WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

MEDispose: A Program Improving the Attitude and Knowledge of Community Pharmacists on Proper Disposal of Expired Pharmaceuticals in Davao City

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A Thesis Presented to the Faculty of Pharmacy Department
San Pedro College

CHAPTER 1
INTRODUCTION

Background of the Study

In a 2019 World Health Organization (WHO) report, over 50% of prescriptions are not filled exactly as directed, and 10% of medications are used past their expiration date [1]. This shows that a significant amount of medications are improperly disposed of each year. In the year 2018, it was estimated that households in France discarded 17,600 tonnes, or 260g per capita, of medications that were not used and have already expired [2]. Contrary to the countries of Saudi Arabia and Ethiopia, where the prevalence of unused medications was a significant 89.3% and 85.2%, respectively, a cross-sectional survey conducted among households of Indonesian people found that unused medications are disposed of using environmentally hazardous methods [3,4]. In the United States, it was also discovered that two out of every three prescription drugs were reported as unused inside households [5]. Overall, estimations on the proportion of medicine inside households that is discarded as waste vary, spanning from 3% to a potentially substantial 50% [6].

When medications that have outlived their usefulness are discarded in an improper manner, this may provide a substantial danger to both human and environmental health [7]. The improper disposal of unwanted or expired medications via solid household waste may lead to the introduction of pharmaceutical residues into the environment, where they are illegally discarded or sent to landfills without appropriate leachate collecting equipment [2] Medication that has expired may find its way into the wastewater system and ultimately land up in rivers, lakes, or the ocean if it is disposed of improperly, such as by flushing it through the toilet or laundry machine. This has the potential to pollute drinking water supplies and pose a threat to the well-being of aquatic organisms [8]. Ingestion of expired medications can also pose potential risks to human health. One such instance is the diminished efficacy of expired drugs in treating illnesses, which may further exacerbate the emergence and proliferation of antibiotic resistance [9]. To mitigate these risks, it is critical to dispose of expired pharmaceuticals correctly. It is crucial to provide convenient and secure disposal alternatives and educate the public about the dangers associated with unlawful disposal in order to decrease the amount of expired pharmaceuticals that are disposed of inappropriately [10].

The Philippine Drug Enforcement Agency (PDEA 6) destroyed illicit drugs and expired pharmaceuticals valued at PHP8.8 million in Western Visayas in 2019. Among the drugs destroyed were expired medications surrendered by hospitals and pharmaceuticals [11]. Just this year, the Commission on Audit (COA) also discovered medications and drugs in the Department of Health's inventory that were "expired, near-expiration, damaged, overstocked, excessive, slow-moving, undistributed, and distributed late." [12]. The Department of Health admitted that only 1.16 percent were discovered to be nearing expiration, while a mere 0.03 percent had actually expired [13]. Last 2020, the 2019 report by the Commission on Audit (COA) was released and showed that the Department of Health (DOH) had over P2.2 billion worth of medications and other supplies in its inventory that were either expired, nearing expiration, or in excessive quantities. According to the Department of Health, the procurement of expired or almost expired goods took place in the years 2017 and 2018 [14].

In the Department of Health Davao Region, the state auditors discovered that the Davao Regional Medical Centre had accepted medicine supplies that had expiry dates falling below the minimum shelf life requirement of 18 months [15]. An estimated total of P24.8 million worth of illicit substances, drug paraphernalia, and expired pharmaceuticals were also discovered in Barangay Malagamot and subsequently burned [16]. In Davao City, the Environmental Management Bureau, also known as EMB, of the Department of Environment and Natural Resources, or DENR, reports that between 15 and 20 percent of expired medications are disposed of incorrectly. This means that around 300-400 kilograms of expired pharmaceuticals are improperly disposed of in Davao City each year.The Department of Environment and Natural Resources (DENR) in Davao City oversees the

Environmental Management Bureau (EMB), which conducted research and found that illegal disposal practices affect 15-20% of pharmaceutical products that have passed their expiration date. It is estimated that around 300-400 kilogrammes of expired medications are disposed of in an incorrect manner inside Davao City on an annual basis [17]. Nevertheless, the regional offices of the Philippine Drug Enforcement Agency (PDEA) have been actively engaged in the eradication of hazardous substances, drug-related equipment, and expired pharmaceuticals.The purpose of this initiative is to lessen the possible risks to the environment and public health that could arise from the presence of outdated and unused medications [18]. In this case, community pharmacies play a critical role in the healthcare system by acting as important points of access for prescription drugs. [19]. In addition, it is crucial to incorporate the MEDispose program among Davao City's community pharmacists in order to guarantee and enhance the appropriate and safe disposal of outdated pharmaceutical waste.

Literature Review

This portion of the research paper contains a variety of pertinent studies and literature from both local and international viewpoints, all of which have been carefully conducted by many researchers. This section includes a variety of conceptual literature and related studies on community pharmacists' attitudes and knowledge regarding the appropriate disposal of expired pharmaceuticals.

Expired Pharmaceutical Waste

Pharmaceutical waste is used or expired medication that, depending on its chemical makeup, can be classified as hazardous or non-hazardous. This evaluation also takes into account the potential for harm to the natural world or public health [15]. This kind of waste could include both harmful and non-hazardous prescription drugs that can contaminate trash regardless of their intended use, as well as unused over-the-counter drugs like paracetamol [16]. Five to ten percent of all pharmaceutical waste is classified as "hazardous waste" by the US Environmental Protection Agency or EPA [17]. Furthermore, 10%–25% of medical waste is deemed "hazardous" by Padmanabhan and Barik's 2019 study, which could result in a number of environmental and health issues [18].

In North East Ethiopia, Mohammed et al.'s 2021 study found that the most pharmaceutical dosage form waste was associated with tablets and injectables [19]. As per Insani et al. (2020), a significant majority of respondents, specifically 95%, indicated that they commonly did not use nonsteroidal anti-inflammatory substances (NSAIDs), vitamin pills, and antimicrobial agents [20]. Several substances have also been identified as potentially dangerous, including anesthetic agents, antiviral agents, and antineoplastic cytotoxic drugs. These risky drugs may cause serious side effects like cancer, organ toxicity, reproductive problems, genetic damage, and birth defects [21]. As a result the bacteria with Antibiotic-resistant are expanding as a result of the increasing problem of antibiotics being released into the environment, and antibiotic-resistant hereditary are becoming more frequent in the environment [22]. Antihypertensive medicines, steroid medication, antimicrobial agents, and hormonal agents are commonly used in the treatment of numerous illnesses, but their proper disposal is inadequate. These out-of-date drugs and/or their metabolites pose a serious risk to human health [23].

Pharmaceutical waste, which is produced as a result of insufficient waste management practices, insufficient awareness, and gaps in knowledge utilization, is frequently mixed with regular household waste due to inadequate waste segregation procedures. This poses a substantial hazard of disease transmission to patients, hospital staff, waste management personnel, and the general public. [24]. As a result of improper disposal, these active pharmaceutical ingredients enter the food chain and are eventually reintroduced into wildlife, plants, and humans. [25]. In addition, pharmaceuticals have a diverse array of detrimental impacts on the environment, including but not limited to their influence on reproduction and elevated cancer rates in humans, as well as their contribution to the resistance to antibiotics and population survival [26].

