



Major Article

Review of state regulations related to environmental sanitation in long-term care facilities

Ruwan Dissanayake MS¹, Emily E. Johnson BS¹, Mary E. Leong BS¹, Angela M. Fraser PhD^{*,1}

Department of Food, Nutrition, and Packaging Sciences, Clemson University, Clemson, SC



Key Words:
Health care-associated infections

Background: We examined how state regulations for long-term care facilities address environmental sanitation. **Methods:** State regulations for nursing homes and assisted living facilities across all 50 US states and the District of Columbia were sourced from government Web sites. We searched using key terms about environmental sanitation and then quantified our findings to answer 4 questions.

Results: More states required infection preventionists in nursing homes (29 states) than in assisted living facilities (14 states). References for environmental service workers appeared more frequently in nursing home regulations (22 states) than in assisted living regulations (6 states). Infection control training was required more often in nursing homes (32 states) than in assisted living facilities (27 states). Gloves were the most common personal protective equipment cited, addressed in 14 state nursing home regulations and 13 state-level assisted living regulations. Only 7 state nursing home regulations and 2 assisted living regulations addressed carpet, with only 6 addressing high-touch items.

Conclusions: State regulations inadequately address environmental service workers, staff training, carpets, and high-touch items. These regulatory gaps could pose significant risks to long-term care residents if infection control policies and procedures rely solely on regulatory requirements.

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BACKGROUND

In the United States, an estimated 30,600 assisted living facilities and 15,300 nursing homes are licensed to provide care for over 2 million, mostly older, US Americans.¹ These long-term care facilities (LTCFs) meet the medical and personal care needs of those who cannot live independently.² Although both nursing homes and assisted living facilities are classified as long-term care, they differ in the type of care provided. Nursing homes, also known as skilled nursing facilities, offer 24-hour nursing care, whereas assisted living facilities provide nursing and personal care on demand.³

One concern in LTCFs, especially nursing homes, is the high rate of health care-associated infections (HAIs). Each day, an estimated 1 in 43 long-term care residents is diagnosed with an HAI.⁴ HAIs can be

devastating to long-term care residents as most are older adults susceptible to severe or prolonged illness and possibly death. While reducing HAIs has long been a priority for US public health agencies, they still pose a significant burden. Additionally, concerns about preventing HAIs among long-term care residents have intensified due to the disproportionate number of reported COVID-19 deaths during the height of the pandemic. Nearly half of all deaths (41%) in the United States are attributed to long-term care residents and staff.⁵ Although many HAIs are preventable, the high numbers in LTCFs suggest infection control measures are not effectively implemented.

Many HAIs involve pathogens transmitted person-to-person through direct or indirect contact. In direct contact transmission, pathogens move from an infected person to a susceptible individual, whereas indirect contact transmission involves a contaminated intermediate surface (eg, hands, medical device, or environmental surface). Indirect contact transmission can be prolonged, as some pathogens can survive in the physical environment for days, weeks, and even months.^{6–9} One infection control practice warranting further study is environmental sanitation. Environmental sanitation typically involves cleaning (ie, washing and rinsing) a surface to remove dirt and debris and, when necessary, treating the cleaned surface with an antimicrobial (ie, sanitizer or disinfectant). Compared with other

* Address correspondence to Angela M. Fraser, PhD, Department of Food, Nutrition, and Packaging Sciences, 206 Poole Agriculture Center, Clemson, SC 29634.
E-mail address: afraser@clemson.edu (A.M. Fraser).

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¹ All authors contributed equally.

health care settings, environmental and operational differences in LTCFs can make implementing environmental sanitation practices challenging. The home-like features common in LTCFs, such as carpets, draperies, and upholstered furniture, could complicate the implementation of environmental sanitation practices.

