

Management of sharps waste produced at private and public dental offices in the provinces of Rabat and Kenitra

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Abstract— Pungent and sharp waste (PSW) produced by dental practices is a reservoir of microorganisms that can infect hospital patients, staff and the general public. WHO estimates that, in 2010, unsafe injections resulted in 33,800 new HIV infections, 1.7 million cases of hepatitis B and 315,000 cases of hepatitis C. Health professionals, dentists should be aware of the safe disposal of sharps waste produced at their firms to minimize the risks to the environment and the health of the population. The objective of this study is to evaluate the current practices of the management of the DPT produced at the level of the dental offices, to sensitize the professionals of the health to the sorting of this type of waste and to emit proposals for a better management TPDs during the dentist's daily exercise.

Index Terms— Collection, Pungent and sharp waste, dentist, storage, disposal, Law 28-00, sorting.

1 INTRODUCTION

Pungent and sharp waste (PSW) produced in dental practices is a reservoir of microorganisms that can infect hospitalized patients, health professionals and the general public. The WHO estimates that 16 billion injections are performed each year worldwide [1]. Not all needles and syringes are properly evacuated, creating the risk of injury and infection, in addition to the risk of material reuse. WHO estimates that, in 2010, unsafe injections resulted in 33,800 new HIV infections, 1.7 million cases of hepatitis B and 315,000 cases of hepatitis C [1]. As health professionals, dentists should be aware of the safe disposal of PSW at their practice level to minimize risks to the environment and the health of the population.

The objective of this study is to evaluate current practices in the management of pungent and sharp waste produced in dental practices, to make health professionals aware of the sorting of this type of waste and to emit proposals for better management of PSW during the daily exercise of the dentist.

2 MATERIALS AND METHOD

This is a descriptive and analytical cross-sectional survey, which took place between April 15 and July 15, 2017. The dentists included are those registered on the list of the national council of the order of dentists practicing dentists. Private and public sector, provinces of Rabat and Kenitra. A questionnaire was developed to evaluate the method of sharps waste management in dental practices and to make dentists aware of the importance of this management. Our anonymous questionnaire is printed on four pages; it consists of 19 Questions dealing with the following topics: Sociodemographic characteristics, evaluation of knowledge concerning the management of PSW produced within dental practices, evaluation of current management practices PSW and the factors that can influence the management of PSW.

Random and representative sampling made it possible to determine the total number of dentists who will participate in

this survey to 293 cases.

The statistical analysis was carried out with XLSTAT software [2]. The chi-2 test is used to search for significant as-

Table 1
Response rate of dentists to the survey, Rabat-Kenitra, 2017.

City	Number of Dentists	Sample With a threshold of 5%	Number of responses	Response rate
RABAT	455	n=209	40	8,79%
KENITRA	107	n= 84	10	11,90%
Total	562	n= 293	50	17,06%

sociations between variables with a statistical significance level of 0.05.

3 RESULTATS

Of the 293 questionnaires filed with dentists, only 50 completed and usable questionnaires were retrieved. The response rate was 17.06% (Table 1).

Regarding the knowledge of *law 28-00* on waste management and disposal, only 10% of dentists who responded to our questionnaire said they had an idea about this law, while 90% had no idea about this law.

TABLE 2
QUANTITY OF PUNGENT AND SHARP WASTE PRODUCED DURING ONE MONTH OF EXERCISE, RABAT-KENITRA, 2017.

Quantity of PSW per month	
Average quantity produced by cabinet	757,70 g
Quantity of PSW produced by 50 dentists (Samples)	37,885 Kg
Estimated quantity of PSW produced by 562 dentists	425,827 Kg

According to the results obtained, 60% of practitioners use specific containers, 24% of practitioners use plastic bottles and 16% use plastic bags to isolate sharp and sharp waste.

