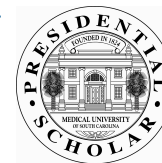


# Improving Knowledge of Proper Medication Disposal Among Pharmacists in Charleston County, SC

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## INTRODUCTION

As a result of medical advancements over the past few decades, distribution and consumption of pharmaceuticals in the United States has increased immensely. Between 1999 and 2009, prescriptions were reported to have increased by 1.9 billion<sup>1</sup>. With this rise in medication use, the effects of discarded and excreted medications on the environment have become a major concern. Discarded pharmaceuticals enter the environment in the form of our wastewaters. Wastewaters from municipal wastewater treatment plants, livestock farms, hospitals, and pharmaceutical manufacturers are the known sources of pharmaceuticals in the water environment<sup>2</sup>. Unfortunately, current water treatment systems do not remove many pharmaceuticals from the water we drink. Acetaminophen, estradiol, and verapamil are examples of the medications most commonly found in United States waterways<sup>3</sup>.

The impact of drugs in our water systems on human health and local ecosystems is not entirely understood. Usually, the concentration of any medications found is negligible. Nonetheless, long-term exposure to even these low levels could be unsafe<sup>4</sup>. Endocrine disruptions, maintenance or development of antibiotic resistance, and disturbances in the beneficial denitrifying bacteria in our environment have all been implicated as effects of these pollutants<sup>4</sup>.

Improper disposal of unwanted or expired medications, therefore, represents an easily preventable means of pharmaceuticals entering water supplies. However, it has been demonstrated that the general public may be unaware of proper disposal methods. In a 2006 study by Seehusen and Edwards, 89% of those surveyed disposed of their unwanted medications via a toilet or sink. 56% of those participants were under the impression that it was appropriate to flush medications down the toilet or sink. In another survey, 35.4% of the population flushed medications down the toilet or sink<sup>5</sup>. Data obtained from the previous Presidential Scholars "Crush Don't Flush" initiative also suggested a continuing need for education about proper medication disposal.

The previous Presidential Scholars "Crush Don't Flush" initiative distributed flyers on proper medication disposal to Charleston residents in their water bills. Our project aims to assess our local pharmacists' knowledge of proper disposal methods and to increase this knowledge among local pharmacists and pharmacy customers.

## MEDICATION DISPOSAL FACTS

- Proper medication disposal recommendations from the Office of National Drug Control Policy and the FDA say to crush unused or expired medications, mix with kitty litter or coffee grounds, and discard in your normal trash in a plastic bag or hard-sided container
- Studies show that 35-89% of people flush their leftover medications down the sink or toilet.
- Water treatment plants do not have the ability to remove pharmaceuticals from water.



## METHODS

A survey was created to investigate medication disposal advice given by local pharmacies. The five question survey was conducted at as many local pharmacies as possible. Fifty-nine pharmacies were surveyed. The questions on the survey were as follows:

- What medication disposal options does this pharmacy offer?
- What are this pharmacy's recommendations regarding left over or expired medications?
- How often does the pharmacy provide its customers with medication disposal advice? (i.e. daily, weekly, monthly, hardly ever)
- Are informational handouts about proper medication disposal currently available in the store?
- If no to question 4: Who should I contact regarding the possibility of displaying or offering informational posters/handouts/brochures in this pharmacy?

Prior to completing the survey, the respondent received a letter of explanation about the study and that their participation was voluntary and confidential. Responses of each pharmacy were collected without any personal identifiers and results were reported in aggregate. Once data were analyzed, educational pamphlets were created and distributed to each of the fifty-nine pharmacies surveyed.

## RESULTS

Figure A. What are this pharmacy's recommendations regarding left over or expired medications?

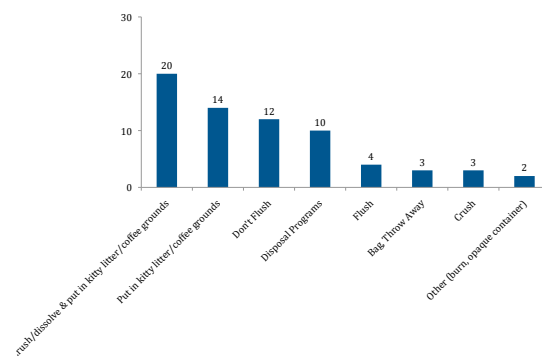
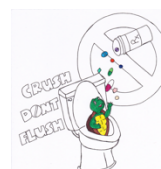
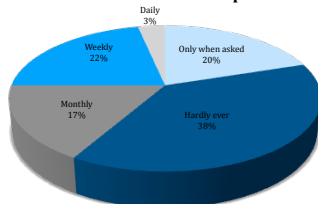


Figure B. How often does the pharmacy provide its customers with medication disposal advice?



