

Household Pharmaceutical Disposal: Issue Overview

Dave Galvin

Local Hazardous Waste Management
Program in King County



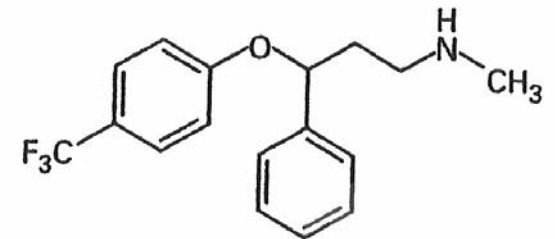
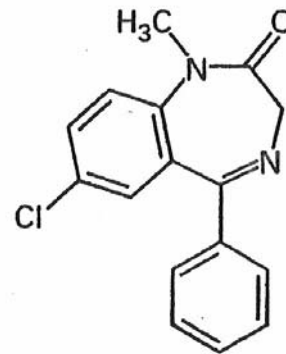
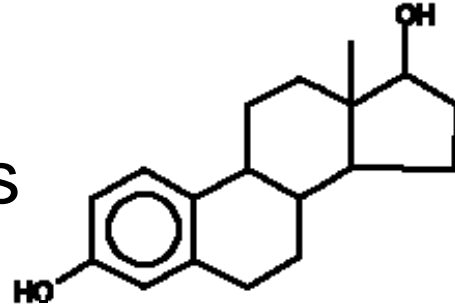
Pharmaceutical disposal issue



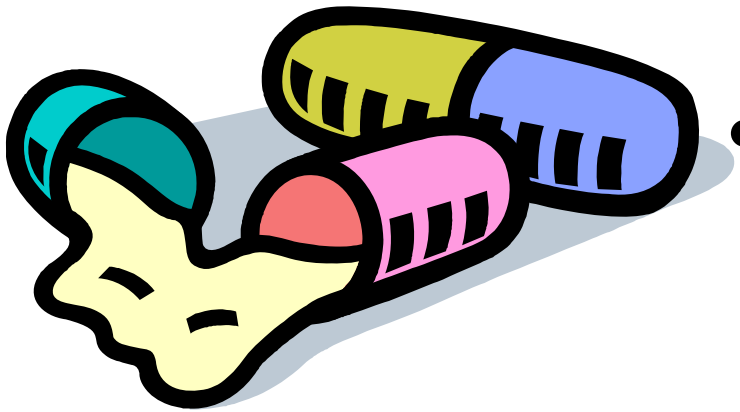
- Issue overview
- Medicine return pilot program
- Regulatory Challenges
- Pharmacy involvement
- British Columbia program example
- Product stewardship

Pharmaceuticals

- Antibiotics
- Anti-inflammatories
- Beta-blockers
- Anti-depressants (SSRIs)
- Steroids
- Hormones, estrogen replacements, BC pills
- Chemotherapeutics
- Stimulants
- Etc.



Pharmaceuticals (cont'd)

