

# The Assessment of Blood Exposure Accidents at Casablanca Dental Center for Treatment and Consultation in Morocco

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## ABSTRACT

**Objective:** The purpose of this analysis is to determine the frequency of blood exposure accidents (BEAs), evaluate the knowledge, attitudes, and practices of dentists regarding infectious risk, particularly after a BEA, and to propose actions within a prevention policy framework.

**Method:** A descriptive epidemiological survey was conducted among 142 dentists practicing at the Dental Consultation and Treatment Center through an anonymous questionnaire.

**Results:** Our study found a response rate of 96.6%, noting that standard precautions were used regularly and systematically by most dentists: glove use 95.8%, protective goggles 36.5%, face mask 83%, use of sharps containers 90.8%, but only 39.2% had received the hepatitis B booster vaccine. In fact, 53.8% of dentists declared having been victims of at least one BEA. The most frequent mechanism of occurrence was needle sticks (73.2%). We identified gaps in their attitudes towards BEA: among 90.6% who practiced emergency measures after a BEA, only 83.9% practiced them properly. Furthermore, there is a discrepancy between the knowledge and the practitioners' actual practice regarding these accidents. Among the 94.7% of practitioners who stated serological follow-up is necessary after a BEA, only 63.2% checked the serological status of patients involved in the BEA.

**Conclusion:** These results show the urgent need for improved procedures to reinforce awareness and enhance dentists' understanding of BEA risks. Additionally, training practitioners is essential to better control the conduct to be followed immediately and subsequently in the event of such accidents.

**Keywords:** Blood exposure accidents, dentistry, occupational risk, prevention.

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## 1. INTRODUCTION

A blood exposure accident (BEA) is defined as “any accidental exposure to blood or a biological fluid contaminated with blood, involving a cut or a prick to the skin, or a splash into mucous membranes or injured skin” [1].

The risk of exposure to blood lies in the possible transmission of blood-borne viruses, including HIV and hepatitis B and C. These risks are assessed according to the nature of the biological product and the type of lesion (Circular DGS/DH). According to a study by Yasukawa and Tilotta-Yasukawa [2] the risk of transmission of the hepatitis C virus after a percutaneous accident is related to

the task in progress, the depth of the wound and the viral load in the source patient.

The average risk of transmission after professional exposure to contaminated blood is estimated at 30% for HBV, when the source patient is HBsAg positive, regardless of the stage of infection (acute or chronic). For HCV, it is about 3% but can reach 10% if the source subject has a positive HCV Rna [3]. For HIV, in the case of percutaneous exposure, it is 0.3% and 0.09% after mucosal exposure [4]. The risk after dermal exposure is lower but has not been estimated. There are insufficient data to assess the risk of transmission after exposure to infected tissue or other biological fluids.



Although there is a large body of scientific literature concerning BEA in health care settings, there are few data available concerning BEA occurring in the dental area. Dental staff are at high risk of BEAs, with incidence rates varying according to studies [5].

In Morocco, a country of medium endemicity for HBV the prevalence of HIV and HCV infections are insufficiently evaluated. In addition, the risk for caregivers in the event of an AES is insufficiently taken into account [6].

The purpose of this study is to evaluate the knowledge, attitudes and practices of dentists concerning the risk of infection, particularly after an AES, to determine the prevalence of viral infections related to BEA and to propose actions in the framework of a preventive policy.

## 2. METHODS

A descriptive cross-sectional survey was carried out. The target population was of 150 dentists (all interns, residents, specialists and professors) practicing in the Casablanca Dental Consultation and Treatment Center (CCTD). The survey was based on an individual, anonymous questionnaire, distributed directly to the various departments and consisting of 4 pages with 53 items, the majority of which had a predetermined response. The questionnaire had 3 main sections: the first section concerned socio-demographic and professional data like sex, age, and grade; the second section concerned primary prevention, including 3 parts: (the patient's state of health, individual protection, and protection of the patient and the practitioner); and the last section concerned secondary prevention.

The survey started on March 25, 2024 and ended on June 28, 2024. The questionnaire was distributed directly by the single interviewer.

A pre-survey was carried out with six dentists practicing at the CCTD before distributing the questionnaire to the dentists in the sample in order to check the relevance of the questions and to detect any difficulties in understanding them.

