

THE ARTIFICIALLY INTELLIGENT MONITORING SYSTEM (AIMS) QUANTITATIVE & QUALITATIVE EVALUATION

COMPLETED AT THE OTTAWA HOSPITAL (TOH)

September 2nd, 2025

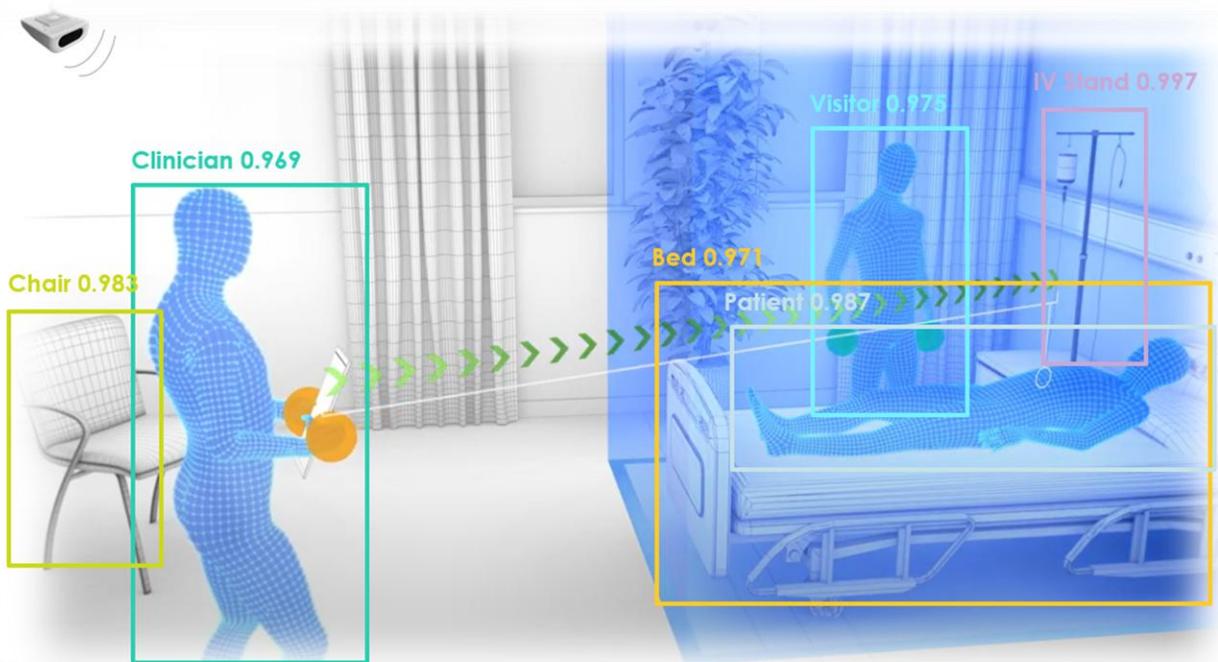
Report Prepared By:

Dr. Jeremy Grimshaw, MBChB, PhD, FRSC, FCAHS, CorrFRSE

Medical Director, Senior Scientist, Implementation & Behavioural Science Research, Lumenix

Jaimie Delaney, MBA

Vice President, Emerging Technologies, Lumenix



EXECUTIVE SUMMARY

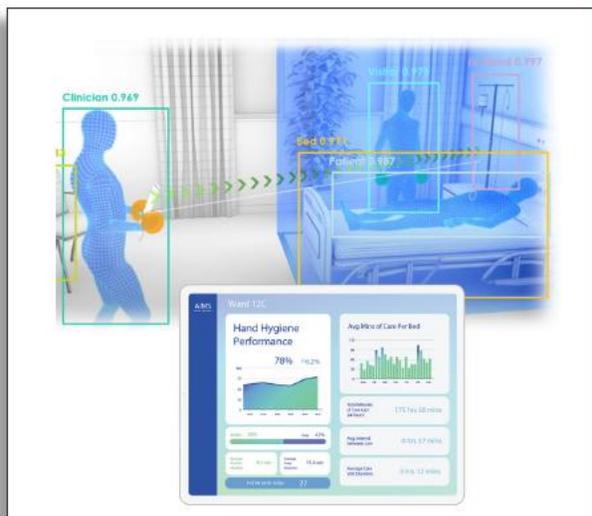
Hand hygiene compliance remains a key quality and safety challenge globally.

