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Brief Report

Use of an automated hand hygiene compliance system by emergency room nurses and technicians is associated with decreased employee absenteeism

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Few studies have examined the use of hand hygiene interventions among health care personnel and employee absenteeism. To improve the hand hygiene practices of emergency room nurses and technicians, we implemented mandatory use of an automated hand hygiene compliance system. After implementation, we found reductions in employee absenteeism and the number of overtime hours worked by substitute staff. These unanticipated results demonstrate a return on investment that benefits the health of employees.

The importance of hand hygiene practices in health care settings cannot be overstated. The World Health Organization promotes the use of alcohol-based handrubs at the point of care to reduce the burden of nosocomial infections.[1] Little data exist on the effect of improved hand hygiene practices by health care personnel on their health and subsequent absenteeism, and yet, US employers have long recognized the financial burdens of health-related absenteeism.[2] A pilot study of the use of surface and hand hygiene wipes in a long-term care facility demonstrated a 41% reduction in employee absenteeism.[3]

Schools and workplaces have been the focus of most studies that examine this apparent link between hand hygiene interventions and reduced absenteeism. In a randomized controlled study conducted in 5 schools, a multifactorial hand hygiene intervention, which included alcohol-based hand sanitizer, was associated with reductions in the risk of both total student absenteeism (37%) and respiratory infection-related absenteeism (38%) during the school year.[4,5] A prospective study of a hand hygiene intervention in office buildings, which included alcohol-based hand sanitizer, demonstrated a 21% reduction in the incidence of hygiene-preventable health care claims and a positive impact on employee absenteeism.[6]

Best practices for monitoring and assessing hand hygiene in health care settings have not been determined, although studies have shown that automated hand hygiene compliance systems (HHCSs) offer a more effective means than direct observation to quantitate hand hygiene performance by health care personnel.[7] Studies examining the use of automated HHCSs in health care settings have yielded varying results and highlight the importance of device implementation strategies for sustained improvement in hand hygiene performance by health care personnel.[8-12]

In an attempt to increase the handwashing practices of emergency room (ER) nurses and technicians, we implemented use of an automated HHCS. Here we report decreased absenteeism among ER nurses and technicians after adopting the HHCS.

METHODS

We mandated use of an automated HHCS (Biovigil Healthcare Systems Inc, Ann Arbor, MI) in the ER at Lutheran Medical Center, a 249-bed, acute care, community hospital in Wheat Ridge, Colorado. Biovigil personnel installed the HHCS and provided training to ER staff who enter patient care areas.

The HHCS consists of a wearable badge that detects when caregivers have sanitized or washed their hands before and after patient room entry. The badge also provides caregivers point-of-care reminders to perform hand hygiene via lights and tones.[13] The green light on the badge means that hand hygiene was performed as

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required with entry into or exit from a patient care area; yellow is a reminder to clean hands; red means that hand hygiene was not performed within the required time period. If a staff member enters or exits a patient care area without performing hand hygiene, the reminder begins: the badge light turns yellow and the badge vibrates and sounds a tone. If hand hygiene is not performed and confirmed within the required time period, the light turns red and the event is considered noncompliant. Once the staff member performs hand hygiene, the light returns to green.

Hand hygiene activity data were tracked on each badge and uploaded to a cloud-based system when the badge was returned to a charging station. Staff received weekly emails detailing their personal hand hygiene compliance data. Managers and infection prevention staff were also provided individual and group-level data on a weekly and/or monthly basis, which was used for coaching, performance tracking, and reporting purposes.

This retrospective study qualified for exemption by the hospital's institutional review board. The periods before and during the HHCS intervention were January 2015 to July 2016 and August 2016 to December 2018, respectively. Before the intervention, hand hygiene was occasionally monitored through direct observation by unknown observers. The number of daily sick call hours for each nurse and technician were obtained from ER records. The number of monthly community respiratory illnesses that occurred before and during the intervention was obtained from the hospital's electronic surveillance system (VigiLanz, VigiLanz Corporation, Minneapolis, MN).

Total sick call hours for each day were averaged within each month, producing a continuous value, which we assumed to be normally distributed, as supported by a histogram of the monthly averages. We used linear regression to model the expected average number of sick call hours with 5 predictors: (1) year (treated as a category to allow for nonlinear trends in sick call hours among the 4 years examined; (2) month (treated as a category to allow for the annual cyclical pattern in sick call hours); (3) an indicator of whether the HHCS had been implemented; (4) the number of flu cases reported, to adjust for any possible confounding of the flu season with the effect of the HHCS; and (5) the mean sick call hours in the previous month, to account for any serial correlation in sick call hours between neighboring months. Inspection of the residuals from this model indicated good fit and no violation of model assumptions. The reduction in the number of average monthly sick call hours associated with the HHCS was summarized by the regression parameter estimate and its corresponding 95% confidence interval. $P < .05$ was used to define statistical significance. Statistical analyses were carried out with R software v3.4.0 (R Foundation for Statistical Computing, Vienna, Austria).

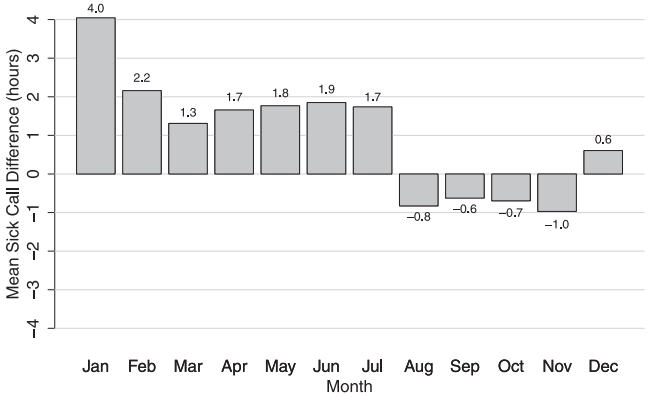

Fig 1. Difference in mean number of sick call hours for each month of the year, adjusted for monthly and annual trends, incidence of flu cases, and serial correlation of adjacent months. Before HHCS intervention: January 2015 to July 2016. After HHCS intervention: August 2016 to December 2018. *HHCS*, hand hygiene compliance system.