Evidence-based guidelines should be the basis of environmental sanitation practices. The US Centers for Disease Control and Prevention (CDC) cites environmental sanitation practices and the use of personal protective equipment (PPE) in 3 guidance documents.^{10–12} Notably, these guidance documents recommend but do not mandate practice. Therefore, regulations (also called rules or standards), which are mandated, play a critical role in informing policies and procedures for infection control. Regulations are formal directives issued by governmental agencies under statutory authority establishing the minimum standards an LTCF must meet. For example, as outlined in Federal Regulation 42 CFR § 483.80(a)(2), LTCFs must maintain written standards, policies, and procedures for infection control, including mechanisms for reporting infection incidents to local and state health authorities.¹³ Routine review and revision of required policies and procedures at the facility level and ensuring staff familiarity with all requirements are essential. Additionally, 42 CFR 483.80(b)(3) requires LTCFs receiving Medicaid/Medicare funds to appoint at least a part-time infection preventionist (IP) who is trained in infection control practices. This requirement applies to nursing homes but not assisted living facilities.^{14,15} LTCFs are regulated by state laws through state licensing regulations, with each state having the autonomy to establish its own licensing regulations for LTCFs, so regulations can vary widely.¹⁶

We aimed to determine how state regulations for nursing homes and assisted living facilities addressed environmental sanitation. Four research questions focused on our study: (1) How many states require IPs and environmental service workers? (2) How many states require infection control training? (3) What PPE is required to be used? (4) What are the requirements regarding the treatment of nonporous and porous materials?

METHODS

The state regulations for nursing homes and assisted living facilities in all 50 states and the District of Columbia were downloaded in portable document format (PDF) from publicly accessible government Web sites. Before coding began, each PDF was searched using select keywords representing various dimensions of environmental sanitation. For environmental sanitation, the keywords were cleaning, disinfecting, and sanitizing. For porous materials, the keywords were cloth, linen, textile, fabric, rug, carpet, upholstery, soft, and draperies. For nonporous materials and high-touch areas, the keywords were bed controls, bed rails, chairs, floors, doorknobs, tray tables, desks, sinks, light switches, toilet seats, toilet flush handles, call buttons, countertops, and faucets. For PPE, the keywords were personal protective equipment, gloves, apron, shoe cover, booties, goggles, masks, face shields, hair nets, and gowns. For infection prevention and training, the keywords were infection prevention, infection preventionist, environmental service workers, environmental service worker (ESW), environmental services, housekeeping staff, housekeeping personnel, housekeeping services, custodians, janitors, cleaning staff, sanitation workers, sanitation services, and facility cleaners and infection control training.

Each keyword was entered into the “find” bar of the PDF version of each state regulation. The search process was conducted separately for all nursing homes and assisted living regulations. Two independent coders conducted the search to verify the accuracy of the search. A summary of all search findings was presented in 2 tables—1 for nursing homes and the second for assisted living

facilities, listing the findings for all 50 states and the District of Columbia in rows and the search terms in columns. “X” was used to denote if the search term was mentioned in the regulations and “-” if the search term was not mentioned. Additionally, references to IPs were then categorized into 1 of 4 groups: medical professionals, administration, committees, and IPs, based on how this topic was addressed within the respective regulations. We also categorized our proxy terms for porous materials as either launderable or non-launderable. Search terms (ie, cloth, linen, textile, fabric, soft, and rug) were used as proxy terms for launderable porous materials in the regulations. Search terms (ie, carpet, upholstery, soft, and draperies) were used to identify nonlaunderable porous materials. The term soft was assigned to both categories. Findings were reported as numbers and percentages. In addition, we searched Google to find the official Web site of the regulatory authority for nursing homes and assisted living facilities for 50 states and the District of Columbia. Then, we searched “nursing home regulation division,” and “assisted living regulation division” for each official Web site’s search function to identify the regulatory division. Under the division, we search for regulatory functions conducted by them. Findings were reported as text in the table.