The Artificially Intelligent Monitoring System (AIMS) is a patient-centric, ambient perception-action AI system that provides a complete 360-degree, 3-dimensional (3D) understanding of the clinical operational environment to help support healthcare staff to address multiple challenges simultaneously within the same interconnected ecosystem of AIMS Nodes.

As an ambient perception-action AI system, AIMS offers insights into the hospital environment that were previously impossible to capture. The AIMS technology provides the opportunity to see what was previously obscure, transforming how tasks, activities, and operations/events are understood and anticipated. AIMS monitors the environment continuously, providing key functions such as:

- Detection: identifying elements in the environment.
- Saliency: understanding what matters most.
- Data Relevance Recognition: perceives when disparate data constitute an event.
- Predictive AI: anticipating future events.
- Real-time Feedback: offering real-time audible and visual communications, data, and insights.

AIMS is a Canadian owned technology and is the result of 7+ years of development. As a scalable platform technology with numerous applications, AIMS uses cutting-edge 3D perceptual sensors, depth measurements (not images or video), and state-of-the-art neural networks to continually detect elements in the environment and anonymously observe, understand, and predict human behaviour in order to proactively prevent adverse events.



The image illustrates the AIMS system in a clinical setting. On the left, a clinician is shown with a green bounding box and a confidence score of 0.969. In the center, a patient is shown with a blue bounding box and a confidence score of 0.987. On the right, another patient is shown with a blue bounding box and a confidence score of 0.977. In the foreground, a tablet displays a dashboard with the following data:

| Ward TIC | |
|--------------------------|------------------|
| Hand Hygiene Performance | 78% (+0.2%) |
| Avg Min of Care Per Bed | 170 hrs (22 min) |
| Acceptance Rate | 170 hrs (22 min) |
| Accepted Care | 170 hrs (22 min) |
| Accepted Care | 170 hrs (22 min) |

Perception-action AI explained:

Perception-action AI systems are seamlessly integrated into their environments, and not only *perceive* what's happening – like movement, object identification, complex behaviours, and activity patterns – but also *act* on that information by generating real-time nudges, alerts, understanding, and insights. This helps care teams to identify risks early, respond more proactively and efficiently to patient needs, and stay focused on delivering outstanding care.

The **AIMS Hand Hygiene Compliance application** monitors hand hygiene compliance in a clinical environment continually (30 times per second, 24/7, in the light or dark) and incorporates two highly effective implementation strategies to promote hand hygiene compliance - *decision support* (real-time point-of-care audio and visual communications) and *audit and feedback* (via an organisational level dashboard providing feedback on hand hygiene performance) to improve hand hygiene rates. It also provides a real time dashboard on hand hygiene compliance which can be used by organisations to monitor their own performance and inform local quality improvement interventions.

In 2021 the Federal Government of Canada purchased the AIMS platform technology and completed a clinical validation at The Ottawa Hospital (TOH). The purpose was to test the functionality and performance of the AIMS platform technology via the AIMS Hand Hygiene Compliance application. Following successful completion of the Federal Government clinical validation, The Ottawa Hospital and Lumenix entered into an innovation collaboration partnership whereby a Lumenix Living Laboratory for scaled application development and testing was established at TOH. In 2023, construction and installations were completed on the E5 Transitional Care Unit (36-bed unit) at TOH's Civic Campus with a focus on scaling the commercially available AIMS Hand Hygiene Compliance application and additional AIMS Solution Suites of applications. To maximise learning from this scaled install on E5, Lumenix and TOH undertook an evaluation to assess staff members' perspectives of and experiences with the AIMS technology and AIMS related training activities, and to assess the effects of AIMS on hand hygiene six weeks and 15 months post implementation.

