WHO/ORH/INFECT.CTR/87
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Informal consultation between the World Health Organization and representatives of the dental manufacturing industry

on

Infection control and hygiene in oral care settings

Geneva, 2–3 September 1987

The Oral Health Programme
World Health Organization

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WORLD HEALTH ORGANIZATION

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CONTENTS

1. INTRODUCTION

As part of the activities of the Global Programme on Acquired Immunodeficiency Syndrome (GPA) and the Oral Health Programme (ORH), a consultation to promote the information exchange concerning infection control and infectious diseases in the delivery of oral health care was held at WHO in September 1987. Technical advice was provided by the Centres for Disease Control (CDC). Issues concerning information dissemination and the development of guidelines for use in oral health care settings were discussed.

HIV infection is a global problem, with three-quarters of the world's countries now reporting cases of AIDS to WHO. The increasing number of countries reporting HIV infection cases, from 60 in 1986 to about 130 in 1987, reflects the increased awareness of HIV infection as a global problem and the increasing willingness of countries to report cases to WHO.

On August 26, 1987 approximately 57,000 cases of AIDS had been reported to WHO. Available statistics indicate that the Caribbean, South America, Africa, Europe and North America are the areas most affected, and that the virus is found all over the world.

Since 1984, the Oral Health Programme, through the Expert Group on Equipment and Materials for oral Care (EGEMOC) has been active in promoting design and manufacture of appropriate oral care equipment and facilities, particularly for use in developing country situations. The emphasis has been on good design that facilitates oral care at as low a cost as possible. EGEMOC also provided guidelines to the International Standards Organization and the International Dental Federation on standards development in this area, and works in close communication with the dental manufacturing industry.

As a result of this collaboration, guidance in the area of infection control has been requested from WHO by the industry, so that practical and economic consequences can be taken into account when planning for the future.

Assistance from dental manufacturers on technological aspects relating to the implementation of guidelines, similar to that already received from other health care product manufacturers, is needed.

The production of safe systems for infection control and hygiene in oral care facilities for patients and operators at as low a cost as possible can be promoted by:

- providing guidelines to industry and oral care administrators on economic, practical and safe designs for oral care facilities and equipment;

- obtaining assistance on technological and design aspects of oral care environments;

- preparing guidelines on disinfection and sterilization procedures that are effective, realistic and practical for oral care environments;

- defining a role for the industry to participate in the dissemination of information to dentists and the public.

Health personnel have a vital role in the prevention of transmission of human immunodeficiency virus (HIV) infection. Oral health personnel (OHP) have three responsibilities in responding to the problems of the AIDS crisis:

1. To educate themselves and their patients about the disease;

2. To prevent disease transmission within the oral care setting; and

3. To provide for the care of patients infected with the virus responsible for AIDS.

According to preliminary data, the public and many health professionals have misconceptions concerning the epidemiology of AIDS and HIV infection. These misconceptions have, at times, caused a climate of fear and anxiety. For

example, despite epidemiologic data demonstrating low risk of contracting infection, many medical and OHP refuse to treat AIDS patients. The Oral Health Programme has already addressed this issue (see Annex 1).

Educational efforts concerning HIV infection should include OHP as one mechanism to reinforce the community message for AIDS to the public. Therefore, education of OHP must be conducted rapidly and in co-ordination with other health care disciplines.

National AIDS programmes have the lead role in providing the prevention response to AIDS and HIV infection. These responses are at varying stages within different countries. The specific role appropriate for oral health programmes and national dental organizations should be integrated within the national AIDS programmes of each country.

Guidelines for infection control are available from WHO, CDC, and the Federation Dentaire Internationale. Consistent use of currently recommended strategies will reduce, if not eliminate, disease transmission to oral health professionals and patients in the oral care setting. These guidelines were developed for industrialized countries, and their implementation may be problematic in situations where resources and manpower are limited. Whereas the principles of infection control are universal, specific procedures, methods and materials outlined should be appropriate for use in developing countries and for adaptation to diverse environmental settings.

OHP have an important role in providing health care to patients with AIDS and HIV infection. Diagnostic, referral and treatment services are rendered by OHP in conjunction with other health disciplines. Barriers to care, such as costs associated with infection control procedures, must be determined and maintained as low as possible.

HIV infection has been documented to occur via three main routes of transmission:

1. Penetrative sexual intercourse (homosexual or heterosexual);

2. Blood and blood contact (including transfusion of unscreened blood or blood products); and

3. Perinatally, from infected mother to child.

Studies have conclusively shown that the disease is not transmitted by:

1. Casual personal contact, such as among household members;

2. Environmental surfaces, such as lavatory seats, telephones or used clothing;

3. Food, water or airborne routes; and

4. Insects.

In areas of the world where blood donors are not screened for HIV, blood transfusions are still implicated in transmission. Likewise, the use of other contaminated sharp items, such as skin-piercing instruments which have not been sterilized, can contribute to HIV transmission. However, studies among health care workers have documented that the risk of HIV transmission from contaminated sharp items is low (probably much less than 1 percent).

Since HIV infection is a global problem, the involvement of WHO is critical in co-ordinating the response to AIDS. As with other epidemic diseases of global extension and concern, WHO cannot consider that AIDS has been controlled until it has been controlled in every country in the world.

An overview of epidemiology of the transmission of infection in health care settings and information on sexually transmitted diseases of the oral cavity was presented to the participants. Annexes 2 and 3 provide summaries of this information.

2. THE ROLE OF THE ORAL HEALTH SECTOR

The role of OHP in the prevention, diagnosis, counselling and treatment of patients with oral manifestations of infectious diseases has grown in importance. OHP are the only health care workers specifically trained in oral diagnosis and who regularly examine a large number of both healthy and compromised persons. Therefore, they have an important role in:

1. Counselling patients as to how to reduce their risk of acquiring infectious diseases;

2. Acting as a resource to patients in reinforcing community preventive messages and recommendations;

3. Ensuring that OHP do not contribute to the spread of diseases, and informing their patients about hygiene and sterilization routines used;

4. Recognizing oral signs and symptoms of infectious diseases and referring for treatment to prevent complications and further spread to non-infected persons;

5. Encouraging patients with oral manifestations of infectious diseases to refer their contacts for diagnostic evaluation and appropriate treatment; and

6. Acting as a resource for other health professionals in the care of oral conditions related to infectious diseases.

OHP need to maintain current knowledge of the epidemiology and modes of transmission of infectious diseases because:

1. It is very likely that OHP will be confronted with these issues in practice;

2. Occupational exposure by OHP to infections, such as hepatitis B, herpes and HIV, and cross infection among patients, can be prevented through consistent use of recommended strategies for infection control; and

3. OHP can offer advice on oral health-related topics and can play an important role in counselling the public on reducing risk behaviour. The regular contact between OHP and their patients provides an opportunity for the transfer of accurate information and for providing motivation to reduce high risk behaviours.

The scientifically documented risks for transmission of infectious agents in oral care settings should be identified and distinguished from perceived risks: in this way, a logical, reasonable framework can be devised so that the oral health community can engage in rational decision-making concerning personal practices.

While the documented risk of infectious disease transmission from OHP to patients is very low, relative to the total number of patients treated, the risk of disease transmission from patients to OHP is notably greater. Hepatitis B virus (HBV) represents a "worst case scenario" relative to transmission of infectious diseases. This is because HBV is more readily transmitted by relatively small amounts of contaminated blood or other body fluids and survives for considerable periods in the daily environment. Numerous studies document the increased risk of OHP to hepatitis B compared to the risk for the general population.

