

## Massachusetts Dental Public Health Program Directors Practice Behaviors and Perceptions Of Infection Control

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### Introduction

The Centers for Disease Control and Prevention (CDC) issued updated guidelines for infection control and disease prevention in 2003. Although these guidelines focus mainly on fixed dental settings, the recommended infection control practices are to be applied in all settings where dental treatment is provided.<sup>1</sup> Unlike a traditional fixed dental setting, public health settings utilizing portable or mobile equipment have additional factors to consider, such as limited resources (availability of sinks, water, electricity and space). These can have a direct impact on hand hygiene procedures, pre-cleaning/sterilization of dental instruments and disposal of contaminated waste.

Past and current research regarding dental infection control standards and challenges focus on traditional settings using fixed equipment. Public health settings may have varied issues that impact the delivery of care and infection control procedures. It is important to better understand predictors that influence lapses and adherence to existing standards. The purpose of this exploratory pilot study was to determine the current infection control practices used in Massachusetts dental public health programs and assess perceived compliance and challenges with infection control standards as outlined in the 2003 CDC guidelines.

### Abstract

**Purpose:** The objective of this exploratory study was to determine the current infection control practices used in Massachusetts dental public health programs and assess the perceived compliance and challenges with infection control standards as outlined in the 2003 Centers for Disease Control and Prevention (CDC) infection control guidelines.

**Methods:** A convenience sample of program directors of dental public health programs in Massachusetts (n=82) were invited to participate. The directors were identified through the Massachusetts Department of Public Health, Massachusetts League of Community Health Centers, local dental/dental hygiene schools and key stakeholders in dental public health. The electronic questionnaire-based survey consisted of 26 open/closed-ended and Likert scale questions. Statistical analysis included frequency distribution and factor analysis.

**Results:** The overall response rate was 43%. The majority of responders to the survey were from public health settings using fixed/mobile dental equipment (82.9%), compared to settings using portable equipment (17.1%). Perceived lapses in the guidelines were attributed to lack of finances (r=0.938), lack of personnel (r=0.874) and lack of space (r=0.763). The only significant correlation between the program directors perceived adherence to the CDC guidelines was having access to necessary supplies and equipment (r=0.914). Program directors indicated that the CDC guidelines are hard to apply (r=0.895) and guidelines specific to settings using portable equipment would be helpful (r=0.925).

**Conclusion:** Within the limitations of the sample size and response rate, directors from public health settings using both fixed/mobile and portable equipment reported being able to apply the current 2003 CDC infection control guidelines with few compliance challenges. However, respondents indicated that the guidelines were hard to apply and that infection control guidelines for settings using portable equipment would be useful.

**Keywords:** Infection control, portable dental equipment, fixed dental equipment, safety-net programs, public health programs

This study supports the NDHRA priority area, **Occupational Health and Safety:** Investigate methods to decrease errors, risks and or hazards in health care and their harmful impact on patients.

Access to oral health care is a significant problem for a large segment of the population in the U.S.<sup>2-6</sup> The most vulnerable affected individuals include the poor and the working poor, poverty-stricken inner-city residents, rural residents, ethnic minority groups, elderly, unemployed, uninsured, persons with special needs, mobility-restricted individuals and limited health literacy levels.<sup>3,5-7</sup> A 2000 Special Legislative report entitled *The Oral Health Crisis in Massachusetts* revealed a serious problem in access to oral health care in the state, especially for the poorest and most vulnerable populations. According to the report, more than 2.3 million residents do not have dental insurance, as evidenced by the 4,000 calls per month to the Division of Medical Assistance from members of MassHealth (a government assisted health insurance program) unable to find dental care.<sup>8</sup> Compounding the problem, 86% of practicing dentists are not active providers in MassHealth, thereby impacting access to care for almost 1 million residents enrolled in the program.<sup>8</sup> A major recommendation made from this report was to increase access to oral health screening and treatment services in both the public and private sector by expanding beyond the traditional private practice setting. These alternative settings, also referred to as safety-net programs, are located in community health centers, public health departments or schools, and provide services to groups of individuals that are unable to access and/or afford care from the private sector.<sup>4,9</sup> Last reported in 2009, Massachusetts had 48 safety-net dental programs located in community health centers, public health departments and schools across Massachusetts that saw 377,577 patient visits per year.<sup>10</sup>

