JOURNAL OF CLINICAL CASE STUDIES, REVIEWS & REPORTS

Research Article

Volume 2 | issue 6

Insights From Implementing an Electronic Hand Hygiene Compliance Monitoring System

Sharon Wong[1], Pan Li Na[2], Ng Tong Yong[3], Amanda Goh Huixuan[4], Terilyn Ong Yu Ting[5] and Sabrina Koh[6*]

[1]*Senior Nurse Clinician, Infection Prevention & Control*

[2]*Nurse Clinician, Infection Prevention & Control*

[3]*Senior Consultant, Director, Infection Prevention & Control*

[4]*Senior Staff Nurse, Nursing Division*

[5]*Registered Nurse, Mater Hospital, Brisbane*

[*6]*Deputy Director Nursing, Nursing Education & Development*

***Corresponding Author:** KOH Bee Leng Sabrina, Deputy Director Nursing, Nursing Education & Development Sengkang General Hospital Singapore

Submitted: 10 June 2024 **Accepted:** 15 June 2024 **Published:** 19 June 2024

Citation: *Wong S, Pan L N, Ng T Y, Goh H A, Ong Y T T and Koh S B L (2024). Insights from implementing an electronic hand hygiene compliance monitoring system. J of Clin Case Stu, Reviews & Reports 2(6), 1-4.*

Abstract

Hand hygiene (HH) levels are predominantly enforced and monitored through the use of direct observation and audits. However, with today's healthcare landscape where manpower is stretched, many institutions are looking into incorporating technology to improve efficacy in monitoring of HH. SKH is one institution in Singapore that incorporated the use of electronic HH monitoring with existing strategies to catalyse the sustainability of good HH culture and thereby, reducing hospital acquired infection (HAI) [1,2].

Keywords: Biological Properties; Host Reaction; Natural Suture Materials; Suture Materials; Synthetic Suture Materials.

Introduction

HAI are the most common adverse events affecting inpatients [3]. World Health Organisation (WHO) has identified HH as the most effective means of reducing HAI [4]. Direct HH observation by trained observers is the gold standard recommended by WHO to monitor HH compliance [5]. Traditional direct observational audits are manpower resource intensive and can be subjected to biasness [5]. With the increasing healthcare needs, especially in times of pandemic, healthcare professionals are often not dispensable from clinical work. Along with that, with the spread of COVID-19, there is also an imperative need for infection control practices to be tightened, such as through HH audit.

Direct observational audits are also opportunistic, which can be a poor reflection of actual hand hygiene compliance in a workplace. The observational aspect of the HH audit inevitably leads to confounding bias such as Hawthorne effect [6]. Electronic monitoring of HH has rapidly surfaced with promising effectiveness in measuring adherence and in presenting objective data to healthcare workers themselves [7].

They record HH events constantly in real time, apply consistent algorithms to monitor adherence and, in theory, should overcome the Hawthorne effect and other sources of bias (Srigley et al., 2014). Hence, electronic monitoring of HH could provide support to direct observational HH audits in order to measure HH compliance more accurately in the midst of this endemic.

Background and Challenges

In Sengkang General Hospital (SKH), monthly cross-department HH audits are carried out in clinical areas to monitor compliance based on the WHO 5 moments (see Figure 1) (WHO, 2009) through direct observation by auditors. However, audits may not fully reflect actual HH compliance given the limitations of direct observation such as:

- Limited audit sample size of 50 opportunities per clinical unit that is inadequate for statistical comparison and quality assurance.
- Hawthorne Effect that had influenced good practices during audits only.
- Inter-observer variation between auditors may result in compliance scoring discrepancies.

Since SARS in 2003, contact tracing has become the linchpin for infectious disease management and control. As a new institution set up in 2018, SKH has an integrated ten-level compound consisting of a medical Centre (1 block), a general hospital (6 blocks) and a community hospital (3 blocks); it was determined that a radio frequency sensor capable system could serve the purpose of staff movement tracking (contact tracing). A real-time location system (RTLS) was installed and a card-sized sensor was issued to each SKH personnel. There were ideas explored on more robust use of the RTLS to serve better purposes beyond just contact tracing.

Real-Time Location System for Hand Hygiene Surveillance

HH compliance is an ongoing concern for the SKH Infection Prevention & Control Unit (IPCU); surveillance through direct observation may provide temporary visual reminders to HCPs on the need to keep up with HH however, in the long run and during non-surveillance, HCPs should ideally internalize HH practices. The IPC team initiated a Proof-of-Concept (POC) to explore the use of the campus-wide RTLS infrastructure, RTLS staff card sensors integrating with an electronic HH compliance monitoring. A 3-month POC was conducted in Jun 2019 to assess the technical accuracy of the electronic HH monitoring system in actual clinical settings. The POC findings reflected technical viability of the electronic solution with continuous monitoring of Moment 1 (M1) and Moment 4 (M4) (Figure 1). The POC outcome had encouraged the team to extend the solution to SKH inpatient wards in 2021.