Significant fear of HIV infection among health care providers exists, despite the fact that current epidemiologic data support the conclusion that the actual risk of transmission of HIV in the occupational setting is low for all health personnel. The risk of transmission to health personnel who had parenteral or mucous membrane exposure to the blood or body fluids of patients infected with HIV, i.e., by injury from contaminated instruments, is also very low. Even though the documented risks for transmission of HIV infection are low, concern about the exposure is high and is likely to increase as HIV prevalence in the population increases. This concern must be addressed through objective information and guidelines for control of the spread of this infection in oral care settings.

In WHO, the Global Programme on AIDS and the Oral Health Programme have agreed to:

1. Disseminate information to the public through OHP;

2. Prepare guidelines on infection control;

3. Develop information, training packages and curricula for OHP;

4. Develop oral care strategies for HIV-infected patients;

5. Disseminate information on early detection and oral manifestations of HIV to OHP; and

6. Extend the Global Oral Data Bank to include oral manifestations of HIV infection.

3. INFECTION CONTROL IN ORAL CARE SETTINGS

The guidelines and recommendations for infection control in oral care settings provided in this document are especially focused on the prevention of transmission of HIV infection, but also relevant to other infectious agents. It is recognized that protection of OHP from contact with the blood and body fluids of all patients and appropriate decontamination of items used in providing oral care is necessary. Since infected patients may not be readily identified, the blood and body fluids of all patients must be assumed to be infectious and the same precautions used for all patients. If consistently used, these procedures will virtually eliminate the risks of transmission of infectious agents.

The aim of any sterilization and disinfection procedure is to reduce the transmission of infectious agents between patients, personnel and clinical environments. HIV is more sensitive to disinfection and sterilization than most pathogenic microorganisms. Therefore, methods of sterilization or of disinfection which are capable of destroying other pathogenic organisms, such as HBV, would also destroy HIV.

Oral care equipment may be subdivided into two categories:

- Critical - items which are used to penetrate tissue or for which such contact may be anticipated;

- Non-critical - items that come into contact with intact skin and clothes;

All instruments used intraorally in the provision of oral care may inadvertently become contaminated with the blood and body fluids of patients and, therefore, should be managed as critical items.

3.1 Critical Items

The following procedures are recommended for critical items:

It is imperative that all instruments be cleaned thoroughly before being sterilized or be disinfected at high level by any method. It is suggested, particularly for health care settings where the prevalence of HIV infection among patients is high, that medical instruments should be soaked for 30 minutes in a chemical disinfectant before cleaning. This will give further protection to the personnel from exposure to HIV during the process of cleaning. Where economic constraints dictate instruments should be soaked in cold water.

Table 1

Examples of Items	Process of first choice Sterilization	Process of second choice Disinfection
Needles Instruments Suction tips Handpieces Burs X-ray film holders Impression trays	a) clean/rinse in cold water, then b) steam autoclave at 121°C for 20 minutes, or c) dry heat at 170° - 180°C for 2 hours	a) clean/rinse in cold water, then b) boil for 20 minutes, or c) use chemical methods

Sterilization by steam. Steam sterilization (autoclaving) is the method of choice for reusable medical instruments including needles and syringes. An inexpensive type of autoclave is an appropriately modified pressure cooker (WHO/UNICEF type). Autoclaves and pressure cookers should be operated at 121°C (250°F) equivalent to a pressure of 1 atm above atmospheric pressure (203 kPa, 15lb/in^2), for a minimum time of 20 minutes.

WHO and UNICEF have collaborated in developing a portable steam sterilizer containing an insert (rack), where needles, syringes and other instruments commonly used in oral health care settings can be fitted.

Sterilization by dry heat. Sterilization by dry heat in an electric oven is a method of sterilization for instruments that can withstand a temperature of 170°C (340°F). This method is therefore not suitable for plastic items. An ordinary electric household oven is satisfactory for dry heat sterilization. The sterilization time is two hours at 170°C (340°F).

High level disinfection by boiling. A high level of disinfection is achieved when instruments, needles and syringes are boiled for 20 minutes. This is the simplest and most reliable method for inactivating pathogenic microbes, including HIV, when sterilization equipment is not available. Hepatitis B virus is inactivated after a few minutes of boiling and it is probable that HIV, which is very sensitive to heat, is also inactivated after several minutes of boiling. However, to be sure that other more resistant agents are also inactivated, boiling should be continued for 20 minutes.

High level disinfection by soaking in chemicals. Many disinfectants recommended for use in health care facilities have been found to inactivate HIV in laboratory testing. However, chemical disinfectants are, in practice, not reliable because they may be inactivated by blood or other organic matter present. Furthermore, they must be prepared carefully. They may also rapidly lose their strength, especially when stored in warm climates. Chemical disinfection must not be used for needles and syringes. Chemical disinfection for other skin-cutting and invasive instruments should only be employed as the last resort, if neither sterilization nor high-level disinfection by heat is possible and then only if appropriate concentration and activity of the chemical can be assured, and if used on instruments which have been thoroughly cleaned prior to soaking in the chemical disinfectant.

The following chemical disinfectants have been shown to be effective in inactivating HIV:

sodium hypochlorite 0.1 to 0.5% of available chlorine
chloramine 2%
ethanol 70%
isopropyl alcohol 70%
polyvidone iodine 2.5%
formaldehyde 4%
glutaral (glutaraldehyde) 2%
hydrogen peroxide 6%

Other commonly used disinfectants may also be effective, but laboratory data on their effectiveness are not available.

Ideally injection needles should be disposable and not reused. If, for economic reasons, needles are reused, they should be cleaned, and then steam sterilized or boiled. No chemical disinfection method should be used.

3.2 Non-critical items

Chairs, units, lamps should be routinely cleaned with water and detergent and wiped with a chemical disinfectant. Should they become visibly contaminated with blood and saliva, the following special procedures should be used:

Disinfection by wiping with a chemical. Wiping with an appropriate disinfectant is acceptable for surfaces such as table tops and for areas on which blood has been spilt. The area should first be flooded with the disinfectant; the mixed blood and disinfectant should then be removed; finally the surface should be wiped with the disinfectant. Sodium hypochlorite is the preferred agent. If alcohol is used, the surface should be wiped several times because alcohol evaporates rapidly.

3.3 Clinical situations

In oral care facilities equipped with reliable services - water, gas and electricity - first choice processes for sterilization of critical items and for cleaning and disinfecting non-critical items are recommended for routine use.

Specific guidelines are provided in the CDC booklet "Preventing the Transmission of Hepatitis B, AIDS and Herpes in Dentistry".

3.4 Community situations - Primary oral health care settings

Care provided in these settings usually includes:

- oral examination
- surface care (noninvasive treatment procedures)
- health education
- referral
- emergency care.

In many situations, first choice methods - steam autoclaves - will not be routinely available, and second choice options - boiling or chemical methods for instrument management are recommended. Where extractions are also provided in these settings, special care of needles is needed (see section 3.2).

3.5 Special situations

Oral epidemiological surveys are usually conducted outside regular oral care settings and, boiling or chemical methods, for survey instruments is recommended where facilities for steam sterilization are not available.

Emergency care settings where large numbers of patients are treated daily in facilities with limited equipment, the use of second choice methods are recommended.

4. THE ROLE OF THE DENTAL MANUFACTURING INDUSTRY

4.1 The following recommendations concerning the design and manufacture of products for oral care were agreed upon during the meeting:

- Improved design of instruments to prevent or reduce the risk of accidents is needed;

- Double-ended instruments in general are probably more dangerous than single-ended ones;

- Needle and syringe designs, in particular, should facilitate safe dismantling and disposal;

- Surface texturing of instruments, e.g. knurling, should be limited in area and as shallow as possible in order that they may be cleaned easily;

- Items should be constructed of stable materials that can be cleaned and sterilized or disinfected economically and simply, e.g., by routine steam autoclaving;

- Items should be designed for disposability, where economically feasible;

- Other problems that need to be solved are decontamination of water-lines and handpieces.