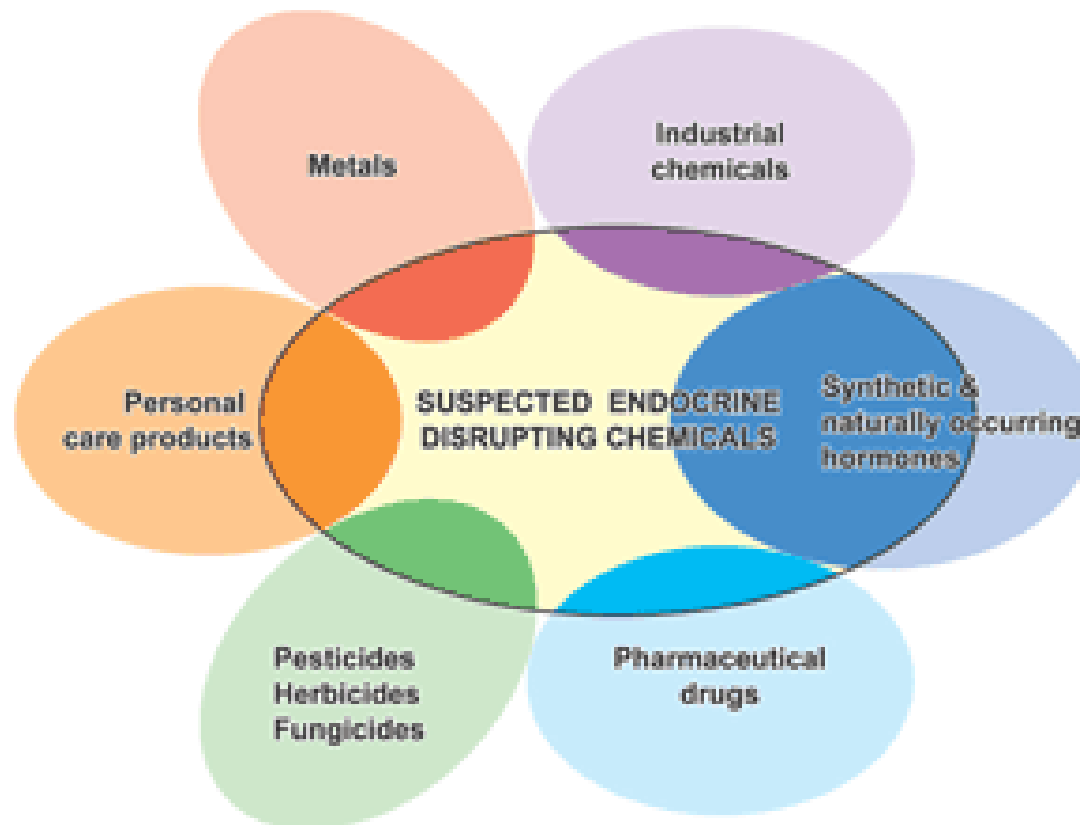


- Wide range of biologically-active chemicals
- Three classes by sale/regulation:
 - Over The Counter
 - Prescription (or “Legend”)
 - Controlled Substances

Pharmaceuticals (cont'd)

- **Controlled Substances** – regulated by the Federal Drug Enforcement Administration due to potential for abuse
 - Schedule I – illegal drugs (ex., heroin, LSD)
 - Schedule II – morphine, OxyContin, codeine, Demerol, Ritalin, amphetamines
 - Schedule III – Tylenol with codeine, Vicodin
 - Schedule IV – benzodiazepines, Valium, Darvon
 - Schedule V – codeine cough syrups

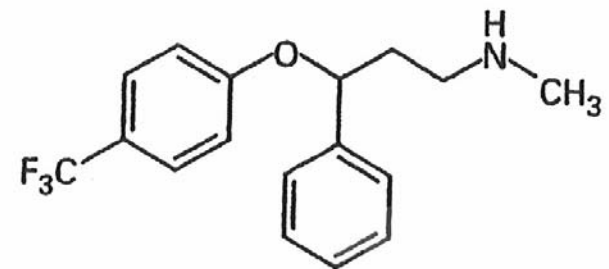
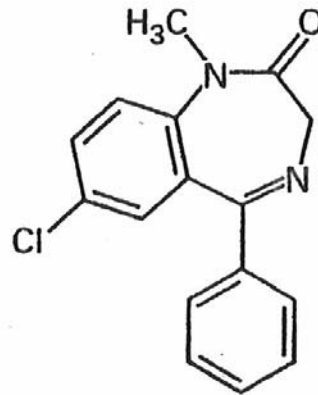
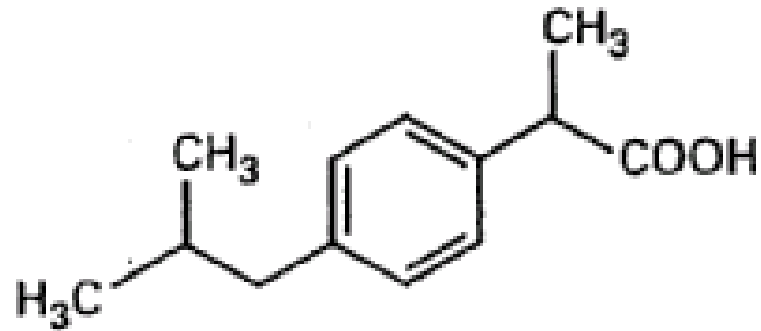
Some Pharmaceuticals are Endocrine Disrupting Chemicals



