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## Pharmacist's opinion and practice towards disposal of unused medications in South India

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### ABSTRACT

A large portion of the pharmaceuticals in our water comes from the improper disposal of unused or unwanted drugs by households and medical facilities. The ability to detect these tiny amounts has increased public awareness and raised new questions about the potential longer-term impact of pharmaceuticals on environment. The aim of the study was to evaluate the opinion and practice of the pharmacists towards disposal of unwanted/left out medicines. A random qualitative interview study was conducted and the data was collected by face to face semi structured interview among registered pharmacists in south India. Institutional Ethical clearance was obtained before proceeding for the study. A total of 127 registered pharmacists were participated in the study. Disposing unwanted medicines in trash and flushing down the sink by 50.5% was the main method by the respondents, 63.9% agreed that they were not aware of environmental hazards due to improper drug disposal; however 45% of the participants were accepted to have their pharmacy as a collecting point of unwanted medicines. Need of some policies to implement strictly and concerned authorities should monitor and implement proper disposal guidelines.

**Keywords:** Unused medications, proper disposal, pharmacist's opinion



### INTRODUCTION

The disposal of pharmaceuticals (unwanted medicines) from household and healthcare activities is becoming an increasing problem for local, national health and environmental authorities. The risks of inappropriate medical disposal by throwing in dustbin, flushing down to the sink/ toilet and disposing without taking proper precautions have been recognized for some time and environmental concerns are now receiving prominence [1,2].

Unwanted medications include expired, left out (unused), damaged, contaminated substances from households and healthcare activities. There are many factors that contribute to the generation of unwanted medicines like side effects intolerance, dosage changes, discontinuation of the medication, or medications reaching the expiry date. Presence of various pharmaceuticals across the world has been confirmed by several reports [1]. So it is not an uncommon to have unwanted medications, when it happens there is a need of clear guidance how to

dispose these medications. Some of the education materials and regulations are available for safe disposal but the extent to which got adherent to these guidelines is not clear [2,3]. This improper disposal of medicines may ends up in accidental poisoning in children, presence of these pharmaceuticals in sewage have a chance to enter into drinking water supplies and may affect vulnerable population like children, pregnant women on long term exposure. Several reports had already showed that pharmaceuticals in environment problematic to the aquatic animals like fishes, mussels resulting in reproductive failure, growth problems. Cattle's death in Cuttack, studies of antibiotic resistance highlighting the need of awareness and safe disposal practice [4]. The World Health Organization recommends that unwanted medications should never be used, should always be considered as pharmaceutical waste and need to be disposed appropriately [5]. Unwanted solid medications should be crushed and mixed with cat litter/ coffee grounds and disposed in trash in a leak-proof, sealed container. Such disposal method will reduce the chances of

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poisoning and diversion [6,7]. Other methods of disposal like reverse distribution or drug take-back programs provide a safer route for disposal of various medications. In these systems unwanted medicines that left in homes due to various reasons will be collected by local pharmacies or agencies of government/ private. In many countries, this drug takes back program giving good results and a better alternative. The aim of this pharmaceutical collection program is to decrease the quantity of unwanted medicines polluting the environment and reducing the quantity of drugs available for accidental poisoning, theft or diversion. These programs provide the legal support and resources to allow the public return unwanted medicines to be disposed of safely [8]. Medical professionals have the greatest interaction directly with patients/ consumers especially of pharmacists and are therefore in an excellent position to influence the use of medications as well as it's safe disposal [9]. Here, we therefore conducted a qualitative study among pharmacists to evaluate opinion, awareness, behavior and practice towards disposal of unused medications.

## MATERIAL AND METHODS

The survey was carried out from February to September 2014, a total of 127 Pharmacists were participated in the study. This survey study was carried initially to get permission from the Institutional ethical committee. The questionnaire was reviewed, got approval. Purpose of the study was informed to the participants before they proceed and assured that information obtained would be considered anonymous and confidential only the researchers would have access to the information. The questionnaire was given in English language. Few of Medical representatives and Medical distribution centres were also involved for the successful completion of the study. The collected data was analysed by using appropriate statistics.

