

Concise Communication

Infection prevention and control and antibiotic stewardship practices in pediatric long-term care facilities

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Abstract

Pediatric long-term care facilities were surveyed to assess infection control and antimicrobial stewardship practices. Policies mandated by the Centers of Medicare and Medicaid Services (CMS) were included. Only 40% of sites reported implementing >90% of surveyed CMS policies. The survey also identified several gaps in non-CMS-mandated policies.

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Healthcare-associated infections (HAIs) place a significant burden on pediatric long-term care facilities (pLTCFs).^{1,2} Infection prevention and control and antimicrobial stewardship practices have been endorsed by the Centers for Disease Control and Prevention (CDC) and the Agency for Healthcare Research and Quality (AHRQ) to reduce HAIs in all patient care settings. In addition, the Centers of Medicare and Medicaid Services (CMS) have mandated implementation of infection control and antimicrobial stewardship practices as a condition of reimbursement.³ However, pLTCFs present unique challenges for infection control and antimicrobial stewardship: these facilities provide care for children with complex medical conditions who (1) often require continuous use of invasive medical devices; (2) have frequent interactions with multiple members of their care team; and (3) utilize shared spaces and equipment for therapy, medical treatment, and school.⁴

Despite these challenges, the need for infection control and antimicrobial stewardship in pLTCFs is well recognized,⁵ and these facilities are taking steps to improve infection control and antimicrobial stewardship.⁶ However, data on the uptake of CMS mandated practices are lacking. The CDC developed an infection control assessment tool for adult LTCFs,⁷ but no data have been published using this tool in pLTCFs. The purpose of this study was to use a modified version of this tool to assess infection control and antimicrobial stewardship policies in pLTCFs, including compliance with the most recent CMS rule.³

Methods

From May through June 2017, the modified CDC infection control assessment tool⁷ was e-mailed as an electronic survey to the

directors of 41 pLTCFs belonging to the Pediatric Complex Care Association (PCCA, pediatriccomplexcare.org) by PCCA leadership.

The survey contained 67 items in 8 domains: infection control program and infrastructure, staff and resident safety focusing on influenza vaccination, surveillance and disease reporting, hand hygiene (HH), personal protective equipment (PPE), respiratory hygiene, antimicrobial stewardship, and environmental cleaning. Survey modifications made by the study team included deleting questions related to staff exposures to tuberculosis, hepatitis B, and bloodborne pathogens and adding questions about HH supplies in on-site schools and cleaning policies for schools and toys because these are unique to pLTCFs (Supplementary Fig. 1 online). Questions related to staff training were expanded to specify the type of staff: physicians, nurses, therapists, or housekeepers. Questions assessed the presence of written policies, staff training and feedback, and data collection; 15 questions explicitly pertained to the CMS rule. Questions could be answered “yes,” “no,” or “not sure.” Individual respondents remained anonymous but provided their job title and facility location.

Affirmative (“yes”) responses to each question were summarized using frequencies. Practice gaps were defined if ≤60% of respondents provided affirmative responses to a question. Facilities were considered CMS compliant if they provided affirmative responses to ≥14 of the 15 questions (>90%) pertaining to the CMS rule. The overall responses to the remaining 52 survey questions of CMS-compliant sites were compared with those of non-CMS-compliant sites (≤13 of 15 affirmative responses to questions pertaining to the CMS rule) using the χ^2 or the Fisher exact test, as appropriate. All analyses were performed using SAS version 9.4 software (SAS Institute, Cary, NC). $P < .05$ was considered significant.

Results

Of 41 eligible pLTCFs from 17 states, 25 (61%) completed the survey. Overall, 48% of respondents reported involvement in the infection control programs at their facility.

