

## **Cross-infection in dentistry and its control**

Angelina Kiselova, Doan Ziya

Department of Dentomaxillofacial Radiology and Oral Pathology, Faculty of Stomatology, Medical University, Sofia, Bulgaria

### **Summary**

**The article studies a topical problem related to cross-infection and its control in dentistry. In recent years much attention has focused on this problem first of all with hepatitis B and its related agents, and then with HIV. Although screening is possible in some cases, in day-to-day practice and in particularly in private dentists' surgeries, this is of little value as most of the individuals with Hepatitis B and HIV infection are asymptomatic and therefore difficult to identify. Hence, in order to avoid such risks, safe practice mandates the use of strict cross-infection control as part of everyday practice on all patients.**

**Bacterial infection is regarded as a major etiological factor in focal infection of dental origin. This is a problem that can be overcome by relevant treatment of the disorders of development of the teeth and related tissues.**

**The prevention of cross-infection becomes the focal point in the education of students of dentistry from their very first day at the Faculty of Dentistry both in terms of their own health safety and that of their patients. Besides, it is also a state policy - all health control bodies are primarily concerned with hygiene and health safety in terms of cross-infection prevention. The author shares her experience and practice in cross-infection control and prevention.**

**Key words: cross-infection control and prevention, HIV, Hepatitis B, student training and education, state control bodies.**

We present the possibilities of transmission and control of cross infection in the everyday dental practice.

Dealing with infectious diseases, dentist's main purpose is not to allow transmission of the disease from one patient to another, as well as preventing his own health.

Among the hepatitis virus, the accent goes to the types A and B. 75% of them remain undiagnosed, because the typical icteric disease is observed in only 25% of the cases. That's why the dentist should know the symptoms.

Hepatitis A affects mainly kids and young people and transmits to faecal-oral way, primarily to people with low hygiene habits. The incubation period is 15 to 40 days. The type A virus (HAV) causes formation of

antibodies (anti-HAV), which specifies the diagnosis. The beginning is unexpected, just as the one of flue: high temperature, myalgia, stomachaches, vomiting. In the phase of icteric, the icteric disease begins to show with biliuria, lack of appetite, vomiting, bradycardia, depression, hepatomegalia. In the posticteric phase, the symptoms fade away, but hepatomegalia may remain for a long period of time. HBV remains in the blood throughout the incubation period and whenever there are undiagnosed symptoms, the infection can spread through the blood.

When having data for patients previously diseased with Hepatitis type A, the dentist's attitude should be proper.

Hepatitis B is caused by the B virus (HBV), while in laboratories are established

HBsAg (B surface antigen), HBcAg (B core antigen), HBeAg (Be antigen), as well as antibodies anti-HBs, anti-HBc and anti-HBe. The incubation period is 50-180 days. The infection (parenteral, but should be kept in mind that the virus is located in all body fluids) is most commonly in heavy phase and in the late incubation period. In 5-10% HBV can persist in the blood for months and years.

The existence of the virus is best diagnosed through HBsAg-test and anti-HBs. The beginning is not acute, but the symptoms in prodromic, icteric, posticteric phase is common to the one in Hepatitis A. Having in mind that 10-15% of patients who previously had Hepatitis B can be in chronic stage, it is necessary that these tests be done together with the anamnestic data. Considering the dental stuff, the health law foresees obligatory Hepatitis B vaccinations through 5 years (50% of the cases of hepatocellular cancer is caused by HBV). In Bulgaria is used the r-DNA Hepatitis-B vaccine-Engerix B of Smith Kline Beecham).

When having patients with information about active Hepatitis type B, the manipulations are done in urgency, when previously the prothrombin time is tested, in order to prevent hemorrhages. In these cases, as the ones positive to HBsAg-test this is mandatory:

- Preventive measures: gloves, masks and glasses or helmets, overalls for individual use - for all dental stuff participating in the intervention;
- Arranging the instruments, gauzes, needles, syringes onto foil;
- Rinsing the patient's mouth with chlorhexidine solution for 30 sec. or application of Octenisept, of Schulke & Mayr - for decreasing the concentration of the virus in the saliva!;
- Decreasing the formation of aerosol though avoiding the usage of: air spray, ultrasound instruments for odontolith, tilling periodontal pouch and polishing, minimizing and even avoiding the usage of turbine;

- Application of the necessary medicines through one fold mini-pipette (of SDI - Sweden), as well as using Saliva absorbent (of the same company);

- After finishing work, the tools are put into a rarefied (1:3) solution of sodium-chloride, after which they are brushed, rinsed, dried and sterilized (best in separate club, in which they are marked for use by patients with hepatitis);

- The used consumers are folded into foil, placed in a container and delivered to a place where they can be exterminated;

- After removing his gloves, the dentist and his assistant wash their hands numerous times with soap and afterwards with disinfecting solutions (according to the rules, it is not allowed to wear wedding rings or other rings while working with patients).