RESULTS

Regulatory authority

In 48 and 43 states, the Department of Health was responsible for regulating nursing homes and assisted living facilities, respectively ([Supplementary Table S1](#)). In 8 states, the assisted living regulations assigned this responsibility to other departments, such as the Department of Social Services or the Department of Human Services. In all states, licensing was a regulatory function for both nursing homes and assisted living facilities. Certification, which involves compliance checks for federal health care programs (eg, Medicare and Medicaid), was more commonly applied to nursing homes (25 states) than to assisted living facilities (16 states) ([Supplementary Table S1](#)).

Infection preventionist

[Supplementary Tables S2 and S3](#) showed which states required an IP. Most (29 states, 57%) required an IP in nursing homes, whereas only 14 states (27%) required an IP in assisted living facilities ([Table 1](#)). Over one-third (18 states, 35%) required a committee to inform infection control policies and procedures in nursing homes, whereas no state required assisted living facilities to have an infection control committee ([Table 1](#)). In 9 state nursing home regulations and 4 state assisted living regulations, medical professionals, such as Medical Directors, physicians, and Directors of Nursing, could serve as an IP, whereas in 16 state assisted living regulations and 4 state nursing home regulations could have nonhealth care staff, such as facility administrators or managers, serving as an IP ([Table 1](#)). Fourteen (14) states (27%) and 10 states (20%) addressed infection prevention procedures without requiring an IP in nursing homes and assisted living regulations, respectively ([Table 1](#)).

Environmental service worker

Our findings showed that less than half (22 states, 43%) of nursing home regulations explicitly mentioned ESWs or related terms (ie, housekeeping worker, sanitation worker) within the context of cleaning ([Supplementary Table S2](#)). In contrast, only 6 states (12%) included such references in their assisted living regulations ([Supplementary Table S3](#)). While less than half of the nursing home regulations (23 states, 45%) and most assisted living regulations

Table 1
State regulations of long-term care facilities: requirements for housekeeping or environmental service and infection preventionists across all 50 US states and the District of Columbia

		Long-term care facilities			
		Nursing home* (N = 51)		Assisted living facilities† (N = 51)	
		Number	%	Number	%
Environmental service workers	Regulations explicitly mentioned the ESW/housekeeping workers in the cleaning context as a regulatory requirement	22	43	6	12
	Regulations mention the environmental services, housekeeping services, and sanitation services in the cleaning context as a regulatory requirement	23	45	37	72
Infection preventionists	No requirements for infection preventionist‡	22	43.1	37	72.5
	Requirements for infection preventionist§	29	56.9	14	27.4
	Medical professional	9	17.6	4	7.8
	Committee	18	35.3	0	0.0
	Administration**	5	9.8	16	31.3
	Infection preventionist	2	3.9	0	0.0

*Nursing homes, also known as skilled nursing facilities, offer 24-h nursing care.

†Assisted living facilities provide medical and personal care on demand.

‡In total, 14 nursing home regulations and 10 assisted living facility regulations described the infection control procedure without reporting infection preventionists for infection control.

§Four nursing home regulations and 6 assisted living regulations required more than 1 infection preventionist.

**Administration includes administrator, manager, operator, governing body, and designee positions.

(37 states, 72%) did not explicitly mention ESWs, housekeeping staff, or similar roles, these regulations often use broader terms like “environmental services,” “sanitation services,” or “housekeeping services” in the context of cleaning (Table 1).

Infection control training

Our findings showed that 32 states (63%) required infection control training for nursing home staff, while 27 states (53%) required such training for assisted living staff (Fig. 1). Notably, 11 states (22%) did not require infection control training for staff in either nursing homes or assisted living facilities.