In the country of Brazil, as part of Ecomed program, discarded medications are burned by private partner companies under the "Discarte Consciente" project, which was developed by the BHS (Brasil Health Service) and launched in 2011. This comprehensive waste management initiative is supported by the Brazilian government [27]. Over 704 tonnes of medications were collected in 2016 by the Return Unwanted Medicines Project in Australia, which was established to give customers a safe and cost-effective way to dispose of unwanted medications at pharmacies. According to an audit, opened, unexpired packets of acute condition medications, like paracetamol, salbutamol, and glyceryl trinitrate, were the most frequently returned items [28]. Since 2010, Malaysia has implemented a voluntary policy that allows patients to return medications they no longer need to pharmacies, medical centers, and other establishments affiliated with the Ministry of Health. Despite the existence of this program, the most prevalent method for disposing of unwanted medications remains simply discarding them. This highlights the significance of implementing a proficient program for the return and disposal of unwanted medication, which serves as a more environmentally and health-conscious approach towards managing medical waste [29].

Disposal of Expired Pharmaceutical Waste

Local area drug specialists have a fundamental impact in drug squander the executives by showing their patients how to appropriately discard meds as well as giving remedies [30]. Due to their easy accessibility, specialized knowledge in this domain, and primary role as the patient's main contact, they possess a distinct advantage in educating the public on the appropriate disposal methods for medications [31]. The community pharmacists have the duty to ensure proper disposal of pharmaceutical waste. Continuous education and retraining are crucial in order to keep individuals up-to-date and enable them to implement optimal methods in their professional endeavors.

Insufficient awareness and implementation of national regulations at the research site often restrict the knowledge and abilities of healthcare workers in managing medical waste [32]. A 2019 study carried out by Al Safwa University College within Karbala, Iraq revealed that pharmacists in the

region possess limited understanding regarding the appropriate methods of pharmaceutical disposal. In order to enhance their knowledge on the subject, it is imperative to attend seminars and classes. Research indicates that a significant number of individuals dispose of their unused medications by flushing them or throwing them away. Hence, it is imperative for pharmacists to undergo training on the appropriate methods of medication disposal. The study aimed to assess pharmacists' comprehension of appropriate medication disposal protocols and their knowledge of the generation of pharmaceutical waste in pharmacies. Based on the study, most pharmacists agreed that drugs should be discarded in the trash, but they disagreed with methods such as incineration or sink disposal [33]. Several significant issues and cases of wrongdoing were also discovered. These factors encompassed a lack of awareness regarding appropriate disposal methods that have harmful consequences for the natural world and public well-being, wrongfully disposed surgical supplies along with medications, ineffective programs for returning unused drugs, insufficient and unused methods for disposing of prescription medications, and so forth [34]. It was discovered that pharmacists' opinions on disposing of waste varied. Hospitals presently lack knowledge regarding the safe and proper disposal of pharmaceutical waste. Nonetheless, some interns handle such trash with a sense of accountability. Nevertheless, there appears to be a lack of commitment towards educating patients and their families on the appropriate disposal of expired or unwanted prescription medications. Healthcare professionals, especially pharmacists, should undergo thorough training on the appropriate and secure disposal of pharmaceutical waste to minimize the environmental hazards linked to it [35].

A number of pharmacists are already aware of the damage that inappropriate medication disposal causes to the environment, according to a Trinidadian study. The fact that only 45.2% of them are aware that antibiotic resistance may develop as a result of incorrect antibiotic disposal is noteworthy. When a medication becomes outdated, most pharmacists dispose of it through the Drug Inspectorate or return it to the pharmaceutical distributor. However, compared to other establishments, community pharmacies have a higher tendency—32.3% of people—to dispose of expired prescription medications in office trash.Hence, it is crucial for pharmacists to acquire a comprehensive understanding of the regulations established by the United States Food and Drug Administration, as well as the World Health Organization, regarding how to properly dispose pharmaceutical waste[36].

A study conducted in the city of Riyadh in Saudi Arabia, looked at community pharmacists' attitudes and methods for getting rid of unwanted drugs. Out of the 360 participants, over 70% sent back any unused medication to the distributors. Eighty percent of respondents acknowledged that illegal drug disposal causes environmental damage, and eighty-seven percent held themselves responsible for preventing it. This finding suggests that the Saudi public's awareness of safe and proper drug disposal techniques is rather low, and that community pharmacists have a crucial role to play in advising and encouraging these practices is not given enough attention [37]. It is true that there are shortcomings in standard drug disposal practices, and professionals from a variety of disciplines agree that pharmacists have a duty to advise the public on proper medication disposal [38]. According to the results of a survey given to participating pharmacists by the Malaysian Community Pharmacy Guild, community pharmacies have a mediocre awareness of and a positive outlook on how to properly dispose of pharmaceutical waste in homes. Nevertheless, a mere 10.7% of pharmacists reported that their establishments exhibited signage advocating for the appropriate disposal of medications. Based on these findings, it appears that community pharmacists possess the necessary expertise and attitude, but they may not actively campaign for the adoption of secure disposal practices in order to mitigate the presence of pharmaceutical contaminants in the surroundings [39].

It is important for public health to address the inappropriate and hazardous disposal of unused and expired medications because it puts human health and the environment at serious risk [40]. Because of this, community pharmacists need to undergo regular training to increase their knowledge, soft skill training to change their attitudes, and behavioral modification. Furthermore, biomedical waste management standards and guidelines must be understood and followed in order to standardize communication and practice [41]. Given that sewage or general refuse is presently utilized for the disposal of numerous leftover and medications that had already expired within the community, it is imperative for community pharmacies and healthcare providers to advocate for educational resources that provide guidance to clients regarding appropriate medication disposal methods [42].An investigation into medical waste management practices, attitudes, and knowledge among healthcare personnel in different clinics was carried out in Phuket, Thailand. There were found to be positive relationships between knowledge and attitude, practice and attitude, and practice and knowledge. Overall, it was found that the scores for practice, attitude, and knowledge were high. In order to lessen environmental pollution and risks to medical staff and the public, the research recommends that local governments put in place well-thought-out medical waste collection and transfer protocols. Excellent medical waste management was influenced by experience and length of service [43].

That being said, community pharmacists who are knowledgeable about precision medicine are becoming more common, and they seem to be very excited about this new field [44]. Through their involvement in a wide range of activities, including patient counseling, safe storage, medication development, manufacture, distribution, and research, pharmacists play a critical role in promoting public health [45]. Many pharmacists in the Sudanese community lacked knowledge about leftover drug take-back programs, indicating a deficiency in knowledge. However, the majority of pharmacists expressed a wish for their locations to serve as take-back collecting places despite the lack of awareness. [46]. The medical professionals in Adigrat City are also keen to spread the word about the dangers of incorrectly discarding outdated and unused prescription drugs. This inclination implies a predisposition that aligns with the utilization of suitable disposal methods. Adigrat City's government agencies demonstrate their endorsement of the implementation of suitable disposal methods by providing comprehensive training programs to healthcare professionals on the matter of wrongfully disposed leftover and expired pharmaceuticals [47].

