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PHARMACISTS' ROLE IN SAFE AND LEGAL MEDICATION DISPOSAL

by

Allyson Lamb

AN UNDERGRADUATE THESIS

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# PHARMACISTS' ROLE IN SAFE AND LEGAL MEDICATION DISPOSAL

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## **Abstract**

This study, funded by a Nebraska Environmental Trust Grant (NET), is carried out in partnership with the Lincoln-Lancaster County Health Department (LLCHD) and the Nebraska Medication Education for Disposal Strategies (MEDS) Coalition. Stakeholders, including LLCHD, are working together in Nebraska MEDS to determine the best means of medicine destruction. Often unused, unwanted, and expired drugs are flushed or thrown away, which can cause environmental, human health, and/or safety hazards. Nebraska MEDS ' wants to create means for medication destruction that will eliminate these hazards. The most current "golden standard" according to several federal and local agencies is to put tamper-resistant boxes in pharmacies that will allow consumers to bring medication back to knowledgeable pharmacists for safe, legal, environmentally sound disposal. Although pharmacies participating in these programs have seen increased traffic in their stores and a good community reputation for environmental stewardship, the downside can be the cost of disposal and the time it takes for individual pharmacists to participate. Before implementing the project, *Nebraska MEDS Disposal*, pharmacists were interviewed about their current recommendations for medication destruction and how they feel about the *Nebraska MEDS Disposal* project. Results showed that most pharmacists in Nebraska want to do the right thing and will take the time to implement the project in their pharmacies. Future studies will include pharmacy and community participation, how many pounds of drugs collected, and overall educational change in community about drug disposal.

## **Preface**

Thank you to my thesis advisor and supervisor, Renae Rief, as well as my thesis reader, Dan King. Both have inspired me with true enthusiasm for this project and many other environmental issues. I also appreciate my other coworkers at LLCHD who always have fresh ideas. Thank you to the Nebraska Environmental Trust for funding my position and work. And a final thank you to Sara Cooper and Dave Gosselin for gracious flexibility, understanding, and enormous amounts of support throughout my undergraduate career.

## Introduction

Often, people with unused or expired medications are unsure of what the golden standard for disposal is. For years, pharmacists told patients to flush their old medicine. This provides a quick disposal, which keeps the drugs out of the hands of children, pets, and others who should not have the medicine. Flushing is also cost efficient for the consumer. An ongoing United States Geological Study (USGS), though, found pharmaceuticals and other “emerging contaminants” in groundwater and surface waters across the United States (Caracciolo) as well as increases in accidental ingestion of unknowing children (Alegent Health). The ongoing USGS study and other common studies like the one from Carlsson in 2006 are part of a national reconnaissance effort aimed at providing baseline information on the environmental occurrence of “emerging contaminants” such as human and veterinary pharmaceuticals, industrial and household wastewater products, and reproductive and steroidal hormones in water resources. During 1999 and 2000, 142 streams, 55 wells, and seven effluent samples were collected across 36 states as part of this baseline study. Included in this study were seven streams from Nebraska and aquifers from eastern Nebraska. A majority of the sites sampled in the study were suspected to be susceptible to emerging contaminants. At least one chemical was detected in low levels in 80% of streams and 93% of groundwater sampled. Steroids, nonprescription drugs, and insect repellents were the chemical groups most frequently detected.

An interesting piece of regulation from the Resource Conservation and Recovery Act (RCRA) includes that all household wastes are technically exempt from being considered “hazardous wastes”. This does not mean that household wastes are not hazardous, as is obvious from the above USGS study. One article out of *Pollution Engineering* says drugs should be considered hazardous and should coincide with regulatory action if it is thrown away carelessly.

This is a bit extreme for households, but the public should be aware of their impact on ecosystems nonetheless.