Our study included dentists practicing at the CCTD of Casablanca, i.e., interns, residents, specialists and professors, and excluded Dentists practicing in the private sector and Dentists practicing in the CCTD of Rabat dentists practicing at the CCTD of Casablanca who participated in the pre-survey.

Statistical data was entered and analyzed with JAMOVI version 1.6.23.0.

## 3. RESULTS

Out of 144 questionnaires distributed, we obtained 142 responses, i.e., a response rate of 98.61%.

The sex-ratio was 3.05 the practitioners were between 23 and 30 years old was 45.7%. However, 30.3% of the practitioners did not report their age; the majority, 32.4% of practitioners, were professors. 17.7% of the practitioners were assigned to the Pedodontics Department (Table I).

TABLE I: PARTICIPATION RATE AND IDENTIFICATION

|                         | N   | (%)     |
|-------------------------|-----|---------|
| Sex (n = 142)           |     |         |
| Female                  | 107 | (75,4)  |
| Male                    | 35  | (24,6)  |
| Age (n = 96)            |     |         |
| 23 to 30 years old      | 48  | (45,72) |
| From 31 to 40 years old | 27  | (25,71) |
| From 41 to 50 years old | 21  | (20)    |
| Grade (n = 142)         |     |         |
| Professor               | 46  | (32,04) |
| Resident                | 45  | (31)    |
| Specialist              | 35  | (24,6)  |
| Intern                  | 16  | (11,3)  |
| Department (n = 142)    |     |         |
| PEDO*                   |     |         |
| PATHO*                  | 25  | (17,7)  |
| OCE*                    | 22  | (15,6)  |
| PARO*                   | 21  | (14,9)  |
| PA*                     | 20  | (14,1)  |
| PC*                     | 19  | (13,5)  |
| ODF*                    | 17  | (12,1)  |
|                         | 17  | (12,1)  |

Note: -Pedo: pedodontics. -Patho: surgical odPatho:y. -OCE: conservative odontology endodontics. -Paro: periodontology. -PA: adjoiningprosthesis. -PC: Conjoint Prosthodontics. ODF: Dentofacial Orthopedics.

### 3.1. Primary Prevention Data

The results show that 87.1% of practitioners asked their patients about the presence of a blood transmitted infections and 49.3% of practitioners used a pre-printed questionnaire to collect this information. In the case of presence of a blood transmitted infection, 97.2% of the practitioners investigated further, 96.3% of the practitioners contacted the treating physician, 65.1% of the practitioners ordered tests and 8.1% used other investigations such as checking medical records.

Regarding clothing, 78.2% (104 practitioners) changed their clothing once it was soiled. Concerning the means used to protect the eyes, 65.1% of the practitioners used a visor to protect their eyes. 34.9% of the practitioners used protective glasses. Regarding the wearing of masks, 83.0% of the practitioners always wore a mask while 5.7% only wore it when necessary. 69.5% of the practitioners changed their masks once a shift while 30.5% changed them between patients. 86.5% of the practitioners did not reuse their gloves while 13.5% reused them (Table II).

The majority (99.3%) of the practitioners used surgical drapes of which 96.4% used disposable drapes. For the use of the dam, we note that 85.1% of the practitioners used it during endodontic care and most of them (98.6%) used disposable salivary cannulas 93.3% of the practitioners sterilized the material and 87.8% of the practitioners used sterilization bags as a means of packaging. 90.8% of practitioners disposed of sharps in containers and 82.9% of practitioners recapped needles after use. As for the equipment of the CCTD, 91.4% of the practitioners said that the CCTD sterilization facility is equipped with an autoclave. 10% of the practitioners did not know the equipment of the CCTD sterilization facility (Table III).