Over the past decade, many individuals, professional health organizations and advocacy groups have strived to improve the problem of access to oral health care for underserved populations. Three key national documents, *Oral Health in America: A Report by the Surgeon General*, *Healthy People 2010*, and the *National Call to Action to Promote Oral Health* all highlight the issues of access to care and the need to establish programs to eliminate oral health disparities.<sup>2,3,6</sup> Based on these recommendations, the Surgeon General invited all dental providers "To expand plans, activities and programs designed to promote oral health and prevent disease."<sup>2</sup> To meet the challenge of increasing access to oral health care, requests were made to expand safety-net programs located in non-traditional settings, such as health centers, schools, hospitals and community centers.<sup>2-4,6,9</sup>

There are primarily 3 types of practice settings for accessing dental care: fixed, portable and mobile. A traditional, fixed clinic facility is considered the most efficient and effective for providing direct dental services to 1,400 or more patients.<sup>11</sup> This type of setting can also provide a full spectrum of services from prevention (e.g. prophylaxis, sealants and fluoride) to treatment services (e.g. fillings, implants and oral surgery procedures). Mobile and portable dental programs operate as a safety-net for individuals or groups that do not have a dental home. These types of programs are often administered by agencies such as the Department of Public Health, dental/dental hygiene schools, neighborhood health centers, non-profit organizations and individual volunteers, thus the term "public health settings."

With the expanding scope of practice for the dental hygienist in a public health setting, these programs are moving beyond the traditional community-based health centers with the use of mobile and portable dental equipment allowing services to be provided outside the confines of a fixed equipment facility. Recent developments in the technology and transportability of portable equipment (e.g. patient chair, unit, light and clinician chair) have allowed dental personnel to administer screenings, prevention, education and treatment to patients outside a traditional fixed dental office setting.<sup>11</sup> For portable equipment to be effective, it must be easily transported, have sound durability, good ergonomical features and be able to sustain the required infection control recommendations for dental settings.<sup>11</sup>

The CDC issued updated guidelines for infection control and disease prevention in 2003. Although these guidelines focus mainly on outpatient, ambulatory dental settings, the recommended infection-control practices are applicable to all settings in which dental treatment is provided.<sup>1</sup> Literature suggests that several factors have been related to infection control standards in the clinical dental setting using fixed equipment.<sup>1,12,13</sup> To date, no studies have evaluated the current practices and challenges to implementing proper infection control in settings that use portable equipment. With an increase in dental public health programs using portable equipment, current CDC infection control guidelines may impact these settings and require further guidance to ensure the safe delivery of dental care for providers and patients. This study attempted to address this question and set the foundation for future research in this area.

## Methods and Materials

### Instrument

An expert panel of 9 health care professionals, consisting of dental public health program directors, clinicians and an epidemiologist convened at the Forsyth Institute in Boston, Massachusetts in 2007 to discuss the topic of infection control in public health settings using portable or mobile dental equipment. The group identified the following infection control challenges that are faced when providing care in community and school-based settings: space limitations for providing care, lack of hand washing sinks in immediate care area, insufficient instrument processing area, storage of contaminated items, sharps management and challenges with waste management (handling storage and disposal). A 38 item forced-choice questionnaire evaluated by the panel was used to elicit information on site characteristics, infection control policies and procedures and infection control behaviors. Face validity of the questionnaire was determined based on their responses and modifications were made to insure that items were applicable for public health settings. The questionnaire was again tested for face validity with 2 dental public health care providers from the Forsyth Institute. The finalized questionnaire-based survey consisted of 26 open and closed ended and Likert scale questions designed to elicit information on the current infection control practices used in Massachusetts dental public health programs and assess the perceived compliance and challenges with infection control standards as outlined in the 2003 CDC guidelines. The University of Missouri-Kansas City Social and Behavioral Sciences Institutional Review Board approved this survey prior to administration.