KEY FINDINGS

Staff members' perspectives of and experiences with the AIMS technology and AIMS related training activities

- Staff valued the AIMS technology and the support it gave them to improve hand hygiene compliance. Feedback interviews pointed to a high degree of comfort and confidence with the AIMS technology, its role and function.
- AIMS was positively embraced by patients and their family members. Over the entire fifteen months following implementation, not a single patient, family member or staff member made a request to have the AIMS technology disabled – demonstrating sustained acceptance and trust throughout its first year and beyond.
- The AIMS dashboard was a helpful tool that supported E5 management to work with and encourage staff to improve their hand hygiene performance.
- The training and education provided by the Lumenix team on the AIMS technology was valued and highly effective (especially when this was done in-person with a live demonstration).
- Staff were excited by the prospect of further AIMS applications to support their work and help improve care.

The effects of AIMS on hand hygiene

- AIMS delivered unprecedented data on hand hygiene compliance on E5, providing the equivalent of 7 years of hand hygiene data per day. With routine human observation-based hospital hand hygiene audits, Public Health Ontario guidance required E5 to conduct 25 human observations of any hand hygiene opportunities per month. With AIMS, 936 moment 1 hand hygiene opportunities per day were detected, equivalent to 66,857 total hand hygiene opportunities a month. AIMS generated comprehensive and granular data never previously available.
- AIMS led to an immediate 10.8% absolute increase (from 26.7% to 37.6%) in the moment 1 hand hygiene compliance rate ($p < 0.001$) between the baseline and post intervention periods.
- During the 15 months following the install, the hand hygiene compliance rate continued to increase to 45.0%, an absolute increase of 18.7% from baseline ($p < 0.001$).
- By 15 months after the install, AIMS led to an extra 1,179 moment 1 hand hygiene events per week (168 extra moment 1 hand hygiene events per day) on the 36-bed unit.

AIMS AT TOH

BACKGROUND

Clean Hospitals in Geneva, a world-leading international Centre of Excellence in Public Health, identifies hand hygiene as *the first and most important* defence against Hospital Acquired Infections (HAIs). HAIs are common, serious, patient safety events leading to significant morbidity, mortality and increased length of stay for patients. They also lead to a significant financial burden for healthcare organisations and systems and contribute to antimicrobial resistance. Improving hand hygiene is one of the most important safety improvements hospitals can make, but achieving this remains remarkably difficult. Despite World Health Organization (WHO) guidance and ongoing quality improvement efforts (including human hand hygiene auditing), hand hygiene compliance is low worldwide.

There are many barriers to improving hand hygiene. Hospitals lack high quality, reliable data. Currently, hand hygiene data are collected by human auditors for a very small proportion of hand hygiene moments (<0.0001%) and the estimates of hand hygiene compliance by human auditors overestimate performance due to the Hawthorne Effect (Chen et al 2015, Vaisman et al 2020). This lack of high quality, reliable data hampers patient safety initiatives to improve hand hygiene. Hospitals are essentially “flying blind” without detailed information about hand hygiene compliance. Healthcare facilities also lack real-time supports for staff to remind them to perform hand hygiene before touching the patient in busy clinical settings. Novel approaches leveraging new technologies are required to address this centuries old problem.

The Artificially Intelligent Monitoring System (AIMS) is a patient-centric, ambient perception-action AI system that provides a complete 360-degree, 3-dimensional understanding of the clinical operational environment to help support healthcare staff to address multiple challenges simultaneously within the same interconnected ecosystem of AIMS Nodes.

As an ambient perception-action AI system, AIMS offers insights into the hospital environment that were previously impossible to capture. AIMS provides the opportunity to see what was previously obscure, transforming how tasks, activities, and operations/events are understood and anticipated. AIMS monitors the environment continuously, providing key functions such as:

- Detection: identifying elements in the environment.
- Saliency: understanding what matters most.
- Data Relevance Recognition: perceives when disparate data constitute an event.
- Predictive AI: anticipating future events.
- Real-time Feedback: offering real-time audible and visual communications, data, and insights.

AIMS is a Canadian owned technology and is the result of 7+ years of development. AIMS units ('Nodes') are ceiling mounted, interconnected, and use cutting-edge 3D perceptual sensors that use depth measurements (not images or video) to create a 3D point cloud of the environment, and state-of-the-art neural networks to detect elements in the environment and anonymously observe, understand, and predict human behaviour in order to proactively prevent adverse events. AIMS is a truly disruptive platform technology that can help address major healthcare quality and safety problems (e.g., hand hygiene, fall detection and prevention, wandering patient management, staff duress, etc.) (<https://www.aimsplatform.io>).

