

Waste disposal practices among community pharmacies in akwaibom state

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There has been a concern in many countries over the disposal of unwanted medications and pharmaceutical waste, thus ultimately having an effect on human health and environment. This study attempts to assess knowledge and disposal methods practiced in community pharmacies in Akwalbom State.

In a cross sectional descriptive survey, data on practices of disposal of pharmaceutical waste among community pharmacists in Akwalbom State was collected using a semi structure questionnaire. Information on sources of generation of Pharmaceutical waste, method of disposal, respondents' knowledge about the sorting process in the disposal of Pharmaceuticals as well as recommendation for sorting process during Pharmaceutical wastes disposal were obtained and analysed.

Expired products were observed to generate the most waste with 35.90%, next was medicament packages with 24.36% while the least was unused medications with 1.28%. Various disposal methods practiced by respondents in figure 3 shows that more than one-quarter (29.49%) of the facilities preferred burning and open dumping (26.92%) respectively. Majority (84.62%) of the respondents had no knowledge about the sorting process in the disposal of pharmaceutical wastes. Most (88.46%) of the respondents could not recommend any disposal method requiring sorting.

In appropriate methods of waste disposal, very low level of knowledge and awareness of disposal of pharmaceutical waste and a subsequent lack of regulatory control was observed in this study.

Pharmaceutical waste is not one single waste stream, but many distinct waste streams that reflect the complexity and diversity of the chemicals that comprise pharmaceuticals. Four to five decades ago, the focus of developed countries was how to prevent industrial and domestic waste from entering the waterways. Treatment plants were employed to improve the quality of water before wastewater was discharged into the lakes and rivers. The main way to achieve this is to sort the material to minimize the need for expensive or complicated disposal methods¹.

Landfill

To landfill means to place waste directly into a land disposal site without prior treatment or preparation. Three types are recognized:

Open uncontrolled non-engineered dump

Untreated waste discharged into an uncontrolled, non-engineered open dump does not protect the local environment and should not be used.

Discarding of untreated waste pharmaceuticals into such a site is not recommended except as a last resort. It should be noted that discarding in open, uncontrolled dumps with insufficient isolation from the aquifer or other watercourses can lead to pollution, with the risk of drinking water contamination in the worst cases.

Engineered landfill

Such a landfill has some features to protect from loss of chemicals into the aquifer. Direct deposit of pharmaceuticals is second best to discharging immobilized pharmaceutical waste into such a landfill.

Highly engineered sanitary landfill

Properly constructed and operated landfill sites offer a relatively safe disposal route for municipal solid wastes, including waste pharmaceuticals². The top priority is protection of the aquifer. The term “ safe sanitary landfill” refers to such a site that is adequately situated, constructed and managed. Upgrading an uncontrolled waste disposal site to a reasonable standard should be considered, and advice is available from World Health Organization (WHO).

Waste Immobilization:**Inertization**

Inertization is a variant of encapsulation and involves removing the packaging materials, paper, cardboard and plastic, from the pharmaceuticals. Pills need to be removed from their blister packs. The pharmaceuticals are then ground and a mix of water, cement and lime added to form a homogenous paste. Worker protection in the form of protective clothing and masks is required as there may be a dust hazard. The paste is then transported in the liquid state by concrete mixer truck to a landfill and decanted into the normal urban waste. The paste then sets as a solid mass dispersed within the municipal solid waste. The process is relatively inexpensive and can be carried out with unsophisticated equipment.

Encapsulation

Drums are filled to 75% capacity with solid and semi-solid pharmaceuticals, and the remaining space is filled by pouring in a medium such as cement or

cement/lime mixture, plastic foam or bituminous sand. Once the drums are filled to 75% capacity, the mixture of lime, cement and water in the proportions 15: 15: 5 (by weight) is added and the drum filled to capacity. The sealed drums should be placed at the base of a landfill and covered with fresh municipal solid waste. For ease of movement, the drums may be placed on pallets which can then be put on a pallet transporter.

Sewer

Some liquid pharmaceuticals, e. g. syrups and intravenous (IV) fluids, can be diluted with water and flushed into the sewers in small quantities over a period of time without serious public health or environmental affect. Fast flowing watercourses may likewise be used to flush small quantities of well-diluted liquid pharmaceuticals or antiseptics.