Challenges in Implementing Effective Pharmaceutical Waste Disposal Programs

Complex and inconsistent pharmaceutical waste management regulations have plagued the healthcare sector for more than ten years, making organizational compliance difficult. The public health and safety department's high employee turnover rate and continuous regulatory changes exacerbate the issue [48].

According to Michael et al.'s 2019 study, Anambra State, southeast Nigeria, faces significant obstacles when it comes to disposing of expired and unused medications. The challenges encompassed in this context consist of inadequate educational achievement, lack of knowledge about established protocols, insufficiency in documentation, ineffective law enforcement approaches, and limited comprehension regarding the process of returning unused drugs to NAFDAC. The results emphasize how important it is to enhance the elimination and management of outdated and discarded pharmaceuticals [49]. A study by Bungău et al. (2018) found that Romanian pharmacies' pharmaceutical waste collection services are deficient in a number of areas. The lack of initiatives has also led to a major decline in the nation's pharmaceutical waste management standards [50]. The findings of the current Malaysian research showed that participants seemed to be aware of the possible drawbacks of using incorrect drug disposal techniques. There is a discrepancy between the respondents' awareness and behavior, and their disposal practices were frequently ineffectual [51]. In Palestine, the majority of pharmacists disposed of drugs by either discarding them or returning them to manufacturers or retailers. Only a small number of pharmacists adhered to the proper protocols of incineration or returning the drugs to the Ministry of Health. The outcomes underscore the urgent requirement for enhanced training programs for healthcare practitioners by showcasing the prevalence of inadequate medication dumping among Palestinians [52].

However, a Polish study highlights the need for creating "green drugs," or pharmaceuticals that are friendly to the environment, because of the current environmental burden and the environment's declining ability to regenerate itself. Additionally, it highlights how crucial it is to design efficient procedures for separating pharmaceutical waste and stresses how important it is to put the main emphasis on lowering pharmaceutical use through consumer education. It emphasizes the critical role that pharmacists play in supporting these programs and the relationship that exists between participants' knowledge of appropriate drug disposal practices and the disposal decisions they make later [53]. Chew et al. (2023), on the other hand, recommended using the Artificial Neural Network (ANN) method and presented a number of hospital-specific medical waste management and disposal strategies. Furthermore, a thorough analysis of their research revealed a variety of disinfection strategies that were employed to combat the coronavirus. Some of these methods included pyrolysis, autoclave and microwave chemistry, dry heat, ultraviolet light, ozone, and vaporized hydrogen peroxide [54].

Theoretical Framework

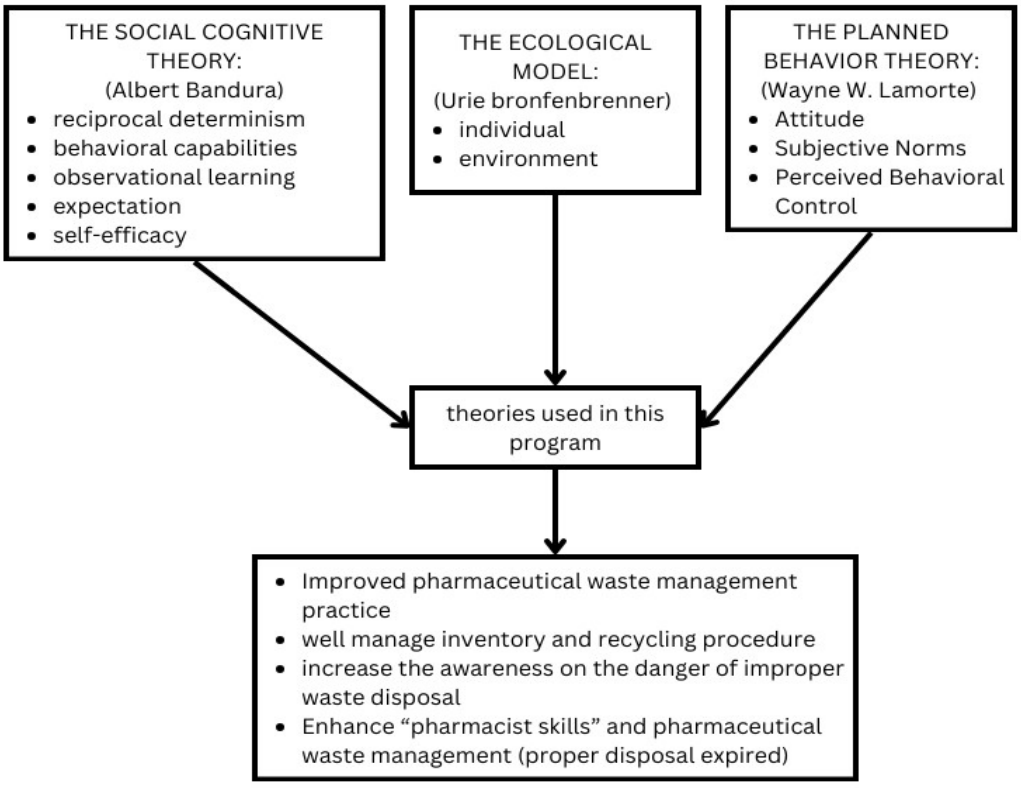


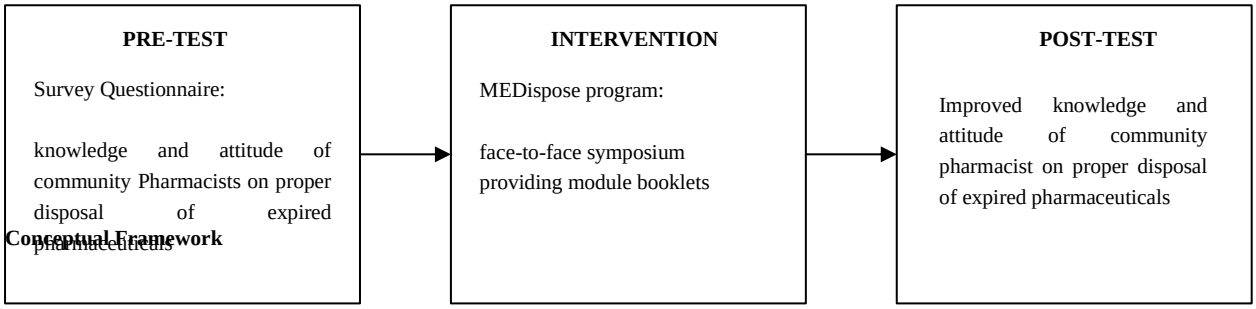
Figure 1: Theoretical Framework

Albert Bandura formulated the Social Cognitive Theory (SCT) during the 1960s.. It emphasizes how crucial social influence, self-efficacy, and observational learning are in determining how people behave. People pick up knowledge by watching others (role models) and the results of their actions. This theory is objective in five main ways: self-efficacy, expectation, behavioral capability, observational learning, and reciprocal determinism. which will ascertain how the person's practice and knowledge have changed in terms of behavior. The most significant aspect of this theory that the study will concentrate on is self-efficacy, a fundamental idea in SCT that characterizes a person's belief in their capacity to carry out a particular action or activity successfully. Possessing a high sense of self-efficacy increases one's likelihood of taking on new challenges and overcoming hardship. Given that it affects their willingness to adopt new practices, understanding pharmacists' self-efficacy is essential to evaluating their knowledge and attitudes in the pharmacy. Utilizing Social Cognitive Theory (SCT), one can evaluate the attitudes and knowledge of pharmacists to design interventions that leverage

social influences, learning through observation, and self-efficacy to promote favorable modifications in pharmacy conduct and practices [55].