When having HBsAg-negative, the path is routine. Although there are no instructions for work with patients positive to C virus, the preventive measures should be according, because the infection is parenteral.

During the last years, the hepatitis virus non-A and non-B is characterized as type C. It runs without any symptoms, but triggers posterior cirrhosis and liver cancer. For the dentist it is also important the information for presence of virus-carrier of type C in lichen planus in the oral mucosa. It is diagnosed by verifying the level of anti-HC. The incubation period is 15-180 days. The infection is parenteral.

In infection, sexual transmitted, such as lues, blennorrhagia, herpes simplex type 2, as well as HIV-carrier and HIV, if the before-mentioned measures are not taken, the dentist may get infected with oral lesions, which are phases of ulcus durum, plaques muqueuses, in blennorrhagic gingivo-stomatitis and all evidences of HIV-infection and AIDS.

***Epidemiological data*** - belonging of an individual to some of the groups with risky attitude.

**Clinical data** with the most important practical meaning:

- Asthenia, decrease of the body mass with more than 10% per month;
- Persisting febrility for more than two months;
- Night sweating;
- Generalized itching - prurigo;
- Changes into the tongue and mouth area;
- Disorders in memory, attitude and mood;
- Persisting diarrhea;
- Dysphagia and retrosternal pain during eating and swallowing;
- Dry cough for more than one month;
- Progressive lack of breath;
- Enlarged lymph nodes (without the inguinals);
- Vision disorders.

**Laboratorial:**

- Progressive anemia, leucopenia, lymphopenia, highly increased B.S.R (blood sedimentation rate), thrombocytopenia.

**Virusological tests:**

- Positive orrholgy for anti HIV-antibodies - by the method of ELISA and affirmative test Western Blot;
- Proof of HIV-antigen, ??V ?24-?ntigen, antibodies to ??V ?24, ?17;
- Proof of ??V-virions - it has no practical mean yet;
- Positive PCR (polymerizal-chain reaction) - also with limited use.

***It has to be emphasized the need of highly attention while working with cutting and acute tools, in order to prevent not only from cutting the glove, but also the liable skin.***

After the treatment of virus-carrier or AIDS diseased, in order to inactivate the virus, The Center for Control and Prevention of Diseases (USA) recommends the overalls to be put in bleaching solution to the temperature of 60-70°, after which to be washed to the temperature of 100°.

These principles are based on the fact that the great majority of carriers of hepatitis

viruses, or HIV, or both cannot be recognized clinically, contamination of instruments and hands is inevitable and imperceptibly small traces of blood can transmit hepatitis B and the virus is difficult to kill. ALL PATIENTS MUST THEREFORE BE REGARDED AS POTENTIALLY INFECTIOUS.

***Major measures to minimize cross-infection***

1. Have immunization against hepatitis B.
2. Take extreme care with needles or other sharp instruments and discard disposable safely into appropriate impervious bins.
3. Make sure of effective sterilization (autoclaving) of instruments and disinfecting of working areas.
4. Wear gloves, mask, protective goggles, or face shields and clean clinical garments in the surgery.
5. Maintain meticulous personal hygiene.
6. Give patients a 0.2% chlorhexidine mouth rinse preoperatively to reduce the number of oral microbes.
7. Use rubber dam (wherever feasible) and high-speed evacuation.
8. Try to avoid causing bleeding.
9. Keep working area to a minimum; use tray system or cover surfaces with disposable material. Uncovered surfaces and equipment should be cleaned and disinfected after treatment of each patient.
10. Take a careful medical history and take particular care in observing these precautions with high-risk patients.

