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Major article

Improved hand hygiene compliance after eliminating mandatory glove use from contact precautions—Is less more?

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Background: Guidelines recommend that health care personnel (HCP) wear gloves for all interactions with patients on contact precautions. We aimed to assess hand hygiene (HH) compliance during contact precautions before and after eliminating mandatory glove use.

Methods: We assessed HH compliance of HCP in the care of patients on contact precautions in 50 series before (2009) and 6 months after (2012) eliminating mandatory glove use and compared these results with the hospital-wide HH compliance.

Results: We assessed 426 HH indications before and 492 indications after the policy change. Compared with 2009, we observed a significantly higher HH compliance in patients on contact precautions in 2012 (52%; 95% confidence interval [95% CI], 47-57) vs 85%; 95% CI, 82-88; $P < .001$). During the same period, hospital-wide HH compliance also increased from 63% (95% CI, 61-65) to 81% (95% CI 80-83) ($P < .001$). However, the relative improvement (RI) of HH compliance during contact precautions was significantly higher than the hospital-wide relative improvement (RI, 1.6; 95% CI, 1.49-1.81 vs 1.29; 95% CI, 1.25-1.34), with a relative improvement ratio of 1.27 (95% CI, 1.15-1.41).

Conclusion: Eliminating mandatory glove use in the care of patients on contact precautions increased HH compliance in our institution, particularly before invasive procedures and before patient contacts. Further studies on the effect on pathogen transmission are needed before revisiting the current official guidelines on the topic.

Adequate hand hygiene (HH) is a key measure to prevent transmission of health care–associated infections.[1] Over the last few decades, campaigns promoting HH have been launched all over the world.[2] Nevertheless, the importance of this simple procedure is not sufficiently recognized by all health care personnel (HCP), and compliance with recommended HH practices is often low.

Wearing gloves cannot be considered as an alternative to HH. Doebbeling et al showed that washing artificially contaminated gloves often failed to remove microorganisms and that bacteria could penetrate unapparent holes in gloves and eventually contaminate the individual's hands. Therefore, hand disinfection or washing is required after glove removal.[3]

In 1996, the Centers for Disease Control and Prevention (CDC) introduced a revised version of a preventive concept against nosocomial infections that had originated in the 1960s.[4] In these guidelines, basic standard precautions are recommended for all health care activities. Additionally, contact precautions are intended to prevent transmission of pathogens that are spread by direct or indirect contact with the patient or the patient's environment. According to the CDC recommendations and the HH guidelines issued by the World Health Organization (WHO), HCP caring for patients on contact precautions should wear gloves for all interactions with patients or contact with potentially contaminated areas in their environment.[5,6] This recommendation was based on general consensus and not on high-level evidence. To our

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knowledge, no studies have directly compared the efficacy of standard precautions alone versus standard plus contact precautions for the control of multidrug-resistant (MDR) microorganisms.[7]

Of note, when gloving is required, it may become more challenging to perform optimal HH. Indeed, several authors have identified the use of gloves as an important risk factor for poor HH.[1,8-14]

In 2009, an observational study of HH compliance at our institution showed that the requirement to wear gloves during contact precautions caused HCP to neglect HH, thereby potentially increasing the risk of pathogen transmission.[15] In light of this finding our infection prevention unit implemented a policy change in 2011, eliminating mandatory gloving from the care of patients on contact precautions knowing that this new strategy followed neither CDC nor WHO guidelines.

The objective of this study was to assess the compliance with HH before and after this policy change took place.

MATERIAL AND METHODS

Hospital setting

Our institution is a 950-bed tertiary care teaching hospital covering all medical specialties, including a 30-bed mixed intensive care unit (ICU). There are on average 38,000 admissions annually, resulting in 290,000 patient days. Institutional guidelines for infection prevention are based on the CDC's Guidelines for Isolation Precautions[5] and are regularly updated by the infection prevention unit. Patients colonized or infected with MDR bacteria (eg, methicillin-resistant *Staphylococcus aureus*, vancomycin-resistant *Enterococcus*, MDR gram-negative bacteria) are placed on contact precautions.

