

Letter to the Editor

Estimated incidence rate of healthcare-associated infections (HAIs) linked to laundered reusable healthcare textiles (HCTs) in the United States and United Kingdom over a 50-year period: Do the data support the efficacy of approved laundry practices?

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To the Editor—The assumed transmission of healthcare-associated infections (HAIs) from reusable healthcare textiles (HCTs) has been a perception in the decisions to use disposable versions of these textile items.^{1–4} Here, we compared the 50-year publication record of HAIs related to laundry of HCTs to the overall actual occurrence of HAIs in hospitals over the same 50 years.

To reduce the risk of HAIs from reusable HCTs (ranging from linens to isolation gowns to surgical gowns), the reprocessing of these items involves a laundry process that renders the HCTs hygienically clean. In a well-studied database by Sehulster⁵ of all outbreak events published between 1970 and 2013, laundered, clean HCTs were implicated as a source of contamination leading to HAIs. Root causes linked to the introduction of microbial contamination of the laundered HCTs were mostly mechanical problems with laundry equipment or the occurrence of inadvertent environmental contamination. The Sehulster review followed the methodology of PRISMA⁶ and was peer reviewed. This same methodology was then used for the period of 2013–2020 and we found 3 more studies^{7–9} and another review,¹⁰ making the scope of this analysis 1970–2020.

For the purposes of the present assessment of reusable HCTs versus disposable alternatives, we have combined the United States and United Kingdom incidences of HCT laundry-associated HAIs in the 50-year period (1970–2020). Based on available national data, the HAI rate as a percentage of population for the United Kingdom and the United States in ~1995, appears to be similar, 0.5%–0.6% of population, which is near the midpoint of the 50 years of covered in this HAI study (Table 1). In these past 50 years for the United Kingdom and the United States, the 10 published events involved 69 patients with HAIs attributed to reusable HCTs including patient gowns and other garments, bed linens (ie, sheets, pillows and pillow cases, blankets, towels), and in 1 instance mop pads for environmental cleaning of floors.⁵

We documented the United States and United Kingdom average actual HAI rates of cases/year over these 50 years (Table 1). This average for the United States plus the United Kingdom was ~2.0 million cases per year at the 1995 midpoint. Thus, the total

number of HAI cases in the United States plus the United Kingdom over this entire 50-year period was ~100 million actual cases (5,500 HAI cases per day in the US plus UK populations).

Based on the 69 HAIs attributed to laundered HCTs over 50 years, we further added a very high speculation factor that infections related to reusables may be underreported by using 100 times the reported laundry-related HAIs to do this risk analysis. Thus, the laundry-related HAIs were scaled to 6,900 in the entire 50 years of record (0.37 cases per day). That is, 69 was assumed to represent only 1% of the total laundry-related HAIs occurring as unreported. With this conservative upper estimate, this would mean that instead of the reported incidence ~1 incident per year across these 50 years, we would expect to see upward of 100 HAI cases per year in the United States and United Kingdom combined attributable to laundered HCT, which seems unlikely based on reported practices, lawsuits, published notes, etc. Thus, the 100-fold factor seems conservative.

With this conservative estimate, the laundry-implicated HAIs in 6,900 patients for the United States and the United Kingdom over the past 50 years is ~0.37 HAI case per day (2.6 HAI per week). The estimated total healthcare HAI for the United States and United Kingdom over this same period is 5,500 cases per day (38,000 cases per week) (Table 1). Thus, in probability terms, the chance of a patient having an HAI linked to contact with the laundered, reusable textile is ~1 in 14,900 ($5,500/0.37 = 14,900$). As a reference, a person in the United States and the United Kingdom is more likely, based on the odds, to be struck by a meteor in any given year over a 78.5-year lifespan, which is 1 in 9,000.¹⁸

Regarding cost, numerous articles acknowledge that on an annual basis, disposable textile items are more expensive compared to the cost of reusable textiles.^{19–21} A recent economic analysis found that the disposables were approximately twice as expensive on an annual basis.²²

In conclusion, the healthcare system is paying annually on the order of 10%–100% more for disposable HCTs with a risk improvement of ~2.6 HAI per week in the United States and the United Kingdom, which would lower the HAI rate of these (combined) nations from 32,900 per week to 32,897 per week. This low risk of infection attributed to reusable HCTs is the basis for the Centers for Disease Control and Prevention's (CDC) acknowledgment of the historical record of patient safety and extremely infrequent episodes of infection linked to these clean HCTs. Furthermore, the CDC concluded that the need to establish

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Cite this article: Overcash MR and Sehulster LM. (2021). Estimated incidence rate of healthcare-associated infections (HAIs) linked to laundered reusable healthcare textiles (HCTs) in the United States and United Kingdom over a 50-year period: Do the data support the efficacy of approved laundry practices?. *Infection Control & Hospital Epidemiology*, <https://doi.org/10.1017/ice.2021.274>

Table 1. Available Data on HAIs in the United States and United Kingdom from 1972 to 2018

Year	Cited Annual HAI Cases in US or UK Hospitals, Millions	Source	US or UK Population, Millions	HAI, % of US or UK Population
1972	2.1	Haley et al 1985 ¹¹	209	1.00
1974	1.6	Sencer et al 1974 ¹²	213	0.75
2002	1.7	Klevens et al 2007 ¹³	288	0.59
2009	1.7	Zimlichman et al ¹⁴	307	0.55
2011	0.3	UK House of Commons ¹⁵	61	0.49
2015	1.4	AHA ¹⁶	321	0.44
2018	1.2	AHA ¹⁷	327	0.37

a healthcare laundry certification program based on microbiologic testing of cleaned, reusable HCTs does not appear to be supported by epidemiologic data.^{5,23} In conclusion, the annual cost savings from selecting reusable HCTs does not come with any measurable increased risk of HAI to patients and therefore represents a prudent healthcare facility decision. With the COVID-19 pressure on PPE, reusables are increasing substantially and so the results herein should build confidence in these decisions.

Acknowledgments.

Financial support. No financial support was provided relevant to this article.

Conflicts of interest. All authors report no conflicts of interest relevant to this article.

Supplementary material. To view supplementary material for this article, please visit <https://doi.org/10.1017/ice.2021.274>

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