Occasionally referred to as the Socio-Ecological Model, the *Ecological Model* is a theoretical framework that acknowledges the intricate interactions that take place between individuals and the environments in which they find themselves. Urie Bronfenbrenner developed the model, which is made up of many nested layers that both affect and are affected by one another. Examine the unique work environments that pharmacy professionals work in, taking into account elements like patient interactions, team dynamics, and workload. Examine the ways in which these microsystem components affect people's attitudes and their ability to learn new things. Examine cultural norms, general healthcare policies, and societal attitudes toward healthcare. Examine external factors like organizational structures, community support for healthcare initiatives, and regulatory policies. Examine the ways in which these macrosystem elements impact knowledge dissemination and the development of collective attitudes within the pharmacy profession. It is important to investigate the ways in which these exosystem factors impact the work atmosphere of pharmacy experts, as well as the ways in which this impacts their views and knowledge. Through the utilization of the Ecological Model, the research is able to acquire a holistic viewpoint that takes into consideration not only the individual factors but also the larger contextual elements that have an effect on the knowledge and attitudes of pharmacy professionals. This strategy can help focus interventions and policy recommendations while promoting a more sophisticated comprehension of the diverse aspects of the pharmacy industry [56].

Another example of a psychological framework that is used to predict and describe human conduct is the *Theory of Planned Behavior (TPB)*. This framework is particularly useful in situations that involve choices and intentions. This point of view holds that people's intentions influence their actions. which are impacted by three main elements: Attitude: This is a person's general assessment or understanding of an activity. Positivity toward a behavior raises the probability that one will desire to engage in it. Subjective Norms: These are the ideas one has about what significant others believe one should be done. An individual's intentions can be influenced by perceived expectations from others and social pressure. *Perceived Behavioral Control (PBC):* PBC is the belief that one is capable of carrying out a particular task.Being self-assured and feeling in control of one's skills increases the probability of engaging in an activity. When it comes to educating patients about the advantages of prescription medications, pharmacists are crucial. Reusing, attending to quality and safety concerns, and streamlining the procedure for sending back and reissuing medications. Pharmacists can promote favorable opinions about medicine by educating their coworkers and staff about the financial and environmental advantages of the profession [55] Subjective norms can influence people's intentions and behaviors in the context of reducing medication waste [57].



Conceptual Framework

Figure 2: Conceptual Framework

This study will utilize the input-process-output model. The study investigators will distribute a validated survey questionnaire to community pharmacists to gather information about their sociodemographic profile and their current knowledge and attitudes regarding the disposal of expired pharmaceutical waste. It is necessary for participants to fill out the pre-test survey. Following that, the participants will have to go to the symposium that the researchers, with the help of the City Health Office, are organizing. Additionally, module booklets detailing the correct way to dispose of expired pharmaceutical waste will be given to them. Following the process phases, the investigators will conduct a post-test by administering the same questionnaire used in the pre-test. Subsequently, the researchers will gather and organize the information. Data analysis shall be employed to evaluate the efficacy of the program, taking into consideration the attitudes and level of knowledge of the participants regarding the proper disposal of pharmaceutical waste.

Statement of the Problem

1. What is the level of the following indicators on the proper waste disposal of expired pharmaceutical products before and after MEDispose Program in terms of:
   1.1 Knowledge
   1.2 Attitude
2. Is there a significant difference in the level of the following indicators on the proper waste disposal of expired pharmaceuticals before and after MEDispose Program in terms of:
   2.1 Knowledge
   2.2 Attitude
3. Is there a significant difference between the community pharmacist with and without the MEDispose Program in terms of:
   3.1 Knowledge

3.2 Attitude

Objectives of the study

1. To identify the level of the following indicators on the proper waste disposal of expired pharmaceutical before and after MEDispose Program in terms of:
   1.1 Knowledge
   1.2 Attitude
2. To evaluate the significant difference in the level of the following indicators on the proper waste disposal of expired pharmaceuticals before and after MEDispose Program in terms of:
   2.1 Knowledge
   2.2 Attitude
3. To evaluate the significant difference between the community pharmacist with and without the MEDispose Program in terms of:
   3.1 Knowledge
   3.2 Attitude

Hypothesis

H0:

1. There is no significant difference in the level of the following indicators on the proper waste disposal of expired pharmaceuticals before and after MEDispose Program in terms of:
   1.1 Knowledge
   1.2 Attitude
2. There is no significant difference between the community pharmacist with and without the MEDispose Program in terms of:
   2.1 Knowledge
   2.2 Attitude

Ha:

1. There is significant difference in the level of the following indicators on the proper waste disposal of expired pharmaceuticals before and after MEDispose Program in terms of:
   1.1 Knowledge
   1.2 Attitude
2. There is a significant difference between the community pharmacist with and without the MEDispose Program in terms of:
   2.1 Knowledge
   2.2 Attitude

CHAPTER 2
METHOD

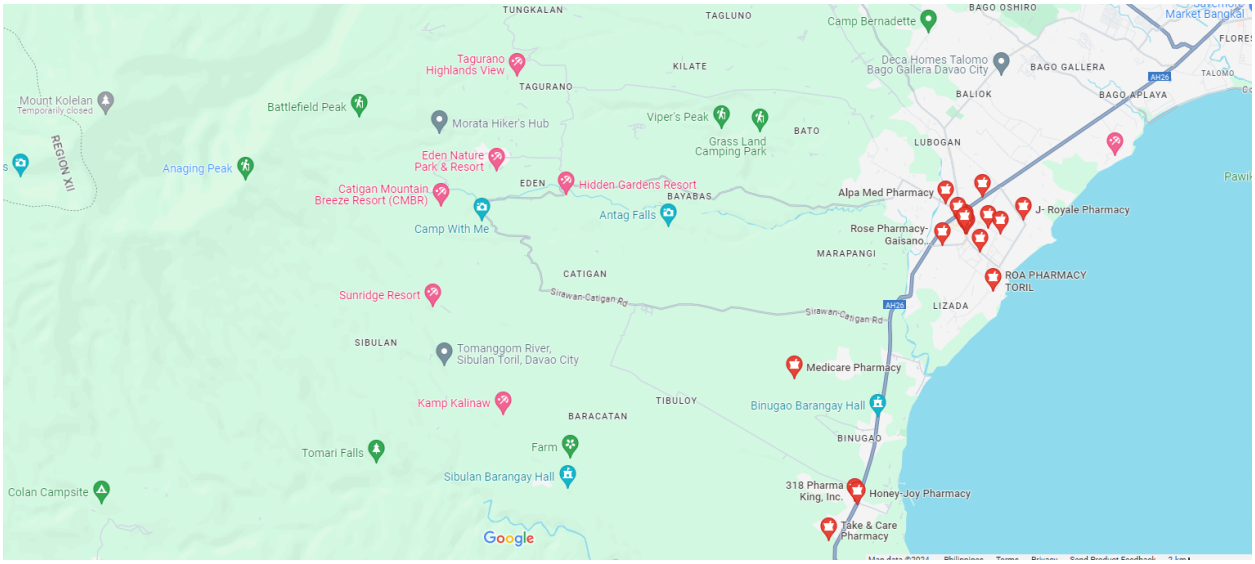
This chapter describes the methodical approach and strategies used to collect and evaluate data, laying the groundwork for understanding how we researchers carry out our investigation.