Some chemicals from the "families" above are potentially endocrine disruptors

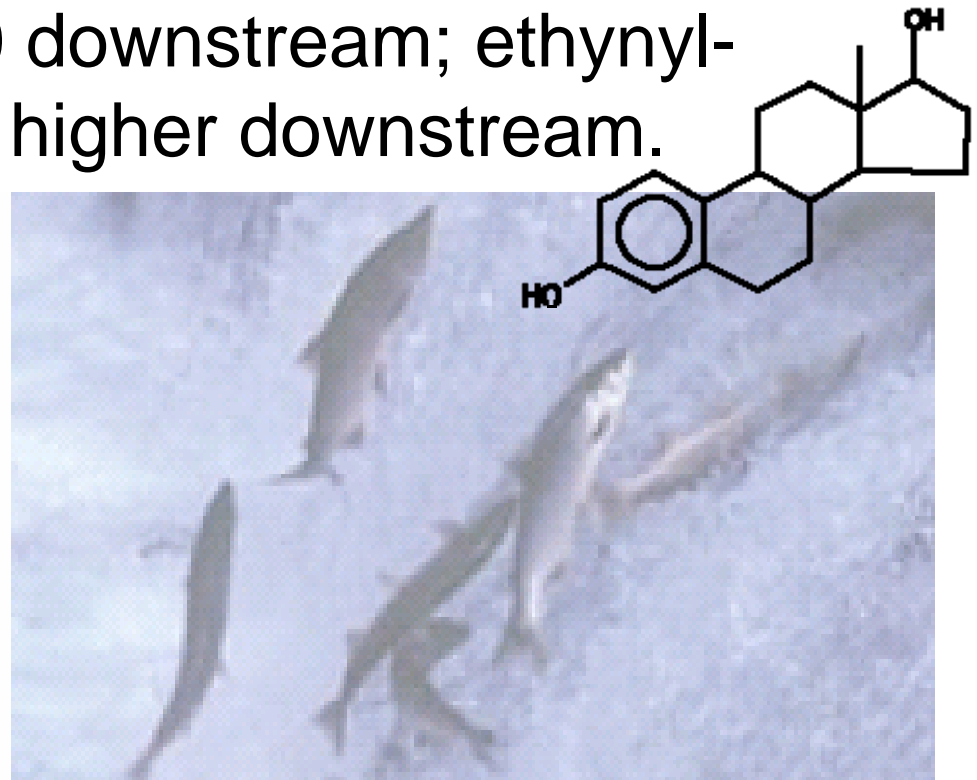
Pharms are showing up in the environment

- Ibuprofen, valium, prozac, antibiotics, steroids, hormones
- Found in 80% of U.S. streams tested by USGS
- Not sure of significance, but something is not right



Pharms in the environment (cont'd)

- Antibiotics, hormones, SSRIs are receiving the most attention.
- Boulder Creek, CO, study: 50:50 female:male ratio upstream, 90:10 downstream; ethynyl-estradiol measurably higher downstream.
- Male fish are producing eggs in the Potomac River.



