Video Surveillance of Hand Hygiene: A Better Tool for Monitoring and Ensuring Hand Hygiene Adherence

Shruti Sharma¹, Vipul Khandelwal², Gajendra Mishra³

Abstract

Introduction: Hand hygiene practice, as correctly said, is the backbone of infection control and it has been proven to limit infections in hospital settings. Currently most healthcare facilities monitor hand hygiene compliance by direct observation technique. We decided to use video surveillance as a tool to monitor hand hygiene compliance and its impact.

Materials and Methods: This study was conducted over a period of 6 months from March 2018 to August 2018 at Apex Hospital, Jaipur, India. We compared direct observation of ICU, High Dependency Units, and Emergency with video surveillance in these areas.

Results and Observations: In this study, direct observation and video audit were compared from March 2018 to August 2018. During March to August, average compliance rates of direct observation and video surveillance were compared. In month of March, they were 67% and 20%, respectively and in the month of August, they were 81% and 47%, respectively.

Conclusion: In our study, We can conclude in our study that video monitoring combined with direct observation can produce a significant and sustained improvement in hand hygiene compliance and can improve quality of patient care.

Keywords: Compliance monitoring, Hand hygiene, Video surveillance, WHO five key moments

Indian Journal of Critical Care Medicine (2019): 10.5005/jp-journals-10071-23165

Introduction

Hand hygiene practice, as correctly said, is the backbone of infection control and it has been proven to limit infections in hospital settings. One of the most important component of infection control program is to monitor hand hygiene compliance. WHO recommends regular hand hygiene monitoring to improve the hand hygiene compliance. WHO recommends five key moments of hand hygiene, these are:

- Before touching a patient
- Before clean/aseptic procedures
- After body fluid exposure/risk
- After touching a patient
- After touching patient’s surroundings

Currently most healthcare facilities monitor hand hygiene compliance by direct observation technique, as this is considered “gold standard”. But this approach has its own limitations. Direct observation technique is most of the time affected by observer and other kind of biases, which can influence the action of the person being observed and sometimes does not give us the actual data of hand hygiene compliance. It is observed that direct observation gives us false high results than actual hand hygiene compliance. Furthermore, we cannot rely solely on direct observation technique for hand hygiene monitoring as it has sampling bias and sometimes the compliance vary from 4 to 100%. Video surveillance for compliance monitoring had been observed in many different industries like sports etc., as well as in hospital settings too for different purposes. Some studies have used video monitoring for hand hygiene monitoring as well. We also decided to use video surveillance as a tool to monitor hand hygiene compliance and its impact.

Materials and Methods

This study was conducted over a period of 6 months from March 2018 to August 2018 at Apex Hospital, Jaipur, India. Previously, we were using direct observation technique as the sole monitoring tool for hand hygiene compliance. We gave regular training for hand hygiene as before. No extra training was done in the study period. For hand hygiene compliance monitoring, we used following formula:

\[
\text{Hand hygiene compliance} = \frac{\text{Hand hygiene action (WHO key moments) taken during observation}}{\text{Hand hygiene opportunities present during observation}}
\]
was introduced for hand hygiene compliance monitoring and it was prior informed to all doctors and staff. Video surveillance was also done for the same duration i.e. 30 minutes. During video surveillance, no observer was physically present in those areas.

**Results and Observations**

In this study, direct observation and video audit were compared from March 2018 to August 2018 between doctors, nurses, and housekeeping staff (Tables 1 to 6).

**Table 1: Comparison of direct observation vs video surveillance (March)**

|                | % (DO) | % (VS) |
|----------------|--------|--------|
| ICU Doctors    | 72     | 20     |
| Nursing staff  | 72     | 21     |
| Housekeeping staff | 61 | 15     |
| HDU Doctors    | 68     | 20     |
| Nursing staff  | 71     | 22     |
| Housekeeping staff | 60 | 17     |
| Emergency Doctors | 70    | 22     |
| Nursing staff  | 68     | 23     |
| Housekeeping staff | 64 | 18     |

**Table 2: Comparison of direct observation vs video surveillance (April)**

|                | % (DO) | % (VS) |
|----------------|--------|--------|
| ICU Doctors    | 71     | 25     |
| Nursing staff  | 76     | 25     |
| Housekeeping staff | 62 | 17     |
| HDU Doctors    | 68     | 23     |
| Nursing staff  | 71     | 25     |
| Housekeeping staff | 60 | 18     |
| Emergency Doctors | 70    | 28     |
| Nursing staff  | 68     | 29     |
| Housekeeping staff | 64 | 18     |