***Care of equipment and working areas***

1. Heavy duty rubber gloves should be worn for all cleaning and disinfecting.
2. Clean all blood and debris from instruments before sterilization.
3. Autoclave all possible equipment, unwrapped, usually at 134°C for 3 minutes.
4. Discard all disposable and waste into an impervious bin for incineration.
5. Hand-pieces and other non-autoclavable

equipment may have to be sterilized in a hot-air oven or chemically, after thorough cleaning.

6. Disinfect working surfaces with 1% hypochlorite, change any disposable covering material and disinfect impressions.

***High-risk groups for AIDS and hepatitis***

1. Promiscuous male homosexuals and bisexuals
2. Intravenous drug abusers
3. Hemophiliacs and others who have received untreated blood products or unscreened blood
4. Sexual contacts of any of the above
5. Visitors from high-risk areas.

Cross-infection is the transmission of infectious agents between patients and staff within the clinical environment. Potential risks include not only hepatitis and HIV, but also other viruses (e.g. herpes) and bacteria (e.g. *Streptococcus pyogenes*). Transmission can occur by inoculation or inhalation. The BDA recommend:

1. A standard cross-infection control policy for all patients. This is advisable because it may not be possible to distinguish the healthy carrier. Also an effective policy will reduce the risks to the dentist and his staff, as well as being a practice builder.
2. Carriers of blood-borne viruses (hepatitis, HIV) can be treated in general dental practice, provided routine procedures are implemented rigorously.
3. Patients with manifestations of immunosuppression should be referred for specialist hospital care.

***Routine cross-infection procedures for all patients***

***Immunization.*** This is necessary against hepatitis B for all clinical staff, with a booster after 3 years (NB only 95% seroconvert) and also for tuberculosis, rubella, tetanus.

***Medical and social history.*** Tact and discretion is required if truthful answers are to be obtained to sensitive questions.

***Gloves.*** Should be worn routinely by dentist and DSA. The BDA recommend a new pair of gloves for every patient. Hands should be washed before gloving in a disinfectant solution and any cuts covered with a waterproof dressing. Hand cream should be used at the end of a session to prevent drying and cracking of the skin. Those with an allergy to latex can try vinyl instead, or wear under gloves of silk or nylon.

***Surgery design and equipment.*** New and existing surgeries should include separate areas for dentist and DSA, within which are designated "clean" zones. Layout and equipment must be planned to minimize the number of surfaces touched, e.g. taps or lights that can be turned on with infrared light switches or foot controls. Dental chairs and units are now designed with easy to clean surfaces.

***Cleaning and sterilization of instruments.*** Disposable instruments and cleaning materials should be used wherever possible. Manufacturers are exhibiting considerable ingenuity in this area (e.g. single-use diamond hand-pieces) must be cleaned and sterilized after use. Chemical solutions only disinfect and should be restricted to those articles, which cannot be sterilized by conventional methods. The use of plastic sheeting to cover hand-piece and 3-in-1 tubing and equipment handles is recommended by the BDA and is increasingly accepted by dentists, however, its use does increase the time taken between patients.

***Treatment of work surfaces.*** During use, instruments should only be placed on a sterilizable tray or disposable covering. Care is required to avoid contamination of areas that are difficult to disinfect.

- Apparently clean surfaces - 70% alcohol.
- Contaminated non-metallic surfaces - 10% chloride for 3 min.
- Contaminated metallic surfaces - 2% glutaraldehyde for 3 min.

- Spillage of blood - hypochlorite granules (left to gel)
- At end of session - as for contaminated surfaces.

**Aerosols.** These should be minimized by high volume suction. Gloves and masks should be worn. Aspirators and tubing should be flushed through daily with recommended disinfecting agent.

**Disposal of sharps.** Care is required to prevent needlestick injuries, and preferably a re-sheathing device should be used. Sharps must be placed in a rigid box. Disposal can be arranged via FHSA.

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**Laboratory items.** All impressions and appliances should be rinsed before going to the lab. Alginates which contain a disinfectant are available. Impressions of known carriers should be disinfected, therefore rubber base or impression compound materials are preferable.

### **Disinfection of impressions**

Silicone and hydrocolloid: 10% v/v Domestos for 10 min. Polyether C/I. Alginate: 2% gluteraldehyde for 5 min.

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Correspondence to: Prof. Angelina Kiselova, PhD, DDS, DMSc, Faculty of Stomatology, Medical University; Blvd. St. G. Sofiiski no. 1, 1606-Sofia, Bulgaria. E-mail: a\_kiselova@yahoo.com