4.2 It was agreed that the development and production of the following specific items was needed:

- An apparatus to clean and steam-sterilize instruments that would eliminate the need for handling soiled instruments, e.g., a "washer/sterilizer."

- Reliable, economic and easy-to-use indicators, either chemical or biologic, to indicate that

  i) instruments have been exposed to a complete sterilization cycle, and

  ii) the sterilizer is in proper working order.

These should be used on a daily basis. It should be noted that while chemical indicators show that the package has been exposed to a sterilization cycle, they do not indicate if that package is actually sterile. Biologic indicators to check the efficacy of the sterilizer or to certify the sterility of a particular package must be used on a weekly basis.

- Containers composed of lightweight, economical materials used for storing sterilized items.

- Inexpensive, practical methods for safe disposal of needles and other sharp instruments, i.e., one-way containers that cannot be opened and are essentially impenetrable.

5. CONCLUSIONS

Risk of transmission of infectious agents can be managed with appropriate information, technology and routine implementation of asepsis by OHP. Information dissemination must increase:

- printed materials concerning disinfection and sterilization must be developed by WHO and its collaborating centres and

- distribution of the material could be facilitated by international and national dental organizations and dental manufacturers and distributors.

Commitments by individuals and organizations in the oral care community are needed for the allocation of adequate levels of resources, continued scrutiny of technology, assessment of information dissemination, and surveillance and management of risk situations. Management of risk by co-ordinated action is necessary to prevent extraordinary and scientifically unjustified expenditures of fiscal and human resources.

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Annex 1

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DENTISTS' PROFESSIONAL AND ETHICAL RESPONSIBILITIES FOR HIV-POSITIVE PATIENTS AND PATIENTS WITH AIDS

There has hardly ever been a disease, which has received such wide-spread interest from the mass media as the acquired immunodeficiency syndrome (AIDS). Several explanations may account for this phenomenon, one of which is the alarming increase in the number of persons infected with the human immunodeficiency virus (HIV) and the number of AIDS patients. The number of HIV-infected and diseased persons will continue to rise and is certain to be substantial in the future (1). As of 1 April 1987, 45 700 AIDS cases were reported to WHO's Special Programme on AIDS from 102 countries throughout the world. AIDS and HIV infection are now pandemic, and constitute a priority public health problem of global importance.

Dentists all over the world will therefore have to prepare themselves for delivery of oral health care to HIV infected patients. Consequently, it is relevant to ask what professional and ethical responsibilities do dentists have with regard to these patients? The World Health Organization recommends that dentists participate actively in the global and national AIDS prevention and control programmes. The oral health section of this programme may be summarized as follows:

- Examination of the oral cavity for detection and diagnosis of those oral manifestations often seen in AIDS-patients and HIV-positive individuals (4-7). When possible, patients should be referred to an oral medicine unit for further diagnosis, if the findings suggest an underlying immunodeficiency.

- Providing ordinary oral health care to HIV-positive individuals. Treatment of oral mucosal lesions may preferably take place in dental departments of hospitals or at dental colleges.

- Upgrading of the oral health team's knowledge with regard to infectious diseases, their transmission, and the necessary hygienic procedures for infection control when providing oral health care.

- Education of dental clients regarding HIV transmission and its prevention.

Dentists are trained to examine and diagnose pathological conditions of the oral mucous membranes. This part of the dentists' professional responsibility has indeed been emphasized by the appearance of AIDS, since oral manifestations can be seen not only among AIDS-patients but they may also precede the general clinical signs of the disease in HIV-infected persons (7). Examination of the oral cavity alone is, however, not a suitable method for screening populations for AIDS or HIV-positivity as this requires a high predictive value for positive as well as negative findings. The predictive value from examining the oral

cavity is of course greater when carried out in populations with a high prevalence of infected persons, but it is still too low to be used alone. It might be concluded only that findings such as oral candidiasis, acute necrotizing ulcerative gingivitis, etc. may be a sign of AIDS or HIV-positivity. The only pathognomonic sign for an HIV infection is "hairy" leukoplakia confirmed by histological examination (4, 7). When oral lesions are found the case history should be further elaborated with regard to general symptoms, sexual behaviour and other risk factors. If suspicion of an underlying immunodeficiency is supported the patient should, if possible, be referred to an oral medicine unit, and, if indicated thereafter, transferred for final diagnosis and treatment. Surveillance and treatment of oral manifestations should be carried out in close collaboration with the responsible medical department.

In contrast, ordinary oral health examinations and treatments are expected to be carried out in general dental practice. Unfortunately, there still seem to be dentists who refuse to treat HIV-infected patients, despite clear recommendations from the experts (8-10). Apparently some colleagues require a complete guarantee that transmission will never occur in connection with oral health treatment; such a guarantee cannot be given. However, transmission during oral health treatment is still considered to be a theoretical possibility only, as no case of AIDS or HIV-positivity due to professional exposure has been reported among oral health personnel (10, 11). A similar low risk of infectivity has been reported in other studies of health care workers (11-16). A depressing factor when dentists reject HIV-infected patients is that the psychosocial pressure on the infected persons is increased even further. Furthermore, the dentists in question do not live up to an acceptable professional and ethical standard, and they do not eliminate the theoretical risk of becoming infected, as rejected patients most likely will seek another dentist and then conceal their HIV-positivity. Finally, only a minority of the infected cases will be identified at a given period, which stresses the unwise decision of rejecting a patient who benefits the dentist by confiding his/her seropositivity.

The World Health Organization considers that dentists have a professional and human obligation to treat and care for HIV-infected persons. In this way the dental community can, together with other health care workers, psychologists, social counsellors, etc., support the infected and the diseased. AIDS and its related problems are not going to disappear in the near future. It is high time that all dentists, especially in countries where HIV-infection is a major public health problem, accept their role in the combat and prevention of the disease.

The World Health Organization is in the process of establishing an International Collaborating Centre for the Oral Manifestations of the HIV-infection at the Dental Department of the University Hospital ("Rigshospitalet") in Copenhagen, Tagensvej, DK-2200 Copenhagen N., Denmark.

As far as financial resources allow the Centre will assist the dental profession in arranging courses, and will supply teaching material and other types of information.

ORAL HEALTH UNIT
WORLD HEALTH ORGANIZATION

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Annex 2

TERMINOLOGY USED IN INFECTIOUS DISEASES EPIDEMIOLOGY

Epidemiology

The study of the distribution and determinants of diseases and conditions in human populations

Descriptive	time, place, person
Analytic	case control, cohort studies. Utilizes descriptive epidemiological data to develop conclusions of risk factors and etiology.