TABLE II: MEANS OF DATA COLLECTION AND PROFESSIONAL CLOTHING

|                                    | (N) | (%)  |
|------------------------------------|-----|------|
| Interrogation of patient           | 121 | 87.1 |
| Printed clinical observation       | 70  | 49.3 |
| Further investigation              | 137 | 97.2 |
| Steps to take if an STI is present |     |      |
| Contact the treating physician     | 130 | 96.3 |
| Ask for tests                      | 89  | 65.1 |
| Other                              | 11  | 8.1  |
| Professional attire                |     |      |
| A blouse                           | 129 | 90.8 |
| A tunic and pants                  | 50  | 35.5 |
| Shoes                              | 49  | 34.8 |
| Change of clothes                  |     |      |
| Every time it is soiled            | 104 | 78.2 |
| Every day                          | 19  | 14.3 |
| Weekly                             | 10  | 7.5  |
| Use of eye protection:             |     |      |
| In some situations                 | 61  | 44.5 |
| Always protection                  | 50  | 36.5 |
| No protection                      | 26  | 19.0 |
| Type of eye protection             |     |      |
| Visor                              | 84  | 65.1 |
| Goggles                            | 45  | 34.9 |
| Other                              | 0   | 0.00 |
| Wearing a mask                     |     |      |
| Always                             | 117 | 83.0 |
| Never                              | 16  | 11.3 |
| If necessary                       | 8   | 5.7  |
| Type of mask used                  |     |      |
| Synthetic fiber                    | 109 | 76.8 |
| Paper                              | 26  | 18.3 |
| Other                              | 7   | 4.9  |
| Change of masks                    |     |      |
| Once per shift                     | 91  | 69.5 |
| Between each patient               | 40  | 30.5 |
| Wearing of gloves                  |     |      |
| For all consultations              | 136 | 95.8 |
| Only for non-bloody care           | 1   | 5    |
| Only for bloody care               | 5   | 3.5  |
| Reuse of gloves                    |     |      |
| Do not reuse gloves                | 122 | 86.5 |
| Reuse gloves                       | 19  | 13.5 |
| Protection of wounds               |     |      |
| Wound protection                   | 117 | 83.6 |
| No protection                      | 23  | 16.4 |
| Hand washing                       |     |      |
| Always                             | 106 | 75.2 |
| Often                              | 34  | 24.1 |
| Never                              | 1   | 0.7  |

The majority (83.1%) of practitioners were vaccinated against hepatitis B, but 60.8% of practitioners did not respect the vaccination reminders and 51.3% of practitioners did not respect the vaccination intervals (Table IV).

### 3.2. Secondary Prevention Outcomes

Informations about BEA: In this survey, 95.5% of the practitioners knew what a BEA was, 53.1% of them had received special training about it while 46.9% of the practitioners had not; among the practitioners who had received

TABLE III: PROTECTION OF THE PATIENT AND THE PRACTITIONER

|                                                   | (N) | (%)  |
|---------------------------------------------------|-----|------|
| Operating fields.                                 | 140 | 99.3 |
| Types of surgical drapes                          |     |      |
| Disposable                                        | 133 | 96.4 |
| Reusable                                          | 5   | 3.6  |
| After washing                                     | 0   | 0.00 |
| Dam                                               |     |      |
| Endodontic care                                   | 80  | 85.1 |
| Conservative care                                 | 70  | 74.5 |
| Prophylactic care                                 | 42  | 44.7 |
| Prosthetic care                                   | 17  | 18.1 |
| Salivary cannulas                                 |     |      |
| Disposable                                        | 138 | 98.6 |
| Reusable                                          | 2   | 1.4  |
| Asepsis chain                                     |     |      |
| Sterilization                                     | 126 | 93.3 |
| Soaking in a disinfectant solution                | 114 | 84.4 |
| Washing with detergent                            | 81  | 60.0 |
| Other                                             | 0   | 0.0  |
| Equipment of the CCTD                             |     |      |
| Autoclave                                         | 128 | 91.4 |
| Poupinel                                          | 13  | 9.3  |
| No idea                                           | 14  | 10   |
| Packaging                                         |     |      |
| Bags                                              | 122 | 87.8 |
| Metal boxes                                       | 23  | 16.5 |
| None                                              | 8   | 5.8  |
| Sharps management (needles and scalpel blades...) |     |      |
| Collector                                         | 128 | 90.8 |
| Garbage can                                       | 13  | 9.2  |
| Recapping of needles                              |     |      |
| Always                                            | 116 | 82.9 |
| Often                                             | 22  | 15.7 |
| Sometimes                                         | 1   | 0.7  |
| Never                                             | 1   | 0.7  |
| Treatment of the rotating system                  | 43  | 33.9 |
| Decontamination of the chair                      | 114 | 87.7 |
| Treatment of the suction system                   |     |      |
| Water suction                                     |     |      |
| Suction of disinfectant solution                  | 70  | 56.5 |
| disinfectant solution                             | 54  | 43.5 |
| Washing of impressions                            | 121 | 92.4 |

TABLE IV: IMMUNOPREVENTION AMONG CCTD DENTISTS

|                                    | (N) | (%)  |
|------------------------------------|-----|------|
| Vaccination                        |     |      |
| Hepatitis B                        | 103 | 83.1 |
| Tetanus                            | 73  | 58.9 |
| Rubella                            | 53  | 43.1 |
| Hepatitis A                        | 48  | 38.7 |
| Vaccination reminders              | 73  | 39.2 |
| Adherence to vaccination intervals | 38  | 48.7 |

training 88.7% of the practitioners had received it during their university course.