The **AIMS Hand Hygiene**

Compliance application combines this monitoring technology with two highly effective implementation strategies to promote hand hygiene compliance:

1. *Decision support* (real-time point-of-care audio and visual communications); and
2. *Audit and feedback* (via an organisational level dashboard providing real-time feedback on hand hygiene performance) to improve hand hygiene compliance rates.

The AIMS Hand Hygiene Compliance application monitors a clinical environment continuously in 3D (30 times per second, 24/7, in the light or dark) and can identify when an individual enters the environment and whether they perform hand hygiene (based on WHO standards or other protocols established by an organization) before they approach a patient. If not, the AIMS Nodes provide an audio and visual alert to encourage the individual to perform hand hygiene before touching the patient. If the individual still does not perform hand hygiene, AIMS captures the hand hygiene compliance violation data.



AIMS also provides a dashboard with real-time reporting and insights. The dashboard for the AIMS Hand Hygiene Compliance application provides actionable data and insights on hand hygiene for everyone in the environment (e.g. staff, patients, visitors, etc.) including, for example, hand hygiene moments, hand hygiene compliance (full and partial) and hand hygiene non-compliance which can be used by organisations to monitor their own performance and inform local quality improvement interventions.



AIMS AT THE OTTAWA HOSPITAL (TOH)

In 2021 the Federal Government of Canada purchased the AIMS platform technology and completed a clinical validation at The Ottawa Hospital. The purpose was to test the functionality and performance of the AIMS platform technology via the AIMS Hand Hygiene Compliance application. Following successful completion of the Federal Government clinical validation, The Ottawa Hospital and Lumenix entered into an innovation collaboration partnership whereby a Lumenix Living Laboratory for scaled application development and testing was established at TOH. In 2023, construction and installations were completed on the E5 Unit at TOH's Civic Campus with a focus on scaling the commercially available AIMS Hand Hygiene Compliance application and the additional AIMS Solution Suites of applications.

E5 is a 36-bed Transitional Care Unit situated in the Civic Campus of The Ottawa Hospital with 76 core unit staff and also visiting healthcare professionals. 125 AIMS Nodes were installed on E5 by Lumenix (November 14th- December 8th, 2023). This was followed by a calibration period (December 9th – December 15th, 2023). Additional optimization was conducted between December 16th – December 26th, 2023).

Lumenix and TOH were interested in learning about the effects of installing and initiating AIMS on hand hygiene compliance and staff perceptions of and experiences with AIMS and AIMS related training activities. To maximise learning from this scaled install on E5, a mixed methods evaluation was undertaken to assess staff members' perspectives of and experiences with the AIMS technology and AIMS related training activities, and to assess the effects of AIMS on hand hygiene. The evaluation assessed immediate effects (6 weeks post-intervention) and long-term effects (15 months post-intervention) on hand hygiene compliance.

OUR APPROACH

The evaluation addressed two key questions agreed to by Lumenix and TOH:

a. What are staff members' perspectives of and experiences with AIMS post implementation and AIMS related training activities?

We conducted semi-structured interviews with 11 E5 staff members following the post intervention period. These included Nurses, Physicians, Ancillary Workers (Catering and Transport), Allied Health Professionals and Management. Participants were asked to share their experiences with and perspectives of the AIMS Technology and AIMS related training activities. The interview guide was informed by the Theoretical Framework for Acceptability. Thematic analysis was used to identify key themes and illustrative quotes.

b. What are the effects of AIMS on hand hygiene?

We collected data on moment 1 hand hygiene compliance (the number of times a healthcare professional washed their hands before touching a patient) captured by the AIMS Nodes on E5 before and after the intervention. Baseline data collection occurred between January 30th and February 27th, 2024. This was followed by a training period during which 148 staff from multiple departments were trained on AIMS (between February 28th and April 2nd, 2024). During the baseline and training periods, the AIMS audio and visual nudges were not activated. There was a short 'bedding in' period (between April 3rd and April 21st, 2024) with the AIMS audio and visual nudges activated to allow staff to get used to the nudges. During the post-intervention period (between April 22nd and May 31st, 2024) and beyond, the AIMS audio and visual nudges remained activated.

