CONCISE COMMUNICATION

Hand Rub Consumption Has Almost Doubled in 132 German Hospitals Over 9 Years

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Annual surveillance data (2007–2015), collected continuously in 132 German hospitals, was evaluated for development of alcohol-based hand-rub consumption (AHC) as a surrogate parameter for hand hygiene adherence. Overall, the median increase in AHC was 94%. The increases over 9 years were significant in all units and quartiles of AHC at baseline.

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Healthcare settings such as hospitals are high-risk environments for the spread of infectious pathogens. The impact of multidrug-resistant organisms on the burden of healthcare-associated infections is increasing. To reduce transmission of pathogens and thereby prevent infections, compliance with hand hygiene is considered the single most effective measure.[1]

In January 2008, the German national hand-hygiene campaign Aktion Saubere Hände (ASH) was launched as part of a strategy of multiple interventions based on the framework of the World Health Organization's Clean Care is Safer Care program to improve hand-hygiene adherence in healthcare settings. A substantial element of the German approach was to implement a surveillance tool to measure alcohol-based hand-rub consumption (AHC) at the unit level or in functional areas as a component of the national surveillance system for nosocomial infections known as KISS (Krankenhaus Infections Surveillance System). As of February 2017, 1,216 hospitals were participating in ASH by transmitting their AHC data annually using the HAND-KISS tool. Hospitals not engaged in AHC can also use HAND-KISS on a voluntary basis for internal quality management.

The objective of our evaluation of AHC data was to provide information on the development of AHC as a surrogate parameter for hand disinfection adherence by healthcare workers (HCWs). In Germany, hospital surveillance data do not include soap or other hand-hygiene solutions (eg, gels) because alcohol-based hand rub is the main hand-hygiene product and national guidelines recommend its use for all hand disinfection opportunities (except in caring for patients with *Clostridium difficile* diarrhea, when the use of alcohol-based hand rub followed by hand washing with soap and water is recommended).

METHODS

Annual AHC data were derived in each individual hospital from hand-rub procurement data. These data were collected on the unit level, aggregated and stratified for intensive care units (ICUs) and non–intensive care units (non-ICUs). Further stratification was conducted according to medical specialty (eg, surgical, neonatal, pediatric, etc). Some hospitals gathered data on both ICUs and non-ICUs, while others participants provided data for only 1 functional area (either ICU or non-ICU). The method of AHC surveillance with HAND-KISS and the calculation of reference data have been described in detail elsewhere.[2,3]

Only hospitals providing data continuously from 2007 to 2015 were included. The median value for annual change in AHC was calculated as the difference in milliliters (mL) per patient day (PD) and percentage difference relative to the baseline. To examine changes between 2007 and 2015 for ICUs and non-ICUs, AHC data were grouped in quartiles: Q1, ≤25%; Q2, >25 to ≤50%; Q3, >50 to ≤75%; Q4 >75%. The significance of a change in AHC was determined using the Wilcoxon rank-sum test for paired samples in quartiles. $P < .05$ was considered significant.

RESULTS

In total, 132 hospitals with 1,092 units (913 non-ICUs and 179 ICUs) provided AHC data continuously over 9 years. Most of these hospitals participated in the ASH; only 6 of the 132 hospitals were not affiliated with the campaign. An overall median increase in AHC of 94% was observed between 2007 and 2015 (Table 1). For the 913 non-ICUs, the increase in AHC relative to baseline was 101%; for the 179 ICUs, this increase was 75%. Among all units grouped in quartiles (Q1–Q4), units with the lowest AHC at baseline (Q1) showed the greatest increase in from 2007 to 2015 (142%), followed by Q2 and Q3 with increases of 98% and 74%, respectively. Units with the highest AHC at baseline (Q4) showed an increase of 60%.

Within the group of ICUs, the annual increase in AHC was significant for almost every year in Q1, Q2, and Q3, except in Q3 in the first year (2007 vs 2008; $P = .316$). ICUs pooled in Q4 achieved a significant increase in AHC compared to baseline from 2012 onward (2007 vs 2012; $P = .037$). For non-ICUs, the annual increases in AHC were significant year after year and in all quartiles except in Q4 for the first year (2007 vs 2008; $P = .159$).

For the units that started with an AHC below the median in 2007, the increase in AHC was distributed evenly over 9 years with hardly any bottom outliers (Figure 1). Hospitals and units with a higher AHC (above the median) showed greater sample variance and more top outliers and extreme top outliers. Especially for non-ICUs, extreme top outliers stood out in Q4 (ie, >75%).

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TABLE 1. Change in Alcohol-Based Hand-Rub Consumption From 2007 to 2015 Among 132 Hospitals Participating Continuously in HAND-KISS (Krankenhaus Infections Surveillance System)

Unit Type and Year	No. of Hospitals	No. of Units	AHC, L	Patient Days	Median AHC (IQR), mL/PD	Difference in AHC Relative to 2007, mL/PD[a]					Difference in AHC Relative to 2007, %				
						Total	Q1	Q2	Q3	Q4	Total	Q1	Q2	Q3	Q4
ICUs															
2007	102	179	49,881	693,558	64.9 (48.7–90.8)										
2015	102	179	91,358	732,504	113.6 (88.4–141.7)	49	53	55	44	30	75	143	100	57	27
Non-ICUs															
2007	120	913	119,419	7,685,322	14.2 (11.5–17.2)										
2015	120	913	231,578	7,660,873	28.6 (24.0–33.0)	14	14	14	15	12	101	158	109	94	57
All															
2007	132	1092	169,301	8,378,880	18.5 (13.9–25.4)										
2015	132	1092	322,936	8,393,377	35.9 (28.6–45.7)	17	16	16	16	22	94	142	98	74	60

NOTE. ICU, intensive care unit.
[a]Q1 (≤25%), Q2 (>25% to ≤50%), Q3 (>50% to ≤75%), Q4 (>75%).

