Automated hand hygiene monitoring increases the understanding of poor compliance behavior: A prospective observational study

Anne-Mette Iversen[1], Camilla R. Lauridsen[1], Rosa Hansen[2], Bjørn Hesselbo[3], Rebekah Alexander[4], Aaron Alex[4], Marco B. Hansen[4], Christiane P. Kavalaris[3]

INTRODUCTION

Hospital-acquired infections and spread of antimicrobial resistance can be reduced by improving hand hygiene compliance (HHC) among healthcare workers (HCWs). However, low HHC at hospitals remains a problem and good monitoring methods are needed.

OBJECTIVES

We aimed to describe our experiences using a real-time automated hand hygiene monitoring system.

Fig. 1. Illustration of the principle of the Sani nudge system

METHODS

An automated HHC monitoring system (Sani nudge™)[a] was installed at two Danish hospital wards between February 2018 and September 2018.

The system constantly monitored staff hygiene behaviour using sensors located on staff name tags, patient beds and sanitizers (**Figure 1**). Specially designed algorithms based on the WHO's '5 Moments for Hand Hygiene' and local hospital guidelines were used to calculate the HHC levels.

A patient clean zone around each bed was created by the sensors and used to register whether hand hygiene was performed before and after patient contact. In the patient rooms, the WHO moments 1, 4 and 5 were measured. The system has been validated and compared with direct observations. Only alcohol-based hand disinfection was measured.

RESULTS I

With 79 staff members (nurses, n=73; doctors, n=6) involved, the system registered 2.2 million data points equating to 127,601 direct observations and a mean HHC of 46%.

There was a disparity in HHC rates across room types with the lowest HHC in patient bedrooms (mean 36%) and the highest in staff toilets (mean 80%) (**Figure 2**).

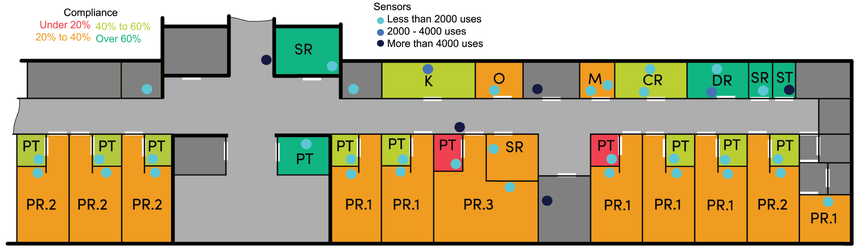
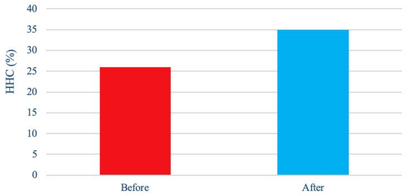


Fig. 2. Overview of HHC and sanitizer usage in one of the hospital wards. The color in each room illustrates the average compliance range during the study period. The circles indicate location of the sanitizers whereas the colors illustrate the amount of time being used. Grey colored rooms (storage rooms etc.) were not included in the study. White bars indicate location of doors. CR, clean rinsing room (sluice room for storage of clean goods); DR, dirty rinsing room (sluice room for soiled goods); K, kitchen; M, medication room; O, office; PR.1, patient room (1 bed); PR.2, patient room (2 beds); PR.3, patient room (3 beds); PT, patient toilet; SR, storeroom; ST, staff toilet.

RESULTS II

In the patient bedrooms, the staff more often sanitized hands after (mean 35%) than before (mean 26%) patient contact.

Fig. 3. Hand hygiene compliance of healthcare workers before vs. after patient contact



Fluctuations in HHC between days became smaller as the HCWs worked with the data from the fully integrated system and a general upward trend could be seen achieving HHC levels as high as 93% in staff toilets.

CONCLUSIONS

The automated hand hygiene monitoring system proved to be a successful alternative to current observation methods in supplying detailed information about HHC. The data-driven approach provided hospitals with repeatable, unbiased and real-time compliance data while giving important insights into hygiene behaviour. Importantly, the system helped the hospitals to identify the most critical areas with low HHC.

REFERENCES

[a]Sani nudge – Hand Hygiene Management [Internet]. [cited 2019 Jun 30]. Available from: https://saninudge.com/

AFFILIATION

[1]Department of Oncology, Aarhus University Hospital, Denmark; [2]Department of Orthopedic, Bispebjerg University Hospital, Denmark; [3]Department of Quality and Education, Infection Control Unit, Bispebjerg University Hospital, Denmark; [4]Konduto ApS, Sani nudge, Copenhagen, Denmark.

DISCLOSURES

This study was partly funded by the Danish Ministry of Health (J. no. 1608966).

MBH is co-founder of the Sani nudge System. RA and AA are employees of Konduto ApS. The other authors declare no conflicts of interest.