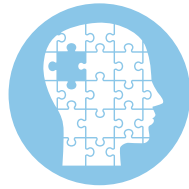


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# USING DATA TO IMPROVE HOSPITAL EFFICIENCY AND SAFETY

**The Missing Piece of the Puzzle is Utilizing Big Data, Specifically, Clinical Intervention Data**

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## **THE PROBLEM**

Artificial intelligence, data visualization, predictive analytics—most healthcare professionals have heard terms like these, but been unsure about their meanings, much less their applications. These buzzwords are associated with big data, and they have serious applications for healthcare.

Big data is generally used to describe the large amounts of data that an organization has access to that can potentially be put to use. Big data can help organizations find patterns and make predictions for the future if it is done properly. Unfortunately, healthcare tends to lag behind other industries when it comes to utilizing big data. The reality is that our healthcare system is unfortunately not built to use large amounts of data to drive clinical practice change.

Hospitals have more access to data than many other types of organizations. Data is collected automatically from smart phones, payer records, patient portals, research studies, and electronic medical records. Unfortunately, a large amount of data with mixed formats and contexts can be almost impossible to utilize. The challenge for all industries is determining how to dissect and digest data in order to detect patterns and even craft predictions. In other words, hospitals need to make big data small again in order to make it useful.

The transition to value-based healthcare has been a challenge for most organizations as they have to transition to newer care models. The pressures to provide better quality care are only growing. Patient satisfaction is becoming more important, but facilities are struggling to provide premium quality care, take care of their staff, and maximize profits.



## THE SOLUTION

Historically, hospitals haven't had the time or resources to sift through large quantities of assorted data, much less take those data points and turn them into actionable insights.

Hospitals using Clean Hands – Safe Hands now have an advantage when it comes to gaining insights into clinical patterns and making decisions for the future. With Clean Hands – Safe Hands, facilities know which clinician is in which patient room and when. This information has a surprising number of benefits.

- **Improve patient satisfaction** by measuring provider visits
- **Reduce nurse burnout** by helping nurses be more efficient with their clinical care
- **Reduce the risk of falls** by developing algorithms that highlight which patients are at risk of falling
- **Reduce the cost of treating providers** by measuring who had contact with a contagious patient and how often
- **Identify the factors leading to the transmission of an infection**
- **Correct workflow inefficiencies** including when and where they happen

Access to this clinical intervention data allows hospitals to find patterns and make changes for the future. Clean Hands – Safe Hands does the data dissecting for its customers, allowing leadership to focus on what's important: using the data to improve efficiencies and the patient experience within the hospital.

