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Tips for **I**mproving **D**isposal of **Y**our **U**nused **P**ills & Potions **S**afely (TIDY-UPS)

Introduction

Medicines are the commonest intervention in healthcare [1], yet not all medications obtained are consumed, whether through nonadherence [2], overprescribing or excessive supply [3]. Up to £300m (€354m) is wasted annually on medicines in the National Health Service in the UK alone [4]. Additionally, toxic heavy metals and chemicals leaching from medical waste occurs in ill-designed landfills, absorbing into the food chain to be consumed by people and contaminating water making it unsafe to drink [5,6,7].

In 2019, in Ireland, more than 16,800 substances were involved in human poisoning, 54% of which were drugs (medications and illicit drugs) [8]. An *ad hoc* system takes place in Ireland whereby some pharmacies offer medicine disposal while others do not [9]. The Pharmaceutical Society of Ireland recommends patients to return unused medicines to the pharmacy [10]. However, pharmacies have no obligation to offer such service, the costs of which lie with pharmacy owners [9].

Consumers in Ireland may not know the effects of improper medicine disposal or even that responsible disposal services are available. A study conducted on dental students found 97% were unaware of drug take-back initiatives [7]. Studies showed counselling on disposal was highly associated with returning medications to pharmacy [6], showing the need for patient education [11]. An Irish study of medicines disposal was undertaken in Galway and Cork [8], in 2014. This survey was conducted prior to COVID-19 and did not provide a theoretical understanding of behaviour.

Aims and Objectives

Therefore, this project TIDY-UPS aims to explore household medicinal waste disposal practices in Ireland. The objectives are to:

- Investigate consumer awareness, attitudes and behaviours about household medicinal waste disposal; and
- identify target behaviour change opportunities using e.g. the Health Behaviour Model [12] and Transtheoretical Model of Behaviour Change [13].

Methods

Survey Development

An anonymous electronic self-administered questionnaire survey will be used. A previously developed theoretically grounded questionnaire on this topic [11], will be adapted to the Irish context and piloted with Public and Patient Involvement (PPI) panel, linking with the TCD

National PPI Network Office. [14]. A diverse PPI panel, e.g. age, ethnicity and health literacy, will be formed, validating research questions, contributing to survey design, data interpretation, dissemination and outreach. To embody diversity, inclusion and accessibility within available resources, the survey will be in Plain English, adapted for people with visual impairment and to suit mobile devices to maximise participation.

The survey will contain sections regarding respondent demographics, household medicine use, storage and disposal, awareness and attitudes of correct medicine waste disposal methods and environmental effects gathered by means of Likert scale, rating scale and ranking questions.

Timeline

The proposed study is feasible within the 6-week timeline. Understandably, ethical approval will be sought before the research phase, guided by the supervisors. The research phase includes two weeks of data collection, three weeks of data analysis and one week of summary and result reporting.

Data Collection

In line with the citizen science approach, the survey will be distributed online to the Irish public by means of social media, charities, patient/carer advocacy groups, personal and professional networks. An adequate sample size is required e.g. a sample of 972 participants provides a 3% margin of error with a 95% confidence level where a total population of 4,757,976 is based on the 2016 National Census [15]. Participants must meet the following criteria: 1) reside in the Republic; 2) Age 18 years or older; 3) be informed for consent. Eligible participants will self-complete the Qualtrics survey online. Remote recruitment and administration methods adhere to public health COVID-19 guidance and are environmentally friendly.

Data Analysis

Responses will be imported from Qualtrics into SPSS V26 [16] to support qualitative analysis. Both descriptive and inferential statistics will be used to describe the data and identify meaningful associations. Sub-group analysis will be conducted to explore differences in demographic group responses.

Strengths and Limitations

Anonymous responses will protect participants whilst reducing potential for social desirability bias. PPI, citizen science and accessibility maximise consumer involvement. Nevertheless, participation is inevitably limited to consumers of sufficient English competency with digital and internet literacy.

Ethical Approval

Ethical approval will be sought from the School of Pharmacy and Pharmaceutical Sciences Level 1 Research Ethics Committee. The survey will be fully anonymous with closed questions only, thereby optimising General Data Protection Regulation risk management.

Interdisciplinary nature

TIDY-UPS will explore householders' awareness, attitudes and behaviours about medication wastage and is therefore suited to interdisciplinary collaboration between pharmacy and psychology. I will be working closely with Dr Tamasine Grimes and Dr Sam Cromie. The proposed TIDY-UPS study aligns strongly with the Household Medication Safety (HoMeS) study led by Drs Grimes, Cromie, with Mr Aaron Koay, pharmacist and Laidlaw alumnus.

Outcomes

This study will report on current attitudes, awareness and behaviours around medication wastage in Ireland. Statistically significant associations will inform strategies for future interventions, grounded in behaviour change theory. A report, short video and infographic all accessible to a wide audience will be promoted on social-media and sent to regulatory bodies, e.g. Health Products Regulatory Authority and policymakers, e.g. HSE National Medication Safety Office, to support future developments. The study addresses United Nations Sustainable Development Goals such as Goal 3 ensuring good heath, Goal 6 ensuring safe water and Goal 12 ensuring sustainable consumption and production patterns.

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