Personal protective equipment

PPE requirements varied widely across state nursing home regulations (Supplementary Table S2) and assisted living regulations (Supplementary Table S3). Gloves were the most frequently cited PPE in nursing home regulations (14 states, 27%) and assisted living facility regulations (13 states, 25%). Hair nets were the second most cited PPE in nursing home regulations (10 states, 20%). In assisted living regulations, the second most frequently cited PPE were hair nets (5 states, 10%) and masks (5 states, 10%). Shoe covers and goggles were the least cited PPE in nursing home regulations, only mentioned in Michigan and Ohio regulations and not in any state assisted living regulations. Generic terms like PPE or protective wear

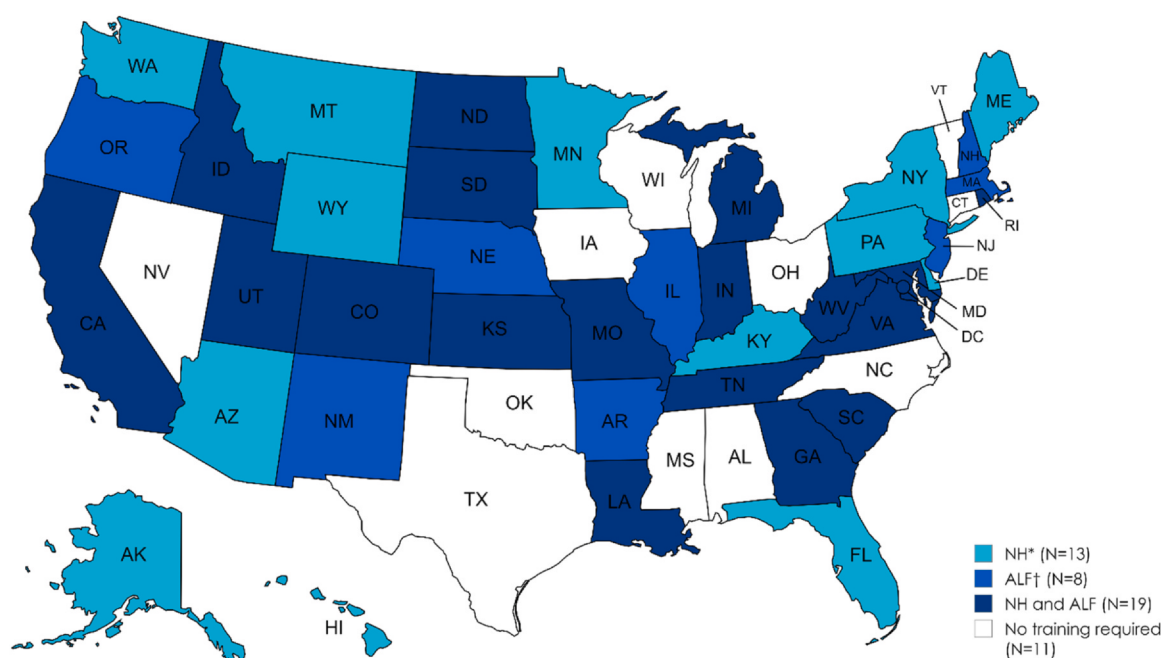


Fig. 1. Infection prevention training for staff requirements in state regulations for nursing homes and assisted living facilities across all 50 US states and the District of Columbia. †ALF, assisted living facilities; *NH, nursing homes.

without explicitly stating what type were mentioned in 18% (9 states) of state nursing home regulations and 10% (5 states) of assisted living regulations, with none of these states specifying individual types of PPE.

Environmental sanitation

Initially, we searched using the terms cleaning, sanitizing, and disinfecting. [Supplementary Tables S4 and S5](#) show reference to environmental sanitation in nursing home regulations and assisted living regulations, respectively. Except for New Jersey, all state nursing home regulations and nearly all assisted living regulations mention cleaning ($n = 45$). Over half (31 states, 61%) of nursing home regulations and nearly half (25 states, 49%) of assisted living regulations mention sanitizing. More than half (34 states, 67%) of the nursing home regulations mention disinfecting, whereas only 31% ($n = 16$) of assisted living regulations do so. We then searched for mentions of porous materials, nonporous materials, and high-touch areas. No state regulations for either nursing homes or assisted living facilities mentioned the terms porous, nonporous, and high-touch areas. Therefore, we used proxy search terms to determine if the regulations addressed porous and nonporous materials, classifying these porous terms as launderable and nonlaunderable. These references to porous and nonporous materials are presented in [Supplementary Table S4](#) for nursing home regulations and in [Supplementary Table S5](#) for assisted living regulations.