After implementing AIMS audio and visual nudges, hand hygiene performance data were collected between April 22nd and May 31st, 2024 during the post-intervention period. The dashboard was made available to E5 management at the beginning of the post-intervention period and Lumenix staff met weekly with E5 management to support their use of the dashboard. See Figure 1 for timeline.

Data is continuously collected by AIMS; for this report, we provide a long-term follow-up 15 months after implementation (June-July 2025).

Figure 1 Evaluation timeline

| Year | 2024 | | | | | | | | | | 2025 | | | | | | | | |
|--------|------------------|----|----|----|---|-------------------|---|---|---|---|-------------|---------------------|----|----|----|----|----|----|----|
| Month | Jan - Feb | | | | 0 | April - May | | | | | June - July | | | | | | | | |
| Week # | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 | 5 | // | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 |
| | Pre-intervention | | | | | Post-intervention | | | | | | Long-term follow-up | | | | | | | |

WHAT WE FOUND

What were staff members' perspectives of and experiences with AIMS and AIMS related training activities?

Overall staff from all departments reported a high level of satisfaction with AIMS.

"We love it. It's great. We genuinely love it...I think that it's a great tool. I present it to our staff as, 'think of it as a vital signs machine', so they don't really get hung up on the AI portion of it and it's just there to remind you to do what you already know to do."
(Nurse Management)

AIMS significantly enhanced hand hygiene awareness and compliance.

Staff reported that AIMS significantly enhanced their hand hygiene awareness and compliance.

"I think that it's making people more aware of hand hygiene, which is a good thing, because I think people get a little lackadaisical with that kind of thing."
(Ancillary staff)

"Ever since I found out about AIMS, I've increased [HH]. I was more knowledgeable about what I was doing. It wasn't just Purell and that's it, I'm done. Now I take my time about it."
(Ancillary staff)

Staff reported that the benefits of AIMS continued beyond E5 as staff work in other units throughout the hospital.

"I go to other units where they don't have [AIMS] and when I walk into a room, I expect to hear it beep. My hand hygiene before [AIMS] was quite good, but it is a good reminder for how long you should do it, and now we're learning to do hygiene in the hallway, to complete it before going in. So, I think that's forcing a lot of people, and us included, to just take the time to complete it properly instead of rushing so much to get in everywhere."
(Allied Health Professionals)

"I can definitely see how it does prompt and help people to wash their hands. When I'm on the other units now, I even surprised myself by how I noticed that I think it's trained me. Because I walk into a room and, even if I just washed my hands in the hallway, when I walk in the room I have a feeling of, "is it going to be beeping", and then if you like, I am on another unit so I don't worry about it. It's funny, but it's a good thing because it's helping."
(Physician)

AIMS was well received by staff and staff reported no disruptions to workflows.

Staff reported that the AIMS system integrated smoothly into workflows. They did not observe any disruptions to their normal workflow when AIMS went live and noted that AIMS was a good reminder to "take it slower" when needed.

"I like it, it is very convenient, and it won't make us anxious, it will be just like your reminder. It's the best. It makes our life so much easier."
(Nurse)

“So, it doesn't get in the way. It's just a good reminder for us I find.”
(Allied Health Professional)

“It's actually quite simple and it only took two minutes to teach me how to use it.”
(Nurse)

AIMS increased the sense of safety on the ward for staff.

Some participants felt that AIMS makes them feel safer on the unit, as well as that it is rewarding to have a system in place that benefits everyone.

“I felt so safe. And it is rewarding, it's for the benefit of everybody.”
(Nurse)

AIMS was well-received by patients and family members; no concerns were raised.

Staff reported no concerns from patients or their family members and support people. AIMS Nodes can be turned off or put into silent mode (no audio and/or visual nudges) if for any reason the nudges or the technology are distressing to the patient, but this was never required over the entire 15 months following implementation. In fact, staff reported that family members embraced the AIMS technology and were happy to have AIMS present to actively protect their loved ones.

“We've never had to disable or change the operating mode [of an AIMS Node]. I mean, that says it all. And that was our biggest concern with our population – [AIMS] really does not affect them. Whether it's the sound, the lights, it's so subtle, but loud enough to hear, but subtle enough that if you don't know what it is, you just don't know. So, our patients, [AIMS] doesn't bother them at all. And once they get that education, they're very happy to also encourage their visitors or staff to wash their hands” and “they themselves are engaged in doing it.”
(Nurse Management)

“I haven't heard a thing. I thought that when I first saw them being installed, I was like, “I'm going to spend an hour of my day reassuring patients about these devices”, and I have not.”
(Physician)

Staff engaged patients and families to educate them about AIMS.