### Data collection procedures and statistical analysis

Due to the preliminary nature of this investigation, a convenience sample of dental public health programs in the state of Massachusetts was utilized in the fall of 2009. A database of active email addresses of program directors ( $n=82$ ) was identified through the Massachusetts Department of Public Health (MDPH), Massachusetts League of Community Health Centers and local dental and dental hygiene schools. The electronic questionnaire-based survey was sent to all program directors via Survey Monkey. Non-responders were sent a second invitation to participate, 2 weeks following the initial mailing. Responses were blinded to ensure anonymity and confidentiality.

The coded data was obtained from the electronic survey program Survey Monkey and imported into and analyzed using the Statistical Package for Social Sciences (SPSS® Inc.,18.0). Factor analysis was used to assess 3 areas: infection control practices, perceived compliance to and challenges with the CDC 2003 infection control guidelines.

## Results

**Characteristics of the sample.** Of the 82 program directors invited to participate, 35 returned the survey for a response rate of 43%. The demographics of the sample are represented in Table I. Worth noting, 74.3% of responders used fixed equipment compared to 17.1% who used portable equipment. A demographic summary of the sample consisted primarily of fixed settings located in community health centers in urban locations funded by both federal and state funds and supervised primarily by the Massachusetts Department of Public Health, which typically saw over 35 patients per day.

**Practice Behaviors.** Evaluation of the program directors' assessment of practice behaviors is depicted in Table II. Questions on the survey were related to infection control behaviors and methods specific to their practice setting, such as most frequent method of hand hygiene, most frequently used method of cleaning instruments prior to sterilization, aerosol and spatter control, surface disinfection and management of regulated waste. The study found that a majority of the programs had access to a sink, water and soap (42.9%), which was the most frequent response for hand hygiene followed by an alcohol-based hand rub (40.0%). Pre-cleaning of instruments was primarily accomplished by using an ultrasonic cleaner (48.6%). The most frequent method to control aerosol and spatter was by use of a saliva ejector (82.8%) followed by high speed evacuation (74.3%), and off-site disposal of medical waste accounted for the majority of the responses (42.9%).

**Perceived compliance and challenges.** A factor analysis of perceived compliance and challenges for infection control was performed and explained 85% of the values in the survey items (Table III). Norman et al suggests that correlations of  $r=0.70$  and above indicate a strong relationship among the variables.<sup>14</sup> The 5 constructs/factors that were extracted included:

- (Construct 1) perceptions of guideline adherence

- (Construct 2) constraints to guideline adherence
- (Construct 3) negative view of CDC guidelines/barriers
- (Construct 4) attitude about low risk of infection
- (Construct 5) attitudes about guidelines for settings using portable equipment

Regarding the first construct (guideline adherence), there was a strong correlation ( $r=0.914$ ) between guideline adherence and having access to the necessary supplies and equipment for implementing CDC infection control guidelines. Additionally, a very strong correlation existed in relation to the program directors' perceptions of their programs infection control policies and procedures compliance with the current CDC guidelines ( $r=0.954$ ) as well as their perception that the CDC guidelines are effective for their practice setting. Concerning constraints of CDC guidelines adherence (Construct 2), a strong correlation ( $r=0.938$ ) presented, indicating that it was perceived that if the CDC guidelines were not followed, it was because of financial constraints followed by lack of dental personnel ( $r=0.874$ ). Construct 3 (negative view of CDC guidelines) showed a strong correlation ( $r=0.985$ ) relating to the difficulty of applying the guidelines to their practice settings. Construct 4 (attitude about acquiring infection) indicated that there was a strong correlation ( $r=0.932$ ) related to the directors' perception that there is a low risk of acquiring infection from the patients seen at their facility. The final construct that emerged from the perception part of the survey addressed whether additional infection control guidelines would be useful for public health settings using portable equipment indicating that a strong correlation ( $r=0.925$ ) existed. Some items in this section of the questionnaire were not answered,