Pharms in the environment (cont'd)

- Bioassays of SSRIs are showing some sub-lethal effects at environmentally-relevant levels.
- 2006 Italian study found that a mixture of common drugs at very low (ng/L - environmentally-relevant) concentrations inhibited the growth of human embryonic cells



Pharms are present in wastewater treatment systems

- EPA, USGS and other studies are finding pharmaceuticals in all systems sampled
- Study of five sewage treatment plants in NE found 38 pharms: naproxen, ibuprofen, acetaminophen, ...
- Study of ten sewage treatment plants in U.S. found 78 of 110, found pharms in effluents and downstream



Pharms are present (cont'd)

- Sequim, WA study by Ecology:
 - 2 wastewater effluents sampled, plus nearby streams and wells.
 - Found 16 of 24 compounds: acetaminophen, carbamazepine, cimetidine, codeine, cotinine, diltiazem, hydrocodone, ketoprofen, metformin, paraxanthine, salbutamol, sulfamethoxazole, trimethoprim, estrone. Also caffeine and nicotine.
 - Metformin (antihyperglycemic) found at unusually high levels in nearby streams, wells and wastewater
 - Sequim wastewater levels are among highest reported anywhere in the world for those pharms with comp. data.



Pharms enter the environment through use and disposal

- Probably most result from use, passing through us un-metabolized, then going through wastewater treatment systems
- Unused/unwanted quantities could be huge, as much as 50% of many prescriptions (80% for antibiotics)
- Common/historical recommendation was to flush; “crush & flush” is still widely practiced method



Too Many Pharms Go Unused

- PhRMA uses an estimate of 3% of all meds go unused
- Recent British survey showed:
 - 82% of antibiotics go unused
 - 50% of antidepressants “
 - 50% of beta-blockers “
 - 20% of pain meds “



Unused Accumulations (cont'd)

- Compliance/adherence rates for some medications are under 20%
- Patient compliance goes down as # of medications goes up: “polypharmacy”
- Medicare Part D now requires 30-day supply billings, regardless of need and without ability to refund unused expenses (or to return unused product)

Unused Accumulations (cont'd)

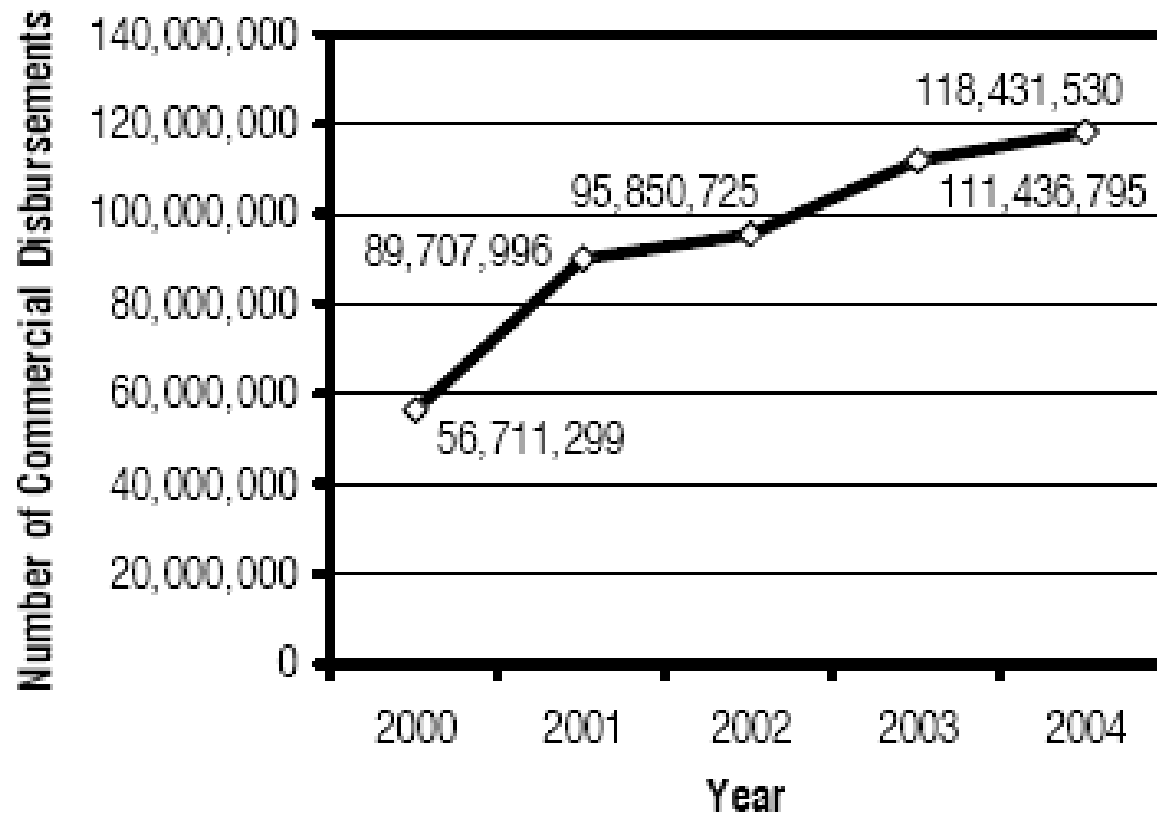
- “Rampant non-compliance” and poor adherence to medication regimens, coupled with medication errors, present a significant health care issue, especially for the elderly
- Accumulations of unused meds have become a national burden, both in health care cost and in potential for diversion and abuse