The percentage of the practitioners who already have had a BEA was 53.8%; 35.4% never had one, while 10.8% of the practitioners could not remember if they did. Regarding the nature of the exposure, we found that 85.9% of the practitioners had a BEA between one to five times,

TABLE V: HISTORY AND NATURE OF BEA, KNOWLEDGE AND IMMEDIATE ACTIONS TAKEN

|                                                          | (N) | (%)  |
|----------------------------------------------------------|-----|------|
| History of BEA                                           |     |      |
| Yes                                                      | 70  | 53.8 |
| No                                                       | 46  | 35.4 |
| Don't know                                               | 14  | 10.8 |
| Number of exposures                                      |     |      |
| 1 to 5 times                                             | 61  | 85.9 |
| From 6 to 10 times                                       | 9   | 12.7 |
| More than 10 times                                       | 1   | 1.4  |
| The services concerned                                   |     |      |
| PATHO                                                    | 26  | 48.1 |
| OCE                                                      | 13  | 24.1 |
| PEDO                                                     | 12  | 22.2 |
| PA                                                       | 8   | 14.8 |
| PARO                                                     | 8   | 14.8 |
| PC                                                       | 8   | 14.8 |
| ODF                                                      | 7   | 12.7 |
| Types of BEA                                             |     |      |
| Sting                                                    | 52  | 73.2 |
| Projection in the eye                                    | 31  | 44.3 |
| Cut                                                      | 25  | 35.7 |
| Direct contact of Blood with injured skin                | 8   | 11.4 |
| Questioning the patient about his health                 |     |      |
| Yes                                                      | 48  | 36.8 |
| Patient's health status                                  |     |      |
| Viral hepatitis                                          | 25  | 49   |
| Good condition                                           | 21  | 42   |
| HIV                                                      | 19  | 37.3 |
| Practitioners' attitudes toward the patient after an SEA |     |      |
| Carry out emergency measures                             | 87  | 90.6 |
| Stop the procedure                                       | 67  | 69.8 |
| Feeling panic                                            | 47  | 49.5 |
| Measures of the dental doctor after AES                  |     |      |
| Washing + antiseptis                                     | 94  | 83.9 |
| Washing + compression                                    | 6   | 5.4  |
| Washing alone                                            | 6   | 5.4  |
| No                                                       | 4   | 3.6  |
| Antiseptis alone                                         | 2   | 1.8  |
| BEA Statement                                            | 86  | 66.7 |
| Provision of an occupational health form                 | 13  | 9.9  |
| Serological follow-up after BEA                          | 126 | 94.7 |

Note: -Pedo: pedodontics. -Patho: surgical odontology. -OCE: conservative odontology endodontics. -Paro: periodontology -PA: adjoining prosthesis. -PC: Conjoint Prosthodontics ODF: Dentofacial Orthopedics.

while 12.7% of the practitioners had a BEA between 6 and 10 times and only 1.4% of the practitioners had it more than 10 times (Table V). 48.1% of BEAs had occurred in the Surgical Dentistry department, 24.1% in the Department of Conservative Dentistry and Endodontics, 22.2% in the Pedodontics Department, 14.8% in the Adjoint Prosthodontics Department, 14.8% in the Periodontology Department, 14.8% in the Conjoint Prosthodontics Department and 12.7% in the ODF Department.

### 3.3. Need for Training

As for need for training, 86.5% of the practitioners felt the need for training to better cope with BEA. Only 60 of the practitioners who requested training suggested the type of training they needed (16 practitioners preferred

continuing education, 13 practitioners preferred to attend workshops, 15 practitioners preferred to attend seminars, 10 practitioners preferred to see posters or forms, and only 6 preferred practical or tutorial sessions).