Table I: Demographics

Characteristics	Frequency	Percent
School	6	17.1
Community center	6	17.1
Community health center	21	60.0
Other	1	2.9
Urban location	19	54.3
Suburban location	4	11.4
Rural location	7	20.0
Uses fixed equipment	26	74.3
Uses portable equipment	6	17.1
Uses mobile equipment	3	8.6
Oversight by Massachusetts Department of Public Health	22	62.9
Oversight by dental/dental hygiene program	7	20.0
Oversight by research center	1	2.9
Oversight by "Other"	7	20.0
Funded by federal agency	23	65.7
Funded by state agency	21	60.0
Funded by private source	13	37.1
Funded by "other source"	3	8.6
Screening/examination services provided	30	85.7
Prevention services provided	30	85.7
Treatment services provided	26	74.3
# of patients seen in a typical day (20 or less)	4	11.4
# of patients seen in a typical day (21-35)	8	22.9
# of patients seen in a typical day (over 35)	16	45.7
# of personnel (5 or less)	5	14.3
# of personnel (6-11)	8	22.9
# of personnel (12-24)	12	34.2
# of personnel (greater than 25)	2	5.7

causing the final results not to be representative of the entire sample. Detailed responses to these constraints from program directors are shown in Table IV.

Limitations. The lack of a directory that identified settings using portable equipment in Massachusetts at the time this study was being conducted resulted in convenience sample recruitment. The sample size of portable equipment users was low ( $n=6$ ). Therefore, significant conclusions cannot be extrapolated from the results for these settings. Another possible limitation was that the results were self reported by the program directors raising the question of bias on some of the responses, e.g. failure to admit that their program does not adhere to the CDC guidelines or that they are familiar with the guidelines.

## Discussion

This pilot study attempted to capture the infection control behaviors, challenges and perceptions of public health program directors in dental public health settings in Massachusetts. With an increase in the number of programs and providers, including dental hygienists delivering care to underserved populations in the state and throughout the country, the question could be asked if there are any barriers or challenges for implementing the current CDC infection control guidelines for these settings and in particular, programs that use portable equipment.

Practice behaviors demonstrated that hand hygiene with soap and water accounted for the most frequently used method of hand cleaning, which is the recommendation in the 2003 CDC guidelines.<sup>1</sup> The availability of sinks with water contributed to this adherence. Programs that only provided screening/examination and prevention services and, therefore, did not have visibly soiled hands or were contaminated with blood or other potentially infectious material, could account for alcohol-based hand rub use which is the acceptable method of hand hygiene from the CDC when hands are not visibly soiled.<sup>1</sup> Instrument processing, including pre-cleaning and sterilization, did not present significant barriers for the majority of programs. This finding is not surprising since public health settings using fixed equipment have similar physical characteristics and properties of a traditional fixed dental facility. As a result, they do not present the same challenges that settings using portable equipment may encounter such as lack of electricity or limited physical space when housed in hallways, basements or small rooms in public buildings. The CDC guidelines recommend separate areas for processing clean and dirty instruments and the use of an automated cleaning device (e.g. ultrasonic cleaner or dishwasher/disinfectant) for pre-cleaning of instruments.<sup>1</sup> The directors of programs located in fixed settings indicated compliance with this recommendation with limited or no challenges. Waste that is infectious and may cause substantial risk with handling and

Table II: Practice behaviors

Practice methods	Frequency	Percent
Hand washing soap/water	15	42.9
Antiseptic handwash	2	5.7
Alcohol-based handrub	14	40.0
Pre-cleaning of dirty instruments – hand scrubbing	4	11.4
Pre-cleaning of dirty instruments – ultrasonic cleaner	17	48.6
Pre-cleaning of dirty instruments – dishwasher/disinfectant	5	14.3
Method used for aerosol/splatter control – high speed evacuation	26	74.3
Method used for aerosol/splatter control – saliva ejector	29	82.8
Method used for aerosol/splatter control – rubber dam	21	60.0
Use of disinfectant sprays for surface disinfection	19	54.3
Use of disinfectant wipes for surface disinfection	29	82.9
Medical waste disposal on site	8	22.9
Medical waste disposal off site	15	42.9
Medical waste disposal both on and off site	1	2.9

disposing of is considered regulated medical waste (e.g. cotton rolls and gauze saturated in blood and/or saliva, extracted teeth, surgical removal of hard or soft tissues and sharp items such as anesthetic needles, surgical blades, orthodontic wires, broken metal instruments and burs). Programs that only provide screening/examination services do not generate medical waste, therefore can dispose waste with ordinary waste. The same applies to prevention programs (sealants/fluoride) if cotton rolls and gauze are not saturated in saliva. A regulated medical waste service or incineration was not applicable and was not utilized.