Study Design

The study employed a quasi-experimental research methodology to assess the causal connection between the Medispose program, the intervention, and its final result of improving pharmacists' attitudes and knowledge regarding the proper disposal of expired medications.

The MEDispose Program (Advancing Knowledge and Attitude in Proper Disposal of Expired Pharmaceuticals Symposium) is a private program initiated by the researchers in partnership with other related healthcare sectors. It is scheduled to be a one-day symposium, during which all participants are cordially invited to convene at the designated venue and collaboratively complete the program, which will offer valuable information on the correct disposal of pharmaceutical waste in a community pharmacy through the use of a quasi-experimental research design. By comparing the attitude and knowledge assessment before and after the symposium, researchers can evaluate the effectiveness of the intervention and provide recommendations for improving waste management techniques, enhancing sustainability in pharmaceutical operations, and raising awareness.

Research Locale



© Google Maps 2023. Pharmacies in Toril, Davao City.

Figure 3: Research Locale

The barrio of Toril in Davao City, Philippines will host the research because of its relevance as an urban center with a significant number of community pharmacies and its application to the issue of pharmaceutical waste management in an urban context, Davao City will be the study's primary site.

Participants

"MEDispose," a research study, looks into Davao City community pharmacists' attitudes and knowledge about how to properly dispose of expired medications. Because community pharmacies are directly involved in the proper disposal of expired pharmaceuticals, they function as research sites.

Participants are chosen using purposive sampling, a purposeful, non-random technique, in accordance with predetermined goals. In contrast to random sampling, this deliberate approach concentrates on individuals who possess particular attributes that are essential to the study. This methodology allows for a targeted exploration of community pharmacists' viewpoints and comprehension concerning the proper elimination of expired pharmaceuticals.

In order to contribute to a thorough understanding of the variables influencing pharmacist attitudes in the local context, this strategy attempts to capture a variety of experiences and viewpoints. Purposive sampling improves the study's applicability and relevance by aligning with particular objectives.

The inclusion and exclusion criteria have been carefully crafted to ensure scientific validity, participant safety, and fair selection practices. These criteria have been designed with meticulous consideration of the study's scientific objectives, ensuring that participants possess the requisite expertise and experience relevant to the research topic. Additionally, safety concerns have been addressed by excluding individuals who may not have the necessary qualifications or experience to handle pharmaceuticals safely.

Inclusion

1. Registered pharmacist working full-time in community pharmacy located in Toril, Davao City.

2. Must have a 1 year and above experience of being a community pharmacist

Exclusion

1. Pharmacy assistant and other employees in the community pharmacy aside from the registered pharmacist.

2. Have a less than 1 year and above experience of being a community pharmacist

Recruitment process:

The recruiting process is critical in reaching and activating the intended participants, who will offer their knowledge, ideas, and experiences to our collaborative efforts. The researcher hope to engage with licensed community pharmacists from various areas and sectors through strategic outreach and personalized communication, encouraging them to join us in this critical conversation about pharmaceutical waste and safe disposal.

1. *Preliminary assessment:* the researcher will gather data on licensed pharmacists in the area through organization, association, and city health data. And also pinned point on the number of community pharmacies in Toril area, which will serve as our ways of communicating and handing out the consent form.
    a. City health office: the city health office has record of registered pharmacist working in davao area, the researcher submitted a letter to the mayor office in collecting the data from the city health record.
    b. Philippines pharmacists associated: the principal adviser of this research is willing to assist the studies by providing a list of pharmacist in the area and part of the association.
2. *Disclosure of information*: Obtain informed consent from the pharmacy organization/City health office before accessing and using the list of pharmacists. Ensure that they understand the purpose of the study, how their data will be utilized, and any potential implications. If the list contains personally identifiable information, such as names or contact details, obtain explicit consent for its use in research.
    a. The pharmacy association abides by confidentiality agreements, and data is de-identified when feasible to safeguard the identity and confidentiality of the list of pharmacists.
    b. To avoid unauthorized access or disclosure, the researcher must maintain data security by following rules and best practices for data transfer, storage, and analysis.
    c. The information should only be used for research purposes, without unrelated activities or sharing without proper authorization, and the intended scope of use should be respected.
    d. Pharmacists' autonomy and rights are respected, with the option to opt out or request information removal, and any requests for withdrawal or modification are honored.
    e. Maximize research benefits while minimizing harms to individuals or organizations, considering reputation, privacy, and interests of pharmacists and organizations, and taking steps to mitigate adverse effects.
3. *Clear communication*: Develop clear and concise communication materials that explain the purpose and significance of your research study. Clearly outline the objectives of the symposium on pharmaceutical waste and proper disposal, highlighting its relevance to the work of community pharmacists and the broader healthcare industry.
4. *Selection of participants*: before handing out of consent form, researcher must conduct a thorough investigation of staff that fit in the criteria of inclusion and exclusion. Here is the criteria of identification on the inclusion and exclusion:
    a. **Verification of registration**: Participants would need to provide proof of their registration as a pharmacist. This could include their professional license or registration number issued by the relevant regulatory body, such as the Professional Regulation Commission (PRC) in the Philippines.
    b. **Confirmation of Workplace**: Participants should demonstrate that they are currently employed at a community pharmacy located in the Toril area. This could involve providing details of their workplace, such as the pharmacy name, address, and contact information.
    c. **Documentation of Work Experience**: Participants should be able to verify their work experience of more than one year as a pharmacist in a community pharmacy setting. This could be supported by employment records, contracts, or other relevant documentation indicating the duration of their employment.
    d. **Self-Declaration**: Participants may also be required to provide a self-declaration or attestation confirming that they meet the eligibility criteria specified for the study. This could involve signing a statement acknowledging their qualifications and experience.
5. *Personalized Outreach*: Consider personalized outreach methods such as directly go to their working setting community pharmacy), in which we will carefully select a time that the pharmacy is not crowded.
6. *Network Outreach*: if personalized outreach can not be assessed, then the researcher will make an initiative on communicating them through emails or phone calls to community pharmacies or individual pharmacists, if provided or available.
7. *Utilize online platforms*: Leverage online platforms such as LinkedIn, Twitter, or facebook professional forums where pharmacists congregate. The platform that will be recruiting will share information about symposiums and invite pharmacists to participate. The researcher will also consider creating targeted ads on social media platforms to reach your audience.
8. *Consent form*: The researchers will physically visit these pharmacies to introduce themselves, explain the study's purpose, and inquire about the pharmacist's interest. If the pharmacist expresses interest, they will be provided with detailed information about the study, potential risks and benefits, and the rights of participants which are stated in the consent form. If they agree, they will sign an informed consent form. The study will be conducted at a convenient time, ensuring ethical and respectful recruitment and allowing a wide range of potential participants.
9. Provide Incentives: the researcher will offer incentives to encourage participation, such as money worth of their salary (1 day), certificates of participation, and gifts that is useful for the participant
10. *Follow-Up*: Follow up with potential participants to remind them about the symposium and address any questions or concerns they may have. Before the symposium acquired date, the researcher will provide an invitation that is one week before the symposium. The researcher carefully selects a date that accommodates their busy schedule, which does not disrupt their workload.

