PRIORITY BRIEFING
The purpose of this briefing paper is to aid Stakeholders in prioritising topics to be taken further by PenCLAHRC as the basis for a specific evaluation or implementation research project. They were complied in 2-3 days.

Would a combined Medicine Disposal Mail-back and Survey Programme be effective in a) reducing direct entry of pharmaceuticals into the environment and b) understanding types of medication wasted and the reasons for that waste?

Question ID: 12
Question type: Intervention
Question: Would a combined Medicine Disposal Mail-back and Survey Programme be effective in a) reducing direct entry of pharmaceuticals into the environment and b) understanding types of medication wasted and the reasons for that waste?

Population: Residents in an area largely populated by individuals over the age of 50, who are anticipated to be regularly receiving prescription pharmaceuticals.

Intervention: A scheme in which people are invited to use a free and convenient way to dispose of unused or expired medication. Prepaid envelopes would be made available in various pharmacy and community sites. Individuals would then be invited to send unused medications in these envelopes to a central location for cataloguing by pharmacists, followed by incineration. A questionnaire would be included in the envelope to collect information on why the pharmaceuticals are being disposed of. An accompanying leaflet on the risks of accumulating medicines in the home and the environmental benefits of safe disposal would also be included.

Control: N/A

Outcome: The main aims of the study would be to reduce environmentally harmful disposal of pharmaceuticals, to identify the types of medication wasted and to understand the reasons for this waste with the aim of improving the value for money of prescription practices in the South West and to raise awareness of the risks of accumulating medicines in the home and the environment.

Medicine Mail-back schemes:
This intervention is based on a scheme that has been successfully trialed by the Centre on Aging at the University of Maine – the 'Safe Medicine Disposal for ME' scheme. This scheme, which was set up in 2007 for older adults and caregivers, is free, easy and confidential and has recently been expanded to include all age groups.

There are several similar schemes for the disposal of unwanted medications in the United States. Some of these provide continuous access to mail-back envelopes others promote a medicines-return event during discrete time periods e.g. envelopes available for two weeks twice a year, or provide periodic collection points in pharmacies and/or police stations for unwanted medications during a specific time period. There appear to be limited medicine disposal schemes aimed at the public within Europe.[1]

The Health Problem

The manufacture of pharmaceuticals continues to grow both in volume and diversity, for example, in the UK during 2000, the 25 most widely dispensed pharmaceuticals reached over 10 tons each, with paracetamol, metformin (a drug used to treat diabetes) and ibuprofen achieving 100 tons. However, it is widely recognised that individuals may not use all the medication issued to them for a variety of reasons including side effect intolerance, resolution of symptoms, dosage changes, discontinuation of the medication and medication nearing its expiry date. As a result, medication may be disposed of either via solid household waste destined for landfill or flushed down the toilet. Unfortunately, both routes may lead to indirect environmental contamination by;

- leachate from landfill, containing pharmaceuticals or their potentially harmful degradation products, entering rivers and groundwater
- sewage treatment plants are currently not able to remove all pharmaceuticals which may remain in effluent water discharged to rivers
- adsorption of pharmaceuticals to sewage sludge which may subsequently be applied to agricultural land.

The presence of pharmaceuticals in the UK aquatic environment was confirmed by a series of papers published in the 1990s.[1] Furthermore, low concentrations of pharmaceuticals such as paracetamol, verapamil (a drug commonly used to treat high blood pressure) and oestradiol (a component of the contraceptive pill) are now commonly found in drinking water. The adverse effects of these compounds or their metabolites in drinking water remain unknown, particularly with regard to foetuses, however, a sustained long-term exposure, even to adults, may be harmful.

Although discarded pharmaceuticals are defined in the UK by the Controlled Waste Regulations 1992 as clinical waste and as such are controlled by the Special Waste Regulations 1996, once dispensed to or purchased by a member of the public, any unwanted pharmaceutical products are classified as household waste and their disposal is not subject to any controls. Product packaging often contains a recommendation to return unused medication to the pharmacist but individuals may feel uncomfortable with this and anecdote suggests that disposal at home is common.