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Table 1. Reported Compliance With the CMS Rule Among Pediatric Long-Term Care Facilities

Domain and Question	Yes, No. (%)		
	Overall (n = 25)	CMS- Compliant Sites (n = 10)	Non-CMS-Compliant Sites (n = 15)
Infection control program and infrastructure			
Designated person responsible for infection control program	24 (96)	10 (100)	14 (93)
Designated person received formal infection control training	13 (54)	7 (70)	6 (43)
Process for reviewing infection surveillance data and infection control activities (eg, presenting to quality assurance committee)	25 (100)	10 (100)	15 (100)
Evidence-based, written infection control policies and procedures available	25 (100)	10 (100)	15 (100)
Annual review of infection control policies and procedures	18 (72)	10 (100)	8 (53)
Staff and resident safety			
Residents: document pneumococcal vaccination status on admission	22 (88)	10 (100)	12 (80)
Residents: provide annual influenza immunization	25 (100)	10 (100)	15 (100)
Surveillance and disease reporting			
Written procedure to identify potentially infectious residents on admission	19 (76)	10 (100)	9 (60)
Written surveillance plan to monitor/track infections in residents	20 (80)	10 (100)	10 (67)
Access to diseases reportable to public health authorities	24 (96)	10 (100)	14 (93)
Hand hygiene			
Promote alcohol-based hand rub, when appropriate	17 (68)	10 (100)	7 (47)
Staff hand hygiene training upon employment	20 (80)	10 (100)	10 (67)
Personal protective equipment			
Policy on transmission-based precautions	25 (100)	10 (100)	15 (100)
Antimicrobial stewardship			
Written policies on antibiotic prescribing	12 (48)	9 (90)	3 (20)
Report summarizing antibiotic use from pharmacy data created in past 6 mo	17 (68)	9 (90)	8 (53)

Note. CMS, Centers for Medicare and Medicaid.

Compliance with CMS-mandated policies is shown in Table 1. Most sites (96%) had a designated person responsible for infection control; 54% reported that this person had formal infection control training. All sites reported written evidence-based infection control policies and procedures; 72% reported reviewing these documents annually. Overall, 92% and 100% of sites provided influenza vaccination to staff and residents, respectively. Written policies for antibiotic prescribing were reported by 48% of sites. Finally, 10 sites (40%) were CMS compliant, and 5 of these (20%) were 100% compliant.

Non-CMS-mandated infection control and antimicrobial stewardship policies reported by $\leq 60\%$ of all sites are shown in Table 2. In addition, non-CMS-mandated policies reported by $>60\%$ of sites included rates of PPE training upon employment for nurses (88%), therapists (80%), and housekeepers (72%) as well as rates of PPE training validation in the past 12 months for nurses (80%) and therapists (72%).

The CMS-compliant sites were significantly more likely than non-CMS-compliant sites to report implementing non-CMS-mandated policies: CMS-compliant sites were more likely to report that all staff received HH training and competency validation within the past 12 months (100% vs 53%; $P = .02$) and to monitor/document PPE adherence (90% vs 40%; $P = .02$). They were also more likely to have implemented practices to improve antibiotic use (90% vs 40%; $P = .02$) and to provide antimicrobial stewardship training to both nursing staff (70% vs 7%; $P = .002$)

and prescribers (60% vs 0%; $P = .001$). Additionally, CMS-compliant sites were more likely to have provided training to housekeeping staff on disinfection procedures in the past 12 months (80% vs 33%; $P = .04$); to monitor and/or document quality of disinfection procedures (90% vs 20%; $P = .001$); and to monitor and/or document feedback to staff regarding cleaning and disinfection (80% vs 20%; $P = .005$).

Responses to questions unique to pLTCFs indicated that 76% had a cleaning and disinfection policy for schools. Also, 92% of sites reported a toy cleaning policy and 84% had designated staff responsible for toy cleaning. Sites reported having HH supplies readily accessible in resident care areas (100%) and schools (92%).

Discussion

We modified a CDC tool for pLTCFs to assess infection control and antimicrobial stewardship practices and compliance with the most recent CMS rule; only 40% of sites had implemented $>90\%$ of policies in accordance with the rule. Additionally, several gaps were identified for policies not explicitly mandated by CMS. Gaps included lack of annual booster training and education on PPE use or environmental cleaning and lack of formal infection control training for the site's designated infection preventionist. Monitoring and providing feedback to staff for PPE, HH, and environmental cleaning were other areas needing improvement. Compared with non-CMS-compliant sites, CMS-compliant sites

Table 2. Non-CMS-Mandated Infection Control and Antimicrobial Stewardship Policies Reported by $\leq 60\%$ of Pediatric Long-Term Care Facilities