Burning In Open Containers (Incineration)

Pharmaceuticals should not be destroyed by burning at low temperature in open containers, as toxic pollutants may be released into the air. Paper and cardboard packaging, if they are not to be recycled, may be burnt. Polyvinyl chloride (PVC) plastic however must not be burnt. While burning pharmaceutical waste is not advocated as a method of disposal, it is recognized that it is not infrequently used. It is strongly recommended that only very small quantities of waste pharmaceuticals be disposed of in this way.

Chemical Decomposition

If an appropriate incinerator is not available, the option of chemical decomposition can be used in accordance with the manufacturer's

recommendations, followed by landfill. This method is not recommended unless chemical expertise is readily available. Chemical inactivation is tedious and time consuming, and stocks of the chemicals used in treatment must be made available at all times.

Other Disposal Methods include the use of ‘ reverse distribution network’ or drug take-back programs which provide a safer avenue for disposal of medications from homes. Landfills can contaminate drinking-water if they are not properly constructed. Occupational risks exist at disposal facilities that are not well designed, run, or maintained. Incineration of waste has been widely practiced but inadequate incineration or the incineration of unsuitable materials results in the release of pollutants into the air and of ash residue. Incinerated materials containing chlorine can generate dioxins and furans, which are human carcinogens and have been associated with a range of adverse health effects. Incineration of heavy metals or materials with high metal content (in particular lead, mercury and cadmium) can lead to the spread of toxic metals in the environment. Dioxins, furans and metals are persistent and bio-accumulate in the environment. Materials containing chlorine or metal should therefore not be incinerated. Only modern incinerators operating at 850-1100 °C and fitted with special gas-cleaning equipment are able to comply with the international emission standards for dioxins and furans⁵. Air pollution results are Cancer, neurobehavioral disorders, cardiovascular problems, reduced energy levels, premature death, asthma exacerbations, headaches and dizziness, irritation of eyes, nose, mouth and throat, reduced lung functioning, respiratory symptoms,

respiratory disease, and disruption of endocrine and reproductive and immune systems.

Nonetheless, waste sorting and separation practice has been known to aid substantial reduction in what would finally end up in the waste stream, however, medical waste are simply mixed with municipal waste in collection bins at road at roadsides and disposed of while some are simply buried without any appropriate measures⁸ and more so, ground water contaminations due to the leachate generated by waste dung, surface water contamination by the run-off from the waste dump, generation of flammable gases (e. g. Methane) inside the waste dung, bad odor, pests, and rodents and wind-blown litter in and around the waste dump, acidity to the encircling soil and greenhouse gases emission⁹. All these call for attention and standardization if good health is to be achieved and maintained at all times. This study attempts to assess knowledge and disposal methods practiced in community pharmacies in Akwalbom State.

Study Design

A cross-sectional descriptive survey was carried out. The study questionnaire was administered to the community pharmacists. The Pharmacy premises, drug shelves, waste bins, dumping sites and so on were observed using an observation checklist.

Study Area

The research was carried out from the 15th of October 2015 to the 31st January 2016 in community pharmacies in Akwa Ibom State, Nigeria. Akwa Ibom is divided into three (3) Senatorial districts; Uyo, Ikot-Ekpene and Eket.

It has a total population of over 5 million people distributed over 31 local government areas. The State was selected because it is experiencing a geometric rise in socio-economic activities as a result of the massive road network and infrastructure development in recent times. There are about 100 registered community pharmacies providing pharmaceutical services to the population under the supervision of pharmacists and so many patent medicine stores located across the city and environ.

Sampling and Sample Size Calculation

The data collection team walked through different streets of the State to collect the data from the various pharmacies. The sample size was calculated using the methods employed by Aisien and Shobowale, 2005 and Adogu et al^{10, 11}.

Data Collection

A semi structured questionnaire and observation checklist were used. The questionnaire was developed having taking into consideration the study objectives and a thorough literature review. The questionnaire was then circulated between pre-selected people working in the field, and feedback was gathered. These people include superintendent pharmacists, locum pharmacists and pharmacy managers. Ninety one (91) community pharmacy premises were visited and each interview section lasted between forty five (20) minutes. The feedback was used to modify it and any ambiguities in the questions or answers were addressed through consensus among the authors. The data obtained from the pilot study was not used in the final analysis.