Unused Accumulations (cont'd)

- Hospice nurses, nursing homes and medical examiners are faced with large accumulations of medicines, including potent controlled substances, when patients die
- “Catch 22” for handling the leftovers – no easy, safe, legal or environmentally acceptable answers

Drug Sales Have Skyrocketed

U.S. sales have more than doubled in last 5 yrs



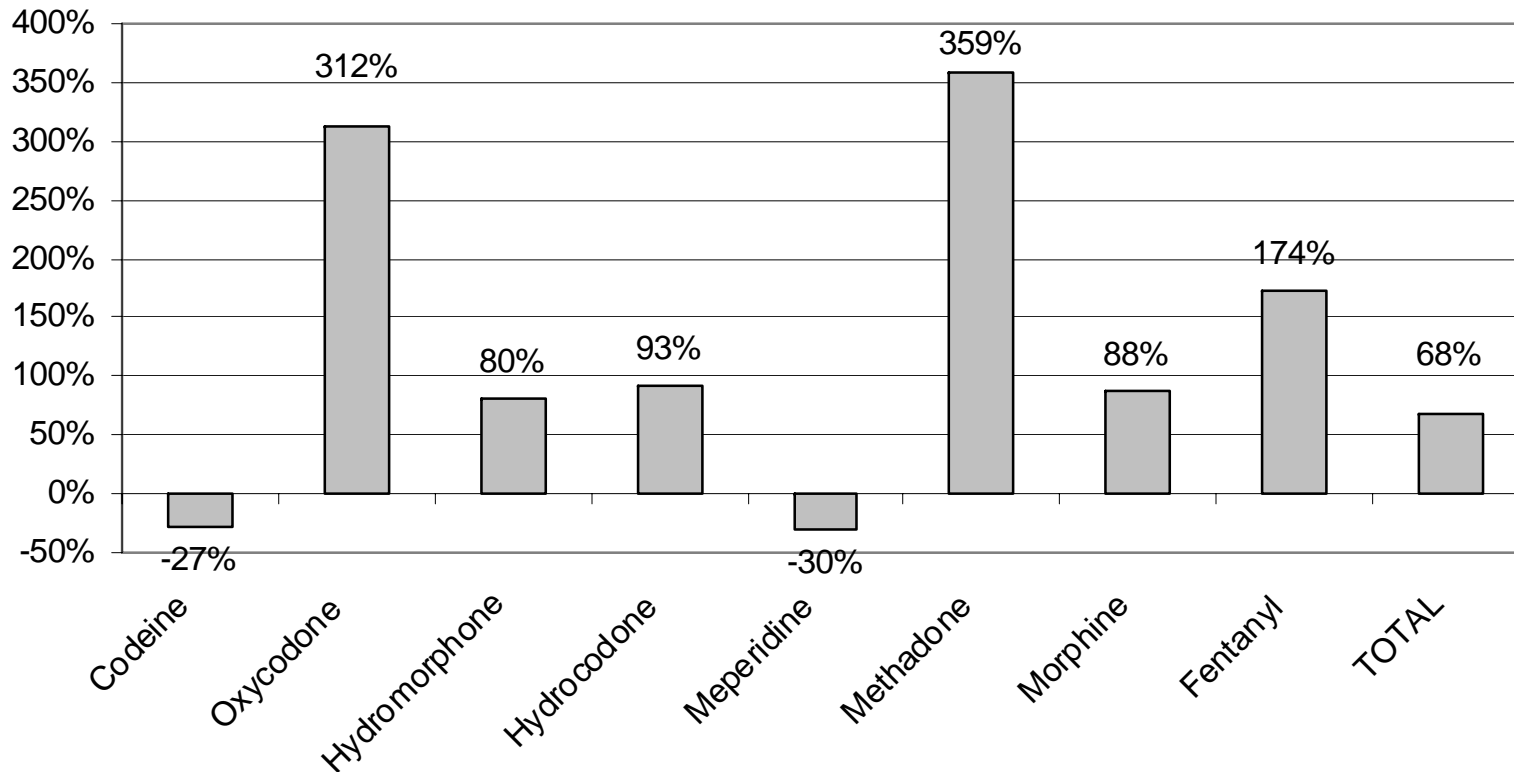
(Ref: National Drug Intelligence Center, 2005, via Ilene Ruhoy, 2006)