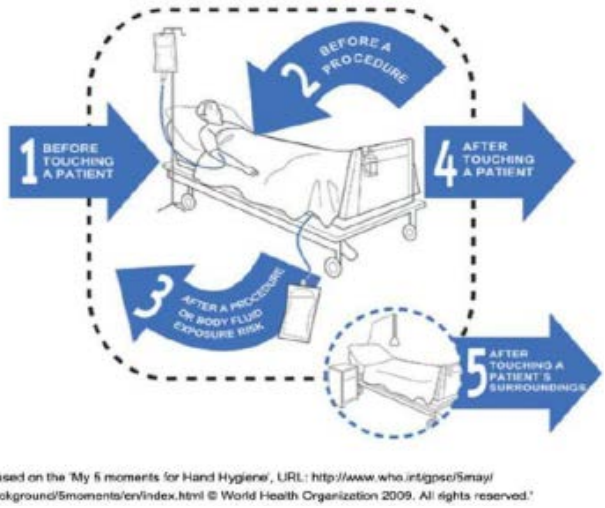

Figure 1: The 5 WHO Moments – Moment 1: Before Touching a Patient; Moment 2: Before a procedure; Moment 3: After a procedure or body fluid exposure risk; Moment 4: After touching a patient; Moment 5: After touching a patient's surroundings, (WHO, 2009).

Implementation and Methodology

Leveraging on the POC findings, IPCU conducted another implementation in Apr 2021 for a pilot ward between 14 Apr to 31 May 2021.

The solution captures the interaction between the RTLS staff card, patient tag and HH sensors installed by the patient bedside (Figure 2).

Figure 2: The Electronic Hand Hygiene (Hh) Monitoring System Records Hh Performed by Staff by Recording Interaction Between the Rtls Staff Card Worn by Staff (Middle Picture) With Sensors Installed at Hand Sanitizers (Far Left Picture) And Soap Dispensers (far right picture).

M1 and M4 are measured based on the proximity of staff and patient to establish staff-patient contact, which also includes recording the time and duration of the contact (Figure 3). M1 and M4 are continuously captured for all ward staff, generating robust data for analysis to supplement the manual HH audits.

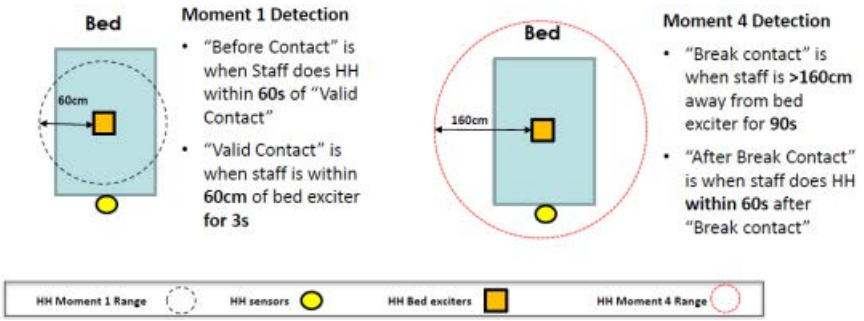

Figure 3: HH Compliance Patterns for Clinical, Nursing and Allied Health staff groups – HH Rate by Staff Type from 14 Apr to 31 May 2021

Results

Data generated from pilot study in April 2021 indicated that M1 (n = 11,612) and M4 (n = 11,902) compliances were 44.4% and 53.0% respectively, with the overall (n = 23,514) compliance rate at 49.5%.

In Figure 4, there was decrease in compliance for both consecutive months in April and May 2021 for Nursing, Clinical, Allied Health staff groups, with 19,643 moments attributed to Nursing (83.5% of all detected moments).

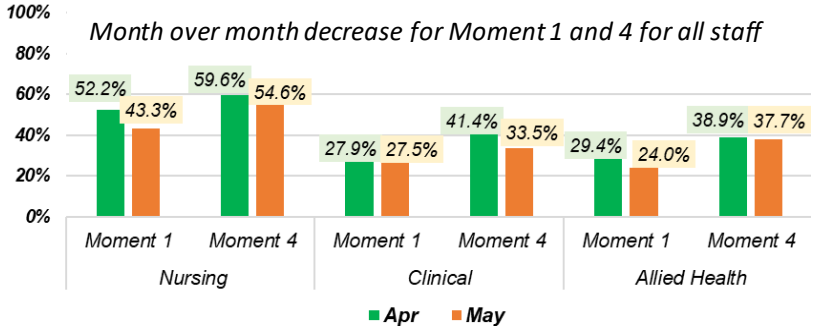

Figure 4: HH Compliance Patterns for Clinical, Nursing and Allied Health staff groups – HH Rate by Staff Type from 14 Apr to 31 May 2021.

