

## PREVENTION OF HEALTHCARE ASSOCIATED INFECTIONS BY COMPLIANCE TO BLOOD BORNE PATHOGENS TRANSMISSION PROTOCOLS IN THE DENTAL OFFICES IN IASI

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### ABSTRACT.

The **aim** of the study was to evaluate the level of training and compliance with administrative and clinical infection prevention recommendations in the dental settings in Iasi. **Material and methods.** A questionnaire based study was initiated including 93 dentists in Iasi. **Results.** 91,5% of the dentists wish to be trained in infection control, and 78,7% consider important the presence of a coordinator in this domain. In no dental office the compliance to Standard Precautions is evaluated by planned activities. 78,4% of the subjects are immunized against Hepatitis B. The sterilization equipment's maintenance is performed and documented in 87,2% of the settings. In 80,5% of them the necessary supplies for hand hygiene are easily accessible. 74,7% of the dentists wear the full protective equipment. Written policies and procedures for the cleaning and disinfection of reusable instruments and environmental surfaces are available in 78,2% , respectively 21,3% of the dental offices. In all dental settings a chemical indicator is used for the sterilisation monitoring. **Conclusions.** The investigation findings highlighted the need for continuous dental staff training by an infection control coordinator based on assessing compliance with recommended policies and practices. **Key words** : infection control , dentistry, training

### INTRODUCTION

Infection control is a main concern due to the fact that the risks of infection transmission to patient and medical staff is still considered to be high in all dental settings, regardless of the level of care provided, including private dental practices, dental clinics, dental schools or settings using portable dental equipment. The complexity of dental care procedures pleads for increasing the individual awareness and responsibility regarding safety by adopting the concept of Standard Precautions (1996) [1]. The increased levels of healthcare associated infections is related to poor performances of dental professionals due to lack of compliance, motivation and professional abilities circumstances in which it is essential to improve the

level of knowledge of dental team in order to perform dentistry at proper safety standards.[2] which represent the most frequent and severe risk for pathogens transmission. [3]

Transmission of bloodborne pathogens from blood or from other blood-contaminated fluids represents the most common transmission way for HBV (transmission risk after needle stick injury 6% - 30%), HCV (transmission risk about 1,8%) , HIV (transmission risk 0,3%) and for other over 20 pathogens (viruses, bacteria, fungi) with severe consequences for patient and medical team (chronic diseases, disability and death). 80% of accidental exposures to blood occur by needle stick injuries

### MATERIAL AND METHODS

It was initiated a questionnaire - based study including 93 dentists working in private dental offices in Iasi , Romania, aged between 27 and 64 years . The questionnaire included 24 questions regarding the compliance with administrative and clinical practice infection prevention recommendations in the dental offices in Iasi.(tab.1) Data were analysed using SPSS 20.0 system. (statistical significance  $p < 0.05$  ).

Table 1. Questionnaire for infection control compliance evaluation

No.	Question
1.	Do you consider you should be trained in the domain of infection control in the dental office?
2.	Do you know the meaning of the Standard Precautions?
3.	Which are the training opportunities on infection control protocols accessed by the medical staff in your dental office ?
4.	Do you agree to have a bloodborne pathogens exposure control plan in your dental office?
5.	Who is responsible for the medical staff training regarding infection control in your dental office?
6.	Do you consider necessary the presence of a responsible for updating, evaluating and monitoring the infection control procedures?
7.	Are there available written documents regarding Standard Precautions and current CDC recommendations for infection control policies and procedures within specific for the dental setting?
8.	Did the medical staff receive training on bloodborne pathogens infection prevention procedures?
9.	Is the compliance to Standard Precautions standards as immunizations, hand hygiene, sterilization monitoring, and proper use of protective equipment monitored and evaluated?
10.	Does the medical staff wear appropriate protective equipment to prevent occupational exposure to infectious agents ?
11.	Are there written documents regarding appropriate indications and technique for routine hand hygiene available in your dental office?
12.	Are the necessary supplies for adherence to routine hand hygiene (e.g., soap, water, paper towels, alcohol-based hand rub) easily accessible?
13.	Does the medical staff use the work practice controls (e.g., one-handed technique for recapping syringe needles, removing burs before disconnecting handpieces) to prevent injuries?
14.	Are the sharps discarded in a puncture-resistant labelled container ?
15.	Has the dental office a registration and tracking control system for the medical staff exposures ?