An additional consequence of wasted medication is cost to the NHS, which has been estimated to reach at least £100 million per year. This has a negative impact on both resources and attempts to improve environmental status.

NHS Priority

<u>Regional</u>

SW SHA Priorities framework 2008-11

- There are no priority headings linked specifically to appropriate disposal of unwanted pharmaceuticals but NHS South West:

- strives for the most effective and sustainable use of resources (NHS South West)
- work continuously to improve access, quality and safety (NHS South West)

Local

Local perspective

- Staying Healthy (NHS Devon)
- Improving methods of pharmaceutical disposal would improve the environmental profile of the NHS and could save money.

Existing Research

Published research:

We found no published reports of the evaluation of medicine mailback schemes. The results of surveys in several countries (US, New Zealand, UK) indicate that improper disposal of pharmaceuticals is widespread.[2,3,4]

A total of 400 households were interviewed in the Southeast of England in 2003 as part of a larger survey of the disposal of hazardous waste supported by the Environment Agency of England and Wales. Results show that 63% of individuals discarded unwanted pharmaceuticals in household waste with the remainder returning them to the pharmacist (22%) or emptying them into the sink or toilet (11%). Reported disposal methods varied according to drug type with most people consuming the majority of purchased painkillers resulting in little being disposed of; the proportion of prescribed antibiotic consumed was relatively low with most of the unwanted drug disposed of in the household waste. Few individuals who reported having hormonal drugs reported flushing them down the toilet with a higher proportion of these compounds being returned to the pharmacy.[4]

A further survey conducted in the US (300 individuals attending an outpatient department) suggests that many individuals are not aware of the environmental consequences of improper disposal of unwanted pharmaceuticals (only 20% were aware of appropriate disposal methods) and with education and opportunity for appropriate disposal significant change in attitude could be achieved. Twenty-three percent of the respondents reported returning unused medication to a pharmacy for disposal. Previous education was highly associated with returning medications to a pharmacy (45.8% vs 17.1%; $p< 0.001$).[2]

Ongoing Research:

No reports of ongoing research were identified by the searches.

Feasibility:

This question would fit within the Environment and Human Health theme. The inclusion of a questionnaire in the mailing envelope may help to inform further research regarding the tailoring of prescription services and heighten public and professional awareness regarding the waste of pharmaceuticals.

References

1. Glassmeyer ST, Hinchey EK, Boehme SE, Daughton CG, Ruhoy IS, Conerly O, Daniels
RL, Lauer L, McCarthy M, Nettesheim TG, Sykes K, Thompson VG. (2009) Disposal practices for unwanted residential medications in the United States. Environ Int 35(3):566-72.

The occurrence of trace levels of prescription and over-the-counter pharmaceuticals in the environment began to receive concerted attention nearly two decades ago. The public's growing awareness and concern over the presence of these chemicals, especially in drinking water, has served to catalyze considerable discussion and debate regarding the best practices for disposal of unused or unwanted medications. In the United States, the first federal guidance for consumers was issued in 2007. It recommends discarding unused pharmaceuticals to household trash, after taking precautions to mix the pharmaceuticals with an inert substance and conceal the contents from view. Providing the consumer with additional options for conscientious disposal are various community, city, and state collection events, ongoing programs, and government-funded pilot projects. These strategies include the opportunity to mail or bring unused medications to various collection points, such as pharmacies, for eventual destruction. All of these approaches to medication disposal play roles in reducing the introduction of pharmaceuticals to the environment.

2. Seehusen DA, Edwards J. (2006) Patient practices and beliefs concerning disposal of medications. J Am Board Fam Med 19(6):542-7.

