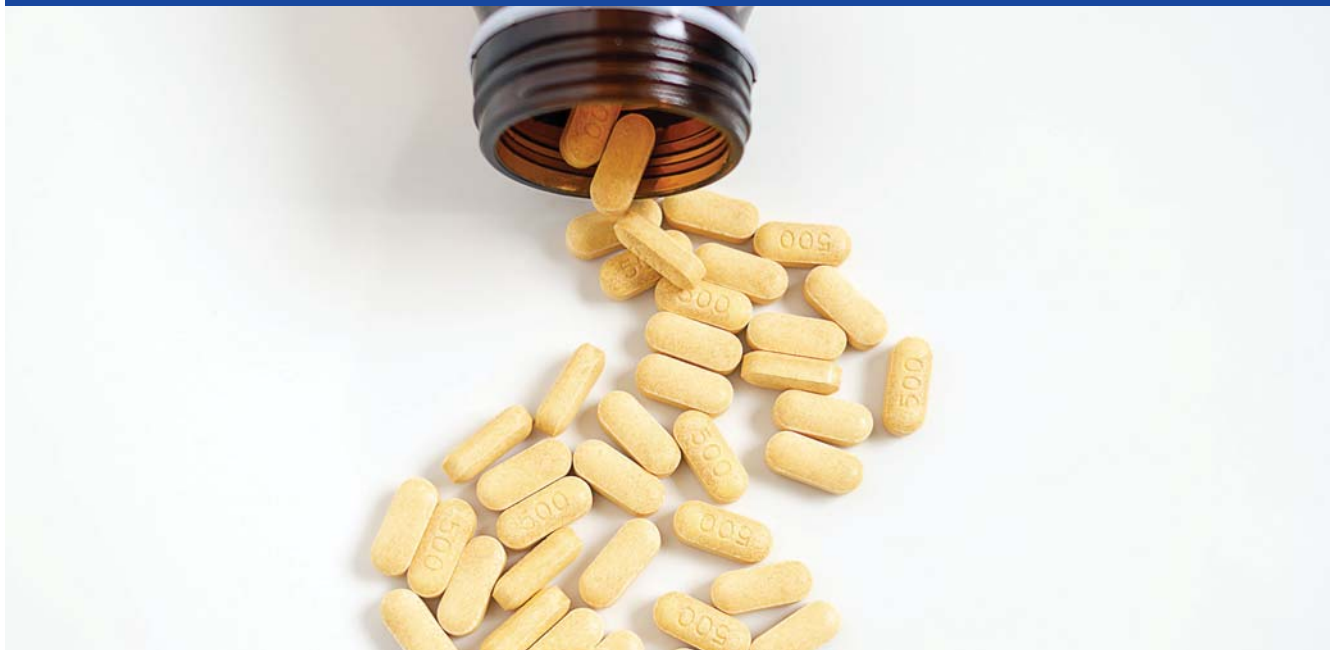


# WATER AND HEALTH

## Safe disposal of unwanted pharmaceuticals a must

*Most pharmaceutical consumers are unfamiliar with the proper disposal measures for unwanted and expired medication. This results in the occurrence of these drugs in the environment, causing a serious danger to both human health and ecosystems. The aim of this article is to inform the public of the correct disposal methods for pharmaceuticals, thereby assisting in curbing their uncontrolled release into the environment and downstream negative implications on animals and humans. Article courtesy of the Agricultural Research Council (ARC).*



Pharmaceuticals are chemicals that are used to diagnose, treat or prevent illnesses. It is worth emphasising that life would have been extremely difficult without the availability of these drugs. However, the majority of pharmaceutical users are unfamiliar with the proper disposal measures for unwanted medication.

As a result, medicines belonging to diverse therapeutic groups have been discovered in environmental matrices. The presence of these chemicals in the environment is a serious and complex issue that has received considerable attention because pharmaceutical pollution poses distinct risks to human health and ecosystems, including the near extinction of species, the feminization of fish, and the spread of antibiotic resistance.

### **Commonly used ineffective pharmaceutical disposal techniques and negative impacts**

Most unwanted liquid medications are washed down the sink or flushed down the toilet, whereby they enter water systems and may also end up in drinking water, leading to the unintentional intake of certain drugs. Solid tablets and capsules, on the other hand, are usually thrown away in the trash, eventually ending up in landfills where they could leak into the environment as leachate. Since they are hazardous to pets and wild animals, unused and expired pharmaceuticals should not be placed in rubbish bins, discarded on open ground or flushed down toilets.