## RESULTS

A total of 127 pharmacists were participated in the study. Government pharmacists and private pharmacists were participated and experience in the profession among the participants was 2 to 34 years. The participants were composed of high proportion of males than females.

Figure 1 depicts participant's current opinion and practice towards disposal of medicines. Among these, 35% of the respondents stated that they were throwing the unwanted/ left out medicines into trash, 15.5% flushing down to the sink/ toilet, 30.7% stated giving back to pharmacy as a best

option, 12% said community take back programs could help to solve the problem and 6.8% following other methods like landfill, burning the unwanted pharmaceuticals.

Figure 2 impregnates the knowledge and awareness for safe disposal methods and hazards of improper disposal. Among the respondents, 63.9% stated that they were not aware of the consequences due to improper disposal of medicines on humans and environment.

Figure 3 represents providing in instruction or guidelines for the safe disposal methods, 81% of the participants said that they couldn't get any guidelines regarding the safe disposal procedures. It was also stated by the participants that national and local government agencies, social media, drug manufacturing companies have to take a step forward in creating awareness and giving guidelines for environment friendly disposal methods. Most of the participants expressed that there is much less awareness of the issue.

Figure 4 signifies participant's opinion and involvement in solving the issues. Among the respondents, 45% were accepted to take unwanted medicines and agreed to keep their pharmacy as a drug take back center and 47.3% of the respondents were not agreed

## Role of pharmacists in providing a solution for the issue

Improper disposal of unused or unwanted drugs by households and medical facilities is one of the important ways of pharmaceuticals into our water system. Most of them either flush them down the toilet or throw them in the trash. One of the best methods of safe disposal is drug take back program which of less popular, less practiced and leaving people with few options.

*"We are ready to accept the unwanted medicines/ left out medicines from patients when they come with the payment slip and prescription within 3 to 6 months of hand over of the medicines to patients" (Registered Pharmacists with experience of 21 years).*

*"Usually we give back the expired medicines within three months to the distributor/ manufacturer by that we get credits from them it's a kind of redistribution and its quite good practice not only financially but also in protecting the environment by avoiding improper disposal of various drugs, especially of antibiotics and cytotoxic drug" (Registered Pharmacists with experience of 11years).*

## DISCUSSION

Hospitals and pharmacies deal with many pharmaceuticals and presence of unused medicines not an uncommon one, but not all dispose of the unused ones properly. A significant barrier to ensuring responsible safe disposal is that, very few medical professionals, including doctors, nurses, and pharmacists are educated about the issue. There is little, if any, teaching of proper disposal of pharmaceuticals in medical, dental, nursing, veterinary or pharmacy curriculum.

The consistent increase in production and the use of pharmaceuticals, generating increase in the amount of pharmaceutical waste. The discovery of pharmaceutical compounds in surface, ground and drinking waters around the world has raised concerns about the potential adverse environmental consequences of these contaminants. The fate of the improperly disposed medicines in water is unknown because unfortunately, current water treatment systems do not remove many pharmaceuticals from drinking water [10,11]. Usually the concentration of these medications are negligible, however, long-term exposure to even low levels of multiple medications could be hazardous [12,13,14]. There is high occurrence of pharmaceutical and personal care products in Indian drains, sewerages and rivers and they signaled to be future disaster [15].

One of the important effects due to presence of pharmaceuticals in environment is occurrence of antibiotic resistance. A study at Patancheru, reported the presence of ciprofloxacin in water [16]. Further, in India, bacteria resistant to ciprofloxacin have been found downstream pharmaceutical plants, genes for multi resistance were found in drinking water and multi resistant *Salmonella* in water sprayed on vegetables. Besides, the analgesic diclofenac causes kidney failure in Indian vulture and therefore, population was declined drastically. All these information suggests that pharmaceutical drugs in India were well spread in several environmental as well as biological media. The proper collection and disposal of unused medicines through a well-run disposal system and collection programs are important in ensuring safety of humans and the environment. Drug take-back programs are well established in certain countries where the pharmacy and the pharmacists have significant roles as collection points and as advocators for proper drug disposal respectively [8].

