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## Brief Report

## Bare below the elbows in an academic medical center

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## Key Words:

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We investigated the compliance of health care personnel with a voluntary, institution-wide bare below the elbows (BBE) approach to inpatient care at an academic medical center. BBE compliance increased significantly across all provider types over a 2-year period. The overall compliance with BBE by health care personnel nearly doubled from 2016–2017, increasing significantly from 40% to 84%.

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In 2015, the estimated national burden of health care–associated infections (HAIs) in US acute care hospitals was 687,000.<sup>1</sup> Multiple interventions have been implemented to prevent HAIs, and some infections are decreasing nationally. Hands of health care personnel (HCP) and medical devices are well-recognized sources of transmission of microorganisms to patients. There is a paucity of evidence defining the relationship between HCP attire and HAI; therefore, generalizable evidence-based approaches are lacking. Supported by biologic plausibility and low likelihood of causing harm, expert guidance from the Society for Healthcare Epidemiology of America encourages institutions to consider adoption of a bare below the elbows (BBE) approach to inpatient care as part of an adjunctive infection prevention strategy.<sup>2</sup> In 2009, our institution implemented a BBE approach for inpatient care, which was encouraged by the infection control committee as part of a bundled horizontal infection prevention platform. Here, we describe BBE compliance among our institution's HCP.

## METHODS

This study was performed at an 865-bed academic medical center. A BBE approach to HCP attire was recommended but not mandated by the infection control committee in January 2009 through intensive education of staff and adoption of a black nylon vest while on an inpatient service. Assessments and feedback were implemented in May

2014 via direct observation by 2 trained hand hygiene monitors. Monitors observed HCP entering patient rooms and recorded observations using a web-based application on an electronic device. Observations occurred throughout the hospital on general, acute, and intensive care units. BBE compliance was defined as adherence to short sleeves and avoidance of wristwatches, bracelets, neckties, and white coats when carrying out inpatient clinical duty. We summarized BBE compliance frequencies among HCP during the years 2016 and 2017. Complete compliance data were not available for years 2014 and 2015. We used the  $\chi^2$  test to assess the relationship between year and BBE compliance by provider type. All statistical tests were performed using JMP Pro 13 (SAS Institute, Cary, NC), and  $P < .05$  was considered statistically significant.

## RESULTS

There were 74,796 observations of patient encounters across various HCP over the 2-year study period, with 35,308 and 33,277 observations in 2016 and 2017, respectively. The overall compliance with BBE by HCP nearly doubled from 2016 to 2017, increasing significantly from 40% to 84% ( $\chi^2 = 16,169.4$ ,  $df = 1$ ,  $P < .0001$ ). Each provider type demonstrated statistically significant increases in BBE compliance from 2016–2017 (Table 1). In 2017, physicians remained one of the least compliant provider groups, with 67% compliance.

## DISCUSSION

We encouraged an institution-wide BBE approach to inpatient care in 2009 as part of a bundled horizontal infection prevention platform. BBE compliance has increased significantly over a 2-year

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Conflicts of interest: None to report.

**Table 1**  
BBE compliance among health care personnel

Provider type	Year				P value
	2016		2017		
	BBE participation/total observations	% BBE compliance	BBE participation/total observations	% BBE compliance	
Physician	575/3,714	15	2,758/4,097	67	<.0001
Medical student	56/382	15	308/386	80	<.0001
Nurse	11,086/24,947	44	23,467/27,042	87	<.0001
Nursing student	121/360	34	391/422	93	<.0001
Physical therapist	28/55	51	22/26	85	.0024
Respiratory therapist	115/592	19	767/897	86	<.0001
Other therapist	13/92	14	107/120	89	<.0001
Radiology technologists	33/174	19	189/221	86	<.0001
Nursing assistants	2,157/3,793	57	4,636/5,153	90	<.0001
Other	51/1,199	4	632/1,124	56	<.0001
Overall compliance	14,235/35,308	40	33,277/39,488	84	<.0001

BBE, bare below the elbows.

period at our institution. This is likely due to observation and feedback, intensive education, and adoption of black nylon vests in lieu of the traditional white coat while on an inpatient service. Furthermore, the school of medicine adopted the black vest for students on clinical rotations in 2015.

Since 2011, our institution has implemented multiple infection prevention interventions, including assessment and feedback of BBE with contact precautions. Over a 7-year period at our institution, we continue to observe a sustained reduction in the overall rates of HAI,<sup>3</sup> which is consistent with a national decrease in device-associated infection rates.<sup>1</sup> The impact of our BBE approach on infection prevention is unknown, yet the collective bundled approach has successfully led to a reduction in HAI at our institution. A BBE strategy continues to be encouraged by the infection prevention team as a “common sense” approach to patient care.

The use of BBE for inpatient care is controversial, largely because of the paucity of data demonstrating a reduction in HAIs using this approach. Studies evaluating the burden of bacterial colonization on the hands of physicians who practiced BBE compared with a group who did not practice BBE did not find any significant differences in the number of bacterial colony-forming units on the hands between the groups,<sup>4,5</sup> and no change in the presence of clinically significant organisms was identified.<sup>4</sup> Furthermore, there is concern that physicians who do not wear traditional attire, such as a white coat, may be perceived as unprofessional by their patients, yet evidence has shown that patients do not feel that white coats and neckties are necessary.<sup>6</sup> Studies have found that patients who are educated on the potential benefits of BBE shift their opinion to favor physicians who adhere to a BBE approach.<sup>7,8</sup> One study assessing physician barriers to BBE found that physicians and medical students most often wore a white coat to increase storage capacity.<sup>9</sup> Authors also found that a majority of physicians and medical students believed that it was probably or definitely effective at reducing transmission of pathogens. Another study found seasonal variability in BBE compliance, with a reduction in compliance as the average temperature dropped, suggesting that BBE compliance decreases during colder months, when HCP tend to wear longer sleeves.<sup>10</sup> Another potential barrier to a BBE approach is objection by HCP based on religious preferences.

## CONCLUSIONS

We add to the body of literature advocating for an institution-wide approach to BBE as an adjunct to a horizontal approach to

infection prevention and demonstrate that compliance can increase at a large academic center. Our successes are likely due to intensive education and the provision of adequate attire to satisfy the BBE approach. Overall, physicians were among the least compliant and although data were not collected on what warranted noncompliance, one may theorize that some physicians tend to hold more traditional values regarding attire and prefer the traditional white coat. However, it is notable that two-thirds of physicians did demonstrate compliance. A limitation of this study was that it was conducted at a single academic medical center and results may not be generalizable to other hospitals. Furthermore, compliance may have increased if staff were aware of observations, and the influence of a BBE approach on reduction of HAI is unknown. Despite these limitations, a BBE approach can be effectively implemented without a mandate at a large academic center. It is a simple, low-cost intervention that may decrease cross-contamination of microorganisms from HCP attire to patients.

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