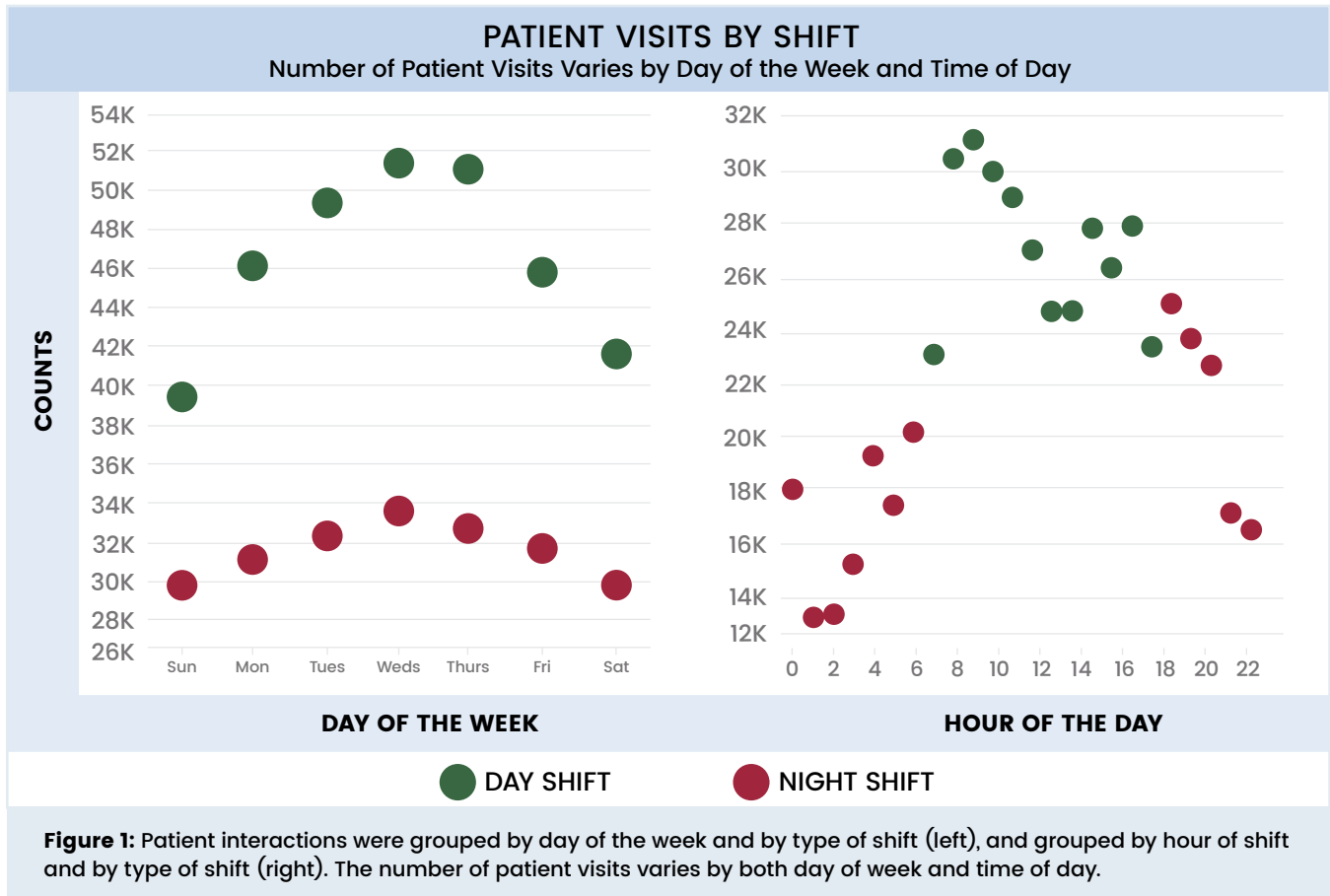


## **Improve Patient Satisfaction by Measuring Provider Visits**

Patient satisfaction is becoming more of a priority for hospitals. Surveys like HCAHPS are assessing hospitals' patient satisfaction. Not only does the survey impact a hospital's reputation in a world where patients are acting more and more like consumers, the government provides reimbursement based on the scores.

One of the most important aspects of the patient experience is responsiveness and communication. Making a patient wait can not only impact their experience, it can cause them harm. Unfortunately, most hospitals don't have insight into their wait times or where their problem areas are.

Technology can assist in determining provider visit patterns. Hospitals using Clean Hands – Safe Hands have access to this type of information in real time, allowing them to make targeted interventions.