Improper approaches to disposing of unwanted medications, such as trash bins, toilets and the land surface, may lead to

the contamination of groundwater by leaking into the soil. Their spread can also be a potential source of pharmaceutical pollution. Furthermore, surface runoff channels these drugs into rivers where they can endanger aquatic species. In areas where there is an inadequate supply of freshwater, people often make use of river water to irrigate food crops as well as to drink, which may increase human exposure to incorrectly disposed medications.

### Sources of unwanted pharmaceuticals

Unused and expired pharmaceuticals are frequently the result of patients failing to comply with instructions for the use of particular medications and so not taking or completing the recommended courses. Excessive prescribing by medical practitioners may also increase the amount of unwanted drugs. According to the World Health Organization (WHO), more than half of all medications are dispensed incorrectly, resulting in wasteful storage and environmental concerns. Moreover, some of these drugs are available in retail stores, allowing people to overstock them for future usage, leading to unwanted pharmaceuticals being stored in households. Since many nations still lack standardized medication disposal protocols, there is a great deal of confusion regarding the 'proper' way to dispose of pharmaceuticals.

### When to dispose of unwanted pharmaceuticals

Pharmaceutical users should get rid of their current medication if the doctor updates their prescription while they still have some remaining, or when they are feeling healthy and the doctor has advised them to stop taking the medication. When over-the-counter medications are no longer required or have reached their expiration dates, they should be thrown away.

This is because having unwanted drugs in the home raises the danger of taking the wrong medication. It can also lead to the unintentional poisoning of children. It has been reported elsewhere that 70 000 children are admitted to hospitals each year as a result of medication errors, which is fuelled by the storage of drugs that are no longer needed. Therefore, it is crucial not to store unwanted medications because they put children's lives in danger.

### Effective pharmaceutical disposal techniques

Returning medications that are no longer needed or have expired to the nearest medical store (pharmacy) is the most effective and environmentally friendly approach to getting rid of them. Healthcare professionals are obligated to accept unwanted drugs from patients and standardised procedures are in place for them to dispose of such medications. In the absence of a nearby medical store, they may be disposed of at home, provided that certain precautions are taken prior to their disposal. This involves taking the drugs out of their original containers and mixing them with unwanted substances such as used tea or coffee grounds, then putting the mixture into a sealable bag or disposable container with a lid.

The discarded medication thereby becomes unappealing to children or pets and less recognisable to people who may intentionally go through the trash seeking drugs. Because medicinal containers are recyclable, the information on them must be scratched out. In this way, your medical privacy is

protected and no one can refill the medication. The sealed drug mixture containers and empty drug containers can then be thrown into the trash bin.

### How properly disposing of drugs safeguards human health and the environment

Proper disposal of pharmaceutical waste contributes significantly to the reduction of the spread of these chemicals in the environment, thereby reducing the exposure risks to aquatic organisms and human health. It has been documented that some aquatic species have developed reproductive abnormalities due of their exposure to pharmaceuticals. Hence, proper disposal may lessen the extinction risks of such species. Although there are other sources of pharmaceutical waste in the environment besides incorrect disposal, the potential risks to aquatic and other organisms, including antimicrobial resistance in human health, may be lessened through proper disposal.

Addressing the problems related to inappropriate disposal procedures is necessary if we are to lessen the negative effects of pharmaceuticals on the environment. The healthcare industry is ideally positioned to aid in stopping the improper disposal of medications. Healthcare professionals can advise patients on how to get rid of unused/expired drugs and discourage them from overstocking for future use since the items may end up passing their expiration dates. Indeed, pharmaceutical consumers should pay special attention to the expiration dates before purchasing any medications so as to avoid storing drugs that will soon expire. The establishment of awareness campaigns spearheaded by healthcare workers, along with other measures as illustrated in Figure 4, could greatly reduce the amount of pharmaceutical waste in the environment.

### CEC Knowledge Hub

The ARC, in collaboration with Tshwane University of Technology, North-West University and the University of South Africa (UNISA), initiated a project funded by the Water Research Commission to establish the Contaminants of Emerging Concern (CEC) Knowledge Hub. This takes the form of an online portal comprising information relating to newly detected aquatic pollutants such as pharmaceuticals.

The CEC Knowledge Hub was established to guide the public and scientists in pre-empting any aquatic catastrophe relating to CECs by identifying the problem and taking relevant, informed steps to prevent the situation from escalating beyond control. It clearly demonstrates the widespread occurrence of pharmaceuticals in several waterways, highlighting the dire need for proper disposal methods.

The CEC Knowledge Hub can be accessed at <https://www.ceckh.agric.za/>

Questions related to proper measures for disposing of unwanted medications and mitigative actions that can reduce pharmaceutical waste in the environment can be submitted by e-mail to the authors:

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