As such, the team focused on analyzing time–based patterns for Nursing across 24 hours (Figure 5).

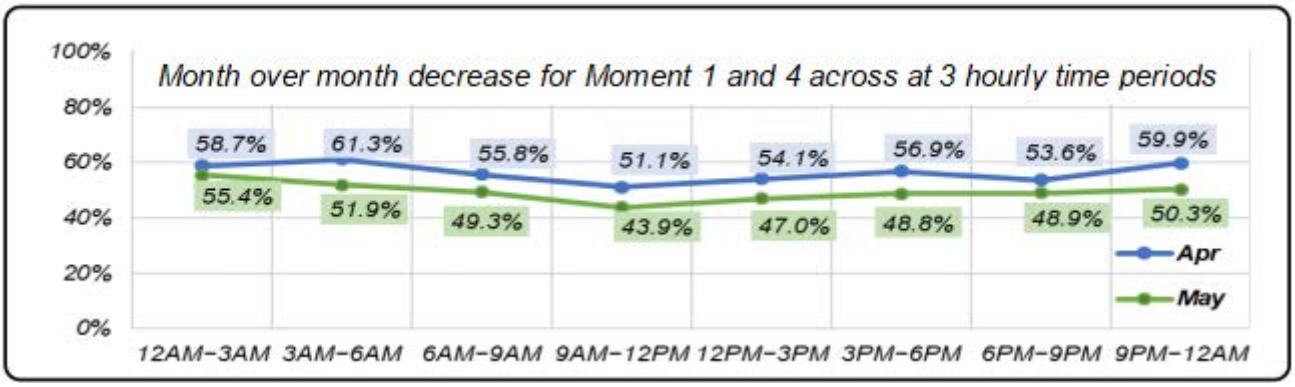

Figure 5: Insights in HH Compliance Patterns for Nursing staff group between 14 Apr to 31 May 2021 -3 Hourly HH Rate.

The data showed that the compliance in May was lower than Apr across all 3–hourly time periods. Compliance was also lowest (51.1% in Apr, 43.9% in May) between the 9AM–12PM period for both months. These results suggested a decreased compliance trend and would allow IPCU and stakeholders to use these insights further to investigate possible root causes and formulate strategies to improve HH compliance. From 1 Jun 2021 onwards, the system was expanded to the rest of SKH inpatient wards.

Conclusion

This insightful information could not be achieved through the manual HH audits. With the system expanded to all SKH inpatient wards, IPC will prepare to supplement these insights into current audit reports and collaborate with staff to formulate new strategies to strengthen the HH culture, which will be especially important as we move towards endemic living with COVID-19.

References

1. Chaofan Wang, Weiwei Jiang, Kangning Yang, Difeng Yu, Joshua Newn, et al. (2021) Electronic Monitoring systems for Hand Hygiene: Systematic review of technology. J Med Internet Res 23: e27880. DOI: 10.2196/27880.
2. Dinah Gould, Håkan Lindström, Edward Purssell, Neil Wigglesworth (2020) Electronic hand hygiene monitoring: accuracy, impact on the Hawthorne effect and efficiency. Journal of Infection Prevention 21: 136-143. DOI: 10.1177/1757177420907999
3. Benedetta Allegranzi, Sepideh Bagheri Nejad, Christophe Combescure, Wilco Graafmans, Homa Attar, et al. (2011) World Health Organization Report on the Burden of Endemic Health Care-Associated Infection Worldwide. Geneva: WHO DOI: 10.1016/S0140-6736(10)61458-4.
4. Challenge F G P S (2009) WHO guidelines on hand hygiene in health care: a summary. Geneva: World Health Organization 119: 1977-2016.
5. Gould D J, Drey N S, Creedon S (2011) Routine hand hygiene audit by direct observation: has nemesis arrived? Journal of Hospital Infection 77: 290-293.
6. Annette Jeanes, Pietro G Coen, Dinah J Gould, Nicolas S Drey (2019) Validity of hand hygiene compliance measurement by observation: A systematic review. American journal of infection control 47: 313-322. https://doi.org/10.1016/j.ajic.2018.08.004.

7. Jerome A Leis, Jeff E Powis, Allison McGeer, Daniel R Ricciuto, Tanya Agnihotri, et al. (2020) Introduction of group electronics monitoring of hand hygiene on inpatient units: A multicenter cluster randomised quality improvement study. Clinical Infectious Disease 71: 680-685. doi.org/10.1093/cid/ciaa412.