Instruments

The primary tool employed in the research to gather data was the pretest and post-test questionnaires, designed to assess the attitudes and knowledge level of community pharmacists in Davao City regarding how to properly dispose expired medications. Data was gathered using this quantitative quasi-experimental methodology. The System Usability Scale (SUS) questionnaire will be modified for use by the researchers, and they will also employ a self-created questionnaire whose reliability has been endorsed by three experts in unrelated fields. A module booklet formulated by the researchers in partnership with the Philippine Pharmacists Association Inc. will also be used to assist the participants in thoroughly learning about the pharmaceutical waste management. The pre-test and post-test, together with the module booklet is created with the help of related sectors. The City Health Office provides the researchers a guideline on what they are basing on, which is the WHO Guideline. The questionnaire made is consequently based on the said guideline and the questionnaire along with the booklet are subjected to be validated by experts in chemical safe & management.

Three survey questionnaires will be administered by the researchers to gauge participants' attitudes and levels of knowledge about the appropriate disposal of expired pharmaceuticals. The Likert scale will be used in assessing their knowledge and attitude. In Section 1 of the survey, participants were asked to rate their pharmacists' knowledge regarding the appropriate disposal of expired medications. Responses ranged from 1 (low) to 4 (very much informed). In contrast, pharmacists' attitudes about appropriate disposal of expired pharmaceuticals are assessed in Section 2 of the survey, where respondents can select a response option that ranges from 1 (Strongly Disagree) up to 5 (Strongly Agree).

Tools on generating of questionnaire:

Creating a well-structured questionnaire is crucial for gathering reliable data, tailored to specific research goals and ensuring consistency for comparisons over time or between different groups. Questionnaires provide valuable insights into participants' perspectives, combining quantitative and qualitative data to inform decision-making. Additionally, they support ongoing improvement by incorporating feedback, serving as essential tools for acquiring actionable data and driving positive outcomes across various fields.

Creating a pre-test and post-test tool involves several steps to ensure validity and reliability. Here's a general outline of how it might be done in collaboration with experts from the Department of Environment and Natural Resources (DENR) and the City Health Office (CHO):

1. **Objective and statement of the problem:** the research studies focused on knowledge and attitude towards pharmaceutical waste in a community pharmacy setting, the questionnaire are revolved on the perspective of the community pharmacist on what drug they handle, available, attainable, and their exposure.
2. **Consultation with Experts**: Collaborate with experts from DENR and CHO to identify key concepts, knowledge areas, and skills that should be assessed in the pre-test and post-test. These experts can provide valuable insights into the most important information participants should know.
    a. City health office: the city health office provides us a guideline on what they are basing on, which is the WHO guidelines, also they suggest on following the DEA and FDA guideline, which provide the instruction on disposal of opoids drugs,
    b. DENR: The DENR only provides the researcher information on facilities that they approved and used to dispose of pharmaceutical waste. They will also provide guidelines on how to segregate hazardous and non-hazardous.
    c. Expert in chemical safety & management: Due to the busy schedule of the expert, he can only validate the questionnaire and booklet.
3. **Review and Validation**: Review the questions with the experts from DENR, CHO, and chemical waste experts to ensure accuracy, clarity, and relevance to the subject matter. They can also provide feedback on the appropriateness of the questions for the target audience.
4. **Pilot Testing**: Conduct a pilot test of the pre-test and post-test with a small sample of participants similar to your target audience. This allows you to identify any potential issues with the questions or instructions and make revisions as needed.
5. **Finalization**: Based on feedback from the pilot test, finalize the pre-test and post-test tools, ensuring that they are clear, comprehensive, and aligned with the learning objectives.
6. **Administration**: Administer the pre-test to participants before they receive the educational intervention or program. Then, administer the post-test after the intervention to measure changes in knowledge, skills, or attitudes.

Pre-test

In order to identify the pharmacists with inadequate knowledge and attitudes about the proper disposal of expired medications, a pre-test will be administered. After gathering information from the two survey sections, the study can move on to the survey responses (knowledge & attitude).

Post-test

After the symposium or program, the researchers will administer the same survey again to see if the program improves or influences the practice of disposing of waste in an appropriate manner. Furthermore, it will display which demo-graphic group has improved the most and the least using the two sections of the questionnaire.

Interpretation

The test's mean score for the community pharmacist's attitude and knowledge regarding the appropriate disposal of medications that have already expired

will be interpreted as follows.

Descriptive Equivalent	
Scale	**Interpretation**
3.40 - 4	Very informed of the pros and cons, also know the instruction
2.60 - 3.39	Informed only the basic
1. 80 - 2.59	moderate
1.00 - 1.79	low

Figure 4.1 : Interpretation of the Knowledge of Community Pharmacist

Descriptive Equivalent	
Scale	**Interpretation**
4.20 - 5.00	Always
3.40 - 4.19	Usually
2.60 - 3.39	About half of the time
1.80 - 2.59	Seldom
1.00 - 1.79	Never

Figure 4.2 : Interpretation of the Attitude of Community Pharmacist

Content Validity

After developing the questionnaires, the researchers will submit a unique survey for approval to a group of experts. This strategy is intended to enhance the accuracy and consistency of the survey. The attitude survey regarding the appropriate disposal of expired pharmaceuticals will employ a 5-point Likert scale. (1) Strongly Disagree, (2) Disagree, (3) Neutral, (4) Agree, and (5) Strongly Agree will be the scale's readings.. There will also be a 4-point Likert scale in the knowledge survey about how to properly dispose of expired medications. The scale goes from (1) low to (2) Partially Informed to (3) Knowledgeable to (4) Very Knowledgeable. In accordance with health protocols, the evaluation process will be conducted in-person, contingent upon the experts' accessibility and availability. Throughout the revision process, the researchers will carefully take into account the input from two experts, making sure that their suggestions are strictly followed.

Data Collection Procedures

The procedures listed below serve as a guide for gathering study data.

- Conducting Pre-Test: A survey questionnaire will be administered to the community pharmacists to assess their current knowledge and attitude on proper disposal of expired pharmaceuticals. Clear instructions and standardized instruments will be used to ensure consistency in data collection.

- Data Collection and Selection of Participants: Following the pre-test, researchers will collect and interpret the data that have been gathered. With that, the participants will be selected based on the conditions set by the researchers.

- Acquiring consent forms:The participants will receive a consent letter asking for their permission to participate in the study. They will be informed of their right to refuse participation or withdraw at any time without consequences. Emphasis will be placed on ensuring participants' understanding of anonymity and confidentiality policies to maintain ethical standards.

- Conducting the Program: Together with the experts, the researchers will conduct the MEDispose Program, which will include the symposium and the distribution of module booklets to the participants that tackles proper disposal of expired pharmaceuticals.