**Table 3: Comparison of direct observation vs video surveillance (May)**

|                | % (DO) | % (VS) |
|----------------|--------|--------|
| ICU Doctors    | 78     | 30     |
| Nursing staff  | 80     | 33     |
| Housekeeping staff | 68 | 22     |
| HDU Doctors    | 76     | 29     |
| Nursing staff  | 79     | 30     |
| Housekeeping staff | 65 | 20     |
| Emergency Doctors | 75    | 32     |
| Nursing staff  | 78     | 35     |
| Housekeeping staff | 65 | 21     |

**Table 4: Comparison of direct observation vs video surveillance (June)**

|                | % (DO) | % (VS) |
|----------------|--------|--------|
| ICU Doctors    | 81     | 38     |
| Nursing staff  | 82     | 39     |
| Housekeeping staff | 71 | 30     |
| HDU Doctors    | 79     | 37     |
| Nursing staff  | 80     | 35     |
| Housekeeping staff | 67 | 29     |
| Emergency Doctors | 79    | 38     |
| Nursing staff  | 82     | 38     |
| Housekeeping staff | 69 | 29     |

**Table 5: Comparison of direct observation vs video surveillance (July)**

|                | % (DO) | % (VS) |
|----------------|--------|--------|
| ICU Doctors    | 82     | 42     |
| Nursing staff  | 81     | 45     |
| Housekeeping staff | 72 | 38     |
| HDU Doctors    | 80     | 40     |
| Nursing staff  | 81     | 39     |
| Housekeeping staff | 70 | 37     |
| Emergency Doctors | 82    | 39     |
| Nursing staff  | 83     | 38     |
| Housekeeping staff | 70 | 35     |

**Table 6: Comparison of direct observation vs video surveillance (August)**

|                | % (DO) | % (VS) |
|----------------|--------|--------|
| ICU Doctors    | 85     | 50     |
| Nursing Staff  | 83     | 50     |
| Housekeeping Staff | 75 | 45     |
| HDU Doctors    | 84     | 48     |
| Nursing Staff  | 83     | 50     |
| Housekeeping Staff | 74 | 42     |
| Emergency Doctors | 85    | 48     |
| Nursing Staff  | 84     | 49     |
| Housekeeping Staff | 74 | 40     |

During March to August, average compliance rates of direct observation and video surveillance were compared. In month of March, they were 67% and 20%, respectively and in the month of August, they were 81% and 47%, respectively (Fig. 1).

**Discussion**

In our study, we observed WHO five key moments of hand hygiene in our hand hygiene monitoring. This study demonstrates that the hand hygiene compliance rate by direct observation technique and by video surveillance showed significant difference at the starting of study12,14-18 but this difference started to reduce later in the study, though not completely12,13.

Direct observation technique can have a disadvantage of observer bias, which can be due to multiple factors.7,15-17 The study of Armellino and colleagues showed reduced selection bias in video surveillance in comparison to direct observation that falsely
increased rates due to Hawthorne effect or observer effect.\textsuperscript{12,13} We observed improved hand hygiene compliance overall, not just in presence of observer or camera.\textsuperscript{12,13} Staff was previously aware of the ongoing video surveillance but significant improvement was seen in subsequent months when feedback was given in monthly infection control meetings where difference in performance metrics between direct and video surveillance monitoring were displayed.

Although the purpose of this study was to observe hand hygiene compliance monitoring by video surveillance, we saw improvement in other areas of infection control practices, such as, standard precaution, aseptic technique during procedures etc. Employee privacy was maintained during the surveillance. Video tapes have been archived and can be further analyzed, which is the additional advantage of video monitoring.

We can conclude in our study that video monitoring combined with direct observation can produce a significant and sustained improvement in hand hygiene compliance and can improve quality of patient care.

**Acknowledgments**

We thank our hospital doctors, nursing staff and housekeeping staff for their assistance.