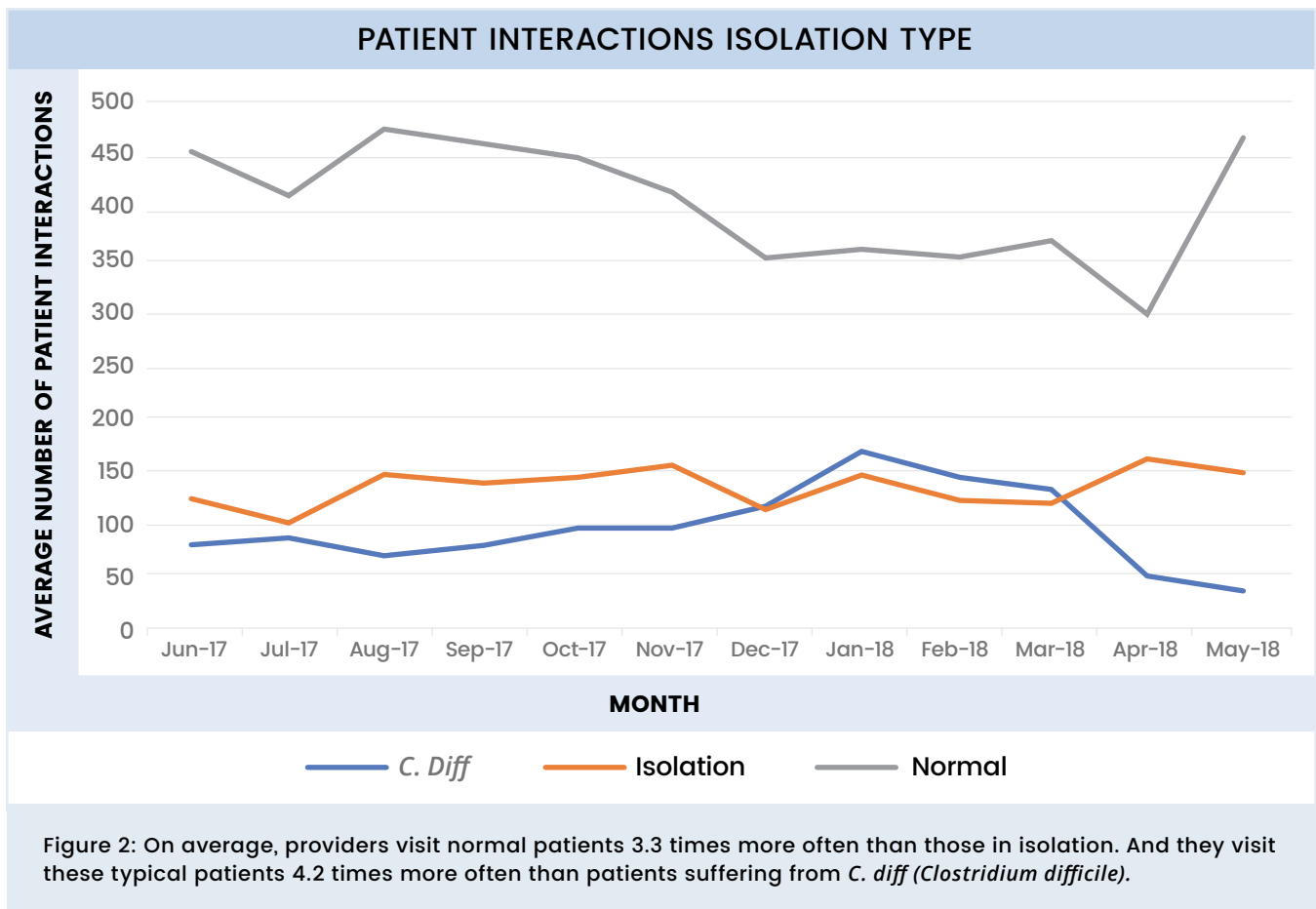


The graphs above (Figure 1) represent data from a community that wanted to target their provider interactions. In the graph, patient interactions were grouped by day of the week and by type of shift on the left. On the right, patient interactions were grouped by hour of shift and by type of shift. The graph shows that the number of patient visits varies by both day of week and time of day. The data showed that night shift visits patients less regularly which was expected. However, everyone was surprised that Wednesday was the busiest day of the week and that patient visits are low at the start of a shift. The hospital leadership was then able to design targeted interventions based on the actual data patterns in their facility. Using data in an actionable way, they were able to improve both their patient experience and clinical workflows.