16.	Are the recommendations for postexposure protocols following an occupational exposure event available for the medical staff ?
17.	Are written documents for procedures to ensure reusable instruments and devices reprocessing available ?
18.	Is routine maintenance for sterilization equipment performed according to manufacturer instructions and documented by written maintenance records ?
19.	Is an automated cleaning equipment (e.g., ultrasonic cleaner, instrument washer, washer-disinfector) used to improve cleaning effectiveness and decrease worker exposure to blood ?
20.	Is a chemical indicator used inside each package of instruments?
21.	Is a biologic indicator (i.e., spore test) used at least weekly?
22.	Does the instrument processing area ensure a clear separation of contaminated and clean workspaces ?
23.	How are the handpieces decontaminated?
24.	Are written policies and procedures for routine cleaning and disinfection of clinical and environmental surfaces available?

## RESULTS

Out of the investigated dentists 42% were women and 58% men. The number of years of professional activity ranged between 2 and 26. The time spent daily by the dentists at work ranged between 4 and 8 hours.

91,5% of the dentists are willing to be trained in the domain of infection control in the dental office. The training opportunities on infection control protocols accessed by the dental medical staff are mainly represented by courses organized by the Dentists College (81,5%) and Dental Medicine Faculty followed by courses during international congresses (57,4%). 78,7% of the dentists consider important the presence of a professional in infection control for updating, evaluating and monitoring of the infection control procedures. In the investigated dental offices there is no a professional or infection control coordinator appointed for this kind of training, each member of the medical staff being responsible for his level of education in this domain. The most implicated in infection control monitoring is the dentist (76,6%) who is the manager of the setting at the same time.

In no dental office the compliance to Standard Precautions is evaluated according to planned

activities. 78,4% of the subjects reported that they are immunized against Hepatitis B virus (HBV) but 21,5% could not offer the required information. From the vaccinated dentists 65,7% did not periodically evaluate their immunisation status against Hepatitis B. The medical staff is not aware of the work practice controls (e.g., one-handed technique for recapping syringe needles or safety devices), to prevent injuries by sharp instruments or syringe needles. The sharps are discarded in puncture-resistant containers located as close as possible to the working area in most of the dental offices (92,5%).

In 92,4% of the dental offices the necessary supplies for hand hygiene (e.g., soap, water, paper towels, alcohol-based hand rub) easily accessible are available but written documents or specific drawings regarding appropriate technique for routine hand hygiene exist in only 14,3% of those settings.

Written documents regarding Standard Precautions referring to the recommended protective equipment are available in 18,7% of the dental offices. 74,7% of the members of the medical staff wear the appropriate full protective equipment to prevent exposure to infectious agents (fig.1) All the investigated subjects were gloves, 84,5% masks and 58,5% protective glasses.

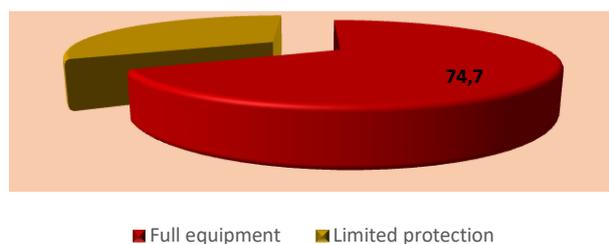


Figure 1. Compliance to protective equipment procedures

For the reusable instruments and devices appropriate cleaning and disinfection written policies and procedures are available in 82,2% of the dental offices. An automated cleaning equipment (ultrasonic cleaner) used to improve cleaning effectiveness and decrease worker exposure to blood is available in 16,7% of the dental offices. In all dental settings a chemical indicator is used for the sterilisation monitoring and the biological indicator is weekly used in 22,5% of them. The sterilization equipment's maintenance is routinely performed according to manufacturer instructions and is documented by written records in 87,2% of the dental offices.