The questionnaire was divided into two sections: Section one were on respondents' demographic information, while the second section was item questions on disposal practices and opinion.

The questionnaire was pre-tested in selected community pharmacy premises in each of the senatorial zones of Akwa Ibom State; Uyo, Eket, and Ikot Ekpene senatorial zones. The different methods were (1) Complete at the spot (2) Drop and call back later to pick-up and (3) Drop and come back later to pick-up. The pre-testing enabled further improvement on the ideal method of administering of the questionnaire before the actual survey.

Verbal informed consent was obtained from the Supervisor/Proprietor or superintendent Pharmacists to participate in the study and those who refused consent were not administered the questionnaire. Only Community Pharmacies registered by the Pharmacists Council of Nigeria (PCN) as at December 2014 were included. Registered patent medicine stores and Unregistered Pharmacies and patent medicine stores were excluded

Data Analysis

This was carried out by entry into Microsoft Excel 2013 version. The entry was then transferred to Statistical Program for Social Scientists (SPSS) version 16 and Epi info analytical software tool to generate the illustrative charts.

The questionnaire was completed by a total number of 78 community pharmacies out of 91 of the pharmacies registered with the Pharmacists Council of Nigeria (PCN) as at December, 2014 to give a respondent

response rate of 85.71%. The following results were obtained: the gender distribution of the respondent is shown in figure 1. 66.67% of the respondents were males while 33.33% were females. Expired products were observed to generate the most waste with 35.90%, next was medicament packages with 24.36% while the least was unused medications with 1.28% as shown in Figure 2.

The various disposal methods practiced by respondents in figure 3 shows that more than one-quarter (29.49%) of the facilities preferred burning and open dumping (26.92%) respectively, while the least (1.28%) preferred the use of contractors as method of disposal of pharmaceutical waste. Figure 4 shows that majority (84.62%) of the respondents had no knowledge about the sorting process in the disposal of pharmaceutical wastes while a few (15.38%) had knowledge of the sorting process in the disposal of pharmaceutical waste.

A higher percentage of the respondents were male which may be favorable for manpower development in the area of pharmaceutical waste disposal when compared to a study by Adogu et al¹¹, the male health workers were significantly more likely to be sent for training on waste management than their female counterpart.

In this study expired drugs generate the most waste, next was medicament packages and the least was unused medications, this was in consonance the report by Smith and Manojlovic that stated that the largest part of pharmaceutical waste in the past had been generated due to the expiration

of medicine, so therefore the development of reverse distribution of the pharmaceutical company allowed the medicine to be returned as products^{12, 13}. Majority of the pharmacies preferred burning and open dumping while the least preferred was the use of contractors. Previous reports has shown that open dumping of waste exposes children and scavengers to infections (Hepatitis and HIV/AIDS) thus making it an environmental and public health hazard¹⁴⁻¹⁷. More so, burning and poorly designed incinerators generate hazardous pollutants (Particulate matter, Mercury, Dioxan, and Furans) which usually cause immune, nervous, endocrine and reproductive system and function impairment and development^{18, 19}. Most of the respondents in this study could not recommend any disposal method requiring sorting and also a few of them had no record on this fact. We also observed that a high percentage of the respondents had no knowledge about the sorting process in the disposal of pharmaceutical wastes. This is implicative as earlier studies had reported that disposal by simple burning and burial is still hazardous as used syringes and needles were reported to be seen in some health care facility in 2004 for which it was reported that more than 60% of 80 health care facility assessed, disposed their waste by open burning and burial²⁰ and also Longe and William had reported that health care waste are still mixed with domestic waste, which creates great risk to health or municipal workers, the public and the environment²¹.

In appropriate methods of waste disposal, very low level of knowledge and awareness of disposal of pharmaceutical waste and a subsequent lack of

regulatory control was observed in this study. This may cause an increase in pharmaceutical waste impact on the ecosystem and its subsequent deleterious effects on humans, aquatic and animal health and these needs to be investigated through safety and toxicological studies vis a vis reawakening of the waste disposal management agency to their responsibility.