Typically, providers are expected to check in on patients once every hour. This improves the patient experience and also keeps patients safe. One might naturally assume that really sick patients, like those in isolation, would be visited more frequently than other patients. Surprisingly, data indicates that's not the case.



Data from all of Clean Hands – Safe Hands customers was compiled to look at provider visit patterns (Figure 2). The data showed that on average, providers visit normal patients 3.3 times more often than those in isolation. And they visit these typical patients 4.2 times more often than patients suffering from *C. diff* (*Clostridium difficile*)!



It seems the hassle of donning PPE and the fear of contagious patients keeps providers away from the patients who need to be visited the most. Armed with this information, hospitals can make decisions about their isolation and *C. diff* protocols. They can also utilize real-time reminders when a patient hasn't been visited in a reasonable amount of time.

This actionable data allows hospitals to see the full picture around provider visits. Leadership no longer has to wonder which shifts visit patients less regularly or if their sickest patients are being visited. Using the data, they can make changes to improve patient experience.





# Reduce Nurse Burnout by Measuring Patient Interactions

Nurse burnout is a major problem for most healthcare organizations and is characterized by fatigue, emotional exhaustion, cynicism, and physical ailments. Nurse burnout is a major problem because it contributes to turnover, shortages, and even hospital-acquired infections (HAIs) and death.

The cost of staff burnout is significant. When Pennsylvania researchers examined 2006 data from 161 acute-care hospitals, they discovered that hospitals could save \$41 million and prevent 4,160 cases of urinary tract infections (UTIs) and surgical site infections if they could reduce the proportion of burnt-out nurses from 30 percent to 10 percent.<sup>1</sup>

Long hours, large workloads, chronic staff shortages, and a lack of support from management contribute to nurse burnout. Often times, management is so focused on meeting safety standards, they don't realize the impact of new initiatives on the providers. As new initiatives roll out, responsibilities get piled on the plates of clinical staff, with nothing taken off those plates.

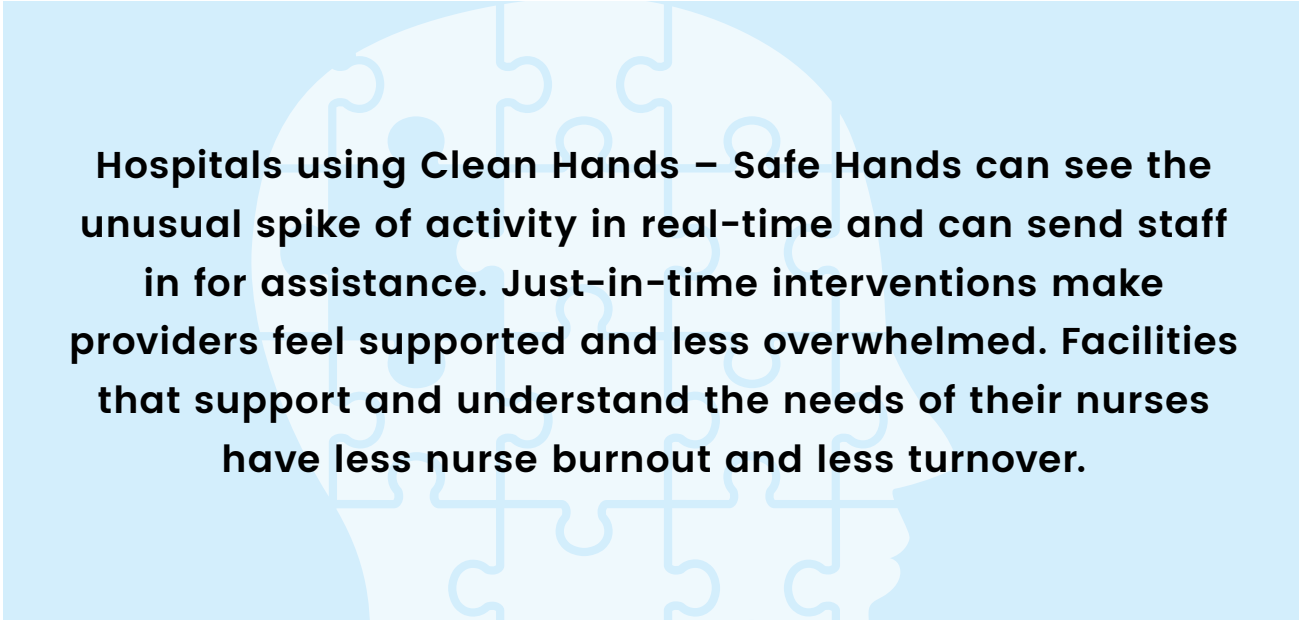
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<sup>1</sup> Nurse staffing, burnout, and health care-associated infection, Cimiotti, Jeannie P. et al., American Journal of Infection Control, Volume 40, Issue 6, 486 - 490



