Solving the Problem of Medicine Disposal: How the Great Lakes States are Protecting Public Health

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Pharmaceuticals and Personal Care Products (PPCPs)

- Includes prescription and over-the-counter (OTC) medications, cleaning agents, cosmetics, nutritional supplements, & skin care products
- Produced and used in larger volumes yearly
- Designed to be biologically active
- Pharmaceuticals not typically evaluated for their environmental impacts
Percent of persons reporting prescription drug use in the past month by age

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<td>All ages</td>
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<td>65 years and over</td>
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<td>18-44 years</td>
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<td>Under 18 years</td>
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Main Risks of Improper Disposal Practices

- **Environmental impact**
  - Accumulation in waterways → potentially harmful effects on wildlife

- **Accidental ingestion (children & elderly)**
  - 78,000 children/year under 5 treated for unintentional medication poisoning in U.S.

- **Illegal use or theft**
  - Appropriation of pharmaceuticals by family and friends, workers in homes, and burglars

- **Unnecessary accumulation & waste of health care $$$**
Medicines in the Environment
U.S. Geological Survey monitoring study

- 139 streams analyzed in 30 states
- Contaminants identified in 80% of these streams
- 82 contaminants identified (many were pharmaceuticals)
- Co-occurrence common; average 7 distinct contaminants identified per stream

Medicines in the Environment

USGS/CDCP study of drinking water facility

- Analyzed for 106 contaminants in 24 water samples from locations within a drinking-water-treatment facility and the 2 streams serving the facility
- 40 contaminants detected in 1 or more samples of stream water or raw-water supplies in the plant
- 34 contaminants detected in >10% of these samples
- Some prescription and non-prescription drugs and their metabolites were detected in finished water

Effects on Aquatic Organisms: Cause for Concern

Aquatic exposure – chemicals in the aquatic environment can result in continuous, multigeneration exposure.

- Feminization of fish - link to estrogen exposure?
  Ex: Boulder Creek, CO: female white suckers outnumber males by > 5 to 1; 50% of males have female sex tissue  
  (David Norris, Univ. of Colorado at Boulder)

- Effects of antidepressants on fish and frog development?
  Ex: Lab studies show low levels of common anti-depressants, including Prozac, Zoloft, Paxil and Celexa, cause development problems in fish, and metamorphosis delays in frogs  
  (Marsha Black, Univ. of Georgia)
Entry Pathways of Medicines into the Environment

- Outflow from wastewater treatment plants
- Surface application of manure and biosolids
- Commercial animal feeding operations and aquaculture
- Landfill leachate sent to wastewater treatment plants
- Septic systems

Source: www.york.ac.uk/.../gsp/esm/images/pharma1.jpg
Focus on theft and improper use

Federal Guidelines:

1. Take unused, unneeded, or expired prescription drugs out of their original containers and throw them in the trash.

2. Mixing prescription drugs with an undesirable substance, such as used coffee grounds or kitty litter, and putting them in impermeable, non-descript containers, such as empty cans or sealable bags, will further ensure the drugs are not diverted.

3. Flush prescription drugs down the toilet only if the label or accompanying patient information specifically instructs doing so (see box).

4. Take advantage of community pharmaceutical take-back programs that allow the public to bring unused drugs to a central location for proper disposal. Some communities have pharmaceutical take-back programs or community solid-waste programs that allow the public to bring unused drugs to a central location for proper disposal. Where these exist, they are a good way to dispose of unused pharmaceuticals.

The FDA advises that the following drugs be flushed down the toilet instead of thrown in the trash:

- Actiq (fentanyl citrate)
- Daytrana Transdermal Patch (methylphenidate)
- Duragesic Transdermal System (fentanyl)
- OxyContin Tablets (oxycodone)
- Aviaza Capsules (morphine sulfate)
- Baraduc Tablets (eritriparin)
- Reyataz Capsules (atazanavir sulfate)
- Tecquin Tablets (gatifloxacin)
- Zerit for Oral Solution (stavudine)
- Meperidine HCI Tablets
- Percocet (Oxycodone and Acetaminophen)
- Xyrem (Sodium Oxybate)
- Fentanyl (fentanyl buccal tablet)

Note: Patients should always refer to printed material accompanying their medication for specific instructions.
The American Pharmacists Association and the U.S. Fish and Wildlife Service jointly recommend the following (2/14/07):

- **DO NOT FLUSH** unused medications
- When tossing unused medications, protect children and pets from the potentially negative effects:
  - crush or dissolve solid medications
  - mix with kitty litter or a solid kitchen substance
  - place in a sealed plastic bag to reduce the poisoning risk
  - remove and destroy **ALL** identifying personal information
  - check for approved state and local collection programs or with area hazardous waste facilities
- **Talk To Your Pharmacist**
**Medicine Waste Management Issues and Barriers**