The promotion of HH has a high priority among the infection prevention measures in our hospital. The hospital provides an alcohol-based solution for handrubs in wall-mounted and bed-mounted dispensers that has also been distributed as coat-pocket bottles for many years. There was no change in the availability of the alcohol-based solution during the study period. Since 2005, when a national campaign by Swissnoso (the Swiss national expert group for the prevention of hospital-acquired infections) launched the 5 HH indications (before patient contact, after patient contact, before an aseptic procedure, after body fluid exposure, and after touching the patient's environment), we have promoted these recommendations.[16] These 5 HH indications were later adopted by the WHO concept My 5 Moments for Hand Hygiene in 2009.[17]

As a quality indicator, the hospital-wide compliance of HCP with HH has been assessed annually since 2005 (with direct feedback to the wards).

Study design

We performed a nonrandomized observational before-after study comparing HH compliance in contact precautions caused by colonization or infection with MDR microorganisms before and 6 months after eliminating mandatory glove use (September-December 2009 and April-June 2012, respectively). The hospital-wide HH compliance in nonisolated patients in both periods served as the control. Patients on contact precautions because of an infection with *Clostridium difficile* were excluded from the study.

Policy change and implementation

Prior to September 2011, all HCP were expected to perform HH and wear gloves before entering the room of a patient on contact precautions and to change gloves if an indication for HH occurred during the encounter with the isolated patient. Afterward, glove use in this setting was only required according to standard precautions (contact with body fluids, nonintact skin, or mucosa and before invasive procedures). We communicated this policy change in written form to all hospital floors and highlighted it in the hospital's infection prevention guidelines. For 1 month, HCP providing care for patients on contact precautions were personally informed about the change in policy. On special request, we scheduled HH training sessions for individual floors. All HH indications were being taught to HCP since the 2005 national campaign. There was no special promotion of the HH indications during the study period (eg, after the publication of the 2009 WHO guidelines), and there was no other specific HH intervention.

Data collection

HH observations in patients on contact precautions and for the entire hospital were performed during routine patient care in the patients' rooms or in the ICU in series of 20 minutes each. For the observations we used a standardized questionnaire offered by Swissnoso[16] evaluating HH in the following situations: (1) before patient contact, (2) after patient contact, (3) before an aseptic procedure, (4) after body fluid exposure, and (5) after touching the patient's environment.[17] Additionally, we monitored the compliance with gloving in contact precautions. Before the policy change we assessed if (1) gloves were worn before entering a room with a patient on contact precautions, (2) HH was performed before and after glove use, and (3) gloves were changed to perform HH. After the policy change, we evaluated if gloves were worn when indicated by standard precautions.

All HH observers were members of the infection prevention team. All of them were instructed in HH observation with the same educational tools provided by Swissnoso and underwent annual refreshers in HH observation. One author (D.N.) performed all HH observations in contact precautions in 2009 and performed most in 2012 (D.N. performed 389 and T.K. performed 103 observations in 2012). The hospital-wide HH observations were conducted with the same methodology by the entire infection prevention team consisting of 10 staff members in 2009 and 7 in 2011. Two authors (D.N. and T.K.) and 1 additional staff member participated in the observations in both years.

Ethics

This study did not require approval by the local ethics committee because it was deemed a quality improvement project. The directors of the involved clinical departments were informed of the study and the research methodology before research activities started. The observed health care workers were aware of the fact that they participated in an HH study.

Statistical analyses

We used Stata/SE10.0 (StataCorp, College Station, TX) to perform statistical analyses. HH compliance was defined as the percentage of opportunities in which HCP adhered to HH guidelines (indications with adequate HH/all HH indications $\times$ 100). We evaluated differences in HH compliance in the care of patients on contact precautions between 2009 and 2012 and differences in HH compliance in the care of patients on contact precautions versus the hospital-wide compliance during the respective year, using the χ^2 test, and calculated the corresponding 95% confidence intervals. Additionally, we calculated the absolute difference in HH compliance between 2009 (baseline) and 2012 for patients on