Real-time data is necessary for organizations to pinpoint potential burnout problems before they occur. The Clean Hands – Safe Hands **The Real-Time Intervention Blueprint™** helps hospitals catch clinical inefficiencies because it detects unusual patterns of activity. The system keeps track of how often clinicians enter and exit patient rooms, so it's able to detect unusual spikes of activity. Management can determine if particular clinicians have higher than average workloads or have patients that require very frequent visits.

The Real-Time Intervention Blueprint™ can also help shift leaders address urgent clinical situations. When a patient shows signs of serious instability, the provider may be in and out of the room many times in a short window because she's concerned about his condition. She may be too busy to ask for help or to check on other patients, but help may be just what she needs.

A large, light blue background graphic featuring a silhouette of a human head. The interior of the head is composed of several interlocking puzzle pieces, symbolizing the integration of different parts of a system or the complexity of clinical work.

**Hospitals using Clean Hands – Safe Hands can see the unusual spike of activity in real-time and can send staff in for assistance. Just-in-time interventions make providers feel supported and less overwhelmed. Facilities that support and understand the needs of their nurses have less nurse burnout and less turnover.**





# Reduce the Risk of Patient Falls by Measuring Nurse Rounding

Patient falls are a huge risk and financial burden for hospitals. Around 1 million patients fall every year in American hospitals,<sup>2</sup> and each fall resulting in injury costs the facility around \$14,000.<sup>3</sup> Often, falls occur because a patient has not been visited by their provider in a while and attempts to go to the bathroom without assistance.

While patient safety is often a top priority for hospitals, eliminating fall risk is nearly impossible as you need your patients to get up and walk. Most hospitals expect nurses to visit their patients once every hour, but without clinical intervention data, it's hard to know if that's actually happening.

Fortunately, many hospitals are utilizing technology to gain insights into their nurse rounding to better prevent falls. With a system like Clean Hands – Safe Hands, managers have access to real-time data around provider visits.

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<sup>2</sup> Preventing Falls in Hospitals. Content last reviewed July 2018. Agency for Healthcare Research and Quality, Rockville, MD. <http://www.ahrq.gov/professionals/systems/hospital/fallpxtoolkit/index.html>

<sup>3</sup> Preventing Falls and Fall-Related Injuries in Health Care Facilities. Sentinel Event Alert. The Joint Commission. September 2015.



Below is real Clean Hands – Safe Hands customer data (FIGURE 3) showing visits to a patient’s room during a day shift. Nurses, Respiratory Therapists, and other clinicians are badged with the Clean Hands – Safe Hands badge reel. Non clinician visitors, like family and friends, are unbadged.