The average quantity of PSW produced in a dental office for one month is 757.70 g and the quantity of PSW produced by 50 dentists for one month is 37.885 kg. This allowed us to estimate the quantity of PSW produced in all dental practices, operating

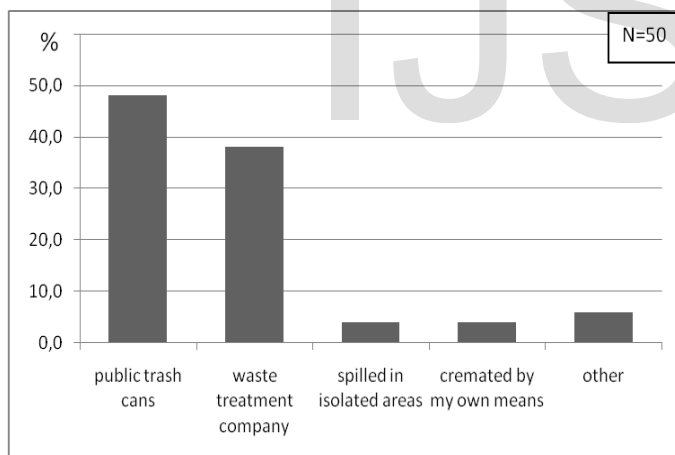


Fig. 1. Percentage use of different methods of storing sharps waste produced at the dental offices, Rabat-Kenitra, 2017.

in the two study cities, at 425,827 Kg (Table 2).

Regarding the disposal method of sharps waste, it was found that 48% of dentists who responded to our questionnaire throw PSW in public trash, 38% report having a contract with medical and pharmaceutical waste treatment companies, 4% dump this waste in isolated areas and 4% incinerate this waste by their own means while 6% use other means to get rid of this waste category (Fig.1).

The results of our investigation, on the problems encountered in the management of medical and pharmaceutical waste (MPW), reveal that 38% of the participants have no problem concerning the waste management, against 38% of the practi-

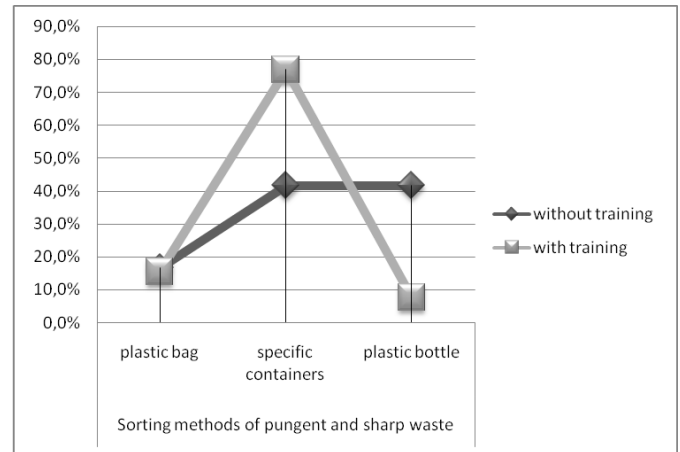


Fig.2. Procedures for sorting pungent and sharp waste in dental practices based on training in waste management, Rabat-Kenitra, 2017.

tioners say that there is a lack of specialized MPW management companies, with 20% of participants saying that good MPW management practice is an additional expense.

There is a statistically significant difference between the use of specific containers to sort PSWs by dentists who have completed waste management training [20 (76.9%)] and dentists who did not follow this formation [10 (41.7%)] with a $p = 0.014 < 0.05$ (Fig.2).

4 DISCUSSION

The awareness of the toxicity of medical and pharmaceutical waste and the need for the protection of man and the environment led the Moroccan government to implement *Law No. 28-00* on the management of waste and to their elimination «ref: Official Bulletin n ° 5480 of Thursday, December 7, 2006».

Article 3 of this *Law 28-00* defines medical and pharmaceutical waste as: "any waste resulting from the activities of diagnosis, follow-up and preventive, palliative or curative treatment in the fields of human or veterinary medicine and all waste resulting from the activities of public hospitals, clinics, scientific research establishments, testing laboratories operating in these fields and similar establishments» [3].

Article 3 of *Decree No. 2-09-139* [3] on the management of MPWs states that these wastes are classified according to their characteristics and nature as follows:

➤ Category 1:

- a- Wastes that pose a risk of infection because they contain viable microorganisms or toxins that may cause disease in humans or other living organisms, as well as non-identifiable human or animal organs and tissues;
- b- Pungent or sharp material intended for abandonment, whether or not it has been in contact with a biological product;
- c- Inactivated therapeutic products and derivatives for therapeutic use damaged or expired.

➤ Category 2:

- a- Unused, spoiled or expired drugs and chemical and biological products;

b- Cytostatic and cytotoxic waste

However, the management of waste resulting from the use of poisonous substances must take into account the legislation applicable to these substances.