Sales (cont'd)

- Between 1992 and 2002:
 - U.S. population grew 13%
 - # non-controlled prescriptions increased 57%
 - # controlled drug prescriptions increased 154%
 - (ref: CASA, via Irene Ruhoy, 2006)
- This increased use and availability is one key to the current concerns over what to do with the left-overs.

Sales (cont'd)

Prescription Opiates Sold in King County Percent Change 1997-2003



Source- ARCOS/DEA Data for Zip Codes 980xx and 981xx, which approximates King County boundaries

http://www.deadiversion.usdoj.gov/arcos/retail_drug_summary/index.html

Poisonings

- Unintentional injuries were 5th leading cause of death overall in the U.S. and the leading cause for those under age 45.
 - (Does not include suicides or homicides)
- Of all unintentional injuries that resulted in death, poisonings accounted for 16.4%
- Of all poisonings, 93.4% were drug-related



Poisonings (cont'd)

- Of all calls to U.S. poison control centers in 2004:
 - 2,438,644 total exposures reported
 - 1,389,156 (57%) were pharmaceutical exposures
 - 581,488 (42%) of the pharm exposures were to children under 6 years of age

Pharms at Home Increase Drug Abuse

- Between 1992 and 2003:
 - U.S. population grew 14%
 - # of teens (12 to 17 yrs of age) who abused controlled prescription drugs jumped 212%
 - # of adults (18 and older) abusing such drugs climbed 81%
 - # of all Americans who abuse controlled prescription drugs nearly doubled, from 7.8 million to 15.1 million

Drug Abuse (cont'd)

- The # (15.1 million) of controlled prescription drug abusers exceeds the combined # of Schedule I (illegal) drug abusers:
 - Cocaine = 5.9 million
 - Hallucinogens = 4.0 million
 - Inhalants = 2.1 million
 - Heroin = 0.3 million