To avoid this environmental contamination, the recommendation for medication disposal was throwing away the medicine. Though cost efficient, throwing pills directly in the trash can still lead to poisoning to children or pets or diversion. A study from Maine's Department of Environmental Quality (DEP) also showed that landfill leachate still ultimately affects nearby groundwater. One of the latest suggestions to deter poisoning and diversion is to crush old pills and add it to an undesirable substance, like kitty litter or coffee grounds. This is cost effective, quick, avoids poisoning and diversion, and is relatively simple to do. Groundwater is still affected by this though from landfill leachate.

A particularly interested group, the Groundwater Foundation, hosted a workshop about the USGS survey. Several concerned stakeholders attended the meeting and eventually a few of them got together to form the Nebraska MEDS (Medication Education and Disposal Strategies) Coalition, which was led initially by the Lincoln-Lancaster County Health Department (LLCHD). The Nebraska MEDS Coalition has been meeting since the original workshop to discuss the steps necessary to confront the issue of pharmaceutical based contaminants in Nebraska ground and surface water. The partners include the Nebraska Pharmacists Association, the Groundwater Foundation, Nebraska Department of Environmental Quality, Nebraska Board of Pharmacy, Nebraska Regional Poison Center, and LLCHD.

The Nebraska MEDS Coalition initially researched how organizations across the United States and Nebraska were handling pharmaceutical waste. "Take-back" days, single days of drug collection sponsored by the DEA, were the predominant, "safe" way to handle unwanted medications. Aside from being expensive, there are several drawbacks to this approach. The first

drawback was that these drugs were taken back were burned at pet crematories, which do not have as strict air regulations as medical waste incinerators. This approach was just moving toxins from the water supply to the air. The main drawback, though, was that a single take-back day encouraged the public to hold dangerous drugs in their homes until the next take-back day, which obviously increased the chance for medical diversion or patient misuse.

Currently there is no responsible, universal plan to take care of unused medication (Bain, 2004). The Nebraska Board of Pharmacy made a unanimous decision to allow pharmacies to take back non-controlled substances in 2010, so the Nebraska MEDS Group has decided to implement some kind of take-back initiative in the pharmacies.

The LLCHD decided to implement a pilot project, titled *Nebraska MEDS Disposal* in Lincoln and Lancaster County that will utilize local pharmacies as a resource for residents to dispose of unwanted non-controlled substances. A program in Iowa that has similar goals, called *TakeAway*, uses boxes from the company Sharps that are tamper-resistant only allow one-way entry to the box. At least one pharmacy per county in Iowa has one of these boxes. Pharmacies there have signs to attract customers and teach them about proper drug disposal. Customers can simply drop off their unwanted medication in these boxes and once the box is full, the postage is prepaid so pharmacists simply hand the box to the mailman and it is delivered to a medical incinerator. Once the old box is shipped away from a pharmacy a new one is delivered and the process is continued.

Below in Figure 1, is a summary of the current practices for medication disposal:

What to do with unused medication	Positive Outcome	Negative Outcome
Flush it	<ul style="list-style-type: none"> <li>•Quick disposal (avoids potential poisoning and diversion)</li> <li>•Cost efficient</li> </ul>	<ul style="list-style-type: none"> <li>•U.S. Geological Survey showed that 80% of streams and 93% of groundwater tested positive for “emerging contaminants”, such as medications</li> </ul>
Throw it in the trash	<ul style="list-style-type: none"> <li>•Quick disposal</li> <li>•Cost efficient</li> </ul>	<ul style="list-style-type: none"> <li>•Potential for wildlife, children, pets, or others to ingest medication</li> <li>•Dept. of Environmental Protection (DEP) study from 2009 shows leachate from landfill still ultimately affects groundwater</li> </ul>
Crush and add to another substance	<ul style="list-style-type: none"> <li>•Quick disposal (avoids potential poisoning and diversion)</li> <li>•Cost efficient</li> </ul>	<ul style="list-style-type: none"> <li>•DEP study shows leachate from landfill still ultimately affects groundwater</li> </ul>
Take to National DEA Take-Back Day	<ul style="list-style-type: none"> <li>•Gets the medication out of the home</li> <li>•Disposal is environmentally sound</li> </ul>	<ul style="list-style-type: none"> <li>•Only happens 2x/year</li> <li>•Leads to medication build-up in home</li> <li>•Can leave potential for poisoning or diversion</li> </ul>
Take to pharmacy as part of community take-back program	<ul style="list-style-type: none"> <li>•Gets the medication out of the home</li> <li>•Disposal is environmentally sound</li> <li>•Cost efficient for consumer</li> </ul>	<ul style="list-style-type: none"> <li>•Can be expensive and more work for pharmacies</li> </ul>