Endemic

Disease which occurs with an on-going frequency within a specified population and/or geographic area. "Background community disease"

Sporadic

Disease which occurs occasionally and irregularly and with generally low prevalence

Incidence (rate)

The number of new cases of an infection in a population within a specified time

Prevalence (rate)

The total number of cases of an infection in a community at a point in time or over a period of time

Epidemic (outbreak)

Marked increase in disease rates above those expected

Infection

Replication of organisms in the tissues of a host to the point of producing clinical symptoms, signs, and/or serologic reactivity

Colonization

Presence of a microorganism with growth - but no clinical disease or detectable immune response

Sub-clinical Infection

No clinical disease but detectable immune response (e.g., serology)

Clinical Disease

Presence of microorganisms of with clinical signs and/or symptoms subsequent to infection

Carriers

Asymptomatic persons capable of transmitting disease

- may be "colonized" or "sub-clinical infection"

  short-term
  intermittent
  chronic

Dissemination

Movement of organisms from a person to the immediate environment

Contamination

(1) Microorganisms transiently present on body surfaces without tissue invasion or physiologic reaction

(2) Presence of microorganisms on an inanimate object

Nosocomial Infections

Historically defined as infections that occur following health care occurring in a hospital

- Practically, should include other health care settings

Iatrogenic Infections

Infections that occur as a consequence or result of a medical or dental procedure due to lack of appropriate precautions and techniques

Transmission

Infection resulting from interaction(s) of an infectious agent with a susceptible host

"Chain of Infection"

Reservoir (source) - Transmission - Host

Modes of Transmission - 4 main routes of transmission

Contact transmission:

a. Direct - contact between susceptible host and infected colonized person

b. Indirect - contact of host with contaminated intermediate object

c. Droplet

   (1) Vehicle - transmission through food, water, drugs

   (2) Air-borne - by droplet nuclei or direct particles

   (3) Vector-borne - by mosquito or other insects

Establishment of infection requires a host-pathogen interaction - transmission of infection are dependent on a number of factors: modes of transmission, host resistance, the physical characteristics of the organism (pathogenicity), and the efficacy of transmission route

Host Factors

Defenses:

Physical barriers (e.g., skin)
Mucosal barriers (e.g., lysozyme)
Immune status (IGA, IGG, antigen-specific antibodies)

Pathogenic Factors

Virulence (invasiveness)

Dose (inoculum)

Transmission Routes - Patient/Practitioner

1. Direct contact
   a. Blood
   b. Secretions
   c. Mucous membranes
2. Droplet nuclei and splatter
3. Water
4. Fomites (inanimate objects)
5. Indirect contact

Sterilization

Destruction of all forms of microorganisms

Disinfection

Destruction of most potentially pathogenic microorganisms except spores

Portals of Entry of Infection - Examples

1. Intact or broken skin or mucous membranes (e.g., hand, conjunctive, oral or nasal mucosa)
2. Upper respiratory tract
3. Other (e.g., anal, etc.)

Percutaneous Exposures - exposures to infectious agents mediated through breaks in the mucous membranes or skin by sharp instruments or objects

1. Injection apparatus used in medical practice or by lay healers, illicit use of by drug abusers
2. Decorative skin piercing
3. Scarification and rituals
4. Tattooing
5. Electrolysis

Analytic Epidemiology

To identify causes of an outbreak, you need:

1. Suspicion
2. Definable disease (case definition)
3. Individuals with disease (cases)
4. Individuals without disease (controls)
5. Numbers (power)
6. Identifiable risk factors
7. Analysis of data
8. Determination of effect

Diseases of Potential Iatrogenic and Occupational Importance in Oral Health Care Settings

Examples from the hospital nosocomial model

Bacterial: Staphylococcus, Streptococci, Meningococcus (pharynx)
Legionella, Pseudomonas, Acinetobacter (water-associated organisms)
Pertussis
Mycobacteria (Tuberculosis)
Treponemes (Syphilis, yaws)

Viral:	Hepatitis B, non-A-non-B	) blood-borne
	HIV	)
	Herpes simplex, Varicella-zoster	)
	Influenza and parainfluenza viruses	) respiratory
	Enterovirus, Rhinovirus, Adenovirus	) secretion-borne
	Respiratory Synctitial Virus	)

Studying the Inanimate Environment and Infections - types of studies

1. Survival studies - poor, i.e., poor epidemiological correlation
2. Microorganism proliferation observations

3. Epidemiologic studies:

   a. Attributable risk

   b. Case-control studies

   c. Prospective studies

Problems in Oral Health Epidemiology Related to Identification of Sources of Infection

1. Ambulatory patient populations with many other contacts
2. Low reported prevalence of disease transmission
3. Relatively healthy patients (i.e., indistinct clinical patterns)
4. Most syndromes are common (e.g., upper respiratory tract infection (URI)), therefore, may not be linked to contact with a dental practitioner by the patient by his/her medical advisor
5. Lack of resources to initiate and conduct studies

Transmission of Hepatitis B

1. Direct contact with blood or other contaminated body fluids
2. Percutaneous exposure to contaminated sharp items, such as needlestick
3. Exposure of mucous membranes or non-intact skin to contaminated spatter
4. Sexual - most common mode in developed world
5. Perinatal - most common mode of transmission in Asia. Effect of immunization campaign in China
6. Contaminated injection apparatus (Intravenous drug abuse)
7. Multiple-use vials
8. Dialysis units

Specific Aspects of Oral and General Health and Care in Developing Countries

1. Advanced oral pathology (more likely to shed blood and other infected secretions)
2. Resources and available technology
3. Higher background carrier rates (e.g., HIV) of disease
4. Informational and training issues

Recommendations for Vaccination of Dental Health Care Workers or Demonstration of Immunity

1. Hepatitis B
2. Tetanus-diphtheria (Td)
3. Measles-rubella (MR)
4. Influenza - annually in endemic area

... and where appropriate

5. Poliomyelitis
6. Cholera
7. Japanese encephalitis
8. Yellow Fever
9. Other vaccine recommended by WHO for specific areas

Annex 3

Sexually Transmitted Diseases of the Oral Cavity

1. Introduction

Exposure to blood and other body fluids by oral health personnel (OHP) is a potential hazard for OHP. These exposures can occur through microtrauma of oral soft tissues, by inoculation with contaminated needles and other sharp instruments, by direct unprotected contact with infected lesions, or through spatter of blood and body fluids onto the mucous membranes of OHP. While the amount of inocula necessary for transmission has only been well documented for hepatitis B (less than 1 microliter of infected blood), other infectious microorganisms may be present in the blood and saliva of patients. Infectious inocula of hepatitis B virus (HBV), human immunodeficiency virus (HIV), non-A-non-B hepatitis virus (NANB), delta hepatitis virus, Treponema pallidum (syphilis), and others may be present in the blood of similarly infected patients.

Documented cases of sexually transmitted disease (STD) transmission via saliva are rare. In saliva, cytomegalovirus (CMV), herpes virus, HIV, and Neisseria gonorrhoeae may be present in saliva without oropharyngeal symptoms. With the exception of CMV and herpes, saliva-borne transmission of disease organisms is probably unusual. Even though the size of infectious inoculum necessary for transmission is not known, the concentrations of these microorganisms are relatively low in saliva.

However, concentrations of infectious organisms in crevicular fluid and blood extravacated from tissues traumatized during oral care may contain much higher concentrations of hepatitis B virus, HIV, and CMV in infected patients.

Direct contact with secretions from infectious lesions may very efficiently transmit some infectious disease. Herpes, syphilis, gonorrhea, and conditions associated with human papillomavirus (condyloma acuminata) may be transmitted by this mechanism.

The following text provides a brief overview of some STDs that OHP may encounter in clinical practice. NOTE: Epidemiological data refers to the United States unless otherwise specified.

Transmission of infectious disease may occur from patient-to-OHP, from OHP-to-patient, and from patient-to-patient. Documented transmission of infectious diseases in general from patient-to-OHP and vice versa is rare in the United States; the greatest risk would be from patient-to-OHP. This risk has not been quantified with the exception of hepatitis B where, in the United States, the occupational risk for dentists from hepatitis B is 5-10 times greater than that of the general population and at least twice that of some physicians. Other infections may be similarly transmitted to OHP. Patient-to-patient transmission of disease in the United States has not been documented. Risk of transmission would vary according to the infection control measures employed.