“So, I find even now I make sure when I go in to see a patient I say, “do you see what this is for” and I'll educate them just so they're aware that it's not a camera like that's the big thing.”
(Allied Health Professional)

The AIMS dashboard was a helpful tool for E5 management.

Management noted that the dashboard was essential for education and training, providing clear insights for decision-making, while also aiding staff education and training by presenting real-time and historical data. Dashboard highlights encouraged the team and allowed for reinforcement of their efforts.

“Being able to use the dashboard significantly helped me be able to show the team how we're doing overall as a whole. ... It was really, really, encouraging to be able to use that information and be like, “guys it's working, and this is you”. I can tell you that at 3am there wasn't anybody

else but us going in and out of the rooms. So that was really encouraging for us as a team, and it helped me as a leader be able to encourage the team in terms of working with AIMS.”
(Nurse Management)

Education and training was highly effective, especially when it involved in-person real-time demonstrations of AIMS.

Staff valued the education and training on AIMS and support from E5 management.

“I only attended one training session but felt it sufficiently addressed my questions”
(Physician)

“The way that we did the training on E5, I think it was great. And the actual education material was great content.”
(Nurse Management)

“[Nursing is a] very practical profession. I think having those training sessions was probably the best way to get buy-in from the employees. They were really, really engaged. They asked a lot of great questions. They really liked having that live demonstration.”
(Nurse Management)

Ancillary staff (catering and transport) who did not receive an in-person real-time AIMS demonstration felt less well supported.

“My supervisor didn’t share anything. We never had any training or anything regarding the technology and it was more or less just asking the [E5] staff what this was all about.”
(Ancillary staff)

Staff were excited by the prospect of having other AIMS applications to support their work.

“Looking at the potential applications for it later down the road and the different areas, I’m excited because I remember when the installation was done, they mentioned fall prevention and assessing for fall risk, and that’s super exciting.”
(Allied Health Professional)

“I heard that AIMS is not just for hand washing ...it would be a very big help not just with hand washing, but also patient safety more broadly.”
(Nurse)

“I don’t know all the applications that it can provide, but I am aware that [AIMS] has other applications, such as gait instability identification and fall identification and kind of mapping back the breakdown of the fall to see how somebody has fallen. In terms of making it as safe as possible [for patients], and really being able to identify how the patient fell, because patients that are falling most of the time are not really great historians, we could say, “okay this is actually how the fall happened rather than just trying to piece it together without all the information”. And so, in our patient population on E5, that would be a valuable tool.”
(Nurse Management)

What were the effects of AIMS on hand hygiene in E5?

Descriptive statistics

During the post-intervention period, AIMS detected 936 moment 1 hand hygiene opportunities per day, equivalent to 66,857 total hand hygiene opportunities a month. As a result, **AIMS provided the equivalent of 7 years of hand hygiene data per day.** (Currently, human hand hygiene auditors report on 25 hand hygiene observations on E5 each month.) *No other healthcare facility in the world has ever had this level of performance data to support its infection control activities.*

Effects of AIMS on hand hygiene events.

The AIMS technology represents a significant breakthrough in addressing the persistent challenge of behaviour change in healthcare settings. **AIMS led to an immediate 10.8% absolute increase in moment 1 hand hygiene compliance** (from 26.7% to 37.6%; absolute difference = +10.8% (95% CI +9.1%, +12.5%); t-test $p < 0.001$) during the post-intervention period compared with the baseline period and **an 18.7% absolute increase in moment 1 hand hygiene compliance** (from 26.7% to 45.0% events per day) 15 months after implementation; absolute difference +18.7%, 95% CI +17.2%, +20.2%; t-test $p < 0.001$). **This equates to an extra 1,179 hand hygiene events per week (168 moment 1 hand hygiene events per day) by 15 months following the implementation.**