PATIENT INTERACTIONS BY CLINICIAN					
HOURLY TOTALS	NAMES	COUNT	HOURLY TOTALS	NAMES	COUNT
7:00am –8:00am	<i>Unbadged Person</i>	3		Nurse Susan	3
	Nurse Susan	2	1:00pm– 2:00pm	Nurse Susan	1
8:00am –9:00am	<i>Unbadged Person</i>	4	2:00pm– 3:00pm	<i>Unbadged Person</i>	2
9:00am–10:00am	<i>Unbadged Person</i>	3		Nurse Susan	3
	Nurse Susan	3	3:00pm– 4:00pm	<i>Unbadged Person</i>	1
10:00am– 11:00am	<i>Unbadged Person</i>	6		Nurse Susan	3
	Nurse Susan	3		Respiratory Therapy	2
	Nurse John	2	4:00pm– 5:00pm	<i>Unbadged Person</i>	2
11:00am–12:00pm	<i>Unbadged Person</i>	2	5:00pm– 6:00pm	<i>Unbadged Person</i>	2
	Respiratory Therapy	1	6:00pm– 7:00pm	<i>Unbadged Person</i>	2
12:00pm– 1:00pm	<i>Unbadged Person</i>	2		Nurse Susan	1

**Figure 3:** Leadership can identify who visits the patient, when, and how often.

In this situation, Nurse Susan is the primary provider of the patient. While she checked on the patient frequently, it wasn’t every hour.

In fact, Nurse Susan only visited the patient about half the time she was supposed to according to the hospital’s nurse rounding policy. Nurse Susan may have been an excellent provider, just busy, but the patient is a fall risk if not checked on regularly. By capturing this data and watching for patterns (FIGURE 4), it’s possible for management to take proactive action to reduce patient falls.

DAY SHIFT SUMMARY		
PROVIDER	COUNT	PERFORMANCE
Nurse Susan	18	50%
Nurse John	2	50%
Respiratory Therapy	3	33%
<b>TOTAL</b>	<b>23</b>	<b>48%</b>

**Figure 4:** Another detailed view of how leadership can identify who visits the patient, when, and how often.



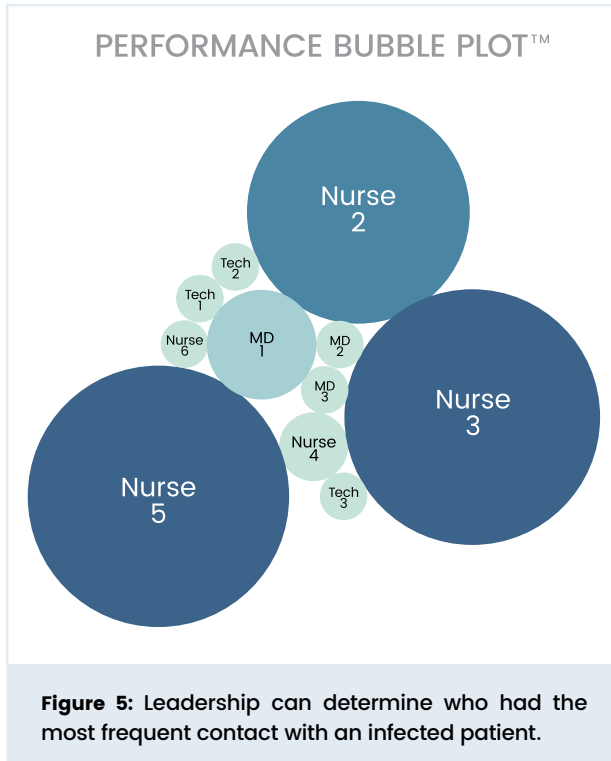
# Reduce the Cost of Treating Providers by Measuring who had Contact with a Contagious Patient and How Often

When a hospital has a patient diagnosed with a highly contagious infection, standard protocol is typically to treat all providers on the unit with prophylactic antibiotics. This is not only extremely costly, it's often unnecessary.

Facilities could save time and money if they were able to pinpoint exactly who had contact with the patient and how often. With this information, leadership could prescribe antibiotics to providers more efficiently.

A Clean Hands – Safe Hands customer had a patient diagnosed with a highly contagious infection that could be passed to providers. In this situation, the patient was in the hospital several days before diagnosis. Typically, every clinician on the unit would need to be scheduled for a physician visit and receive prophylactic antibiotics.