**Figure 1.** Current practices for medication disposal and their pros and cons.



Since pharmacists will be the main champions in the *Nebraska MEDS Disposal* project, a heavy role as a project coordinator has been to get their feedback. How do pharmacists feel about potentially spending more time on this project? Will they internalize the costs of medication disposal? How can the Nebraska MEDS Coalition reach out to pharmacies to explain the importance of proper disposal and how willing are pharmacies to participate in our pilot project?

## **Materials and Methods**

The Groundwater Foundation's workshop about the environmental impacts of improper medication disposal started it all. The first part in any major project is gathering several concerned stakeholders such as the Nebraska Pharmacists Association, the Groundwater Foundation, Nebraska Department of Environmental Quality, Nebraska Board of Pharmacy, Nebraska Regional Poison Center, and LLCHD together to work on a project.

As a group, they decided that awareness and education were going to be the forefront of their initiative. They put together magnets and brochures in 2009 that recommend that pharmacists and the public crush their pills and mix with an undesirable substance, such as kitty litter or used coffee grounds, then throw it away. At the time, this was the best recommendation. After brochures and magnets were distributed to over 400 pharmacies in Lincoln-Lancaster County, Nebraska MEDS sent out surveys asking what pharmacists recommend to their patients for responsible medication disposal.

The next step in getting this program rolling was receiving funding. Last year the LLCHD applied for a \$100,000 grant from the Nebraska Environmental Trust Fund. Over the

summer of 2011, they were informed that they received the grant in full and were anxious to hire a project coordinator to move things along. Below is the job posting and description for the project coordinator position. In October, I applied and began working at the LLCHD.

## ***Local Pharmacy Medication Disposal – A Prescription for Public Health***

### **Seeking Part-time Grant Project Coordinator**

#### **Grant Objectives and Deliverables:**

The Lincoln-Lancaster County Health Department (LLCHD) and the Nebraska MEDS (**M**edication **E**ducation for **D**isposal **S**trategies) Coalition plan to pilot a system that will work to provide Lincoln-Lancaster County pharmacies with a method for safe, legal, and sustainable pharmaceutical waste management. More specifically, the pilot will work to provide all 66 Lancaster County pharmacies with the following deliverables:

1. An educational kit for use by pharmacy staff and customers that details the need and recommended steps for proper pharmaceutical waste handling and disposal.
2. A simple and easily documentable disposal system for pharmacies to use that includes one-way, tamper-resistant disposal devices for non-controlled substances that can be shipped directly to a medical/hazardous waste incinerator.
3. A qualitative and quantitative data set to support statewide efforts to manage unwanted and expired medications.

The pilot project is also expected to produce a final report, detailed analysis, and a complete cost estimate for a medication disposal system model to share with interested pharmacies, industry professionals and elected officials across the State of Nebraska.

#### **Project Coordinator Description:**

Lincoln-Lancaster County Health Department; Hours: PART TIME; M – F (some evenings and weekend hours possible); This position is funded through the Nebraska Environmental Trust Fund and sponsored by the Lincoln-Lancaster County Health Department. Individual will be responsible for implementation and coordination of the *Local Pharmacy Medication Disposal – A Prescription for Public Health* grant project.

Coordinator is expected to work collaboratively with LLCHD staff on Nebraska Environmental Trust grant management and reporting. Individual is expected to implement grant activities based on recommendations and specifications of the Nebraska MEDS coalition/advisory committee and in cooperation with partnering local pharmacies, non-profits, local government agencies, and the general public. Primary duties will include: Project delivery, outreach and marketing; establishment and maintenance of effective relationships and correspondence with participating pharmacists, pharmacies, and other project stakeholders; delivery of health education messages; maintenance of appropriate records to evaluate program effectiveness; support project webpage; assistance in reporting; and delivery of evaluation measures. Knowledge of pharmacy/pharmaceutical/medication management and regulations, environmental toxicology, waste management, collaboration/partner development, and behavior change strategies would be useful.