2. Herpes Virus Infections

The Herpes virus family consists of at least five viruses: Herpes simplex (types 1 and 2), varicella-zoster, Epstein-Barr virus, and cytomegalovirus (CMV). Herpes virus infections are characterized by the development of long-term, latent infection in a susceptible host, which may result from a single exposure. This section will describe the infections due to Herpes simplex viruses type 1 (HSV-1) and type 2 (HSV-2).

Ninety percent of orolabial herpes lesions are caused by HSV-1 while 10 percent of cases are caused by HSV-2. The proportions are reversed for genital lesions. Individuals engaging in orogenital contact (fellatio, cunnilingus) or oroanal contact (analingus) are more likely to develop genital or anal herpes caused by HSV-1, and orolabial herpes caused by HSV-2. Herpes simplex virus infections of the hand (herpetic whitlow) may be transmitted by direct contact with herpetic lesions or, more commonly, from virus shed in saliva or genital secretions. Herpes keratitis infections of the eye are most frequently transmitted from auto-inoculation. They may also be transmitted from contact with contaminated patient secretions, as occurred in an outbreak of herpetic eye infections in nurses working in a pediatric intensive care unit.

The epidemiology of herpes infections in the general population in the United States may provide information concerning potential risks for OHP from occupational exposure to contaminated oral secretions and tissues by OHP: (1) Over half the general population is exposed by age 40; (2) exposure rates are highest in lower socio-economic groups and children attending day-care centers. Serologic prevalence studies, which indicate past exposure to HSV, have reported that primary childhood HSV-1 infection is common; (3) in day-care centers, 40-50 percent of children from 6 months to 5 years of age have serologic evidence of HSV-1 exposure. Over 95 percent of primary episodes in these children were asymptomatic; and (4) in a study of U.S. dental school faculty and students, herpes seroprevalence became higher with older persons and was higher in faculty as compared to students. Over half of the seropositive individuals could not recall an episode of primary infection.

Infections of herpes simplex virus may manifest three clinical phases: primary infection, latency, and reactivation. Shedding of herpes virus, including asymptomatic shedding, may occur during any phase. Although the vesicular and ulcerative lesions of primary and recurrent herpes have the highest viral titers, recent studies suggest that viral shedding may occur during the latency phase in patients without identifiable symptoms or lesions. The latter is of particular concern to OHP.

Primary oro-facial HSV infection may occur following initial exposure, most commonly as a pharyngitis or gingivostomatitis, and may be associated with fever, malaise, and cervical adenopathy. Lesions begin to appear in the affected area 2-3 days after exposure, and new lesions continue to appear for about 1 week. The lesions progress from vesicular through bullous and ulcerative phases followed by the development of crusts and healing within a few days. Complete healing usually occurs 14-21 days after exposure.

Large numbers of virus particles may be shed from herpetic lesions, especially during the vesicular, ulcerative, and bullous stages. Swabs of oral herpetic blisters and ulcers in the first 24-72 hours contained 10^7-10^9 viral particles. Viral titers decreased as healing progressed, but the majority of patients were still shedding virus 1 week later, although at titers lower by several orders of magnitude.

The majority of primary orolabial herpes infections have mild clinical manifestations. However, a small proportion of cases develop severe signs and symptoms from the initial infection. These may include gingivostomatitis, which can cause exquisite tenderness of oral mucous membranes and pharyngeal obstruction.

The second phase of infection is latency. During the primary phase, virus particles have already infected the ganglia innervating the infected area and infection is poorly understood. For oropharyngeal herpes, the trigeminal ganglia are involved, and for anogenital herpes, the lumbosacral ganglia are involved. In herpetic whitlow, the cervical dorsal root ganglia are involved.

The predisposing and precipitating factors for recurrences are not well understood. A recent report suggests that predisposition to recurrence is related to both the type of virus and anatomic site of infection. In the oral cavity, more recurrent episodes were observed with disease caused by HSV-1. Conversely, in the genital tract, recurrences were more frequent in patients infected with HSV-2. Other conditions such as upper respiratory infections, intense sun exposure, fatigue, stress, physiological changes, trauma, including traumatic dental procedures such as extraction and trigeminal-root decompression, have been reported to precipitate the development of new lesions. For this reason, it seems reasonable to delay elective dental procedures for patients with primary or reactivated herpes, if possible, until the episode subsides, in order to prevent the precipitation of recurrences at other anatomic sites.

Clinically, recurrent orolabial HSV may be preceded by prodromal symptoms such as burning or tingling sensations in the affected area. Mucocutaneous lesions similar to those seen in the primary phase appear. However, healing of the lesions in recurrent herpes is faster, occurring a mean of 6 days after onset of symptoms. In contrast to the primary phase, constitutional symptoms are almost always absent in noncompromised patients.

OHP and other health personnel, such as nurses and pathologists, are at occupational risk for herpetic whitlow or paronychia. Herpetic whitlow is herpes infection of the finger while paronychia is infection of the nailbed. These infections are usually acquired through percutaneous exposure or direct contact with infected lesions or secretions. This disease has the same three phases as genital and oral herpes, and is a particular occupational disability for OHP who depend on full use of the hands to practice. In 1981, a dental hygienist with active herpetic whitlow, practicing without hand protection, was implicated in an outbreak of acute herpetic gingivostomatitis in a dental practice. Twenty of 46 patients whom she treated within a 4-day period contracted acute orolabial herpes (attack rate = 43 percent). The outbreak stopped when she started wearing gloves.

Patients with compromised cell-mediated immunity, such as cancer patients or persons infected with HIV, may have more frequent and prolonged recurrences. Recurrences in these patients may also result in severe manifestations such as mucosal ulcerations, bleeding, and Candida. Mucocutaneous herpes lesions of more than 4 weeks may be associated with severe HIV infections.

No known cure for herpes is known. Topical acyclovir and orally administered acyclovir have been shown to decrease the symptom intensity and duration of both primary and recurrent episodes in both orofacial and genital herpes. Recent data suggest that long-term suppressive therapy may decrease the number of recurrences in some patients. However, the beneficial effects of long-term suppressive therapy must be balanced against the cost and potential toxicity of prolonged drug administration.

In defining the risk of occupational exposure of acquiring herpes virus infections, quantitative risks have not been determined. However, transmission by OHP of virus can occur by direct contact with infected lesions, percutaneous exposure to infected exposure, or direct contact with infected secretions. Even though saliva from asymptomatically-infected patients has a relatively low virus titer (10^2-10^3 particles/mm^3) compared to lesion swabs, saliva in patients with active herpetic lesions or in patients who have a history of herpes should be considered infectious. Additionally, published reports have shown consistently that 5 percent of patients with a history of recurrent herpes asymptomatically shed virus particles. Infection control guidelines to prevent exposure by OHP to potentially infected secretions should be scrupulously followed.

Transmission of herpes through fomites (inanimate objects) has not been documented. Inanimate transmission vectors have been of popular concern recently because of the reported isolation of herpes virus from toilet seats, hot tub surfaces, and towels. Herpes virus has been cultured from dental record folders and can survive as long as 45 minutes on dental handpieces. However, the implications of these findings in the transmission of actual infection with disease are unclear. Most experts believe that the finding of pathogens on inanimate objects without epidemiologic evidence of disease transmission is inconclusive and, in many cases, misleading. Patients should be reassured about the low likelihood of transmission via fomites. However, the use of proper infection control procedures to protect both OHP and patients cannot be underemphasized.