Practitioners were asked if this training should be included in the university curriculum and 92.2% of the responses were in favor, emphasizing the importance of such an approach in improving attitudes toward BEA.

## 4. DISCUSSION

### 4.1. Personal Protection

#### 4.1.1. Professional Clothing

The results described in our study are largely superior to those obtained in other studies in the same country. However, in our sample, 90.8% were satisfied with wearing a gown, which remains insufficient for the protection of the practitioner. According to the recommendations, each practitioner must be dressed in a complete outfit (gown, tunic, and shoes), ensuring optimal protection. This outfit, which is specific to dental practice, must be changed every day or every time it is soiled [7]. In case of incomplete attire, it is preferable to wear a gown long enough to protect the clothing from contamination. This is not the case for the majority of practitioners who wear short gowns with half sleeves and expose themselves directly to microorganisms [8].

This paper proposes wearing protective eyewear; the results described by our study are largely lower than those obtained in the following countries. In Germany, a study conducted on the professional exposure of dentists to bloodborne infections showed that 48.6% used protective eyewear [3]. In Mexico, a study of the attitudes and practices of dentists toward HIV patients showed that 79% of Dentists always wore protective eyewear during dental care for STIs. This figure is still high because this study was carried out on patients with an STI [9].

On the other hand, in our study, 65.1% of the practitioners protected their eyes with a splash protector visor, while 34.9% wore protective glasses. In Germany, a study on the incidence of hepatitis B and C among dentists showed that 58% of dentists always used protective glasses during dental care and 32% used protective glasses occasionally [10]. In contrast, a study conducted at the Nancy Medical School reported that students wearing corrective eyewear reported feeling protected all the time, whereas eyeglasses did not stop the risk of splashing because they did not provide lateral eye protection [11].

Therefore, eyeglasses do not replace protective eyewear. It should also be noted that the disinfection of the protective material is mandatory between two patients [12].

In fact, each practitioner must wear protective glasses which must be wide with thick and rounded edges conferring protection for the eye and its environment.

#### 4.1.2. Wearing a Mask

Knowing that the risk is the same for the practitioner and the patient, the mask provides double protection. It must be wide, covering the nose and mouth, made of synthetic fibers, and changed each time it is soiled or wet, and this for each patient [13].

#### 4.1.3. Wearing Gloves

In our study 95.8% of the practitioners wore gloves no matter what the procedure was including consultation.

These results are consistent with those found in other studies; in Rabat's CCTD, 97.2% of practitioners wore gloves for all procedures [13]. In a study conducted in Casablanca, all practitioners wore gloves for all procedures, including consultations [14]. Moreover, a study conducted in Brazil showed that 98% of dentists always used gloves during treatment [15]. However, in Algeria, only 47.4% of practitioners wore gloves for all procedures [16]. In our study 86.6% of the population studied, never reused gloves, while 16.4% of practitioners reused them.

Similarly, in Brazil, 92% never reused gloves, while 8% reused gloves after cleaning and disinfecting them with alcohol [15].

In fact, according to the literature, wearing gloves during a percutaneous accident allows, by wiping effect, to decrease the size of the blood volume inoculated by a hollow needle by 46 to 86% [17].

Thus, a pair of gloves significantly reduces the volume of blood inoculated by a suture needle. This decrease in volume is even greater with two pairs of gloves [18].

It is important to remember that a good dentist should never reuse gloves for another patient. He must be as concerned about his patient's health as his own, while avoiding the risk of cross-contamination [13].

#### 4.1.4. Protection of Wounds during Treatment

Knowing that a small wound can be a gateway for germs such as HBV, HCV, or HIV, the protective role of a clean dressing before putting on gloves for work cannot be overlooked.

It is important to mention that protecting a wound with a bandage remains essential before putting on gloves. The risk of glove tearing is omnipresent, regardless of the nature of the procedure [18].

#### 4.1.5. Hands Hygiene

Unfortunately, only 75.2% of practitioners at the Casablanca CCTD were aware of and regularly washed their hands after each patient, 24.1% did so often, and 0.7% occasionally. This constitutes a risk factor for both the practitioner and the patient.

These results appear to be compatible with a study conducted in Brazil that showed that 86.7% of dentists washed their hands before and after care [19].

As a matter of fact, hand washing is a very important measure to reduce the risk of hand transmission of microorganisms.