Qualifications: Bachelor's degree preferred with major course work in pharmacy studies and management, environmental science, environmental education, public health education, public or business administration, community organizing, or related field, ideally 6 months - 2 years experience in coordinating environmental or public health programs and/or projects; or equivalent.

The next step was to meet with pharmacists to gain insight to how a project like this may function in pharmacies. A Pharmacy Forum was arranged for and held December 16, 2011. Attending included Kim Ross from HyVee, Claude Frerichs from B & R Stores, Matt Wittman from Shopko, Steve Osenbaugh from The Pharmacy, Joe Farrar from CVS, Marcia Muetting from the Nebraska Pharmacists Association, Elizabeth Esseks from the Department of Health and Human Services, and Lincoln-Lancaster County Health Department Staff: Nancy Clark ,Waste Section Supervisor, Dan King ,Environmental Health Specialist, Renae Rief ,Environmental Public Health Education Supervisor, and Ally Lamb ,Project Coordinator. Many concerns and ideas were addressed. A representative from the Nebraska Pharmacists Association (NPA) expressed concern of someone stealing the box if it is not kept behind the counter. But others said that keeping the box behind the counter may decrease participation with an "out of sight, out of mind attitude" or that customers

may be embarrassed to bring back medication if they think they have to explain to a pharmacist why they did not finish their medication. Another concern stated by pharmacists at the Pharmacy Forum was how to market the program to both the public and pharmacy staff. For both groups, it will require a change in attitude, which is not easy to administer. In order for the City of Lincoln's local government to purchase something like this, the first step was to send out a Request for Proposal (RFP). The RFP was publicized in newspapers and other sources and clearly describes what our contractor will need to do for the project. Each interested company submitted their response to the City's purchasing department after two weeks of the RFP being released. Then a selection committee came together to vote on which company will win the bid for the project. The selection committee for this project consisted of myself, a member from the purchasing department, and four other MEDS members. After meeting and debating and requesting more information from all the companies who replied to our RFP, we chose Sharps, the company who also started the *TakeAway* program in Iowa. Unfortunately, the RFP was unclear to other interested companies, so the contract with Sharps was canceled and an updated, more specific RFP was sent out April 20<sup>th</sup>, 2012. The RFP will be open for two weeks.

For advertising, the contractor will play a large role. They will distribute a lot of signs, hand-outs, flyers, give-aways, and other pieces of advertising for each pharmacy, along with their medication disposal box. LLCHD will also come up with substantial marketing materials that can hopefully be more geared to Lincoln-Lancaster residents. Staff are currently working on a logo design and will take note of consumers dropping off medication at the DEA Take-Back Day on April 28<sup>th</sup>, 2012. For example, if more men than women (or vice versa) drop off medication, Nebraska MEDS can take note of that and advertise specifically to that group.

In January, LLCHD also hosted a law-enforcement meeting with members of the Lincoln Police Department, the Sheriffs Office, and our local Drug Administration Enforcement (DEA) representative, Scott Callier. Since pharmacies currently cannot accept controlled substances, there needs to be some kind of alternative for these drugs that is still safer than flushing. Current law allows law-enforcement to accept controlled substances if they are there to witness the destruction. An option would be to put another collection box at police stations, allowing law-enforcement to witness the controlled substance collection and could send it away to a medical incinerator. In a meeting with the project coordinator from Iowa's project last week though, they said this idea is too burdensome. In Iowa, if a citizen brings a controlled substance to a pharmacy, the pharmacists or technician advises the person to either take it home and crush it up with something like kitty litter and throw it away, or wait for the next DEA Take-Back Day. Nebraska and Iowa are hoping for a change in legislation soon that would allow pharmacies to collect controlled substances.