All states except New Jersey and Ohio mentioned linens in nursing home regulations ([Supplementary Table S4](#)), whereas only 36 states (71%) referenced linens in assisted living regulations ([Supplementary Table S5](#)). In only 3 state nursing home regulations, fabric and rugs were mentioned. The term “soft” was not mentioned regarding cleaning in any nursing home regulations, and fabric, rug, and soft terms were not mentioned in any assisted living regulations. Only 7 states (14%) addressed carpets, and 4 states (8%) mentioned draperies in nursing home regulations. In assisted living regulations, only 2 states addressed carpets, while 3 states addressed draperies. Also, neither nursing home regulations nor assisted living regulations mentioned upholstery.

Floors were the most frequently cited in both nursing homes (35 states, 67%) and assisted living regulations (23 states, 45%). In 7 nursing home regulations and 2 assisted living regulations, carpet cleaning was mentioned. Sink is the second most cited nonporous surface in nursing home regulations (4 states, 8%) and assisted living regulations (4 states, 8%). Common high-touch materials (bed rails, doorknobs, light switches, desks, faucets, and call buttons) were not addressed in nursing homes and assisted living regulations ([Supplementary Tables S4 and S5](#)).

DISCUSSION

In this study, we determined how regulations for nursing homes and assisted living facilities addressed various aspects of environmental sanitation. First, our findings showed that more nursing home regulations than assisted living regulations required an IP, with only 9 states and 4 states requiring the IP to be a medical professional in nursing homes and assisted living facilities, respectively. Second, nursing home regulations more often explicitly mentioned ESW than did assisted living regulations. In contrast, nearly three-quarters of assisted living regulations used broad terms as a surrogate for ESW (eg, environmental services, sanitation services, and housekeeping services). Third, only 18 states require infection control training for staff working in nursing homes and assisted living facilities. Fourth, gloves were the most commonly required PPE in both nursing homes and assisted living facilities. Last, all nursing home regulations except for New Jersey and all but 6

state assisted living regulations mentioned cleaning. Over two-thirds ($n = 34$) of nursing home regulations and 16 assisted living regulations mentioned disinfecting, and 31 nursing home and 25 assisted living regulations mentioned sanitizing. Nearly all ($n = 49$) state nursing home regulations and 36 state assisted living regulations mentioned launderable porous materials, such as cloths/linens/textiles. Notably, nonlaunderable porous materials (carpets, rugs, draperies, upholstery, and soft materials) were cited in only 7 state nursing home regulations and 3 state assisted living regulations. Floors were cited as nonporous material in two-thirds of nursing home regulations ($n = 35$) and just under half of assisted living regulations ($n = 23$). Other nonporous materials were cited as fewer than 4 nursing home regulations and 2 assisted living regulations.

Long-term care regulations are mainly designed to ensure the quality and appropriateness of services. Patient safety is a dimension of quality. Our findings show that state regulations for nursing homes and assisted living facilities are not adequately addressing all aspects of environmental sanitation, especially IPs, environmental service workers, PPE requirements, infection control training for staff, and treatment of porous and nonporous surfaces. In particular, environmental sanitation for nonlaunderable porous materials and high-touch areas is insufficiently addressed in nursing homes and assisted living regulations, except for linen/textile/cloths and floors. These regulatory gaps could pose risks to long-term care residents, particularly if policies and procedures for infection control are only based on regulatory requirements and no other guidance documents. Importantly, insufficiently detailed regulations could be offset by LTCFs obtaining accreditation from The Joint Commission. The Joint Commission accredits over 20,000 health care facilities across the United States, ensuring quality care and improving patient rights.^{17,18} However, at present, only 1,300 nursing homes are accredited, which represents only 8% of all nursing homes in the United States.¹⁹ Moreover, LTCF accreditation statistics show that state regulations need to be better enforced to prevent HAIs in long-term care.²⁰