Using technology, the customer was able to see which providers came into contact with the patient and exactly how often. Only clinicians with a high number of patient interactions needed to be treated prophylactically. **The Performance Bubble Plot™** (FIGURE 5) shows



data for the clinicians that cared for the infected patient. The size of the bubble indicates the number of patient interactions. Large bubbles indicate a large number of patient interactions.

After reviewing this data, the hospital decided to only treat the three active nurses. They kept a close eye on the other eight providers to ensure they remained healthy.

Access to this data not only allows hospitals to save time and money, it also allows them to remain in line with antimicrobial stewardship guidelines.





## Identify the Factors Leading to the Transmission of an Infection

If a newly-admitted patient contracts an infection, it can often be difficult to determine if they caught the infection in the hospital or prior to admittance.

Clean Hands – Safe Hands is able to use its analytics algorithms to better estimate and identify the providers that are associated with the transmission of an infection.

In one instance, a hospital had a patient test positive for CLABSI a few days after admittance. While it's impossible to determine transmission point with certainty, the system was still able to give the hospital insights that allowed them to feel confident that the infection was caught prior to hospitalization.

The Clean Hands – Safe Hands team analyzed data from the days leading up to diagnosis and used Performance Bubble Plots™ to identify clinical behaviors. In the plot below, each bubble represents a badged clinician that interacted with the patient. The size of the bubble indicates the number of hand hygiene opportunities. Large bubbles indicate a large number of opportunities. The color of the bubble represents hand hygiene performance for that provider. Green is high performance and red means low performance.

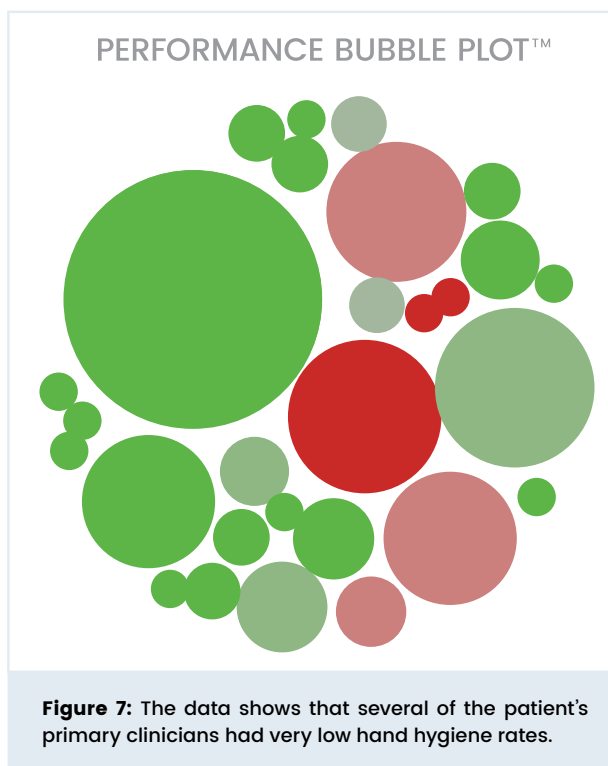
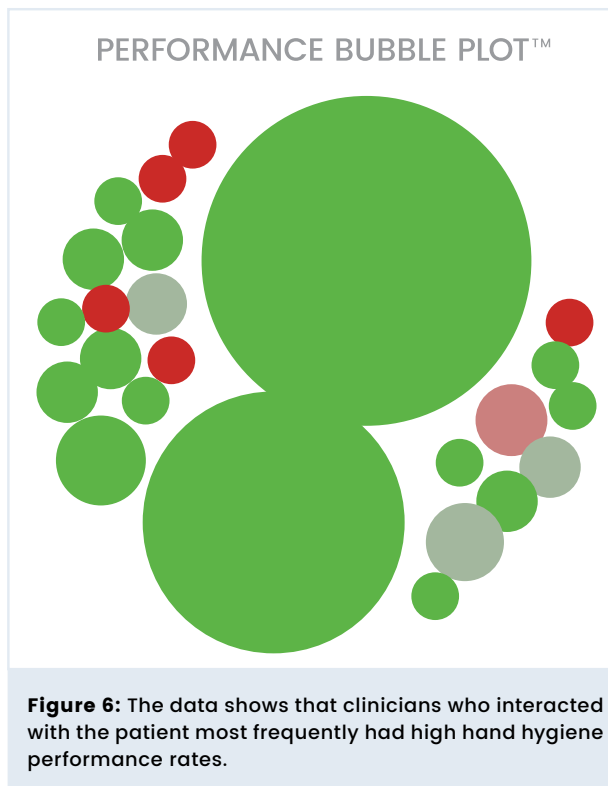