In June, we hope to launch the project. This means that boxes will be in pharmacies and ready for medical waste collection. Hopefully everything runs smoothly, but often there are questions. Each pharmacy will have these three items:

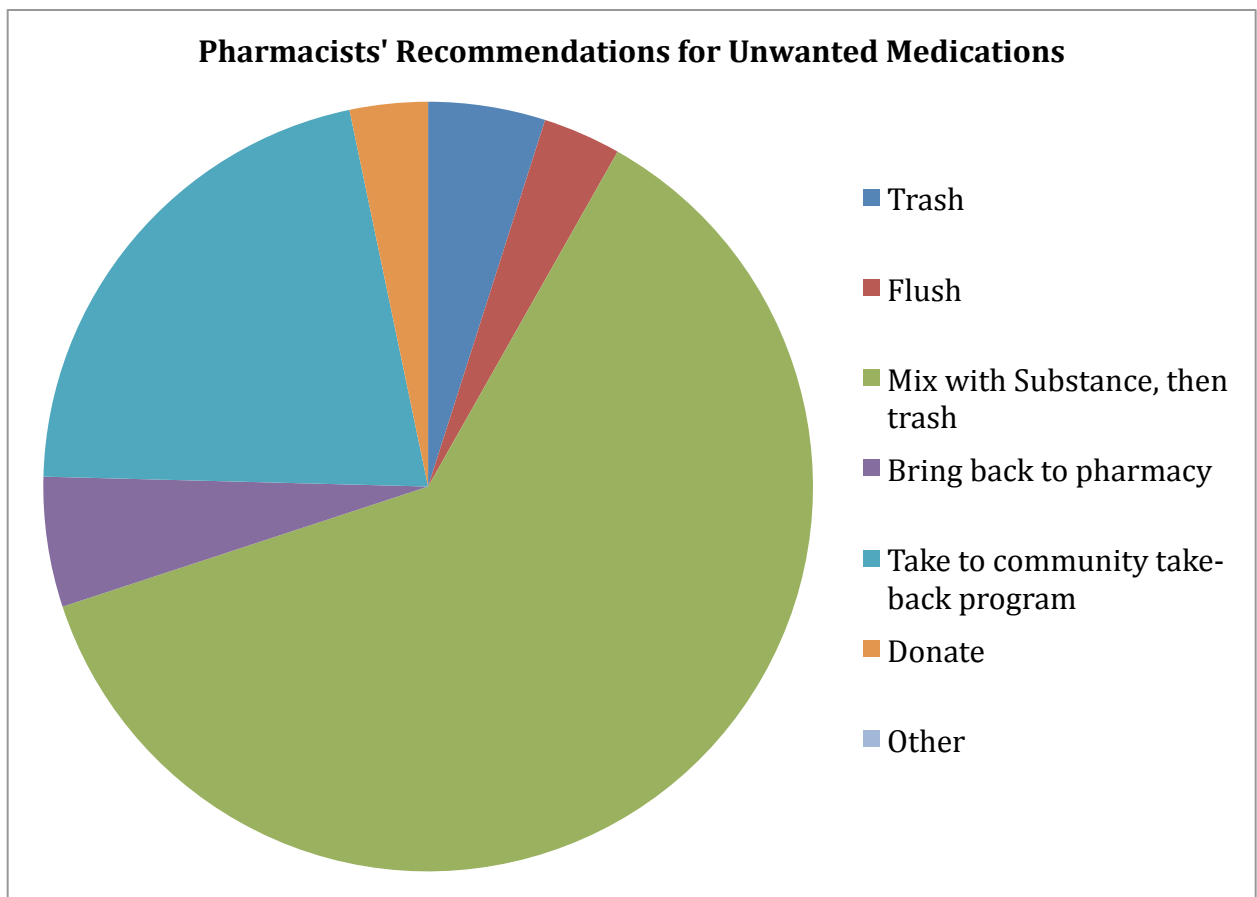
1. An educational kit for pharmacy staff and customers that details the need and recommended steps for pharmaceutical waste disposal.
2. A simple and easily documentable disposal system for pharmacies to use that including a one-way disposal device for non-controlled substances that can be shipped directly to a medical/hazardous waste incinerator.
3. A documentable and legal disposal system for consumers to directly ship their unwanted controlled substances to a medical/hazardous waste incinerator.