The role of the IP is to inform infection control practices, analyze health data, and provide training.²¹ The COVID-19 pandemic demonstrated the need for a more robust IP workforce in health care settings.²² A study by Ye and colleagues reported that only 1 in 4 US nursing homes have a dedicated IP.²³ More nursing home regulations than assisted living regulations required an IP, with few states requiring the IP to be a medical professional. This is not surprising as nursing homes provide 24/7 medical care for residents who are theoretically more susceptible to HAIs than those living in assisted living facilities. The importance of having a medical professional serve as the IP is that it is assumed they have received formal infection control training, whereas nonhealth care workers may not. Given this, standards for who can serve as an IP need to be established. These standards need to include formal and continuing education requirements.^{21,22} CDC provides such training for IPs in LTCFs.²⁴ The lack of a dedicated IP in a LTCF could result in inadequate infection control, increased risk of infections, and insufficient training of non-IP staff, which could increase risk for HAIs.^{25–27}

More states ($n = 32$) require infection control training for staff in nursing homes than they do for assisted living facilities ($n = 27$). Infection control training aims to educate staff to reduce the risk of HAIs.²⁸ CDC reports that having staff trained in infection prevention can reduce rates of HAIs by more than 70%.⁴ The CDC offers 3 free training courses for LTCF staff.²⁹ Additionally, if the facility does not have a dedicated IP, it would be more difficult to conduct in-house staff training in LTCF.^{21,23} Furthermore, environmental service workers/housekeeping staff are directly responsible for environmental sanitation practices.³⁰ Particularly, training for environmental service workers helps bridge the procedural knowledge gap,

enabling them to perform optimal infection control practices.³¹ Not requiring staff training could lead to inadequate infection control knowledge among staff, which can result in insufficient prevention and control against HAIs.³² Moreover, staff training is integral to infection control practices because effective PPE use, effective environmental sanitation, and IP and ESWs' job performance highly depend on trained staff. Hence, the lack of training requirements could compromise resident safety, a main goal of regulations.^{31,32}

Gloves are the most commonly required PPE in both nursing homes and assisted living facilities, with other PPE items (masks, gowns, goggles, hair nets, face shields, and shoe covers) mentioned far less frequently. Standard precautions are designed to protect individuals who come into contact with patients and their bodily fluids, including staff and others who might not come into direct contact with patients. Recommended PPE includes, but is not limited to, barrier gowns, gloves, masks, and eyewear, such as goggles, glasses, or face shields.³³ Proper use of PPE can prevent the spread of HAI-causing pathogens. Usage guidelines for health care staff and residents are provided in CDC guidance documents.^{33,34} Each type of PPE plays a unique role in preventing the spread of pathogens. For example, gloves protect the hands from being contaminated with bodily fluids. Gowns with shoe covers protect health care workers' skin from splashes that could include infectious agents. Masks, goggles, and face shields create barriers against airborne pathogens.³³ Studies have shown that compliance with PPE protocols by trained staff can significantly reduce HAI rates in health care settings.³⁵ We showed that most states do not require many types of PPE in either nursing homes or assisted living facilities. This requirement gap could increase the risk of pathogen exposure, especially during the cleanup of bodily fluids, such as vomitus, blood, and diarrhea.

