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Workload even affects hand hygiene in a highly trained and well-staffed setting: a prospective 365/7/24 observational study

S. Scheithauer [a,b,*], B. Batzer [b], M. Dangel [b], J. Passweg [c], A. Widmer [b]

[a] Infection Control and Infectious Diseases, University Medicine Goettingen, University Goettingen, Germany
[b] Infectious Diseases, Basel University Hospital, Basel, Switzerland
[c] Clinic for Haematology, Basel University Hospital, Basel, Switzerland

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SUMMARY

Introduction: Compliance with hand hygiene (HH) has often not proved satisfactory; high workload is a commonly self-reported reason. Previous studies comparing workload and compliance have not measured workload precisely and have focused on certain times of day. This study aimed to investigate the association between HH compliance and workload, both electronically defined 365/7/24 (primary endpoint). In addition, the quality of commonly used compliance defining methods (hand disinfectant usage, direct observation) was investigated (secondary endpoint).

Materials and methods: Correlation of electronically measured HH compliance (hand-rub activities (HRA)/HH opportunities) with electronically determined workload (nursing time output/nursing time input) was undertaken over one year at a stem cell transplant unit at University Hospital Basel, Switzerland. HRA and procedures requiring HRA according to the five World Health Organization indications were recorded continuously (365/7/24) using electronic dispensers and electronic documentation, and compliance was calculated accordingly. Hand disinfectant usage was calculated using spending records for one year; direct observation was performed for approximately 1800 HH opportunities.

Results: During the investigation, 208,184 HRA, translating into 57 [standard deviation (SD) 10] HRA/patient-day (PD), were performed. Electronically determined compliance ranged from 24% to 66% [mean 42.39% (SD 8%)]. The higher the workload, the lower the compliance (R=-0.411; P<0.001). HRA/PD (r=-0.037), hand disinfectant usage (mean 160 mL/PD) and observed compliance (95%; 1734 HRA/1813 HH opportunities) were not found to be associated with workload.

Conclusion: Calculated compliance was inversely associated with nurses' workload. HRA/PD, observer-determined compliance and amount of disinfectant dispensed were used as surrogates for compliance, but did not correlate with actual compliance and thus should be used with caution.

* Corresponding author. Address: S. Scheithauer, Zentralabteilung Krankenhaushygiene und Infektiologie, Universitätsmedizin Goettingen, Robert-Koch-Str. 40, 37075 Goettingen, Germany. Tel.: +49 (0) 551 394963.
E-mail address: simone.scheithauer@med.uni-goettingen.de (S. Scheithauer).

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Introduction

High compliance with hand hygiene (HH) is regarded as the cornerstone of any infection control programme.[1–3] However, despite World Health Organization (WHO) recommendations, compliance averages at approximately 40%.[1,4]

HH is amenable to influence by several factors, some of which are not changeable (e.g. profession and type of ward and/or faculty).[1,4–6] To date, high workload and lack of time are the most commonly self-reported reasons for non-compliance.[1,7–10] However, only a few investigations included, but did not focus on, the influence of working pressure on compliance in their analyses.[6,10–12] There is some evidence for an inverse correlation between workload and HH compliance.[6,11] However, not all reports support this association.[10,12] It is of note that investigations mainly focused on the early shift on weekdays, and mainly covered short time series by direct observation, which is known to pose a high risk for influencing behaviour.[1] Moreover, the definition of workload is not well standardized. Therefore, there may be bias in results, and it is difficult to compare and generalize these.