Pharmacies will play a key role in the continuation of this project. Their feedback before, during, and after will dictate the course the project takes in coming years. To gauge

pharmacist reactions, we will analyze the 2009 survey data again before the project launch, visit with all participating pharmacies during the pilot project, and send out another survey post-pilot project.

## Results

The 2009 survey asked pharmacists what they recommend to patients for medication disposal. The chart below shows the results:



At the Pharmacy Forum, a series of talking points and suggestions were brought up.

A summary of talking points and notes from the forum can be found below:

Summary of questions and feedback:

- Questions or concerns about project concept?
  - How do we know what people are putting in the box?
    - “best practices” from education and customer interaction
  - Should we wait to start the program until we can accept controlled substances?
  - How many states have a take back program?
    - Answer: Four official programs (Maine, California, Iowa, and)
    - This link shows various programs around the country that are trying take back programs in their community: <http://www.teleosis.org/gpp-national.php>
- What are barriers to implementing the project?
  - Patient and staff education
  - Participation
  - Cost
  - Time
  - Changing pharmacist and patient habits
    - Pharmacists are used to telling people to NOT bring drugs back to pharmacy
- What is a feasible project launch date?
  - March is do-able
    - Work out kinks before a media blast, begin with a “soft start”
    - Do formal, public launch later than actual start date

- Get project materials to pharmacies about 60 days in advance so they can send the materials to corporate and assess liability
- What are efficient methods to train your staff?
  - A “best practices” video on YouTube
  - Flyers
  - Separate training for pharmacy staff and other store staff (like cashiers)
  - Faxes to pharmacies
  - Provide an outline from this meeting
- How would you prefer the project be marketed to your customers and the community?
  - Brochure in waiting area AND through the mail to patients whose drugs are delivered
  - Probably a generic flyer will work with all pharmacies, but we may want to leave a box or something where pharmacies can put their store name/logo/location
  - Clear signs, bag stuffers
  - We need to emphasize that no controlled substances are allowed for now but may be in the future
  - Newspaper ad
- This pilot project is being funded for two years; how do you envision it being funded in the future?
  - Disposal fee?
    - This idea would involve charging an additional cost when customers come in to dispose of medication
    - Most pharmacies seemed opposed to adding a cost to the customers for this service



- Internalized?
  - This idea would let pharmacies pay for the cost of the program from the store's budget, rather than outside sources such as customers
  - Not sure if pharmacies are willing to do this either
- Other outside funding?
  - Other take back programs set up a fee with criminal behavior, such as drug abuse, which is collected and sent to pay for take back program in pharmacies
- No real conclusion as to how to deal with future funding

We also requested the pharmacists answer other questions and their responses are below:

We received the following responses:

**1. Has your company already considered a similar plan?**

Yes      No

**Would your store(s) participate in this pilot project?**

Yes      No      Maybe

**Who is the best person to contact at your store about the program?**

Kim Ross (PIC), HyVee (1390), [1390pharmacydept@hyvee.com](mailto:1390pharmacydept@hyvee.com), (402) 489-0588

**Comments:**

**2. Has your company already considered a similar plan?**

Yes       No

**Would your store(s) participate in this pilot project?**

Yes      No      Maybe

**Who is the best person to contact at your store about the program?**

Claude Frerichs (Pharmacy Director), B&R Stores, Inc, [claudio@brstores.com](mailto:claudio@brstores.com), (402) 464-6297

