

CONCISE COMMUNICATION

Establishment of a National Surveillance System for Alcohol-Based Hand Rub Consumption and Change in Consumption over 4 Years

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(See the commentary by Allegranzi et al, on pages 621–623.)

Germany established a national surveillance system for alcohol-based hand rub consumption (AHC) in 2008. In 2010, the median AHC was 83 mL/patient-day in 543 intensive care units (ICUs) and 18 mL/patient-day in 4,638 non-ICUs. There was a median increase in AHC of 35.9% ($P < .01$) in 159 hospitals that participated in the surveillance system for 4 years.

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Germany started a national surveillance system for alcohol-based hand rub consumption (AHC) in 2008. Germany has been using alcohol-based hand rub for hand hygiene for decades. The surveillance system was integrated as an additional component into the existing national nosocomial infection surveillance system, called KISS (Krankenhaus-Infektions-Surveillance-System).¹ Hospitals participate on a voluntary basis, and there is no public reporting of AHC data for individual hospitals.

METHODS

We present AHC reference data for 2010, as well as the increase in AHC over 4 years. AHC is recorded at the individual unit level. Data are stratified by intensive care unit (ICU) or non-ICU and by specialty: medical, surgical, interdisciplinary, other nonsurgical specialties, other surgical specialties, pediatrics, and neonatology. The following data are required annually per unit: AHC in milliliters, annual number of patient-days (PDs), unit type, and specialty. Units determine their AHC by the amount of hand rub purchased per year. Data are collected using a web-based data-entry protocol and analyzed in the KISS data center. Hospitals and units receive their individual data together with the distribution of reference data on all participating institutions.

All hospitals starting surveillance in 2008 were asked to retrospectively determine their AHC for the year 2007. To analyze the change in consumption over time, all hospitals providing AHC data consecutively for 2007, 2008, 2009, and 2010 are included in a second analysis. Unit-based con-

sumption data are summarized per hospital, per ICU per hospital, and per non-ICU per hospital. AHC data for 2010 are compared with those for the baseline year, 2007. The median value for change of consumption is calculated as the difference in AHC in milliliters per PD and percentage from 2007 to 2010. Significance is tested by the Wilcoxon rank-sum test.

RESULTS

Of approximately 2,000 German hospitals, 468 provided AHC data for 5,181 units in 2010. The median AHC among 543 ICUs was 83 mL/PD, with a range of 46–141 mL/PD between the 10th and 90th percentiles. The median AHC among 4,638 non-ICUs was 18 mL/PD, with a range of 10–38 mL/PD between the 10th and 90th percentiles. Reference data stratified by ICU, non-ICU, and specialty are presented in Table 1.

A total of 152 hospitals provided AHC data consecutively for the years 2007, 2008, 2009, and 2010. Overall, there was a median increase of 35.9% (interquartile range, 19%–61.7%) over 4 years ($P < .01$). Data stratified by ICU and non-ICU are presented in Table 2.

DISCUSSION

Our results are within the range of other recently published data. Unit-based consumption data are generally hard to find in the literature, since most publications report hospital-wide consumption of alcohol-based hand rub.^{2–4} McGuckin et al⁵ established a system of monthly reported data on hand-washing-product consumption that included data from 306 hospitals for 12 months. In that study, ICUs started at a baseline of 63.07 mL/PD, and non-ICUs started at 43.69 mL/PD. By contrast, among the 152 German hospitals included in this survey, the baseline values were 65.8 mL/PD for ICUs and 14.7 mL/PD for non-ICUs. Since soap is used in Germany only when hands are visibly soiled, the fairly big difference of 29 mL/PD between US and German non-ICUs cannot be explained at present. Pessoa-Silva et al⁶ measured a baseline AHC of 66.6 mL/PD in a pediatric ICU, and Eckmanns et al⁷ found a median AHC of 87 mL/PD among 5 different ICUs, with a range of 57–102 mL/PD.

The most important objective of our AHC surveillance system is to provide a benchmarking system. Our unit-based system with defined stratifications allows for the comparison of results between similar units within hospitals. Hospitals are settings of great variety, which makes benchmarking with hospital-wide consumption data much more difficult. In our set of reference data, there are considerable differences in alcohol-based hand rub within units of different specialties—for example, a range of 68–99 mL/PD between different

TABLE 1. Reference Data on Alcohol-Based Hand Rub Consumption among 543 Intensive Care Units (ICUs) and 4,638 Non-ICUs in 2010

Type of unit	Hospitals	Units	PDs	Consumption, L	Distribution of alcohol hand rub consumption, mL/PD					
					Pooled mean	10th percentile	25th percentile	Median	75th percentile	90th percentile
ICUs										
Medical	101	114	412,109	35,675	87	46	59	76	98	140
Interdisciplinary	336	374	1,377,542	123,263	89	49	65	81	101	129
Surgical	68	95	425,765	47,435	111	55	74	92	124	144
Other surgical specialties	22	23	91,116	6,701	74	21	51	84	102	175
Other nonsurgical specialties	23	26	109,973	7,642	69	30	56	68	94	99
Pediatric	31	33	116,531	11,409	98	43	60	99	134	158
Neonatal	68	70	266,065	24,997	94	36	59	76	119	168
Rehabilitation	4	5	32,187	1,543	48	17	51	52	106	108
Total	421	543	2,831,288	258,663	91	46	64	83	105	141
Non-ICUs										
Medical	372	1,272	11,380,801	244,225	21	12	15	19	25	34
Interdisciplinary	218	443	3,275,725	72,641	22	11	15	19	26	42
Surgical	352	935	8,282,698	183,869	22	11	15	18	23	30
Other surgical specialties	291	962	7,578,643	141,208	19	9	13	16	22	30
Other nonsurgical specialties	232	649	5,037,333	99,491	20	5	10	17	25	39
Pediatric	121	249	1,301,245	53,768	41	18	27	38	54	78
Neonatal	20	21	74,200	4,217	57	15	27	38	63	81
Rehabilitation	40	107	1,247,979	14,203	11	2	4	14	29	49
Total	468	4,638	38,178,624	813,650	21	10	14	18	26	38