- Conducting Post-Test: After conducting the MEDispose Program, the researchers will administer a post-test questionnaire which is similar to the pre-test in order to evaluate if the intervention is effective

- Data Collection and Evaluate the Effectiveness of the MEDispose Program: After the post-test, data collection takes place, during which time data is gathered and examined.It will be the primary source of data used to evaluate whether the MEDispose Program improved community pharmacists' attitudes and knowledge about how to properly dispose of expired medications.

- Processing Procedure: After being gathered, data is entered, maintained checked for errors and coded responses are made ready for analysis. Accuracy, dependability, and preparation for statistical analysis are guaranteed by data processing.

- Analysis Techniques: To compare pre- and post-test results and assess the efficacy of the program, statistical analysis techniques are used. Descriptive statistics like means and standard deviations are included in this. Consistency and dependability are ensured through the coding of collected data using predefined schemes and variables for statistical analysis. During disposal, data anonymization or de-identification procedures are used to protect participant confidentiality.

- Data storage: Printed questionnaires will be securely stored in locked filing cabinets or secure storage areas when not in use, with access restricted to authorized personnel directly involved in the research project. Physical security measures will be implemented to prevent loss, theft, or unauthorized access to the questionnaires.

- Disposal of Data: Once the study is complete, the printed questionnaires will be securely disposed of using shredding to ensure that they cannot be reconstructed or accessed by unauthorized individuals. Records of the disposal process will be meticulously maintained in accordance with institutional or regulatory requirements. The timing of questionnaire disposal will be determined based on the specific requirements of the study protocol, ethical guidelines, and relevant regulations, ensuring prompt and secure disposal in alignment with established procedures.

San Pedro College Research Ethics Committee (SPC-REC) will monitor the progress of the study. This inclusion ensures transparency and compliance with ethical guidelines. Monitoring by the SPC-REC may involve periodic reviews of study progress reports, site visits, or communication with the research team to ensure adherence to ethical standards and regulatory requirements. This acknowledgment demonstrates the researchers' commitment to ethical conduct and their willingness to cooperate with oversight activities conducted by the SPC-REC.

Limitations of the Study

The limitations of this investigation should be taken into account when assessing the results. First, there's a chance that the sample size was constrained by resource constraints, which could affect how well the data generalize to a wider population. Furthermore, because the study was conducted in a specific location, its findings might not apply to other cultural or regional contexts. Ultimately, as with any longitudinal study, attrition rates have the potential to gradually impact the completeness of the data. Even with every attempt to minimize these limitations, they should be considered when assessing the implications of the research.

Data Analysis

The standard mean deviation and Paired Sample T-test are two essential statistical tools in evaluating pharmacist attitudes regarding the appropriate disposal of expired pharmaceuticals. The standard mean deviation measures how closely participants' attitudes match the average score by illuminating the variability in responses around the mean.

With the help of this statistical method, researchers can assess participant consensus or divergence by gaining a comprehensive understanding of the response distribution. Analyzing the standard mean deviation enables one to ascertain the extent of consensus or divergence among pharmacists with respect to appropriate disposal of waste.

Furthermore, the Paired Sample T-test determines and measures statistically significant variations in mean scores between the pre- and post-tests, evaluating whether knowledge exposure results in appreciable changes in pharmacist attitudes. This methodology provides insights for bettering information distribution and waste disposal procedures in community pharmacies by shedding light on the existing attitudes as well as enabling a nuanced analysis of changes over time.

Ethical Considerations

The participants were made aware of the study's objective and granted verbal permission after the research received approval from each public health facility involved. The method of informed verbal agreement was approved by the ethics review committee, and stringent confidentiality measures were implemented to protect the data of the study participants throughout the investigation.

Ethical considerations for the "MEDispose" program are essential to ensure the well-being of participants, maintain the integrity of the research, and

uphold ethical standards. Here are some ethical considerations for the program:

1. *Informed Consent:* Obtain the program-participating community pharmacists' informed consent. Make sure that the goals, advantages, and possible risks of the program are all clearly communicated to the participants, and that their participation is voluntary and informed.
    a. It will be the responsibility of the researchers to disseminate consent forms after the study proposal has been acknowledged and approved with regard to ethical considerations. The researchers will visit various community pharmacies located in Toril, Davao City, with the aim of finding community pharmacists who are willing to participate in the study. With this process, it will guarantee that all prospective participants are well-informed and have voluntarily consented to participate in the study.
    b. The MEDispose Program is a comprehensive week-long initiative, featuring a symposium that convenes all participants for a day. Upon securing the informed consent of the research participants, they will be presented with a pre-test, which they are allotted three days to complete. The fourth day marks the symposium, meticulously organized by the researchers and partners. The symposium is structured into two sessions: the first session is scheduled for the morning, followed by the second session in the afternoon. This structure ensures a thorough and engaging learning experience for all participants because in the second session, participants are expected to complete the post-test, applying the knowledge they have gleaned from the distinguished speakers and the informative booklet prepared by the researchers.
    c. For any reason, a participant may voluntarily opt out of the research study. Their choice to withdraw should be honored, and they should be made aware that there are no repercussions for doing so. To protect participant safety, participation may end if there is a risk to the person's health or well-being, or if unfavorable events happen that are thought to be connected to the study intervention. A participant's participation may also end if they persistently disregard the study protocol or fail to carry out their assigned tasks.

2. *Confidentiality and maintaining the privacy of participants:* To safeguard the identity and data of participating community pharmacists, put in place stringent confidentiality measures. To uphold confidence and respect privacy, secure any sensitive or personal data gathered throughout the program.
    a. The personal information of participants attending the symposium will be secured through the following measures: Only essential personal data necessary for registration and communication purposes, such as names, contact details (such as email addresses or phone numbers), and professional affiliations, will be collected. Any personal information gathered will be stored securely in a locked cabinet, with access restricted to authorized personnel involved in conducting the research. Prior to collecting personal data, participants will be informed about its use for symposium-related purposes, and consent will be obtained, with participants having the option to withhold or withdraw their consent at any time. To safeguard personal data against unauthorized access, disclosure, alteration, or destruction, technical and organizational measures will be implemented. Clear policies and procedures will be established for the handling of personal data, including guidelines for data access, sharing, and retention. Responsible individuals will oversee data management activities to ensure compliance with relevant privacy laws and regulations. Through these measures, participants' personal information will be securely managed, preserving their privacy and confidentiality throughout the data collection process.
    b. To protect participants' anonymity and confidentiality at the symposium, all personal information collected will be securely stored and anonymized prior to the presentation. Access to this data will be restricted to authorized personnel only. Presenters will ensure that no identifiable personal details are shared during the symposium, adhering to strict confidentiality protocols. Participants will provide informed consent for the use of their anonymized data, and all measures will comply with the Data Privacy Act 2012 and relevant laws.
    c. The study involves a topic that is practiced in a pharmaceutical community, where most of the participants are mostly pharmacists, there is a high possibility of no stigmation on this topic, since all of the participants understand the crucial importance on this topic. In case there is, then the researcher will not disclose the identity of the participant or the data collected of their survey. The researcher and speaker will refrain from disclosing the participant's identity and their problems involved in practice and the workplace. the speaker will only speak in a broad and general spectrum in which it will relate to them and not choosing each individual.