**Comments:** Looks like a very worthwhile program.

**3. Has your company already considered a similar plan?**

Yes      No

**Would your store(s) participate in this pilot project?**

Yes      No       Maybe

**Who is the best person to contact at your store about the program?**

Joe Farrar, [JMFarrar@cvs.com](mailto:JMFarrar@cvs.com), (810) 210-3098

**Comments:**

**4. Has your company already considered a similar plan?**

Yes      No

**Would your store(s) participate in this pilot project?**

Yes      No      Maybe

**Who is the best person to contact at your store about the program?**

Steve Osenbaugh, Owner of The Pharmacy, [steve@yourhometownpharmacy.com](mailto:steve@yourhometownpharmacy.com),

(402) 466-7283

**Comments:**

**5. Has your company already considered a similar plan?**

Yes       No

**Would your store(s) participate in this pilot project?**

Yes      No       Maybe ← Wrote "Hope So"

**Who is the best person to contact at your store about the program?**

Matt Wittmann, Pharmacy Manager, ShopKo 172, [pharmacy172@shopko.com](mailto:pharmacy172@shopko.com),  
(402) 465-5588

**Comments:**

## Discussion

In the original survey taken in 2009, pharmacists commonly told customers to crush unused medication, mix with another substance, and trash. While this is good for avoiding diversion and poisoning, it still can lead to groundwater contamination. Maine's Department of Environmental Quality did a study that groundwater near landfills can become contaminated with chemicals, like those found in medications. The best option for unused medication right now is to take drugs to national Drug Enforcement Agency (DEA) Take Back Days. The next one will be held April 28<sup>th</sup>, 2012. Lincoln, NE locations can be found at [dea.gov](http://dea.gov) (keyword: got drugs). To the right is a picture of a collection in East Boston. Once a contractor is finalized for the *Local Pharmacy Medication Disposal* pilot project, an updated list of participating pharmacies will be listed on the Nebraska MEDS website, [nebraskameds.org](http://nebraskameds.org). The pilot project in pharmacies will address the issues of diversion and poisoning by offering an immediate location for unwanted medicine and will keep our water, wildlife, and public health safe.

## Summary & Conclusions

Results from surveys indicate that pharmacists really are trying to do the right thing. Pharmacists that attended the Forum and those that were unable to attend but responded to e-mail all seemed genuinely interested in the project. Even if not for the environment, they expressed concern about poisoning and diversion. And beyond that, they realize that using the pilot project in their pharmacy will likely attract business. A contractor will be finalized soon for the disposal container and Nebraska MEDS will launch the *Local Pharmacy Medication Disposal* pilot project in pharmacies. The NET grant will cover the fees associated with the disposal container, shipping and handling, medication destruction, and marketing materials. Once the grant funds are exhausted, though, the real test will be the upkeep of the project. It is our hope

that pharmacies will understand the positive impact they are making in the community and will internalize the costs. In the future, Nebraska MEDS hopes that the pilot project will become a state-wide effort to reduce environmental contamination, accidental poisoning, and diversion with participating pharmacies in every county in Nebraska.

## References

Accidental Poisoning in Children - Omaha, Nebraska | Alegent Health. (n.d.). *Alegent Health - Top Ranked Hospital System in Omaha, Nebraska*. Retrieved December 8, 2011, from <http://www.alegent.com/body.cfm?id=1478>

This local hospital documents the tragedy of children being poisoned by drugs their own homes. In spite of all the recent advances, the number of ingestions and or exposures to household medications and chemicals continues to climb. The American Association of Poison Control Centers reports that in 1994 over one million children under the age of 5 were potentially exposed to poisonous substances. In that same year there were 26 children under the age of 5 who died because they accidentally swallowed medications and household substances. Protecting children from the toxic exposure of drugs, chemicals, and other potential household hazards is an important role for parents and some kind of medical take-back program.

Media. (2009). Drugs are Universal Wastes. *Pollution Engineering* , 41(1), 12.

The article focuses on the proposed addition of the U.S. Environmental Protection Agency's (EPA) hazardous pharmaceutical waste to the Universal Waste Rule. It notes that the proposed rule encourages generators to dispose pharmaceutical waste classified as non-hazardous under the Resource Conservation and Recovery Act (RCRA) as universal waste. It will also facilitate the collection of personal medications classified as household hazardous wastes.