The decontamination of the dental handpieces is performed mainly by external surface disinfection by immersion in liquid disinfectant (29,2%), external cleaning and disinfection by spray (42,6%). Heat sterilisation after cleaning and disinfection is used in 28,2% of the dental settings. (fig.2)

A clear separation of contaminated and clean workspaces is assured in 78,5% of the investigated dental offices. In 89,6% of those facilities, dental sterile instruments are properly stored and again put in use. Routine cleaning and disinfection of clinical and environmental surfaces procedures are regulated by written documents in 21,3% of the dental offices.

## DISCUSSIONS

Infection transmission and health care associated infections prevention in dentistry is a major concern and periodically updated recommendations designed to reduce that risk

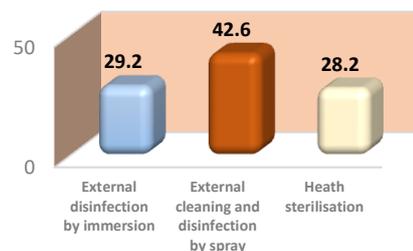


Figure 2. Hand pieces decontamination

provide operational oversight on specific practices. The Summary of Infection Prevention Practices in Dental Settings: Basic Expectations for Safe Care published by CDC in 2016 [3] is meant to supplement existing recommendations provided by the CDC Guidelines for Infection Control in Dental Health-Care Settings (2003) which remains the standard in this domain. This document includes a checklist to be used in dental practice settings to assess infection prevention policies and procedures for adhering to Standard Precautions. Those recommendations should be easily available so that all members of the dental medical team can routinely implement them. The breakdowns in basic bloodborne infection prevention practices reported in the scientific literature include unsafe injection practices, failure to heat-sterilize dental instruments or handpieces between patients, failure to monitor sterilisation procedures, and failure to manage surface contamination by blood and other blood contaminated fluids. [6] [7]

The Occupational Safety and Health Administration (OSHA) Bloodborne Pathogens Standard requires employers to have a written exposure control plan detailing methods and means to reduce and manage occupational exposures. [8] This written plan aims to eliminate or minimize occupational exposures and should include: exposure determination by anticipating contact with blood, use of Standard Precautions, engineering controls (safe medical devices), work practice controls, Personal Protective Equipment, Hepatitis B and other recommended immunizations, post exposure evaluation and

follow-up, information and training for workers and recordkeeping.

Routine monitoring and evaluation of the infection prevention and control program are essential components for assessing compliance with recommended practices. An Infection Prevention Checklist for Dental Settings is highly recommended by CDC in order to perform an annual evaluation of infection prevention training or programs. Employers should maintain training records retained for 3 years from the training date including dates of training, contents or a summary of the training sessions, names and job titles of all persons attending the training, and the names and qualifications of the persons conducting the training.[4][6]

The results of our study demonstrate that most of the dentists are willing to be trained in the domain of health care associated infections prevention, half of them claiming to be aware of the Standard Precautions concept. To this end they access mainly the courses organized by the Dentists College or the courses initiated during international congresses. They are also interested in having a bloodborne pathogens exposure control plan even if it is not mandatory in our country by official documents for the dental settings.

A similar online survey's findings in more than 1,000 private dental practices in United States where those requirements are mandatory, published in the *Compendium of Continuing Education in Dentistry* (2016) [8], suggested that 28 % of them did not have a written exposure control plan, 50% of them do not plan to implement one in the coming year, 65% did not use injury-prevention features and 24 % with a plan had not reviewed it within the past year.

