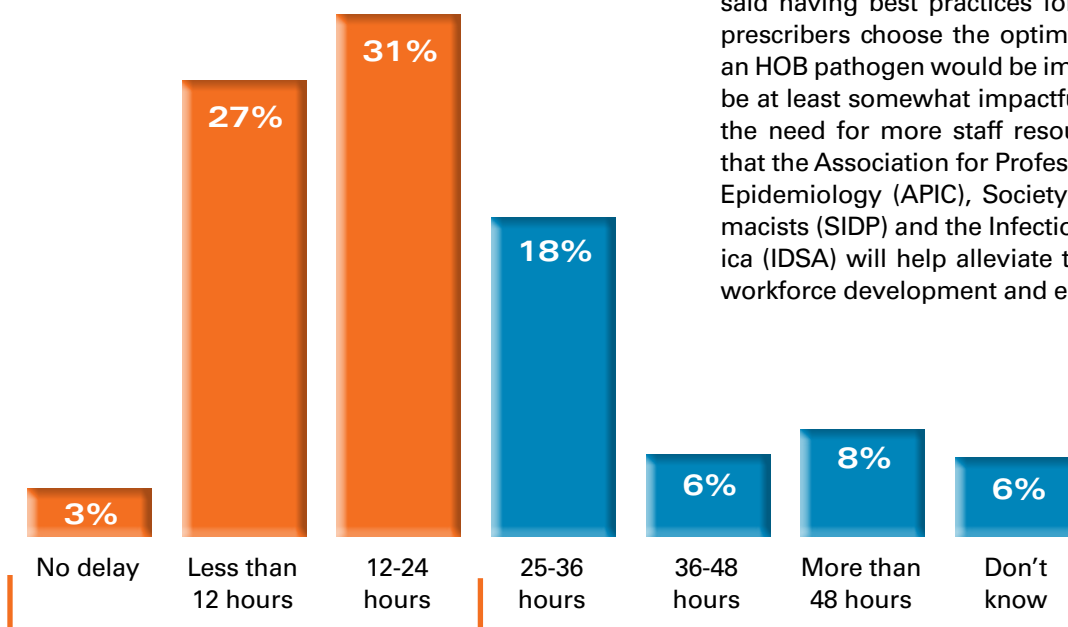
Technology also could play a larger role in the treatment of HOB. For example, approximately half of respondents get notifications of potential HAI designations through their EHR systems, but many respondents reported that their EHR systems do not have such functionality. Slightly fewer respondents are using risk-stratification tools to identify at-risk patients, with the lack of tools being an obstacle for some.

"When I think about prevention, a big piece is communication," says Gay Wehrli, M.D., chief medical officer, University Hospitals Samaritan Medical Center. "Are all the key stakeholders informed of those critical pieces of information? Every lab will need to have a list of what are considered critical values that [must] be reported in a timely fashion with documentation of the conversation including the name of the health care provider who is accepting the critical value information. Keep in mind that every time there's an expectation for the medical laboratory professional to make these calls, then the laboratory professional is being pulled away from doing something else. Any opportunity to optimize timely critical value communication through the EHR platform is beneficial to the health care team and the patients."

As technology and clinical and reporting requirements evolve, organizations will continue to focus on developing and applying best practices to mitigate the occurrence and impact of HOB. Nearly three quarters (73%) of respondents said having best practices for getting AST results to help prescribers choose the optimal antimicrobial treatment of an HOB pathogen would be impactful and 93% said it would be at least somewhat impactful. Participants also identified the need for more staff resources. They expressed hope that the Association for Professions in Infection Control and Epidemiology (APIC), Society of Infectious Diseases Pharmacists (SIDP) and the Infectious Diseases Society of America (IDSA) will help alleviate the staffing shortage through workforce development and educational initiatives.

Figure 8:

## Time from pathogen testing to start of definitive therapy — current state



61% began testing within 24 hours

## CONCLUSION

While there is consensus that HOB sources are varied and mostly comprise already reportable conditions, there is uncertainty around universal HOB preventability and its applicability as a metric for certain patient demographics. Hospital leaders are being proactive in each area, with many already tracking HOB and having preventive measures in place for several HOB sources. Respondents are optimistic that prevention bundles, process changes and training can reduce HOB infections and improve patient safety. The majority believe that creating a cohesive program around the clinical areas of HOB prevention, identification and improving time to definitive therapy will facilitate improved HOB care and outcomes. Optimizing these and other preventive efforts may be challenging, in part because of role-based differences in opinion about HOB sources, preventability and where efforts should be focused. Visit this [AHA webpage](#) frequently to see clinical and regulatory news about HOB and other HAIs, along with resources to help with prevention and treatment.



# ACKNOWLEDGMENTS

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