The factor analysis did provide strong correlations regarding the program directors' beliefs that their sites had access to the necessary supplies and equipment for waste management, had access to sinks and products necessary to perform hand hygiene and had access to the necessary personal protective equipment as recommended in the CDC guidelines. These findings suggest a possible correlation exists between funding and availability of supplies necessary for proper infection control procedures as recommended in the 2003 CDC guidelines. The program directors' perceptions of barriers to guideline adherence were strongly related to factors such as limited finances, personnel and space constraints. This is significant in that the programs are able to ap-

Table III: Program directors group factor analysis of items measuring perceptions of practice behaviors, compliance and challenges regarding infection control

Factor	Factor Loading
<b>Factor 1 (perceptions of guideline adherence)</b>	
• The site has access to the necessary supplies/equipment for implementing proper waste management according to CDC guidelines.	0.914
• The site has access to sinks and products necessary to perform hand hygiene as recommended by the CDC guidelines.	0.745
• The site has access to the necessary personal protective equipment (PPE) as recommended in CDC guidelines.	0.707
• The infection control policies and procedures of our program comply with current CDC guidelines.	0.954
• I know where to obtain information about CDC guidelines.	0.707
• CDC guidelines are effective for our practice setting.	0.877
<b>Factor 2 (constraints to guideline adherence)</b>	
• If CDC guidelines are not followed, it is because there is lack of dental personnel.	0.874
• If CDC guidelines are not followed, it is because of space constraints.	0.763
• If CDC guidelines are not followed, it is because of financial constraints.	0.938
<b>Factor 3 (negative view of CDC guidelines: barriers)</b>	
• If CDC guidelines are not followed, it is because of space constraints.	0.908
• CDC guidelines are hard to apply.	0.895
<b>Factor 4 (attitude about low risk of infection)</b>	
• There is a low risk of acquiring infection from the patients seen at this facility.	0.932
<b>Factor 5 (attitudes about guidelines for settings using portable equipment)</b>	
• Infection control guidelines specific to settings using portable equipment would be useful.	0.925

Table IV: Frequency distribution of survey item responses to CDC guidelines

Survey Item	Frequency							Total	Missing
	Strongly Agree	Somewhat Agree	Neither Agree or Disagree	Somewhat Disagree	Strongly Disagree	Don't know			
If CDC guidelines are not followed, it is because of lack of dental personnel.	-	-	3+	1+	23 (5* 18+)	3+	35	5	
If CDC guidelines are not followed, it is because of financial constraints.	-	1+	3+	5+	19 (5* 14+)	2+	35	5	
If CDC guidelines are not followed, it is because of space constraints.	-	1+	3+	4 (1* 3+)	20 (6* 14+)	2+	35	5	
CDC guidelines are hard to apply.	31 (4* 27+)	-	-	-	-	-	35	4	
Infection control guidelines specific to settings using portable equipment would be useful.	25 (4* 21+)	-	-	6+	-	-	35	4	

Key:

\* = using portable equipment

+ = using fixed/mobile equipment

ply the CDC guidelines to their practice settings, but feel that when barriers occur, the size of the work environment, the number of personnel in addition to the ability to pay for the necessary supplies and equipment all present challenges for implementation and guideline adherence.

## Conclusion

Within the limitations of the sample size and response rate, directors from public health settings using either fixed/mobile or portable equipment reported being able to apply the current 2003 CDC infection control guidelines with few compliance challenges. However, regardless of the type of practice setting, the respondents indicated that the guidelines were hard to apply and that infection control guidelines for settings using portable equipment would be useful. This may require future consideration and guidance especially with an increase number of dental public health programs utilizing portable equipment to address the issue of access to dental care.

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