Comparison with human hand hygiene audits

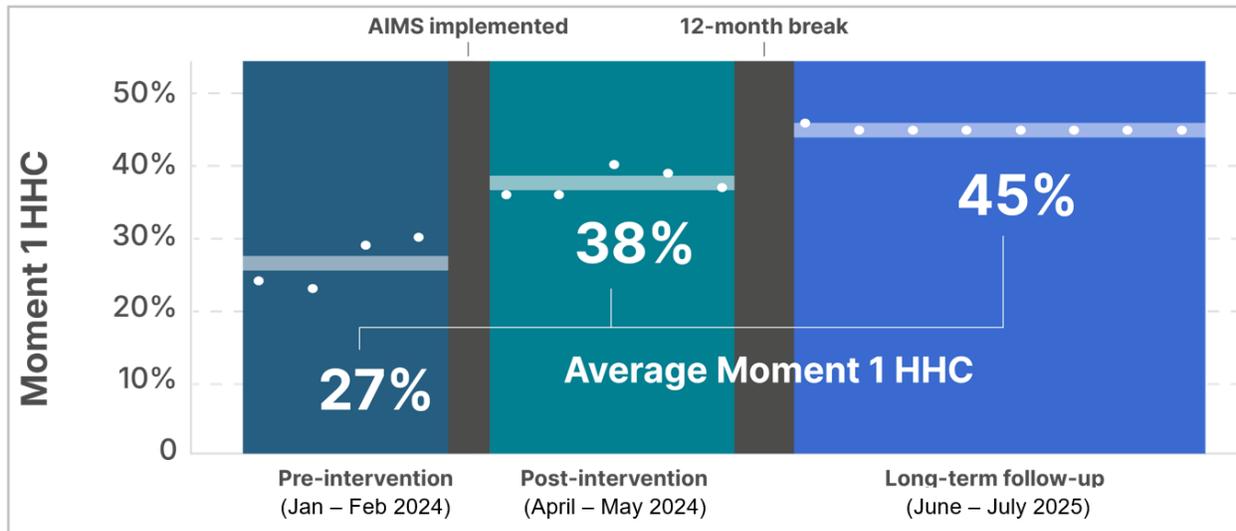
Prior to the implementation of AIMS on E5, monthly hand hygiene compliance rates—based on routine human auditor data—were similar to the overall average compliance rate observed across all TOH units.

Following the implementation of the AIMS platform, E5 transitioned from being routinely at or below TOH's average compliance rate to consistently surpassing TOH's average hand hygiene compliance rate in every subsequent human audit period.

Over the fifteen months following the implementation of AIMS, this performance has continued to improve, with E5 outperforming the TOH-wide average hand hygiene compliance rate to an increasing extent over subsequent human audit periods. Notably, no other hand hygiene initiatives were introduced on E5 throughout this time.

Finally, fifteen months after the implementation of AIMS, routine human observation-based hospital hand hygiene audits reported a moment 1 compliance rate of 80.6% (based on 31 observations during the period from June 1-July 31, 2025). In contrast, during the same period, AIMS recorded moment 1 hand hygiene compliance at 45% based on 52,672 AIMS moment 1 hand hygiene observations. This discrepancy once again demonstrates the well documented Hawthorne Effect associated with human hand hygiene audits and the incredible power of AIMS (Chen et al 2015, Vaison et al 2020).

Figure 2 Moment 1 hand hygiene compliance rates by study week and phase



SUMMARY OF KEY FINDINGS

Staff members' perspectives of and experiences with the AIMS technology and AIMS related training activities

- Staff valued the AIMS technology and the support it gave them to improve hand hygiene compliance. Feedback interviews pointed to a high degree of comfort and confidence with the AIMS technology, its role and function.
- AIMS was positively embraced by patients and their family members. Over the entire fifteen months following implementation, not a single patient, family member or staff member made a request to have the AIMS technology disabled – demonstrating sustained acceptance and trust throughout its first year and beyond.
- The AIMS dashboard was a helpful tool that supported E5 management to work with and encourage staff to improve their hand hygiene performance.
- The training and education provided by the Lumenix team on the AIMS technology was valued and highly effective (especially when this was done in-person with a live demonstration).
- Staff were excited by the prospect of further AIMS applications to support their work and help improve care.