Hand hygiene is one of the simplest, most inexpensive, and yet effective infection control measures in health care settings, including dentistry [5].

### 4.2. Protection's Respect for the Patient and Practitioner

#### 4.2.1. Surgical Drapes

According to our survey, the majority of CCTD's practitioners 99.3% used surgical drapes, 96.4% used disposable drapes and 3.6% reused them.

The results obtained were similar to those obtained in other studies in the same country.

Nevertheless, according to universal standards, drapes should be in the form of clean disposable paper drapes for each patient and should be discarded immediately after use.

In addition, the use of tissue drapes can only be tolerated in case of surgery, and only if they are properly sterilized before the surgical procedure [13].

#### 4.2.2. Rubber Dam

The role of the dam is not limited to isolating the teeth from the rest of the oral cavity, but it also plays an important role in controlling contamination due to aerosols and septic splashes [14].

If the dam cannot be used and in order to reduce the risk of contamination the patient should rinse the mouth with a 0.1% chlorhexidine gluconate solution to decrease the concentration of oral microorganisms [17].

#### 4.2.3. Management of Contaminated Waste

As reported by our study, 90.8% of practitioners disposed of sharps in a waste bin, while 9.2% disposed of them in the trash.

These results are superior to those obtained in other countries: A Tunisian survey showed that 77% of the population studied confirmed the use of collectors for the disposal of contaminated sharps, while the remained (23%) only used the trash can [20]. Another study conducted in Brazil in 2008 revealed that 64.6% of the practitioners used special containers for the collection of these OCPT, while 35.4% threw them directly into the garbage [3].

In order to optimize their use, it is necessary to ensure the rigorous management of these sharp materials:

The collector must be placed near the work field and cleared of its contents each time the fill level is reached [18]. It must also have a suitable volume, a visible maximum fill level and a good seal [21].

#### 4.2.4. Recapping Needles

Conforming to our study, 82.2% of practitioners always recapped the needle after use and 15.7% of practitioners did so often.

On the other hand, in a study done in Strasbourg, only 19% of the practitioners always recapped the needles, 20% did it often, 26% did it sometimes, and 35% never recapped the needles [2].

After use, needles are recapped with one hand and a mirror blocking the needle cap. Two-handed recapping is prohibited [22], [18].

#### 4.2.5. Chair Decontamination

Based on our study, 12.3% of practitioners did not decontaminate their workstations. Also, in Rabat's CCTD, 38.6% of practitioners did not decontaminate their chairs. For the practitioners who did, 62.8% of them did so correctly with a decontaminant product: 'Chlorispray', whilst 37.2% used bleach instead [13].

In theory, every surface in a dental care setting should be decontaminated between patients. Chairside hygiene is considered the most essential because one can never tolerate working in an environment where germs are present [23].

#### 4.2.6. Treatment of the Suction System

The results of our survey showed that 56.5% of practitioners at the Casablanca CCTD used water to decontaminate the suction system, while 43.5% of practitioners used a disinfectant solution.

Unlike the CCTD in Rabat, where only 12.7% of practitioners used either bleach or another disinfectant, 87.3% of practitioners aspirated with water only [13].

Thus, a disinfectant cleaner suction should be used to disinfect the suction system between patients to eliminate any risk of residual germ contamination [14].

#### 4.2.7. Decontamination of Impressions

At the Casablanca CCTD, almost all the practitioners (92.4%) washed the impressions, whilst 7.6% did not wash the impressions after they had been made. These results are in line with those observed in other studies in the same country.

It should be noted that washing impressions with running water is insufficient because they must be disinfected with a disinfectant solution and dried as a prophylactic measure [17].

#### 4.2.8. Vaccination Coverage

The results of our survey revealed that 38.7% of practitioners were vaccinated against hepatitis A and 83.1% were vaccinated against hepatitis B; also, 58.9% of practitioners were vaccinated against tetanus and 43.1% of female practitioners were vaccinated against rubella. Similarly, in Italy, a survey of dentists' knowledge, attitudes, and practices towards immunization showed that 85.7% of dentists were correctly vaccinated against hepatitis B [24].

In the city of Berlin, a survey on hepatitis B and C showed that 74% of dentists were vaccinated against hepatitis B [10].