- Communicating the issue
- Lack of conclusive research
- Safe disposal
- Controlled substances - Drug Enforcement Administration
- Convenience
- Funding for staff, disposal & publicity
- Privacy of medical information
- Misinformation
IL-IN Sea Grant Resource Kit:
Disposal of Unwanted Medications
A Resource for Action in Your Community

http://www.iisgcp.org/unwantedmeds/

**Purpose:** Guide for communities who are looking for a solution for their drug disposal problem

**Use:** Solid waste officials, county and state officials, community groups, environmental and community organizations, pharmacists, researchers

**Successes:** Educated 100’s of individuals on the issue, supported several outreach campaigns for communities holding events, created new networking groups
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Content

1. Introduction and Background
2. Case Studies of Take-Back Programs
3. How to Hold a Collection Event
4. Materials for Public Outreach and Education
5. Pharmaceutical Donation/Take-Back Legislation
6. International Policy on Medicine Donations
7. Bibliography on Pharmaceuticals, the Environment, and Human Health
8. Information for Nursing Homes and Assisted Living Facilities
9. PowerPoint Presentation
Written several newsletter articles
~15 presentations nationally
Provided financial support for outreach materials

The Resource Kit

Received the 2007 “Best Education Program” award from the North American Hazardous Materials Management Assoc.

Unused and Expired Medicines
How to reduce pollution and prevent poisoning

Disposal Do’s and Don’ts
Do:
1. Return unwanted expired medicines to pharmacies and other locations participating in take-back programs.
2. Ask your pharmacist to dispose of your unwanted expired medicines.
3. Check your state’s guidelines on medication disposal.

Don’t:
1. Flush down the sink or drain.
2. Place in the trash.
3. Give or sell to others.
Great Lakes States: What’s Happening in Illinois?

Chicago Collections - May 2006
- 3rd annual event, 25 Chicago sites
- Spearheaded by Chicago Police
- Targeted older citizens
- One-day event: 1,330 citizens turned in 1,600 lbs of medications

Sangamon County – Apr 2007
- Flyers (Sea Grant) circulated to all nursing, senior living, and pharmacies
- ~3000 residents participated
- 7 fifty-gallon barrels of meds were diverted from waterways and landfill
- The unwanted/expired medications were properly disposed of by incineration
Solid Waste Agency of Northern Cook County (SWANCC)

Pilot Program

• Serving about 23 municipalities and 1 million northern Cook County Residents
• Collecting meds and sharps at City Halls
• Paid for by revenue from transfer station
• Disposal costs expected to be about ~$100K for program ($0.10 per person)
What’s Happening in Michigan?

Coalition of Religious Groups

- State & SG planning a workshop in 2008
- Targeting a wide audience
- Considering State Regulatory changes
What’s Happening in Indiana?

Indiana DEM has created a brochure to advise residents on medicine disposal (excerpt below).

Guidelines to Follow

Keep all medications (liquids and solids) out of the water supply. Do not dispose of unwanted medications by pouring them down a drain or flushing them down a toilet. Many medications cannot be removed by wastewater treatment plants. Some of them even damage the treatment system.

Numerous medicine collections have been organized locally by the TRIAD programs, partnerships between law enforcement and senior citizens’ organizations.
What’s happening in….

- Wisconsin: several presentations being given at this conference
- Ohio: ??
- Iowa: local collection events
- Pennsylvania: PA Sea Grant
- New York:
  - Westchester county working with pharmacists
  - NYC Dept. of Sanitation
  - NY Dept. of Environmental Conservation
What is Still Needed?

Research:
• Excretion vs. disposal (Daughton study); veterinary vs. human-feedlots (CAFOs), farms may be largest source
• Humans, pets, livestock will always be taking meds, so solutions at the WWTP are needed for the long run
  • Impact of designer medications
• Curb medicine waste and over-prescribing
• Education and
• Outreach
  • Provide simple solutions for individuals, MDs, Pharmacies, Hospitals (VA), hospices, Rehab centers, schools, etc.
Resource Kit Impacts: Short- and Long-Term Goals

**Short-Term (2006):**
- Form advisory group for review of resource kit ✓
- Give presentations on topic widely ✓

**Long-Term (2007-2017):**
- 1 year → wider distribution of educational materials (clearer, more direct, more accessible); “educate the educator” (e.g. ILCSWMA) ✓
- 2 years → public able to “1-stop shop” for info re: mgmt. of household pharmaceutical waste & disposal
- 2 years → change disposal habits of public = shift away from flushing, disposing in trash, etc.
- 5 years → sustainable collection program established in 5 large Great Lakes cities
- 10 years → measurable decrease of pharmaceuticals in local water supplies/watersheds
To Learn More

www.iisgcp.org/unwantedmeds

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More info: http://www.epa.gov/ppcp/

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