Nearly all (50 states, 98%) nursing home regulations and most (45 states, 88%) assisted living regulations mention cleaning, which aims to remove soil and debris, whereas disinfecting, which aims to reduce/eliminate pathogens, is mentioned in few state regulations—33 (65%) state nursing regulations and 16 (31%) state assisted living regulations. Sanitizing is mentioned in 31 (61%) nursing home regulations and 25 (49%) assisted living regulations. Cleaning, sanitizing, and disinfecting are essential infection control practices.^{10,36,37} Regular environmental cleaning and disinfection help prevent the spread of HAI-caused pathogens that cause illness. Studies have shown that poor environmental cleaning caused several outbreaks in LTCFs, such as *Clostridium difficile*, Group A *Streptococcus*, Hepatitis B and C outbreaks, and Norovirus outbreaks.^{38–41}

Porous materials are difficult to clean due to their structural characteristics, such as inaccessible spaces and damage risks, creating a reservoir for pathogens that cause HAIs.⁴² There is evidence that the contamination of porous surfaces can transfer microorganisms to health care workers and patients, which causes outbreaks in hospitals.^{43,44} However, in the literature, we found less attention on nursing home studies regarding porous materials, focusing on the source and means of transmission of pathogens. Notably, very few regulations address nonlaunderable porous materials, particularly mentioned in fewer than 7 states (14%) nursing home regulations and 3 states (6%) assisted living regulations. Moreover, we also found that the CDC guidelines¹⁰ and Association for the Health Care Environment⁴⁵ are insufficient with detailed treatment protocols for porous surfaces, which may explain why they are mentioned less in regulations. Therefore, this gap in compliance standards and guidelines presumably affects cleaning protocols used in LTCFs, potentially contributing to increased HAI rates due to the ineffective cleaning and disinfection of particularly nonlaunderable porous materials.

Furthermore, among nonporous surfaces, high-touch areas—frequently contacted by residents and staff—serve as significant vectors

for the spread of HAIs.⁴⁶ Few nursing homes (< 4 states) and assisted living regulations (< 2 states) specifically mention the importance of cleaning and disinfecting high-touch areas. One possible reason for this oversight is that most cleaning guidelines focus on nonporous (or hard) surfaces, such as those outlined by the CDC.¹⁰ However, CDC recommendations are not mandatory standards to follow; incorporating specific requirements for cleaning and disinfecting high-touch areas and porous surfaces into LTCF regulations can enhance cleaning protocols followed by LTCFs, which potentially reduce HAI rates.

Limitations

Our findings were based on regulations in effect as of June 2022, so they do not reflect changes made after this date. Also, it is possible that different states use varying terms within their regulations, which were different from our search terms. Terms were not universally and consistently used, which made it difficult to capture all terms that may have been missing from our search range. Our search solely depended on the Adobe PDF search algorithm, which could have technical limitations on the search outputs. Furthermore, a limitation of this study is the misunderstanding or interchangeable use of the terms “clean,” “sanitize,” and “disinfect.” Although these terms have distinct meanings and applications, they are often inappropriately used interchangeably. This ambiguity may impact the implication of the study's search findings related to cleaning, sanitizing, and disinfection.

CONCLUSIONS

We examined if and how state regulations for nursing homes and assisted living facilities addressed environmental sanitation. Overall, our findings show more nursing home regulations addressed IP than did assisted living regulations. Most nursing home regulations but few assisted living regulations explicitly addressed ESWs. Surprisingly not all nursing home regulations and assisted living regulations addressed infection control training. Gloves were the most required PPE item with other PPE mentioned less frequently. Cleaning was the most frequently required treatment for porous and nonporous materials, mentioned in nearly all nursing home and assisted living regulations. The cleaning of floors but not carpet is addressed. Notably, nonlaunderable porous items are addressed in fewer than 7 states' nursing home regulations and fewer than 3 states' assisted living regulations. Similarly, nonporous high-touch items are addressed in few state regulations.

HAIs remain an issue for LTCFs, imposing a high financial burden on the US government.³ Our review shows that state regulations inadequately address environmental sanitation. Insufficiently detailed state nursing home and assisted living regulations could influence implementation of best practices centered around environmental sanitation, which has an impact on the rate of HAI in LTCFs. The findings can be used to support the need to review and potentially revise state regulations.

APPENDIX A. SUPPLEMENTARY DATA

Supplementary data related to this article can be found at [doi:10.1016/j.ajic.2025.02.006](https://doi.org/10.1016/j.ajic.2025.02.006).

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