3. Viral Hepatitis

Viral hepatitis (specifically hepatitis B) is the most significant occupationally-acquired disease of importance to OHP. Viral hepatitis is classified by type of virus into four categories: Hepatitis A, hepatitis B, delta agent, and non-A-non-B hepatitis. Sexual activity is the primary mode of transmission in viral hepatitis, with the exception of non-A-non-B. Excluding hepatitis A, viral hepatitis is an important occupational hazard to health care personnel.

Approximately 60,000 cases of viral hepatitis are reported annually in the U.S. general population. The case definition for reporting cases of hepatitis usually includes jaundice. The reporting efficiency of clinical cases (number of reported cases divided by the number of actual cases) is estimated to be 10-33 percent. Therefore, the actual morbidity (number of infections) is probably in the range of 180,000-600,000 cases annually in the United States. Of the total number of infections, approximately 45 percent are hepatitis A, 45 percent are hepatitis B, 5 percent are non-A-non-B, and 5 percent are unclassified. Because the majority of viral hepatitis infections are asymptomatic and anicteric (without jaundice), estimates of cases substantially underestimate the true number of infections. By contrast, in areas of Asia and Africa, > 90 percent of the population have serologic evidence of hepatitis B infection. For a more detailed discussion of either the clinical features or serological characteristics of the viral hepatitides, the reader should consult a standard medical text.

Hepatitis B

Hepatitis B virus (HBV) has a molecular structure consisting of an inner core and an outer layer of protein. The outer layer, called hepatitis B

surface antigen (HBsAg), is produced in excess during infection and is detectable in the patient's serum.

Only about 10-20 percent of patients with HBV infection develop clinical symptoms and signs. In symptomatic cases, the incubation period may be 2 weeks to 3 months, although production of antigens, closely correlated with viremia, is present soon after the initial infection. The clinical phase consists of low-grade fever, jaundice, nausea, protein/fat intolerance, and weight loss, and usually resolves within 3 months. Approximately 1 percent of HBV infections pursue a fulminant course, and mortality in this subgroup is 50-80 percent.

Within 6 months of symptom onset, 90-95 percent of patients develop hepatitis B surface antibody (anti-HBs), and the antigenemia resolves. The other 5-10 percent, however, are likely to become chronic HBsAg carriers, indicative of chronic HBV infection. These persons may continue to secrete infectious HBV particles and are at high risk for developing chronic hepatitis, cirrhosis, and hepatocellular carcinoma.

Although hepatitis B is usually associated with blood transmission, sexual activity is implicated in the largest number of cases. Heterosexual partners of patients with HBV, heterosexuals with increased number of sexual partners, and homosexual men are at increased risk. No epidemiologic studies have been performed on homosexual women. In homosexual men, an increased number of partners and specific sexual practices such as rectal intercourse and receptive fellatio were independently correlated with increased risk.

Infection rates of HBV are higher among certain populations, including health care workers (HCWs) who may have frequent contact with blood, saliva, and secretions from contact with blood and body fluids of large

numbers of patients. Although HCWs, such as dialysis unit personnel, have prolonged and frequent exposures to hepatitis, OHP are documented to be at high occupational risk since in the words of one editorial writer "dentistry has a monopoly on the insertion of ungloved hands into a body opening." The frequent use of sharp instruments that may be contaminated during use, i.e., scalers, explorers, and handpieces, increases the risk both to patient and to OHP.

The prevalence of previous infection in OHP is indicated by the high rate of seropositivity to hepatitis B surface antigen (HBsAg) and antibody (anti-HBs). Studies conducted during the 1970s report that 9-21 percent of dentists had serological evidence of HBV exposure; 0.8-1.7 percent were HBV carriers. These rates were 2 to 5 times greater than the volunteer blood-donor population at that time. Positive correlation was found consistently between the presence of serological markers and age, years in practice, and performance of procedures involving unprotected exposure to infected blood and other body fluids. The lifetime risk of HBV infection in OHP who practice without consistent protection from potentially contaminated secretions has been documented to be nearly 25 percent.

Transmission of HBV from patient to OHP probably occurs easily. Experiments in animals have shown that 0.01/ul of infected serum can result in transmission of HBV. Quantities this small can be inoculated through microscopic abrasions in the hand and through needlestick injuries. In studies of needlestick injuries in susceptible hospital workers via blood from HBV-positive patients, transmission of HBV was documented in 6-26 percent of cases. HBV particles have been found in saliva, and experimental infection with infected saliva has been

performed in a chimpanzee model. The HBV particles in saliva are derived from the crevicular fluid, a plasma filtrate. In HBV carriers, titers of HBsAg levels in the crevicular fluid approach those of plasma.

Transmission from OHP to patient can occur by the extravasation of blood or serum, possibly from microlesions which may be present on the practitioner's hands (e.g., exzema) into a patient's traumatized tissue or onto mucous membranes. As the patient's oral tissues may sustain some trauma during many dental procedures, the potential exists for direct entrance of virus particles into the bloodstream from unprotected, infected OHP.

Hepatitis B outbreaks of disease transmission from OHP-to-patient have occurred in the practices of OHP who were HBV carriers. In all of these outbreaks, the OHP were asymptomatic and were not aware of their antigen status. Risk of disease transmission to the patient was positively correlated with the degree of trauma involved in the dental procedure. Attack rates can be very high. In one oral surgeon-related outbreak, patients treated in one particular month had an attack rate of 31 percent. In other words, 31 percent of all patients who visited the oral surgeon that month became infected with HBV.

Although rare, catastrophic consequences have occurred. A dentist-related hepatitis outbreak in Indiana in 1985 resulted in two patient fatalities from fulminant hepatitis, the only reported deaths resulting from hepatitis transmitted by a HCW. In another outbreak, dentist-related infection of a pregnant woman resulted in secondary transmission of the disease by the woman to her husband and to the newborn child.

In all of the outbreaks, gloves were not routinely worn by the practitioner. Serendipitously, one of the outbreaks presented an opportunity to evaluate the efficacy of glove use. In this outbreak, the dentist began wearing gloves after his HBsAg status was discovered. No further cases were transmitted afterwards. However, glove use cannot protect against HBV transmission without the use of additional precautions. Needlestick injuries still may occur in gloved personnel.

Cases of HBV transmission have also occurred from HBV-positive medical practitioners to patients. Some of these involved the performing of blind suturing by gloved practitioners, which resulted in punctured gloves.

Hepatitis B transmission can be prevented by OHP, through adherence to implementation of infection control guidelines for all patients, and by vaccination against hepatitis B. The patient's medical, behavioral, and sexual history will fail to identify HBsAg carriers in up to 50 percent of cases.

A very effective prevention measure, the hepatitis B vaccine, can prevent disease in susceptible populations. All OHP, including hygienists and technologists, should be immunized against hepatitis B according to immunization schedules recommended by the Immunization Practices Advisory Committee of the U.S. Centers for Disease Control. Vaccination of OHP should occur early in their careers, preferably during training.

An identified, although unfounded, concern has been the fear of transmission of acquired immunodeficiency syndrome (AIDS) through vaccination. Since vaccine is derived from plasma of HBsAg carriers,

there has been concern over potential contamination of vaccine lots with HIV. Extensive chemical purification procedures are used during processing of the product which inactivate all classes of human viral pathogens. A recombinant hepatitis B vaccine, derived from hepatitis B surface antigen produced by genetically engineered Saccaromyces (yeast), was approved by the Food and Drug Administration (FDA) in early 1987 and has been found to be effective. All vaccines meeting World Health Organization (WHO) standards are effective for HBV immunization.