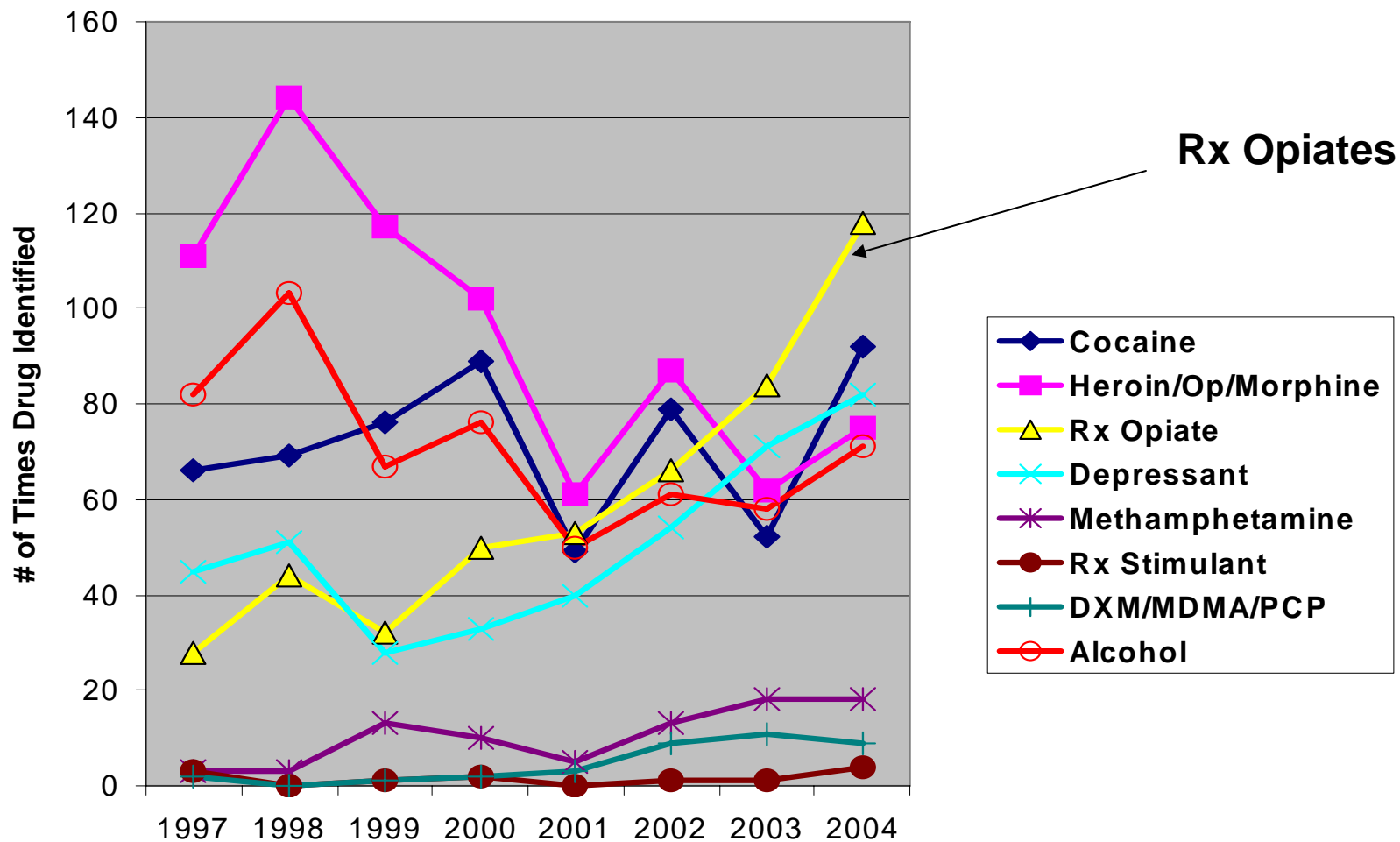


Drug Abuse (cont'd)

- “Pharming” is latest craze among teens
‘Generation Rx’
- One in five teens says he or she has been offered prescription drugs to get high
- In 2003, 15% of all American teens abused or were addicted to controlled drugs

Drug Abuse (cont'd)

Drug Involved Deaths, King County



Source: Medical Examiner, Public Health & Seattle-King County.

Summary of the Problem

- Lots of unused drugs in people's homes
- Poisoning and abuse concerns
- Low compliance = high accumulations
- Leftovers are routinely flushed
- Pharms are showing up in the environment
- No safe, legal, environmentally-acceptable options





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