RESULTS

During the intervention period, the average monthly hand hygiene compliance rate was 94%. Our linear regression model suggests that the mean number of monthly sick call hours was reduced by 4.6 hours per month after HHCS implementation (95% confidence interval, 0.6-8.7 hours per month; $P = .032$). Based on our regression model, Figure 1 shows the difference in the adjusted mean number of sick call hours each month from before to after HHCS implementation.

We also saw a decrease in the number of overtime hours worked by substitute staff, from 11,949 during 2015 to 7,092 during 2018 (Fig 2A). Per employee, this corresponded to a decrease in overtime hours from 31 in 2015 to 17 in 2018 (Fig 2B).

DISCUSSION

We showed that mandating use of an automated HHCS in a community hospital ER was associated with a reduction in employee absenteeism. Reducing the number of sick call outs made by ER nurses and technicians, in turn, reduced the number of overtime hours worked by ER substitute staff. Thus our finding of 4.6 fewer hours per month in employee absenteeism would translate into a cost savings for the department through decreased overtime hours paid to substitute staff and, presumably, decreased paid time off due to unscheduled sick call outs.

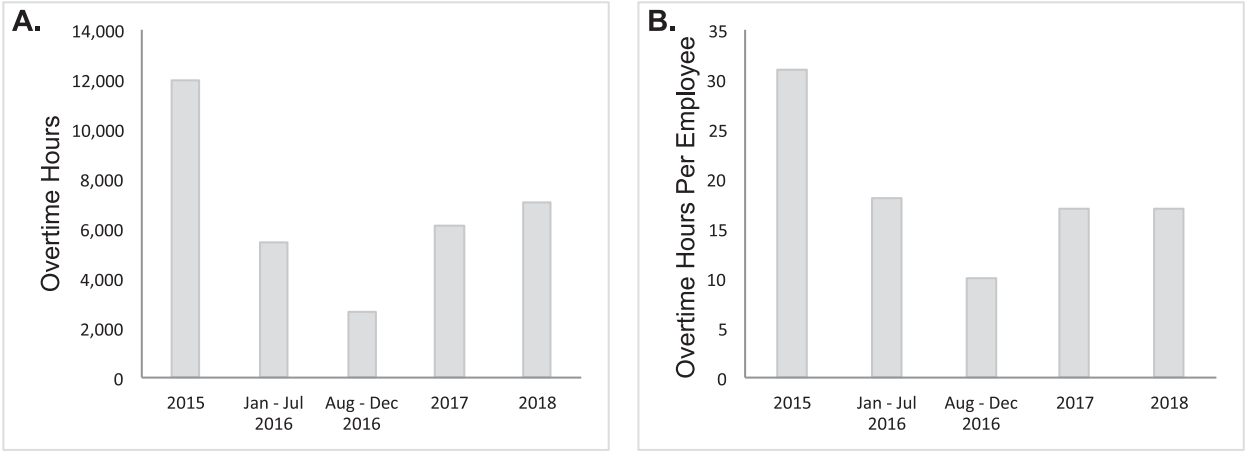

Fig 2. Overtime hours (A) and overtime hours per employee (B) from 2015 to 2018.

In addition to the financial burdens of absenteeism,[2] absenteeism among ER nurses and technicians could also impact the quality of patient care due to potentially overworked staff. The use of substitute staff may contribute additional stress by potentially impacting the continuity of care.

The intervention period overlapped the 2017-2018 flu season, which was A(H3N2)-predominant and classified as high severity by the Centers for Disease Control and Prevention.[14] Given this severity, one might have expected an increase in sick call hours compared with earlier, milder flu seasons. In fact, the Centers for Disease Control and Prevention's workplace absenteeism surveillance analyses showed a sharp increase in absenteeism in November 2017, which peaked in January 2018. The January 2018 peak was significantly higher than average compared with the previous 5 flu seasons.[15] Lutheran Medical Center has a mandatory influenza vaccination policy, so there would not have been differences in sick call hours between flu seasons that could be attributed to differences in vaccination. We speculate that use of the automated HHCS likely contributed to the lower than expected sick call hours for ER nurses and technicians during the 2017-2018 flu season.

This retrospective study has clear limitations, including its quasiexperimental design and lack of randomization. During this study, the hospital had no changes in human resources policies that would have affected absenteeism. Although there were no other direct hand hygiene or employee health interventions during the timeframe of this study, there could have been other unknown factors that influenced the decrease in employee absenteeism. In addition, the consistent reminder of the HHCS brought increased attention to hand hygiene practices throughout the ER.

In addition, because the dataset was limited to the ER of a single community hospital, the results may not be generalizable to other departments or other hospitals. During the intervention, the HHCS was adopted hospital-wide with final implementation in January 2017. However, because of the manual nature of data collection for the ER, which has not been carried out in other departments, we are not able to report on employee absenteeism rates outside of the ER.

CONCLUSIONS

A reduction in employee absenteeism was an unexpected result of implementation of an automated HHCS. This finding, along with the concomitant decrease in overtime hours worked by substitute staff, demonstrates a return on the hospital's investment both financially and through the health of employees.

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