Delta Agent

The delta agent, first discovered in 1977, causes a unique form of hepatitis which requires simultaneous co-infection with hepatitis B virus. Therefore, HBsAg carriers are particularly susceptible for delta infection. Of all the hepatitides, patients with delta are at highest risk to develop fulminant hepatitis, with hepatic failure and death. Delta infection also results in a large number of chronic sequelae, such as cirrhosis. In one outbreak of delta superinfection in HBsAg carriers, 60 percent progressed to chronic disease. Delta can be transmitted through open skin lesions, blood contact (usually through parenteral drug abuse), and through sexual contact. Nosocomial transmission of delta hepatitis from an infected patient to medical staff has been reported and outbreaks have included dentists.

Delta agent should be considered a pathogen which may be easily transmitted to OHP if they are not immunized and if appropriate precautions are not used consistently. Patients infected with delta hepatitis have co-infection with HBV; therefore, both agents can be simultaneously transmitted. The importance of HBV vaccination for OHP

is obvious. Since delta hepatitis cannot occur without simultaneous infection with HBV, vaccination with hepatitis B vaccine will also confer protection against delta hepatitis.

Non A, Non B Hepatitis (NANB)

NANB is clinically diagnosed viral hepatitis when serology for HAV and HBV is negative. The etiologic agent(s) have not been identified. Approximately 5-10 percent of all unreported hepatitis is NANB. In the United States, the risk factors for acquiring NANB are parenteral drug abuse, receiving blood transfusions, and employment in a medical or dental field. No presently available serological tests can detect NANB. Therefore, it is the most common cause of transfusion-related hepatitis. In contrast to the other types of hepatitis, sexual activity does not appear to play a major role in disease transmission.

NANB is transmitted through blood and blood products. In chimpanzees, NANB has been experimentally transmitted by saliva. OHP are probably susceptible to infection through occupational exposure to infected blood and body fluids. Since no vaccination is available, occupationally-acquired NANB can only be prevented through the consistent adherence to infection control procedures which protect OHP from contact with blood and body fluids.

4. Human Immunodeficiency Virus (HIV)

The epidemic of infections caused by HIV has presented society at large and the health community in particular with unprecedented challenges. In this section, the epidemiological and clinical aspects of HIV infection important to OHP will be emphasized.

HIV is an RNA-containing retrovirus which preferentially infects cells of the immune and central nervous systems. HIV infection causes destruction of the "helper T-cells," which mediate the cellular-mediated immune response. The majority of disease manifestations caused by HIV outside the central nervous system result from the suppression of cell-mediated immunity. In the central nervous system, HIV infection causes a wide variety of syndromes secondary to viral-induced loss of neurons and white-matter tissues.

HIV is transmitted through sexual contact or via exposure to infected blood or blood products. In the United States, the groups at highest risk for HIV infection continue to be homosexual men, intravenous drug abusers, persons who received blood or blood products before 1985 (especially hemophiliacs), and pediatric cases resulting from in-utero or perinatal exposure. Heterosexual transmission of HIV may occur from male-to-female or from female to male and is the major mode of transmission of HIV in Africa.

The natural history of HIV infection has been elucidated over the past 5 years. The acquired immunodeficiency syndrome (AIDS) actually represents the last stage of HIV infection in the host. Several schemes have been developed for the classification of HIV infection. The most commonly used is the CDC classification, which is based on clinical characterization of cases. Another commonly used classification scheme is the Walter Reed (U.S. Army) Classification, which combines clinical characteristics with laboratory parameters such as helper T-cell counts.

The primary infection with HIV is usually asymptomatic. Some patients may have a viral-like syndrome 2-6 weeks after primary infection, which

is characterized by fevers, rigors, arthralgias, urticaria, and diarrhea, and resolves spontaneously.

Within several weeks after primary infection, antibody to HIV virus proteins develops. In general, there are no other symptoms. The antibody that develops to HIV is not protective and does not indicate resolution of infection. Sixty-five percent of HIV-seropositive patients will have positive viral culture from blood after one attempt. Detection of HIV antibodies in serum is the basis of the currently used serological tests. The most commonly used test is the enzyme-linked immunosorbent assay (ELISA), which has a sensitivity (measure of false negatives) and specificity (measure of false positives) of 98-99 percent. Because of the profound implications of a positive test result, all positive ELISA tests need to be confirmed by a more sophisticated confirmatory test. The confirmatory test which is usually performed is the "Western blot," which detects portions of the HIV genome. The ethical issues of population-based HIV testing have been recently reviewed, and will not be discussed in this paper.

The course of disease after the establishment of asymptomatic infection is variable. Symptomatic disease may manifest either within months, or may not develop for several years. Symptomatic infection encompasses a variety of syndromes, such as fever, lymphadenopathy, severe weight loss, malabsorption, and neurological disease. Opportunistic infections are defined as infections which do not occur in persons with intact cell-mediated immunity. The most common opportunistic infection in HIV-infected patients is Pneumocystic carinii pneumonia. Examples of other opportunistic infections are candidal esophagitis, cryptococcal meningitis, disseminated fungal infections, disseminated mycobacterial infections, visceral viral infections caused by cytomegalovirus and herpes, and chronic diarrhea syndromes caused by Salmonella,

Cryptosporidium, and Isospora. The most commonly seen malignancy in patients with HIV disease is Kaposi's sarcoma (KS). Other malignancies which occur with increased frequency are lymphomas, Hodgkin's disease, and certain squamous cell carcinomas. The time course of progression of HIV infection from asymptomatic phase to symptomatic phase to disease has not been fully eludicated.

For surveillance and reporting purposes, CDC has used a strict definition of AIDS. Cases which meet this definition are reported to CDC through State and local health departments. In brief, diagnosis of AIDS under the surveillance definition requires the absence of other conditions predisposing to decreased cell-mediated immunity such as cancer, auto-immune disease or steroid therapy, the presence of either KS or lymphoma, or an opportunistic infection. The case definition has been recently expanded to include those individuals with HIV-related neurologic disorders and severe weight loss. As of August 7, 1987, 39,594 cases of AIDS meeting the surveillance definition had been reported to CDC. Reporting efficiency in the United States is estimated to be 90 percent. The case definition for AIDS has recently been revised by CDC and WHO.

Because of its criteria for opportunistic infection, malignancy, or severe systemic disease, the surveillance definition represents the endpoint in the spectrum of HIV infection at the time when the cellular immune system has been impaired. The projected caseload of surveillance definition AIDS is estimated to be 270,000 cases by 1991. Estimates of the total infected pool of HIV-seropositive persons in the United States in 1986 were in the range of 1.5 million.

Because many persons with HIV-related diseases are excluded from the surveillance definition of AIDS, the reported figures underestimate the

incidence of symptomatic HIV infections (e.g., syndromes such as HIV-related fever/lymphadenopathy).

The progression from the asymptomatic phase to more severe forms of disease has been the subject of a number of studies. Studies in large cohorts of homosexual men in San Francisco and Vancouver have indicated that a minimum of 36 percent of asymptomatic seropositive men will develop clinical AIDS within 7 years. These proportions will probably increase as the study interval becomes longer.

The oral manifestations of AIDS and AIDS-related complex (ARC) have been described in a number of reports. It is likely that the full range of oral manifestations associated with AIDS and HIV infection is not known. Systematic prospective evaluations of the oral pathology of HIV infection are in progress in San Francisco and Seattle. These studies should contribute much to available knowledge concerning oral manifestations.