Several methods have been suggested for assessing HH compliance. Although direct observation is regarded as the gold standard for measuring compliance, electronic monitoring has become widely accepted as an alternative method.[13–15] Use of electronic dispensers allows real-time documentation of hand-rub activities (HRA) without increasing the workload. Moreover, analysis contains time-, shift- and localization-specific information that is useful in identifying critical points requiring interventions. Thus, HRA and hand disinfectant consumption calculated from spending records — both representing the numerator of the compliance equation — are widely used as surrogates for compliance, including for benchmark purposes.[16] However, since compliance is always related to a prescription or rule, the numerator (i.e. the extent of the compliant behaviour) must be related in the denominator to the instances for which this behaviour is prescribed. Ideally, both components should be determined electronically in an unbiased way 365/7/24. This study aimed to test the hypotheses of an inverse association between workload and compliance using standardized electronically measured HRA, HH opportunities and workload parameters (primary endpoint).

An additional aim was to assess the quality of commonly used compliance measurements including direct observed compliance, HRA per patient-day (PD) and hand disinfectant usage/PD (secondary endpoints).

Materials and methods

Design, patients and setting

HH practices were examined prospectively in accordance with WHO definitions and standardized data on staff and workload by electronic surveillance 365/7/24.[1]

The investigation was performed on a haematology transplant ward at a tertiary care center in Europe (University Hospital Basel, Switzerland). On this 13-bed ward, approximately 280 patients are cared for annually, translating into approximately 3600 PDs. In total, 103 stem cell transplantations (67 allogenic and 36 autologous) were performed over the study period. The staff consisted of 34 nurses, seven assistant nurses, and three ward-associated physicians. During nights and weekends, an additional 13 physicians from haematology were responsible for patient care.

The investigation lasted for one year (1st March 2012–28th February 2013) following a pilot phase for implementation of electronic hand-rub dispensers and overcoming initial shortcomings with wireless connectivity. Alcoholic hand disinfection was the only HH activity (no wash) according to the local guidelines based on the WHO recommendation, and gown pocket dispensers were not in use at the study hospital. All hand-rub dispensers were exchanged for a total of 41 electronic hand-rub dispensers with WiFi technology (Ingo-man Weco; Ophardt Hygienetechnik, Issum, Germany). The energy for the data transfer was derived from pulling the lever of the dispenser; no battery or power connection was required. The hand-rub dispenser transmitted usage data wirelessly to a common server.

The mechanical hand-rub device dispenses 1.5 mL of gel per pull. An HRA was defined operationally, and only recorded electronically when the end user pulled the hub twice with an interval of no more than 2 s between each pull of the dispenser. Dispensers were located in patient rooms (N=13), at patient room entry (N=8), in the hallways (N=5), at the laminar air flow benches (N=6; Moment 2 according to the WHO protocol), and in the central part of the ward (N=9).

The study was approved by the Human Subjects Committee, and oral informed consent was obtained from staff and patients under care.

Definitions

HRA were measured continuously using electronic counting devices, but data were not provided to the study participants. Calculated compliance was defined by HRA divided by the standardized documented activities requiring HRA according to the WHO protocol.[1] HRA and calculated compliance were analysed on a daily basis in order to correlate them with standardized documented data on staff time and workload, respectively. Daily HH opportunities were calculated according to the 'Five Moments for Hand Hygiene' based on the continuously documented activities using the LEP system (medical treatment recording, display and documentation instrument; LEP AG; St. Gallen, Switzerland). All patient-directed procedures were documented in the electronic documentation sheet, and HH opportunities were ascribed accordingly. Nursing time ('input') and nursing activities ('output') derived from the same system, and workload, defined as nursing time output related to nursing time input, was calculated at a daily level. Nursing time input was given by the nurses at work multiplied by their working time. It is of note that only nurses truly at work were enrolled (not the staff roster as planned). Nursing time output was defined by all activities performed by nurses, and thus coded in the LEP system which deposits the times needed accordingly in a standardized manner. Hand disinfectant usage was obtained from spending records. Direct observation of compliance was performed according to the WHO protocol by a highly trained unblinded infection control nurse, during day shifts alone, throughout the study period for 20–30-min observation episodes according to the WHO recommendation. As no significant differences were seen, correlation with workload was not performed.