NOTE. PD, patient-day.

ICUs. Participating hospitals are instructed to annually compare individual results with reference data and to use the findings for feedback and discussion in their institutions.

Our analysis of consumption data for 4 years from 152 hospitals shows a median increase of 40.9% (or 17 mL/PD) among ICUs and 27.2% (or 6.3 mL/PD) among non-ICUs. McGuckin et al⁵ measured an overall increase of 25.84 mL/PD among ICUs and 19.21 mL/PD among non-ICUs over a period of 12 months with monthly measurement and feedback of data. Those hospitals achieved this consumption increase under controlled study conditions, which might explain the higher increase within a shorter time period. Pessoa-Silva et al⁶ increased their AHC from 66.6 to 89.2 mL/PD. Our surveillance module is designed as a long-term surveillance tool. Participating hospitals are instructed to use AHC surveillance data for benchmarking and feedback in their individual institutions.

Measurement of AHC is a surrogate parameter for hand hygiene performance. The current German system provides a tool for comparison of individual consumption with similar units. The number of hand hygiene opportunities (HHOs) per PD differs greatly in the literature. While McArdle et al⁸ reported 350 HHOs/PD in an ICU, with 159 direct and 191 indirect patient contacts, Scheithauer et al⁹ determined between 124 and 188 HHOs/PD in 3 different ICUs. So it is very difficult to determine a reference value for AHC per unit type. However, on the basis of the assumption that 1.8 mL of alcohol-based hand rub is used per hand hygiene action

(the highest amount dispensed when a hub is pressed once), the median number of hand hygiene procedures per PD in 2010 was 46.1 (range between the 10th and 90th percentiles, 27–82.9) among German ICUs and 10.6 (range between the 10th and 90th percentiles, 5.9–22.3) among German non-ICUs. Our results show very clearly that there is need for improvement in hand hygiene behavior in the majority of institutions.

Alcohol-based liquid hand rub has been used in German hospitals for many years, but hand hygiene compliance remains as low as internationally described.^{2,7} Observational results in more than 175 hospitals between 2008 and 2011 showed that hand hygiene using soap and water is performed in less than 3% of hand hygiene actions (C. Reichardt, unpublished data). Recording consumption of alcohol-based hand rub seems to be a useful method to characterize the frequency of hand hygiene actions.^{5,10} There are several advantages of measuring product usage as a surrogate for hand hygiene performance—for example, it consumes few resources, and it is feasible in all patient care areas and facilities. Some authors have found a good correlation between usage of alcohol-based hand rub and observed compliance rates.^{2,6,7} Participating hospitals are instructed on how to measure hand rub consumption (purchase data per unit per year). Some hospitals reported that unit-specific allocation of consumption is challenging, and many of them changed their purchase systems in order to report exact numbers. However, extensive validation is necessary to eliminate inaccurate results. When

TABLE 2. Increase in Alcohol-Based Hand Rub Consumption from 2007 to 2010 among 152 Hospitals Stratified by Type of Unit

Hospital, year	Consumption, L	PDs	Consumption, median (IQR), mL/PD	Difference relative to 2007, mL/PD		Difference relative to 2007, median (IQR), %
				Median (IQR)	P	
All						
2007	282,360	13,951,042	18.0 (13.9–23.4)			
2010	419,803	15,474,605	25.1 (19.8–31.5)	6.8 (3.9–9.9)	<.001	35.9 (19–61.7)
ICU						
2007	74,416	987,796	65.8 (51.9–91.3)			
2010	101,377	1,073,577	88.9 (69.2–109)	17.0 (5.6–31)	<.001	40.9 (21.8–65.3)
Non-ICU						
2007	207,944	12,963,246	14.7 (11.7–18.4)			
2010	318,426	14,401,028	21.2 (17.2–24.6)	6.3 (3.4–8.6)	<.001	27.7 (7–50.8)

NOTE. IQR, interquartile range; PD, patient-day.

entering the data into our web-based data-entry system, validation rules are implemented to eliminate outliers. Moreover, all units with consumption data less than or equal to the 10th percentile and equal to or greater than the 90th percentile are reviewed by the HAND-KISS team.

Measuring usage of alcohol-based hand rub has certain disadvantages: it can be used for other purposes (e.g., surface disinfection) and in unnecessary hand hygiene actions, and it can be given to patients or relatives. Therefore, AHC data have to be interpreted very carefully by local infection control specialists. Despite these limitations, we consider AHC a useful surrogate parameter for hand hygiene performance and benchmarking for a large number of institutions and over long periods of time.

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