A survey of dentists in Casablanca published that 24.4% of practitioners were vaccinated against hepatitis A, 68.3% against hepatitis B, 18.3% against influenza, and 66.2% of female practitioners were vaccinated against rubella [14]. However, in Algeria, a survey on BEA among dentists showed that 42% of practitioners were vaccinated against hepatitis B [16].

At the CCTD in Rabat, only 30.3% of practitioners were vaccinated against viral hepatitis B, 9.2% against influenza, and 19.3% of female staff against rubella [13].

In Vâlcea, Romania, a study on the practices of dentists towards infection showed that only 26% were vaccinated against hepatitis B [25].

An effective vaccination totally prevents the risk of contamination by HBV. It can only be controlled by verifying an anti-HBs antibody titer that must be greater than 10 IU/L. The notion of a protective titer, even an old one, is sufficient to guarantee total and definitive protection against infection by the B virus [26], [19].

#### 4.2.9. Compliance with Secondary Prevention

The results of our study revealed that 53.8% of dentists reported having been the victim of at least one BEA.

This result is similar to the one reported in Algeria, where a survey on BEA among dentists showed that 50% of dentists had been victims of BEA [16].

On the other hand, this percentage is lower in a study conducted in Brazil on occupational exposure among Brazilian dentists, which showed that 31.1% of dentists had suffered at least one BEA [15]. Similarly, in Casablanca in 2017, 39% of dentists reported having experienced at least one BEA [14].

In fact, among all medical and paramedical professions, dentistry remains the profession most exposed to this type of BEA.

In the United States, the BEA surveillance network analyzed BEA occurring during the period 1995–2004 and revealed that 36% of BEA involved dentists [27]. Also in Washington State, between 1995 and 2001, nearly 20% of BEAs were reported by dentists [27].

In our study, 73.2% of dentists had a sting accident, whilst 44.3% reported having a splash in the eye. We also noted that 35.7% of dentists had a cut accident, whilst a minority of 11.4% reported having direct contact with blood on their injured skin during dental care.

Moreover, these accidents by pricking were also the most frequent in the following studies:

- In Casablanca, the most frequent mechanism of contamination was the pricking by the syringe during the realization of anesthesia or the recapping of the needle in 91.6% of the cases, followed by projection in the eye with a rate of 43.8% [14].
- In the United States, the BEA surveillance network revealed that the equipment involved was mainly the hollow needle (31%) and the anesthesia syringe (80%) [27].
- In Washington State, between 1995 and 2001, 87% of the BEA cases were due to the syringe needle [27].
- In Algeria, a survey of BEA among dentists showed that needle stick was the most frequent mechanism (66.3%) [16].
- Additionally, a study carried out at the Faculty of Dentistry in Nancy reported that 66.7% of accidents were due to needlesticks; 25.9% to cuts and 7.4% to projections [11].

The figures found in our study are alarming. Indeed, most practitioners at the CCTD have had at least one BEA, and this could only be explained by the ignorance of practitioners regarding the risk incurred during several practices such as recapping needles by hand and poor waste management. As it seems, we cannot protect ourselves if we are not aware of the danger that threatens us.

#### 4.2.10. Serological Status of the Source Patient

##### 4.2.10.1. History of BEA

In our study, 63.2% of the victims declared having sought the serological status of the source patients. This result is much higher than those found in other studies. In the private sector in Casablanca, only 16.6% of dentists reported having sought the serological status of the source patients [14].

In our study, 42% of the practitioners had the accident with a patient in good general condition. However, 37.2% of the practitioners had the accident with an HIV patient and 49% with a patient with viral hepatitis.

These results differ from those found in a study in Casablanca in 2017, where 66.2% of practitioners had a BEA occurring with healthy patients, 32.3% with patients with viral hepatitis, and 1.5% with HIV patients [14].

Moreover, in 2004, 54 occupational HCV seroconversions were documented in French health care workers; 41 of them were in contact with a source patient known to be infected with HCV. In 1996, the annual number of HCV seroconversions was between 2 and 5 [22].

There are also American studies that have shown that contamination varies according to specialization. Namely, dentists with activity oriented towards minor surgery have a higher risk than those with general practice activity. In fact, the hepatitis B virus was detected in 2% of dentists specializing in surgery as opposed to 0.7% of general practitioners [22].

Despite this, in our study, 5.3% of the practitioners considered that serological follow-up after BEA was not necessary.