The data shows (FIGURE 6) that the clinicians who interacted with the patient most frequently had high hand hygiene performance rates. While a handful of providers did not perform so well, they had very few interactions with the patient. The hospital concluded that the case of CLABSI was likely not the result of poor hand hygiene by their providers.

Another hospital had a different story. They had a case of *C. diff*, and a few days later, a neighboring patient was diagnosed with *C. diff*. Naturally, the hospital wondered if they could have prevented the transmission. They reviewed the bubble plot for the providers that cared for both patients and were alarmed.

The plot (FIGURE 7) showed that several of the clinicians that were very involved in the patient's care had really low hand hygiene rates. There's definitely no way to prove they contributed to the *C. diff* transmission, but leadership could definitely see room for improvement on the unit.

Not only is this data useful after the fact, it can be used proactively. When the system detects data outside of the norm, it can alert unit leaders or infection preventionists. Armed with data, leaders can determine how to move forward.







## Pinpoint Workflow Inefficiencies Including When and Where They Happen

An Internet of Things (IoT) system can also be useful in finding workflow inefficiencies so that leadership can make changes that ultimately save the facility time and money. Workflow inefficiencies can not only be time-consuming, they can be costly or even dangerous for patients.

One Clean Hands – Safe Hands customer installed glove boxes near the hallway door of the patient room. These glove boxes were far from hand sanitizer and the patient care area. The system caught these inefficiencies, and hospital leadership was able to move the glove boxes closer to the patient bed. This saved time and resulted in better hand hygiene practices.

Another customer struggled with hand hygiene performance in rooms across the hall from the supply closet. Leadership didn't understand why that would be the case. They would enter and exit the patient room and run across the hall every time they needed supplies. Because they popped in and out so frequently, they didn't always wash their hands. The clinicians and leadership used the data to work together to address what was ultimately a workflow inefficiency. The providers started planning ahead and entering the patient room with supplies. This increased efficiency and patient safety.

Workflow inefficiencies are usually hard to detect and costly. Using data, management is better informed of the workflows of staff.



## CONCLUSION

Historically, hospitals have not had access to actionable data. Clinical intervention data either doesn't exist or is too immense to break down and digest.

Clean Hands – Safe Hands not only provides customers with data, the system breaks it down and even looks for abnormalities and patterns. The data is then presented to leadership in a clear and concise manner allowing leadership to take action immediately. This saves facilities time and money.

Contact Us Today to Find Out How You Can Use Cutting Edge Data to  
**Improve Hospital Efficiency and Patient Safety**  
Email [info@cleanhands-safehands.com](mailto:info@cleanhands-safehands.com) or Call **404.975.1686**



### BY CLINICIANS, FOR CLINICIANS

*Clean Hands – Safe Hands began through a research consortium of the Centers for Disease Control and Prevention (CDC), Emory University, Children's Healthcare of Atlanta, the Georgia Institute of Technology and the Georgia Tech Research Institute. Knowing that the primary accepted method of direct observation is ineffectual in reducing HAIs, physicians and technologists worked together to develop an innovative solution to the problem.*