Several studies enlighten the practice towards the disposal of unused medicines by various group of professionals and population [17,18]. Pharmacists in this study disposed unwanted/ left out medicines mostly in trash and toilet and these practices are similar to the practices followed by patients and medical professionals in the previous study of the same authors [19].

In this study although the practice of disposing unwanted medicines is not optimal, the awareness towards protecting the environment from improper disposal is also marginal but most of the participants showed interest in knowing the actual problem. The majority agreed that improper disposal can harm the environment but not able to answer in what way it harms. One of the worth thing noticed in the study that the number of pharmacists has increased who are willing to have their pharmacy as a collecting point of unused medicines and most of them expressed that there is a need of policies to implement. Reverse distribution is one of the good and significant methods which hold a capability of reducing the pharmaceutical waste load. These reverse distributors provide a method for pharmacies, hospitals and wholesalers to return drug products for destruction and a potential credit from the manufacturer. Different reverse distributors may have different permits and accommodate the needs of different entities. Medication disposal is a hot topic in pharmacy today and it is rapidly gaining the attention of more and more professionals and consumers alike. Pharmacists have the potential to be on the forefront of this movement, but it is essential that their knowledge of proper medication disposal is current, complete and accurate.

## CONCLUSION

This study provided the current scenario of knowledge and practice towards the disposal of medicines by Pharmacists. The awareness regarding impact of improper disposal of pharmaceutical is still a cornered issue and need to be roused. The current practices of the pharmacist for the collection and disposal of unwanted pharmaceuticals are not optimal; it is highlighting the role of pharmacists towards the issue. Policies and programs need to be established to educate the problem, minimising the risks and to protect environment and the lives.

Figure 1: Opinion and methods of drug disposal by Pharmacists

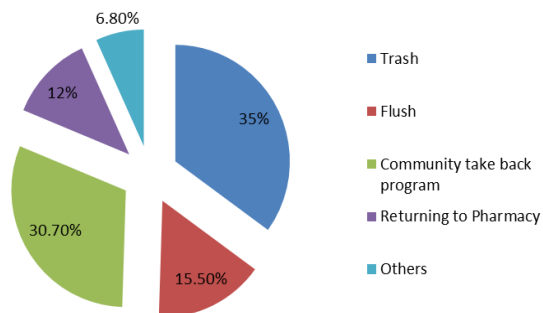


Figure 2: Knowledge towards hazard effects of improper drug disposal

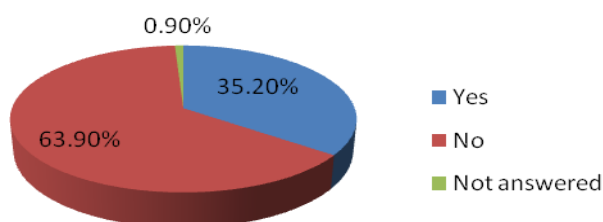


Figure 3: Getting guidelines for safe disposal of drugs

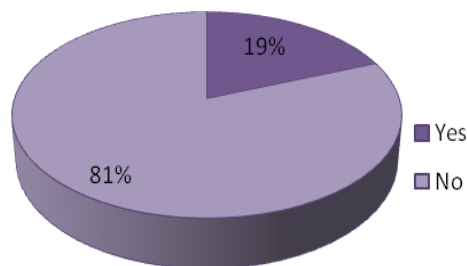
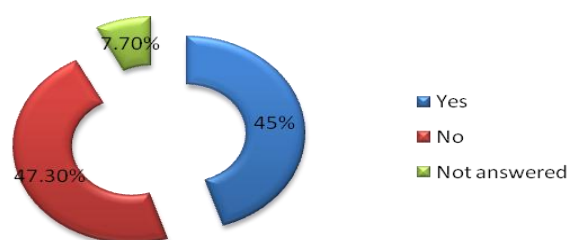


Figure 4: Opinion for having their pharmacy to take back left out medicines



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