BACKGROUND: Clear guidance for how patients should dispose of unused and expired medications is lacking. Medications improperly disposed of can make their way into groundwater, surface water, and even drinking water. Incineration is the best disposal option currently available for waste medications. Although a few pharmacies will facilitate proper disposal of unused and expired medications, the majority will not. METHODS: A total of 301 patients at an outpatient pharmacy completed a survey about medication disposal practices and beliefs. RESULTS: More than half of the patients surveyed reported storing unused and expired medications in their homes, and more than half had flushed them down a toilet. Only 22.9% reported returning medication to a pharmacy for disposal. Less than 20% had ever been given advice about medication disposal by a health care provider. Previous counseling was highly associated with returning medications to a pharmacy (45.8% vs 17.1%, $P < .001$) and was the variable most associated with returning medications to a provider (28.8% vs 10.0%, $P < .001$). Previously counseled respondents were significantly more likely to believe that returning medications to a pharmacy (91.5% vs 60.3%, $P < .001$) or a medical provider (74.6% vs 47.3%, $P < .001$) was acceptable. CONCLUSION: The results of this

study suggest that there is a role for patient education about proper disposal of unused and expired medications.

3. Braund R, Gn G, Matthews R. (2009) Investigating unused medications in New Zealand. Pharm World Sci 31(6):664-9.

OBJECTIVE: The objectives of this study were to determine the reasons for returning medications unused and the types of unused medications returned based on therapeutic class. SETTING: This study was conducted in a region of New Zealand covered by the Hutt Valley District Health Board. This region has approximately 51,000 households. METHODS: A 'Disposal of Unwanted Medication Properly (DUMP)' campaign was conducted for a four week period in November 2007 in the Hutt Valley DHB region. A collection bag was delivered to every household for the collection and disposal of any unused medications. Participants were instructed to return the bags to a community pharmacy. Those returning medications were also asked to complete a questionnaire to determine why the medications were not used. A sample of the returned medications was identified and quantified and every completed questionnaire was analysed. MAIN OUTCOME MEASURES: The main outcome measures included: types and quantities of medications returned, calculated costs of these medications and reasons for returns. RESULTS: Over the four week period, 1,605 bags were returned for disposal. A total of 329 bags (20%) containing a total of 1,253 items were fully analysed. Only 653 questionnaires were completed (41%) all of which were analysed. The most commonly reported reason for not using the medication was that it had passed the expiry date (26%), the second was treatment change (24%), followed by condition resolved (15%). 'Alimentary tract & metabolism' and 'respiratory systems & allergies' accounted for 21 and 20% of cost respectively. CONCLUSIONS: This study found that main reasons identified for patients having unwanted medications were 'treatment changes' and 'expired'. Additionally respiratory medications contributed 20% of the costs associated with unused medications.

4. Bound JP, Voulvoulis N (2005) Household disposal of pharmaceuticals as a pathway for aquatic contamination in the United kingdom. Environ Health Perspect 113(12):1705-11.

Pharmaceuticals are produced and used in increasingly large volumes every year. With this growth comes concern about the fate and effects of these compounds in the environment. The discovery of pharmaceuticals in the aquatic environment has stimulated research in the last decade. A wide range of pharmaceuticals has been found in fresh and marine waters, and it has recently been shown that even in small quantities, some of these compounds have the potential to cause harm to aquatic life. The primary pathway into the environment is the use and disposal of medicines; although much of the research in the area currently focuses on the removal of pharmaceuticals during sewage treatment processes, disposal via household waste might be a significant pathway requiring

further research. To investigate the household disposal of unused and expired pharmaceuticals as a source of pharmaceutical compounds in the environment, we carried out a survey and interviewed members of 400 households, predominantly from southeastern England. We used the information on when and how they disposed of unfinished pharmaceuticals to construct a conceptual model to assess the pathways of human pharmaceuticals into the environment. The model demonstrated that disposal of unused pharmaceuticals, either by household waste or via the sink or toilet, may be a prominent route that requires greater attention.