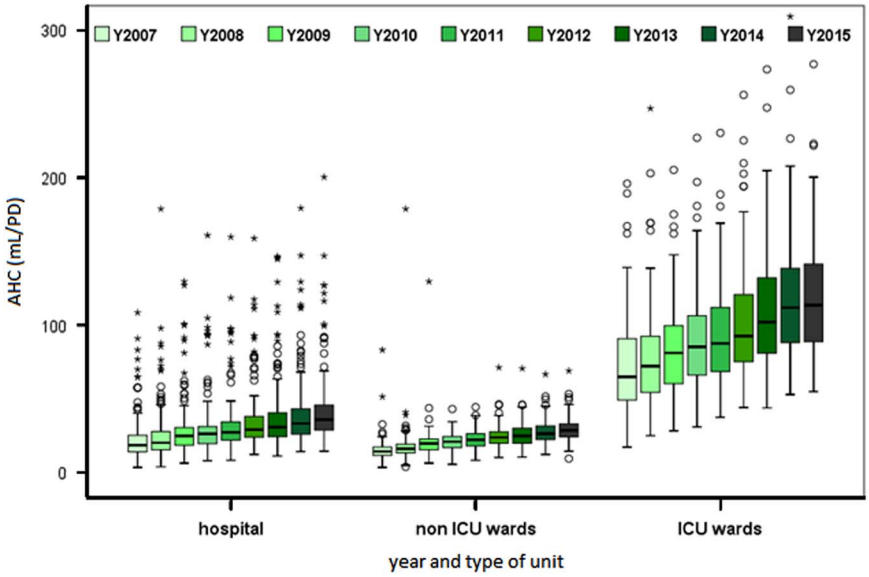


FIGURE 1. Changes in alcohol-based hand-rub consumption in milliliters (mL) per patient day (PD) between 2007 and 2015 baseline levels of hospitals and units (intensive care units and non–intensive care units). o = top outliers; * = extreme top outliers.

DISCUSSION

The evaluation of AHC data collected through the surveillance module HAND-KISS established 2 key findings: First, AHC nearly doubled in 132 German hospitals from 2007 to 2015. Second, units that started with a low AHC at baseline and units who recorded a high AHC ab initio both achieved a significant increase of AHC in the long term. These results highlight the strength of a long-term surveillance program accompanying multimodal intervention (and follow-up) such as the ASH national hand-hygiene campaign.

Because benchmarking is one of the main purposes of HAND-KISS, AHC data were stratified by ICUs and non-ICUs and by medical specialty. AHC per patient day in ICU settings usually exceeded that in non-ICU settings due to a larger number of indications for hand disinfection in ICUs. For medical specialties, AHC was highest in neonatal and pediatric units in 2015. Above-average hand-hygiene compliance in pediatric care has been described previously.[4,5]

Figure 1 shows a lack of bottom outliers compared to the high number of top outliers and even extreme top outliers in AHC. An interpretation of those remarkably high values and their variance is difficult without further characterization of the respective units (which could be a future goal of AHC surveillance within HAND KISS). The lack of bottom outliers speaks for itself: Continuous engagement in infection control

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programs seems to be associated with the establishment of a minimum standard in hand hygiene among HCWs, which is important for quality assurance.

Finally, recording AHC as a surrogate marker for hand disinfection adherence has certain limitations. Measured values may include the amount of hand disinfectant used by visitors and/or patients. Calculating AHC on the unit level can be difficult and may require modification of the dispensing system for hand rub within the hospital. The main disadvantage of indirect monitoring of AHC is its inability to determine when hand disinfection is performed by HCWs at the right time and according to the guidelines.[6,7]

A statement on compliance with hand disinfection indications can only be made by direct observation by a trained and validated observer, which is considered the gold standard of monitoring hand disinfection adherence. In Germany, both methods (direct observation and AHC surveillance) are used to depict hand hygiene in health care. So far, most studies that have compared the results of monitoring AHC with the results of direct observation have reported no correlation between the 2 methodologies.[8,9] Under the premise of long-term observation, Haubitz et al[10] assessed AHC as a surrogate for hand disinfection compliance, and a significant correlation was demonstrated. Certainly, however, regular observation of HCWs performing hand disinfection is not superfluous after several years of AHC surveillance.

In summary, AHC monitoring is a simple and resource-efficient way to estimate the frequency of hand-disinfection activities continuously and over time. It is a useful tool for benchmarking in long-term, multifaceted intervention programs; it complements direct observation of hand disinfection adherence; and it informs a comprehensive picture of this important element of infection control in hospital care.

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