To determine Charleston County's local pharmacies' knowledge of new best practices in medication disposal, the group surveyed 59 local pharmacies. Only 14% of the surveyed locations offered medication disposal options to customers, including those charging for contracted services. The surveys found 20% of the respondents recommended not flushing medications (Fig. A). Moreover, 34% of the responses included the best practices of crushing, adding an unpalatable substance, and throwing the container away (Fig. A). The knowledge deficit of the patrons is illustrated in Figure B with only 3% of pharmacies reporting their need to counsel patrons about medication disposal on a daily basis. Of the pharmacies surveyed, 39% reported that counseling was hardly ever performed; in addition, informational handouts were only found in 8% of the local pharmacies (Fig. B).

The group encountered problems related to the sampling method. A lack of time for answering questions was a significant factor in the responses received. Group members noted that the respondents were often busy or otherwise unavailable. The dissemination of information through local pharmacies was hampered by requirements such as contacting corporate headquarters, district managers, and pharmacy managers to display any informational handouts. One independently owned pharmacy requested access to more brochures and the digital version for future printing.

## DISCUSSION

Our data collected from surveys of pharmacies indicate that there is a lack of education regarding proper medication disposal among pharmacy personnel. It is essential to educate both health professionals and patients on the proper ways to dispose of medications in order to minimize the impact on the environment. In an attempt to educate both pharmacy personnel and pharmacy customers simultaneously, our group developed an informational pamphlet on proper medication disposal and distributed it to the pharmacies in the area. This enabled us to reach both the pharmacy employees and the patients. Pharmacies were offered multiple flyers to distribute to pharmacy customers and were also informed that an electronic copy of our flyer was available online so they may print more pamphlets as necessary. The feedback we received from pharmacies on these flyers was immensely positive, with many asking for more copies.

Another approach we took to increase knowledge of proper medication disposal was to provide this information to students at MUSC in their normal coursework. We worked with the South Carolina College of Pharmacy, MUSC Campus to have an insert placed in the notes for students this year and years to come, so that health care professionals receive this knowledge while in training. We also aim to publish an article on the issue in a state-wide newsletter for pharmacists.

An interprofessional approach was valuable for our group due to the variety of healthcare (and law) backgrounds involved in our project. When it comes to a patient obtaining prescription drugs, multiple health care professions are often involved. At a minimum, pharmacists and physicians are involved. In the hospital setting and in a more broad picture, nurses, healthcare administrators, lawyers, and researchers are also involved. In the development of our project, this variety of backgrounds was immensely helpful in understanding the big picture of pharmaceuticals in healthcare. The value of having varying perspectives was again evident after a project was selected and discussions were being held regarding resources available to assist with the project. Our different backgrounds allowed us to establish connections within a wide community to aid in our project. In addition, the knowledge that we gained from this project is important for all health professionals in their interaction with and advising of patients.

### Lessons learned

- Pharmaceutical disposal is an important issue in healthcare
- Education for providers that dispense medications may be deficient in educating about this issue
  - Only 14% of area pharmacies offer medication disposal options to customers
  - Only 3% of area pharmacies offer medication disposal advice on a daily basis
- There are actions that anyone can take to help solve this problem
- There are many community resources that can aid in proper medication disposal, but there seems to be a lack of awareness
- Providing resources to the pharmacies seemed to be well received and the employees at the pharmacies seemed to be interested in the information

## RECOMMENDATIONS

We recommend that education continue to a larger population. This may entail the inclusion of our information in at least one course in each college at MUSC. Finding an effective way to educate pharmacy personnel statewide would also help disseminate the knowledge of proper medication disposal.

Some questions that are still left to be answered:

- How prevalent are harmful pharmaceuticals in the water supply of the Charleston area?
- Are there other ways to make people aware of this issue?
- Is it possible to increase the amount of disposal options for the area?

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