In the early published reports on patients with AIDS or other symptomatic syndromes of HIV infection, 40-93 percent had oral candidiasis, 9-23 percent had hairy leukoplakia, and one-third had oral lesions of KS. These uncontrolled studies provide a limited description analysis of HIV-related oral pathology. The majority of patients examined in these studies had clinically diagnosed symptomatic HIV infection. The oral pathology of the earlier asymptomatic phases is not well defined in these reports. Only one study has been reported that examined the oral pathology in asymptomatic seropositive persons. In a population of seropositive Danish hemophiliacs, 14 percent had hairy leukoplakia and 10 percent had erythematous atrophic candidiasis. Second, patients in these studies were predominantly homosexual men. The manifestations of AIDS may be different in different risk groups--for example, Kaposi's's sarcoma is more frequently seen in homosexual men with AIDS compared to

persons with other risk factors. Therefore, these data should be interpreted with caution until more comprehensive cross-sectional studies are performed.

Oral candidiasis usually manifests as a raised, whitish exudative lesion on an atrophic or erythematous base. Lesions may be present on any of the oral mucosal surfaces. Candida alone in the oral cavity does not always indicate HIV infection. Patients may complain of local pain or sore throat. Dysphagia and odynophagia (pain with swallowing) may be indicative of related visceral disease. Candida of the esophagus is another one of the criteria meeting the surveillance definition of AIDS. It is diagnosed by: (1) A recent onset of retrosternal pain on swallowing; and (2) oral candidiasis diagnosed by the gross appearance of white patches or plaques on an erythematous base or by microscopic appearance. Diagnosis of candidiasis may be confirmed by either fungal scrapings or biopsy. Treatment consists of either local or systemic antifungal therapy.

Hairy leukoplakias are lesions which usually appear on the lateral borders of the tongue. These lesions appear as raised white areas with a "hairy" surface and are usually painless. Epstein-Barr virus has been strongly implicated in the pathogenesis of hairy leukoplakia. Lesions may be either a response to viral infection or viral-induced epithelial hyperplasia. The appearance of hairy leukoplakia may be a poor prognostic sign in asymptomatic seropositive individuals. Studies have shown that 83 percent of persons with hairy leukoplakia developed clinical AIDS within 31 months after diagnosis of hairy leukoplakia.

KS, one of the diagnostic criteria for the surveillance definition of AIDS, is the most frequently diagnosed malignancy in patients infected with the HIV virus. KS is a mesodermal tumor of the vascular tissues

which may appear at any epithelial or mucosal surface. The lesions typically are purplish in color and have a myriad of clinical presentations, the most common being macules, papules, and ulcerative lesions. Simultaneous multicentric disease is common. Eight to 10 percent of KS have been reported by Dr. Sol Silverman at the University of California, San Francisco, as being initially diagnosed in the oral cavity. Complications of KS in the oral cavity are bleeding, superinfection, and mass effects including one case report of pharyngeal obstruction. Other oral malignancies seen with increased frequency are squamous cell carcinomas, lymphoma, and Hodgkin's disease.

Persons infected with HIV are prone to a wide variety of other infections associated with immunocompromised states. Severe, recurrent orolabial herpes, defined as a recurrent episode lasting more than 4 weeks, occurs more commonly in HIV-positive patients. Precise incidence data, however, are not available. One case of maxillary osteomyelitis due to Mycobacterium avium-intracellulare, which causes disseminated infection in AIDS patients, has been reported. Another case of Cryptococcus neoformans has also been reported.

Aggressive periodontal disease and xerostomia have been described in about 20 percent of symptomatic AIDS patients. Definition and progression of this periodontitis varies. One report suggests that this may be due to loss of epithelial integrity of the salivary gland tissues, evidenced by finding albumin in the saliva of HIV-infected persons.

Management of patients with HIV infection involves aggressive diagnosis and treatment of the secondary disease manifestations. Oral manifestations of HIV disease should be managed in close collaboration with the patient's primary physician. Patients who have oral pathology

suggestive of HIV disease should be referred to a physician for definitive diagnosis. Serologic testing for HIV should not be performed by OHP.

Although concerns about the perceived risks are high, the actual risk to HCWs, while real, is low. Results from seven studies among hospital workers caring for HIV-positive patients have estimated that the risk of seroconversion following parenteral needlestick, or mucous membrane exposure of seroconversion following parenteral needlestick, or mucous membrane exposure to blood or secretions is less than 1 percent. Among OHP, published data have indicated that the risk is approximately the same. Unfortunately, there is one recent case of one OHP without known HIV risk factors who may be have become infected through the course of his practice. However, barrier infection control recommendations were not being practiced consistently.

Based on available epidemiologic data and consistent with WHO policy, there is no ethical justification for denying HIV-positive patients access to dental or medical care. Potential risk can be adequately managed and minimized by the proper use of barrier infection control techniques, i.e., used consistently and with all patients.

OHP in training are being taught to practice while wearing gloves, masks, and protective eyewear. However, resources need to be directed toward retraining currently practicing OHP, many of whom are not accustomed to wearing protective garments and equipment.

The dental operatory, by necessity, contains potentially dangerous sharp instruments. Research should be directed toward designing equipment and instruments to minimize the likelihood of accidents such as puncture wounds. Similarly, dental operatory equipment should be designed to

address the problems presented by infection control issues, especially issues of cross-contamination.

The new challenges of the HIV epidemic have brought to the forefront a number of issues for both the dental and medical communities, as well as for society at large. This epidemic is increasing awareness in the oral health profession regarding the potential for iatrogenic infection of patients and of the potential risk of occupational exposure. Ironically, the risk of HIV infection for OHP is lower than the risk of acquiring other blood- and saliva-borne infections such as hepatitis B and herpes, as well as other infectious diseases not covered in this review, i.e., viral and bacterial upper respiratory tract infections.

HIV and other sexually transmitted diseases may be present with oral lesions occasionally as the initial manifestation of disease. Patients often may seek care for a variety of oral complaints, especially those involving the anterior oral cavity. OHP, as the health care professionals trained in the diagnosis of oral pathology, can be expected to have a greater role in the recognition of oral STD. Universal precautions to protect OHP from contact with all blood and body fluids are necessary for the treatment of all personnel.

Annex 4

DENTISTS ASKED TO JOIN IN FIGHT AGAINST AIDS

The World Health Organization is asking dentists throughout the world, and the dental manufacturing industry to enlist in the fight to stop the spread of AIDS. This applies especially to countries where AIDS is a major health problem.

The risk of the virus being transmitted from patient to patient during oral care is considered very small, as long as needles and other skin-piercing instruments are sterilized. Theoretically, the virus could also be transferred to oral care personnel through patients' blood and oral fluids entering a cut, scratch, the mouth or eyes by spray from the rotary toothcutting instruments, but up to now, this has not been reported.

There is an even smaller risk of transfer from an infected oral care worker to a patient.

In many countries, dentists regularly see more than 50% of the community and therefore can help disseminate correct information and preventive messages by providing information, guidance and counselling on life style. Dentists also have an important role to play in the treating of infected patients and in advising their families.

A framework for infection control, drawn up during a recently-concluded meeting with representatives of the dental manufacturing industry, pointed out:

- that proper sterilization of instruments is essential, especially those that penetrate the oral tissues;

- that simple, cost-effective methods are available and can be applied in all communities in developed and developing countries;

- that wearing gloves, masks and glasses routinely, protects oral health workers. By "dressing up", dentists place a "barrier" between themselves and all infectious diseases, including hepatitis, to which they are at even greater risk.

Yet, these are measures that many oral health workers do not take, nor have they been trained to take, thus underlining a need for full-fledged programmes of education and information aimed at the dental professions.

The representatives from industry came from Austria, Belgium, the Federal Republic of Germany, Italy and the United Kingdom. Also attending the meeting were experts in infection control from the Dental Disease Prevention Activity of the U.S. Centres for Disease Control in Atlanta.

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