The identification of the serological status of the source patient remains an important step in the management of victims of BEA because, in the fortunate case where the source patient is seronegative for the three viruses (HIV, HCV, and HBV), this allows the victim to be relieved of the burden of antiretroviral chemo-prophylaxis and serological monitoring [13].

#### 4.2.10.2. Attitudes in the Event of a BEA

##### 4.2.10.2.1. Immediate Action

In light of our study, we found that 83.9% of practitioners performed a wash and antiseptic treatment after a BEA. However, the time spent disinfecting by the practitioners was not taken into account in the questionnaire. Therefore, it is not possible to verify whether the recommended 5 minutes of wound immersion was actually performed.

In the private sector of Casablanca, 79.3% of practitioners induced bleeding of the wound, performed antisepsis of the site with alcohol or sodium hypochlorite, and then bandaged [14].

On the other hand, these percentages were lower in a study carried out in Rabat, where only 53.2% of the practitioners proceeded immediately to emergency measures [13].

In fact, after contact with blood or biological fluids, local care must be taken immediately in order to limit the risk of contamination and, above all, not to cause bleeding in the wounds.

##### 4.2.10.2.2. Statement

Our study showed that 66.7% of dentists thought that in the event of an AES, a declaration should be made within 24 hours of the accident.

On the other hand, in the private sector, 62.3% of practitioners in Casablanca and 64% in Kenitra believed that a short period of time should be observed to contact the referring physician [14], [5].

When questioning the practitioners in our study about the place of declaration, only 30 practitioners (21.12%) noted that the declaration must be made to the occupational medicine department, 10 practitioners (7.04%) said that the declaration should be made to the infectious

diseases department, whilst the others did not know the place of declaration and preferred not to answer.

In the private sector in Casablanca, 18.3% of practitioners knew that the declaration must be made to the occupational medicine department [14].

However, this declaration is rarely made. Also, in 2008, a cross-sectional study of blood exposure accidents among dentists in the private and public sectors in western Algeria revealed that only 2 victims reported the accident to the social security fund and no report was made by dentists in the private sector [16].

This could be explained by the underestimation of the risk, the ignorance of the administrative steps, the lack of time and interest, as well as the very constraining character of the procedure which includes serological follow-up and possible antiretroviral chemoprophylaxis, and especially the disagreement of the dentists with the occupational medicine service. This often neglected reporting is an obstacle to a constant epidemiological evaluation of the incidence of BEA [28].

##### 4.2.10.2.3. Serological Follow-up

In our study, 94.7% of the population thought that serological follow-up was necessary after a BEA. This result is similar to that found in the private sector of the same city, where 98% thought that serological follow-up was essential [14]. Also, at the CCTD in Rabat, 80.7% of practitioners confirmed that serological follow-up is necessary [13].

The results of this survey must be interpreted in light of several limitations. The major limitation of this study is its single-center design with a small number of practitioners who cannot represent all the dentists in Morocco, even if the participation rate is 98.61%. However, it is a center that receives patients from all over Morocco.

Blood exposure accidents (BEA) are among the most frequent accidents in health care settings and expose patients to serious risks of contamination. Our study has shown the seriousness of the situation. Primary and secondary prevention are essential.

Our results display the urgent need for the implementation of an approach that reinforces sensitization and improves the awareness of dentists towards the risks of BEA. Furthermore, training of practitioners is essential in order to improve and master the behavior to be adopted in front of these accidents, both immediately and subsequently.

This study highlights the high rate of blood exposure accidents among dentists and the need to improve prevention, training, and incident reporting to better protect both practitioners and patients.

## 5. CONCLUSION

This study highlights significant gaps between dentists' knowledge and their actual practices concerning blood exposure accidents (BEAs). Despite satisfactory adherence to standard precautions, the persistence of BEAs—mainly caused by needle sticks—reflects insufficient compliance with preventive measures and post-exposure protocols.

Strengthening continuous education and implementing targeted training programs are therefore essential to improve practitioners' responses in emergency situations.

Establishing clear institutional prevention policies and monitoring adherence can help reduce occupational exposure risks and enhance overall safety in dental practice.

#### CONFLICT OF INTEREST

The authors declare no conflict of interest.

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#### INFORMED CONSENT STATEMENT

Informed consent was obtained from all subjects involved in the study.

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