Domain and Questions	Yes, No. (%)		
	Overall (n = 25)	CMS- Compliant Sites (n = 10)	Non-CMS-Compliant Sites (n = 15)
Staff and resident safety			
Staff paid during work absences due to ARI	15 (60)	8 (80)	7 (47)
Surveillance and disease reporting			
System to follow-up on acute-care clinical information	14 (56)	5 (50)	9 (60)
Hand hygiene			
Facility monitors/documents feedback to staff for HH	11 (44)	6 (60)	5(33)
Personal protective equipment			
Physician training/ alidation on PPE use upon employment	10 (40)	6 (60)	4 (27)
Physician training/validation on PPE use in past 12 mo	9 (36)	6 (60)	3 (20)
Housekeeper training/validation on PPE use in past 12 mo	15 (60)	8 (80)	7 (47)
Facility monitors/documents PPE adherence	15 (60)	9 (90) ^a	6 (40) ^a
Facility monitors/documents feedback to staff on PPE use	10 (40)	6 (60)	4 (27)
Antimicrobial stewardship			
Facility implements practices to improve antibiotic use	15 (60)	9 (90) ^a	6 (40) ^a
Report summarizing antibiotic resistance (antibiogram) in last 24 mo	9 (36)	4 (40)	5 (33)
Prescriber feedback about antibiotic prescribing practices	10 (40)	7 (70) ^a	3 (20) ^a
Antimicrobial stewardship training to nursing staff in past 12 mo	8 (32)	7 (70)	1 (7)
Antimicrobial stewardship training to prescribers in past 12 mo	6 (24)	6 (60) ^a	0 (0) ^a
Environmental Cleaning			
Nurse training on cleaning/ disinfection in past 12 mo	14 (56)	8 (80)	6 (40)
Housekeeper training on cleaning/disinfection in past 12 mo	13 (52)	8 (80) ^a	5 (33) ^a
Monitor/document quality of cleaning/ disinfection	12 (48)	9 (90) ^a	3 (20) ^a
Monitor/document staff feedback for cleaning/ disinfection	11 (44)	8 (80) ^a	3 (20) ^a

Note. CMS, Centers for Medicare and Medicaid; ARI, acute respiratory illness; HH, hand hygiene; PPE, personal protective equipment; AS, antimicrobial stewardship.
^aDenotes $P < .05$ CMS compliant vs non-CMS compliant.

were more likely to report initial and booster training, monitoring, and feedback.

Antimicrobial stewardship was another area of low compliance. Of the 10 questions about antimicrobial stewardship policies, 6 received $\leq 60\%$ affirmative responses. Implementing antimicrobial stewardship strategies in LTCFs was only included as a condition for reimbursement in the most recent CMS rule³ (November 2016). As a newer mandate with few evidence-based strategies specific for pLTCFs, it is not surprising that fewer sites had policies for antimicrobial stewardship than for infection control.

This study has several limitations. First, all sites were members of the PCCA; thus, findings may not be generalizable to other pLTCFs. Additionally, the overall sample size was small. We were unable to measure differences between responding and nonresponding sites or to measure availability of resources based on facility characteristics. Finally, actual implementation of reported infection control and antimicrobial stewardship policies and practices could not be assessed.

Using an assessment tool, we identified practice gaps related to both the CMS rule and to other areas of infection control and antimicrobial stewardship. Booster education, monitoring adherence, and providing feedback for both infection control and antimicrobial stewardship practices were notably missing in many of these

pLTCFs. The facilities that were CMS-compliant also had fewer gaps in non-CMS-mandated areas. Future studies assessing objective differences between CMS-compliant and non-CMS-compliant sites could potentially identify strategies to improve infection control and antimicrobial stewardship in all pLTCFs. As more facilities implement antimicrobial stewardship to comply with the CMS mandate, studies on the efficacy of these practices can inform future interventions. Additionally, training modules developed by organizations such as the CDC and AHRQ could offer an efficient way to improve maintenance of pLTCF staff education.

Supplementary material. To view supplementary material for this article, please visit <https://doi.org/10.1017/ice.2019.314>.

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

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