- Category 3: Organs and tissues of humans or animals easily identifiable by a non-specialist;
- Category 4: Waste assimilated to household waste.

Thus, sharps present a risk of infection and / or injury and should be disposed of safely.

Regarding the designation of responsibilities, *Law No. 28-00* stipulates in *Article 6* that "Anyone who holds or produces waste, under conditions likely to produce harmful effects on the soil, fauna and flora, to degrade sites or landscapes, to pollute the air or water, to generate odors, or in general, to harm the health of man and the environment, is required to insure or cause to be insured the elimination of such effects in accordance with the provisions of this Law and its implementing regulations" [3]. By this article the dentist is responsible for the management of his waste from their production until their final treatment.

Estimating the quantity of PSW is an important activity for planning good waste management. The estimated quantity of PSW produced per month by 562 dentists practicing in the two study towns was estimated at 425,827 Kg. This quantity is unusual, which requires adequate management to preserve public health and environment against infection and / or toxicity.

Potentially exposed persons are all persons in contact with hazardous medical waste [4], whether they are inside the dental office: "Nursing staff (doctors, nurses, health auxiliaries)", the persons in charge waste, carriers, patients, families and visitors', or outside the dental office: 'external transport staff; personal treatment or disposal infrastructure; general population (including adults or children who collect found objects around the establishment or in uncontrolled landfills)".

Regarding the knowledge of the *law 28-00*, 90% of dentists who answered our questionnaire said they had no idea about this law.

Our survey showed that 48% of waste managers have not received specialized training in this domaine; these results are very similar to those found in other countries [5]. This lack of training in waste management as well as the legal vacuum and the lack of awareness regarding the *law 28-00* on waste management and disposal can have a negative impact on the various stages of the project of the process of sharps waste management.

Regarding the different steps of waste management, it is obvious that from their production, the different categories of waste do not require the same treatment. The dentist practitioner, as a generator of waste, must follow the technical management prescriptions, set by *Decree No. 2-09-139* on the management of medical and pharmaceutical waste *Article 5* stipulates that: "Whatever is the generator of medical and pharmaceutical waste, the management of this waste includes the sorting at the source, the packaging, the storage and if necessary the collection and the transport, the treatment and the elimination of this waste" [3].

The sorting at the source of the PSW is an important criterion for a good practice of management of this waste, the evaluation of the current practice of the dentist doctors, rela-

tive to the sorting of the PSW, showed that 24% of the respondents still use bottles in plastic and 16% use plastic bags to sort pungent and sharp waste. The use of bottles and plastic bags to sort PSWs poses a risk of injury and infection for the various stakeholders in the waste management chain, because plastic bottles and bags are not rigid enough to resist the sharp and / or perforating stresses of this type of waste.

Of the dentists who answered our questionnaire, 48% throw PSW in public garbage cans (fig.3). This percentage is significantly higher than that found in India where only 32% eliminate all kinds of garbage in general garbage [6]. On the other hand, the situation in France is quite different, according to the barometer of the French Dental Association (FDA) of September 2014, 97% of the dental offices have established a contract for the disposal of MPW with companies specialized in MPW management [7]. This difference in results makes the situation alarming given the large amount of infectious and toxic waste produced by dental practices, which is mixed with household waste, a situation that poses a great risk for man and the environment.

As for the sorting modality of PSWs based on waste management training, it was found that there is a statistically significant difference between the uses of specific containers to sort PSWs by dentists who have undergone training in waste management [20 (76.9%)] and dentists who did not receive this training [10 (41.7%)] with a $p = 0.014 < 0.05$. The training follow-up in MPWs management has a positive impact on the PSWs sorting mode. This ties in with what was reported by Abhishek KN and his team confirmed that there is a statistically significant association between the Continuing Dental Education Program (CDEP) and the dental waste management practice scores ($p < 0.05$). This can be attributed to the updated information provided in these programs [8].

5 CONCLUSION

The management of sharps waste in dental offices is regulated by *law 28-00*, the application of which is not always real in dental cabinet. There is a lack of training in sharps waste management at the dental practices in both provinces. This lack of training has a negative impact on the safe management of waste. On the other hand, the lack of companies specializing in the treatment of medical and pharmaceutical waste makes the situation alarming given the infectious effect of pungent and sharp waste on the environment and public health.

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