The effects of AIMS on hand hygiene

- AIMS delivered unprecedented data on hand hygiene compliance on E5, providing the equivalent of 7 years of hand hygiene data per day. With routine human observation-based hospital hand hygiene audits, Public Health Ontario guidance required E5 to conduct 25 human observations of any hand hygiene opportunities per month. With AIMS, 936 moment 1 hand hygiene opportunities per day were detected, equivalent to 66,857 total hand hygiene opportunities a month. AIMS generated comprehensive and granular data never previously available.

- AIMS led to an immediate 10.8% absolute increase (from 26.7% to 37.6%) in the moment 1 hand hygiene compliance rate ($p < 0.001$) between the baseline and post intervention periods.
- During the 15 months following the install, the hand hygiene compliance rate continued to increase to 45.0%, an absolute increase of 18.7% from baseline ($p < 0.001$).
- By 15 months after the install, AIMS led to an extra 1,179 moment 1 hand hygiene events per week (168 extra hand hygiene events per day) on the 36-bed unit.

IMPORTANCE & IMPLICATIONS

Hand hygiene represents one of the most important patient safety practices. Unfortunately, many patients suffer adverse events during their hospital stay, such as HAIs. Recent studies in North America demonstrate approximately 1 in 5 patients experience hospital related complications and resulting harms during their hospital stay (Bates et al 2023). Many of these harms result from a failure of healthcare staff and others (e.g. hospital visitors) to follow standard practices. Until AIMS, there was little hope we could monitor, predict, prevent, and therefore change behaviours to reduce these adverse outcomes.

Thus, there are several important implications of AIMS for improving patient safety.

- 1) **Management has a tool for evaluating behaviours** – the evaluation demonstrated that AIMS enables the measurement of critical clinical behaviours in healthcare environments. While this was previously possible using human observers or cameras, AIMS is vastly superior to alternatives in terms of effectiveness and cost and protects the privacy of patients and staff. This is demonstrated by the coverage (AIMS can monitor all patients, all staff, and all visitors, at all times), avoidance of the Hawthorne effect associated with human auditors, and granularity (for example, AIMS can measure the precise technique and duration of hand hygiene activities).
- 2) **AIMS can be used alone or alongside other management interventions to improve compliance with standard practice** – the AIMS platform led to large, sustained increases in hand hygiene compliance. Other management interventions might be added to the current AIMS approach to further enhance behaviours. Because AIMS can accurately measure behaviours, we will be able to determine the benefit of these management interventions. This was not possible prior to AIMS – leaving management without an ability to assess the impact of their work.
- 3) **The tool can be used to determine cause and effect.** Due to the ubiquity of the AIMS nodes and the AIMS technology's high-fidelity monitoring, we can determine root causes of adverse events. This information enables a quantum shift forward and will enhance our understanding of what causes adverse events and leads to more effective interventions to prevent them. This was not possible without AIMS.

- 4) **This tool is acceptable to staff.** In fact, staff were reassured by the presence of the AIMS technology. Management of staff behaviours can be intimidating. It is critical to develop cultural and psychological safety to change behaviour. The AIMS implementation demonstrated that culture and psychological safety were attained.

This evaluation underscores and demonstrates the transformative potential of the AIMS platform and its diverse applications. Beyond improving hand hygiene compliance, AIMS offers the capability to improve a broad range of patient safety problems by continuously observing behaviours or conditions that contribute to safety risks or errors. By providing real-time insights and actionable feedback, AIMS supports and empowers clinical staff and healthcare organizations to proactively address safety challenges and avoid preventable errors.

End note: Lumenix reflections on working with E5

The Lumenix team would like to acknowledge the TOH Executive, Management, and Staff for their support in this collaboration and commitment to excellence through innovation. The Lumenix team would like to further recognize the E5 Management and Staff for their dedication to their patients and willingness to embrace innovation to support their commitment to excellence in patient care. We learned a lot from their thoughtful insights during the install and evaluation. The success and results achieved as illustrated in this report are a testament to their hard work and unwavering commitment to providing their patients with exceptional service, compassion and care.

References

- Bates DW et al. (2023) *N Eng J Med*; 388:142-153.
Chen LF et al. (2015) *Infect Control & Hosp Epidemiol*; 36: 1444-1450.
Vaisman A et al. (2020) *BMJ Qual Saf*; 29: 932-938.