Adherence to infection prevention transmission recommendations involves assigning one individual trained in infection prevention the responsibility of coordinating the dental practice infection prevention program. This infection control coordinator has to provide written infection prevention policies and procedures, train the medical staff in procedures designed to prevent bloodborne pathogens transmission, ensuring that all staff members have received HBV vaccination,

and emphasizing the use of Standard Precautions. Several aspects such as cleaning, disinfection or heat-sterilization of the instruments and equipment, barrier-protection or cleaning and disinfection of environmental surfaces, proper use of gloves and performing correct hand hygiene must be evaluated. In addition, infection control coordinators must use a checklist to periodically evaluate compliance with correct, affective and updated infection prevention practices during professional activity. Our investigation findings reveal that in no dental office such an infection control coordinator is available although its presence would be essential and is desirable by the medical staff. In this circumstances the training in infection control is performed by each member of the medical team on his own; the dentist which is the manager of his setting at the same time is mentioned to perform occasionally such tasks.[6]

Even though they are concerned about the possible transmission of bloodborne pathogens the percentage of the dentists immunized against HBV is far below that reported in similar studies: Canada - 91%, UK - 86%, USA - 93% [9] One third of the dentists are not vaccinated against HBV as a result of a poor compliance to this essential preventive measure considering the fact that dental care professionals are included in the A risk category regarding the exposure to infection. Most of the immunised dentists do not evaluate periodically their immunisation status against Hepatitis B infection.

Written documents referring to the recommended protective equipment are available only in 12,7% of the dental offices. In accordance to Standard Precautions recommendations the proper sequence for putting on and removing the protective equipment should be easily available for all the medical staff. In our study the compliance to the full protective equipment is reported by two thirds of the respondents, higher for the gloves and masks but lower for the protective goggles.[3]

Adherence to hand hygiene protocols is considered to be the most important method to reduce the infection transmission in the medical facilities. In

most of the dental settings the necessary supplies for routine hand hygiene are easily accessible but no written documents regarding the appropriate technique are available.[10]

Occupational exposure to bloodborne pathogens must be seen as medical emergency and calls for strict protocol, known as Post-Exposure Protocol (PEP). Medical personnel exposed should benefit of counselling, regular medical check-up, post-exposure testing and medical evaluation for PEP initiation. [11] In no investigated dental office the recommendations for postexposure protocols following an occupational exposure to bloodborne pathogens or a registration and control system of those events are available .

The dentists' answers demonstrate a high compliance to protocols of reusable instruments cleaning and disinfection which are documented by written policies. [12] In most of the dental facilities the instruments cleaning is performed manually , the ultrasonic cleaner to decrease worker exposure to blood being available in 18,6% of them. [13] In the investigated dental offices sterilization monitoring, essential in its efficiency evaluation, is performed by chemical indicators for every sterilizer cycle and less by the biological indicators which provide the main guarantee of sterilization. [14] Regulatory written procedures are available and sterilization monitoring records (mechanical, chemical, and biological) are retained according with national regulations ( ORDER 961 of the Ministry of Health 2016) .[15]

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Dental hand pieces considered as semi-critical devices, become contaminated on internal surfaces with viruses and bacteria from the patient blood and saliva during use. They should be cleaned and disinfected on external surfaces using mild liquid disinfectants, moistened wipes, or specific cleaners than they should always be heat sterilized between patients.[16] In one third of the investigated dental offices heat sterilisation is used for those equipment decontamination the rest of them using only external or high level disinfection.

In order to reduce the risk of infection transmission the work flow of clinical activity in the dental office must assure the clear separation of contaminated and clean workspaces and the routine cleaning and disinfection of clinical and environmental surfaces. [17] According to the dentists' s answers those protocols are applied but no records of those protocols are available.

**CONCLUSIONS** The investigation findings emphasizes the overall importance of adopting European standards and requirements to prevent infection transmission in the dental settings based on Standard Precautions. Is highlighted the need for continuous dental medical staff training by an infection control coordinator based on assessing compliance with recommended practices and bloodborne pathogens exposure control plan.

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