

Research Brief

Training opportunities in sterilization and disinfection of patient care items and devices in dental settings

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Infection prevention and control (IPC) gaps remain in dentistry due to inadequate staff training and cross training of standardized procedures and protocols.^{1,2} The literature emphasizes the need for education and training in the sterilization process, sterilizers, and the benefits of competency evaluations.^{1,3,4} From August 2018 to June 2021, the Nebraska Infection Control Assessment and Promotion Program (ICAP), funded by Nebraska Department of Health and Human Services (NE DHHS) through a grant from the Centers for Disease Control and Prevention (CDC), provided voluntary consultations to dental facilities across Nebraska using a checklist adapted from the CDC “Basic Expectations of Safe Care.”⁵ Our program emphasized assessments consisting of policy and practice review with staff and direct observation of clinical practice. Here, we report our findings in 3 key areas related to sterilization and disinfection of patient care items and devices: (1) staff training, (2) sterilization and disinfection processes, and (3) other best practices assessed related to instrument reprocessing.

Methods

From August 2018 to June 2021, we conducted on-site assessments of sterilization and IPC practices in 18 of Nebraska’s 817 dental facilities: 9 private practice clinics (independently owned), 7 public health clinics, and 2 other facilities. All dental facilities included in the study volunteered for the on-site assessments. Assessments included 15 questions about annual staff training on reprocessing reusable dental instruments, competency evaluations, and audit and feedback regarding adherence to reprocessing procedures. In 4 of the facilities, we also directly observed 27 specific processes, identifying opportunities for improvement in sterilization and disinfection. Nebraska ICAP staff obtained assessment responses from interviewing practice managers and infection control leads, which were analyzed using descriptive statistics. We identified

questions and observations from the assessments that demonstrated nonadherence in at least 50% of the facilities.

Results

Among the 15 questions, 7 of these identified areas of non-adherence in at least 50% of the facilities. More than half ($n = 9$, 56.3%) of the facilities did not offer annual staff training on sterilization and disinfection practices. Most did not evaluate competency in reprocessing procedures following training (68.7%); most failed to perform routine audits for checking adherence to reprocessing procedures (81.3%); and most did not provide feedback to staff based on audit results specific to sterilization and disinfection processes (81.3%). Nonadherence in at least 50% of facilities was noted for 6 of the 27 directly observed processes. Opportunities for improvement in instrument transportation and proper immediate-use steam-sterilization processes were identified in 2 facilities where those practices were observed. Additional opportunities were identified in 2 of the 4 of facilities where sharps management, pouch- and pack-labeling protocols, and processing dental handpieces were observed. Training availability and competencies were similar between public and private facilities (Table 1).

Discussion

Our data highlight opportunities for infection control training in contemporary dental settings. A 2008 survey of 3,042 randomly sampled US dentists from various regions demonstrated that dentists who recognized the importance of infection control and had received more continuing education credits in infection control were more likely to implement CDC recommendations.⁶ Even when there is knowledge of infection control, lapses in practice may continue without regular retraining and competency evaluations. A survey of 765 randomly sampled dental hygienists from all 50 states indicated that they were familiar with dental infection control guidelines and considered them important but that they were frequently nonadherent to tenets of those guidelines

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Table 1. Interview Responses and Direct Observations of Sterilization and Disinfection Assessments

Response	Yes No. (%)	No No. (%)
Interview		
Written policies and procedures are available to ensure reusable patient care instruments and devices are cleaned and reprocessed appropriately before use on another patient.	8 (50.0)	8 (50.0)
Written policies and procedures are available to ensure reusable patient care instruments and devices are cleaned and reprocessed appropriately before use on another patient at least annually.	7 (43.8)	9 (56.3)
HCP are required to demonstrate competency with reprocessing procedures (ie, correct technique is observed by trainer) following each training.	5 (31.3)	11 (68.8)
HCP responsible for reprocessing reusable medical devices receive hands-on training on proper selection and use of PPE and recommended steps for reprocessing assigned devices.	7 (43.8)	9 (56.3)
Policies and procedures are in place outlining dental setting response (eg, recall of device, risk assessment) in the event of a reprocessing error/failure.	8 (47.1)	9 (52.9)
Facility routinely audits (monitors and documents) adherence to reprocessing procedures.	3 (18.8)	13 (81.3)
Facility provides feedback from audits to personnel regarding their adherence to reprocessing procedures.	3 (18.8)	13 (81.3)
Direct observation		
Prior to transportation, items contaminated with blood and other infectious materials are placed in a container that is puncture-resistant, leak-proof on the bottom and sides, labeled as biohazardous, and sealed.	0 (0.0)	4 (100.0)
Work-practice controls that minimize contact with sharp instruments are used and appropriate PPE is worn if manual cleaning is necessary.	2 (50.0)	2 (50.0)
Sterile packs are labeled at a minimum with the sterilizer used, the cycle number, the date of sterilization, and if applicable an expiration date.	2 (50.0)	2 (50.0)
Immediate-use steam sterilization, if performed, is only done in circumstances in which routine sterilization procedures cannot be performed.	0 (0.0)	2 (100.0)
Instruments that undergo immediate-use steam sterilization are used immediately and not stored.	0 (0.0)	2 (100.0)
Dental handpieces (including the low-speed motor) and other devices not permanently attached to air and waterlines are cleaned and heat-sterilized according to manufacturer instructions.	2 (50.0)	2 (50.0)

(eg, preprocedural rinsing, handpiece reprocessing, appropriately handling contaminated instruments).⁷ These lapses can place patients and staff members at risk. Cleveland et al⁸ identified 3 reports of hepatitis B virus and hepatitis C virus transmission in dental settings, related to unsafe injection practices and failure to reprocess instruments appropriately. Indeed, according to our data, dental settings frequently do not receive adequate training on and do not follow manufacturer instructions for reprocessing.⁷

This study had several limitations. The sample size was small, and self-selection bias may have occurred due to voluntary participation from the facilities. In addition, most participating facilities (78%) were located near a metropolitan area. Other limitations in the study include that the study collected data from 2018 through 2021, and infection prevention practices could have changed in facilities after 2020 due to the coronavirus 2019 (COVID-19) pandemic. Future studies with larger sample sizes including rural dental facilities could assess regional variations in infection control and prevention (IPC) training, staff competency, and compliance in clinical practice.

Until now, data have been limited regarding US dental infection control practices, and our study provides insight into the frequent performance gaps in annual training, competency evaluations, and compliance audits. Our research stresses the importance of providing standardized training, competency evaluations, and feedback to dental staff. These processes facilitate a better understanding of sterilization and disinfection protocols, and protocols for sterilization failures. Our analysis

also suggests opportunities for improvement in dental facilities' infection control practice.

Further research is recommended to examine the efficacy of staff training, auditing, and feedback on sterilization and disinfection protocols and practices to determine the ideal approach to IPC training in dental settings. Research should also examine regional variations in IPC training and competency evaluations.

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