Bain, E. (2004). Environmental update: household prescription medication waste is posing an environmental hazard.. *Massachusetts Nurse*, 75(4), 10.

This article demonstrates the demand for a widespread plan for taking back

unused or unwanted medication. Currently there is no universal plan aside from the biannual DEA take-back days, although more and more states are coming out with their own versions of drug disposal plans.

Caracciolo, A. B., Grenni, P., Falconi, F., Caputo, M., Ancona, V., & Uricchio, F. (201).

Pharmaceutical waste disposal: assessment of its effects on bacterial communities in soil and groundwater.. *Chemistry & Ecology*, 27, 43-51.

Pharmaceuticals have been detected throughout the environment where at least in some cases, they have been shown to have a detrimental effect. Many result from improper patient disposal of unused pharmaceuticals via environmentally-unfriendly routes, such as the sink, toilet or rubbish bin. This review surveys the current peer-reviewed literature on attitudes and practices to medicine disposal methods as reported by patients and the various medication disposal and destruction systems around the world. A literature search was carried out using the keywords "medicines disposal", "unused medicines", "medicines wastage", and "medication disposal".

Carlsson, C., Johansson, A., Alvan, G., Bergman, K., & Kahler, T. (2006). Are

pharmaceuticals potent environmental pollutants?: Part II: Environmental risk assessments of selected pharmaceutical excipients.. *Science of The Total Environment*, 364(1-3), 88-95.

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Drug Disposal - National Take-back Initiative. (n.d.). *DEA Diversion Control Program* ::

*Welcome* :: Retrieved December 8, 2011, from

[http://www.deaiversion.usdoj.gov/drug\\_disposal/takeback/index.html](http://www.deaiversion.usdoj.gov/drug_disposal/takeback/index.html)

This is the DEA's announcement of the next national drug take-back day. They will be collecting unwanted or expired drugs from the public, controlled and uncontrolled. This is a great way for families to get rid of controlled substances, which by definition mean they are addictive. These take-back days aim to divert accidental and intentional poisonings.

Long, D. (n.d.). Drugs That Can Kill Toddlers Because of Accidental Ingestion - ABC News.

*ABCNews.com: Daily News, Breaking News and Video Broadcasts - ABC News.*

Retrieved November 8, 2011, from

<http://abcnews.go.com/Health/Wellness/accidental-ingestion-common-pills-kill-toddlers/story?id=10130146>

A recent news story from March 2010 documents how single pills can affect a child. Prescription medication intended for an adult can end up in the hands of little kids, who can be greatly impacted. In this news story, a friend of the parents came over, dropped a pill, and the child put it in its mouth. It was a complete accident, and the parents actually keep their drugs locked away in a safe. The



parents thought the change of accidental ingestion in their home was zero, when in reality, the risk is always there.

Medication Disposal: Questions and Answers. (n.d.). *U S Food and Drug Administration Home Page*. Retrieved November 15, 2011, from

<http://www.fda.gov/Drugs/ResourcesForYou/Consumers/BuyingUsingMedicineSafely/EnsuringSafeUseofMedicine/SafeDisposalofMedicines/ucm186188.htm>

The FDA currently recommends either crushing unused medication and mixing with something unpalatable, like coffee grounds or kitty litter, then throwing away OR taking medicine to one of the bi-annual take-back days that will accept any medication from peoples' homes.

Patwary, M. A., Sarker, M. H., & OHare, W. T. (2011). Assessment of occupational and environmental safety associated with medical waste disposal in developing countries: A qualitative approach.. *Safety Science*, 49(8/9), 1200-1207.

In a city in Bangladesh, scientists watched how excess medicine was handled. Many items, like syringes, were taken out of the trash and resold at local convenience stores. Although the standards for American medical equipment are much higher, this is an extreme example of how medicine can be just picked up by anyone if it is not destroyed appropriately.

Tong, A., Peake, B., & Braund, R. (2011). Disposal practices for unused medications around the world.. *Environmental International*, 37(1), 292-298.

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