**References**

1. Marra AR, Moura DF, Paes AT, dos Santos OF, Edmond MB. Measuring rates of hand hygiene adherence in the intensive care setting: a comparative study of direct observation, product usage, and electronic counting devices. Infect Control Hosp Epidemiol. 2010; 31: 796–801. doi: 10.1086/653999
2. Boyce JM, Pittet D. Guideline for hand hygiene in health-care settings: recommendations of the healthcare infection control practices advisory committee and the HICPAC/ SHEA/APIC/IDSA hand hygiene task force. Infect Control Hosp Epidemiol. 2002; 23: S3–S40.
3. Pittet D, Allegranzi B, Boyce JM. The World Health Organization guidelines on hand hygiene in health care and their consensus recommendations. Infect Control Hosp Epidemiol. 2009; 30: 611–622. doi: 10.1086/600379
4. Erasmus V, Daha TJ, Brug H, Richards JH, Behrendt MD, et al. Systematic review of studies on compliance with hand hygiene guidelines in hospital care. Infect Control Hosp Epidemiol. 2010; 31: 283–94. doi: 10.1086/605451
5. Sax H, Allegranzi B, Uçkay I, Larson E, Boyce J, Pittet D. ’My five moments for hand hygiene’: a user-centred design approach to understand, train, monitor and report hand hygiene. J Hosp Infect. 2007; 67: 9–21.
6. Haas JP, Larson EL. Measurement of compliance with hand hygiene. J Hosp Infect. 2007; 66: 6–14. doi: 10.1016/j.jhin.2006.11.013
7. Adair JG. The Hawthorne effect: a reconsideration of the methodological artifact. J Appl Psychol. 1984; 69: 334–345. doi: 10.1037/0021-9010.69.2.334
8. Eckmanns T, Bessert J, Behnke M, Gastmeier P, Ruden H. Compliance with antisepsic hand rub use in intensive care units: the Hawthorne effect. Infect Control Hosp Epidemiol. 2006; 27: 931–934. doi: 10.1086/507294
9. Carson F. Utilizing video to facilitate reflective practice: developing sports coaches. Int J Sports Sci Coach. 2008; 3: 381–390. doi: 10.1260/174795408787823851
10. Smeeton SJ, Hibbert JR, Stevenson K, Cumming J, Williams AM. Can imaginary facilitate improvements in anticipation behavior? Psychol Sport Exerc. 2013; 14: 200–210. doi: 10.1016/j.psychsport.2012.10.008
11. Robinovitch SN, Feldman F, Yang Y, Schonop R, Leung PM, Sarraf T, et al. Video capture of the circumstances of falls in elderly people residing in long-term care: an observational study. Lancet. 2013; 381: 47–54. doi: 10.1016/S0140-6736(12)61263-X
12. Armellino D, Hussain E, Schilling ME, Senicola W, Eichorn A, Dlugacz Y, et al. Using high technology to enforce low-technology safety measures: the use of third party remote video auditing and real-time feedback in healthcare. Clin Infect Dis. 2012; 54:1–7. doi: 10.1093/cid/cir773
13. Armellino D, Trivedi M, Law I, Singh N, Schilling ME, Hussain E, et al. Replicating changes in hand hygiene in a surgical intensive care unit with remote video auditing and feedback. Am J Infect Control. 2013; 41: 925–927. doi: 10.1016/j.ajic.2012.12.011
14. Cohen SH, Gerding DN, Johnson S, Kelly CP, Loo VG, McDonald LC, et al. Clinical practice guidelines for Clostridium difficile infection in adults: 2010 Update by the Society for Healthcare Epidemiology of America (SHEA) and the Infectious Diseases Society of America (IDSA). Infect Control Hosp Epidemiol. 2010; 31: 431–455. doi: 10.1086/651706
15. Siegel JD, Rhinehart E, Jackson M, Chiarello L Guideline for isolation precautions: preventing transmission of infectious agents in healthcare settings. Am J Infect Control. 2007; 35(10 Suppl 2):S65–164. doi: 10.1016/j.ajic.2007.10.007
16. Whitby M, McLawns ML, Ross MW. Why healthcare workers don’t wash their hands: a behavioral explanation. Infect Control Hosp Epidemiol. 2006; 27: 484–492. doi: 10.1086/503335
17. Boudjema S, Dufour JC, Soto Aladro A, Desquerres I, Brouqui P. MediHandTrace*: A tool for measuring and understanding hand hygiene adherence. Clin Microbiol Infect. 2014; 20: 22–28.
18. Srigley JA, Furness CD, Baker GR, Gardam M. Quantification of the Hawthorne effect in hand hygiene compliance monitoring using an electronic monitoring system: a retrospective cohort study. BMJ Qual Saf. 2014; 23: 974–980. doi: 10.1136/bmjqs-2014-003080