3. *Fair and non-discriminatory*: The program emphasizes the moral precept that all research participants should be treated equally and fairly, regardless of their personal traits, social origins, or demographic.

4. *Fair selection of participants*: To prevent biases, work toward fair access and involvement in the program. Make sure that every community pharmacist, irrespective of location or affiliation, has an equal chance to participate.

5. *Credibility of the results*: The researcher will not alter a participant's score, leaving it unchanged, irrespective of whether it surpassed or fulfilled the study's expectations.

6. *Transparency and Communication:* Assure openness regarding the program's objectives, procedures, and possible results in all respects. Keep participants updated on program progress and any potential changes by communicating with them on a regular basis.
    a. Participants in the study will have the unequivocal right to access their own records upon request. This includes any information collected or generated during the course of the research that pertains to them personally. They will be entitled to review and obtain copies of their records promptly upon request, subject to any legal or ethical constraints.

b. In the event of pending requests for approval on non-disclosure or partial disclosure of certain information, participants will be informed transparently about the status of their request. If any portion of their records is deemed ineligible for disclosure due to privacy concerns, confidentiality agreements, or other valid reasons, participants will be provided with a clear explanation outlining the rationale behind the decision. They will also be informed of any available recourse or appeal mechanisms to address their concerns regarding access to their records. Throughout this process, utmost respect for the participants' rights to privacy, autonomy, and informed consent will be upheld.

7. *Professional Development:* As part of the program, provide opportunities for professional development. To improve community pharmacists' knowledge and abilities and advance their careers, provide them with pertinent training and resources.

a. The MEDispose Program, a symposium designed to enhance the knowledge and attitudes of community pharmacists towards the proper disposal of expired pharmaceuticals, will also provide a certificate to all participants upon completion of the entire program. This includes participation in the pre-test, attendance at the symposium, and completion of the post-test. The program is conducted in collaboration with the City Health of Davao, the Department of Environment and Natural Resources - Davao, and the Philippine Pharmacists' Association. This partnership lends credibility to the program, allowing it to serve as equivalent training for the participants. This initiative underscores our commitment to continuous learning and environmental responsibility in the field of pharmacy.

8. *Environmental Impact Assessment:* Consider the environmental impact of the program's initiatives. Ensure that any disposal methods recommended or implemented are environmentally responsible and in compliance with local regulations.

9. *Community Engagement:* Foster community engagement by involving community pharmacists in decision-making processes. Encourage their active participation and input in the development and execution of the program to ensure it aligns with their needs and concerns.

10. *Continuous Evaluation and Improvement:* Implement a system for continuous evaluation of the program's effectiveness and ethical considerations. Regularly assess whether the program is meeting its goals and make necessary adjustments to address any unforeseen ethical issues.

11. *Regulatory Standard Compliance:* Verify that the program conforms to all applicable regulatory requirements, policies, and guidelines. Before starting any program components, obtain approval from the relevant regulatory bodies and ethical review boards.

12. *Sustainability:* Keep the program's sustainability and long-term effects in mind. Strive to create lasting positive changes in the attitudes and knowledge of community pharmacists, ensuring that the benefits extend beyond the immediate duration of the program.

a. On the pretest of the data collection or the findings, it will bring impact toward the government, city health, and pharmaceutical community that the study identified a problem in community pharmacy setting which has been long speculated, but don't have the evidence for it. (i.e. knowledge and attitude on disposal pharmaceutical waste). Once the study on pharmaceutical waste disposal is completed, it could have significant implications for the community. To mitigate this, measures should be taken, including communication and collaboration with government, city health officials, and the pharmaceutical community. Education and training programs could be developed to address knowledge gaps and promote proper waste disposal. Policy development should be informed by the findings, and community engagement should be encouraged through public meetings and feedback. Continuous monitoring and evaluation of the interventions are also crucial. These measures aim to improve practices and outcomes in the community, turning challenges into opportunities for positive change.

13. *Protocol addressed benefit/risk balance:* The researcher shall conduct face to face data collection (i.e. the distribution of survey shall be in groups) within the said premises. The handing out of survey questionnaires shall only be conducted during day time (i.e. 9:00 am to 3:00pm) which ensures the safety of the researcher while at the same time ensures the safety of our participants. The location of handing of survey shall be conducted in Toril in their respective pharmacy setting, which will benefit the participant on answering the survey and no disturbance of their working schedule (i.e. the participant can answer any time as long they passed it on a specific date and time, which the researcher will be the one who collect). On the day of the symposium, the researchers have also made comprehensive arrangements to ensure the comfort and well-being of the research participants. A lunch meal will be provided at the venue, along with snacks and water. These provisions are intended to maintain the energy levels of the participants, enabling them to actively engage in the discussions and successfully complete the study.

a. In this study, the researchers have meticulously selected and inspected the venue to ensure the comfort and convenience of the participants. The venue is equipped with air conditioning, an essential feature to combat the heat of the season. Adequate tables and chairs will be provided, along with booklets to aid participants during the discussions. To further enhance the participants' comfort, lunch, snacks, and water will be readily available. However, it is important to note that participants may encounter certain inconveniences such as traffic during their commute and unpredictable weather conditions. Despite these potential challenges, every effort has been made to ensure a comfortable and productive experience for all participants.

b. Participants and researchers might have a risk in obtaining any airborne disease. In order to lower the risk of this, participants and researchers shall be encouraged to wear masks and disinfectant shall be placed on each table for convenience. For the location, the researcher picked Toril because most of the participants we choose are from Toril, which is the scope of our study, and so they will have safe arrival and departure. The researcher will also assure that the program will end during day time.

c. Participating in the symposium may also pose other physical, emotional, time, financial, and health risks. Physical risks include injury that could range from minor discomfort to serious injuries. Emotional risks involve challenging or stressful activities, which can cause discomfort, anxiety, or exhaustion. Time commitment can cause inconvenience, especially if it interferes with work or family responsibilities. Financial risks involve financial investments, which can lead to financial loss. Health risks may arise from exposure to certain environments or substances. For this reason, we chose a convenient and safe place to be the venue of the event in order to avoid physical and emotional risks. For the time commitment and financial risks, the researchers ensure that the participant's time will not be wasted and they will receive compensation for going to the symposium. Only the participant shall come to the venue, however for assurance to their partner and family, the program will take a picture of all the participants as a documentation. This photo shall be distributed to the participant if they want to post it on social media.

14. *A clear description of reasons for termination:* In case of termination, this provides a clear description of the circumstances under which participant involvement in the study may be terminated and the reasons guiding such decisions. Understanding these termination criteria and procedures is essential for ensuring participant safety, maintaining data integrity, and upholding ethical standards throughout the research process

a. Participant Withdrawal: If a participant decides to withdraw from the study voluntarily, the procedures for discontinuation of their involvement would be outlined.
b. Non-Compliance: If a participant fails to adhere to the study protocol or guidelines provided, their participation may be terminated to maintain the integrity of the data.
c. Protocol Deviations: If there are significant deviations from the study protocol that affect the validity or reliability of the data, the participant's involvement may be terminated.
d. Unforeseen Circumstances: This could include situations such as changes in the participant's health status, external events that affect the study, or any other unforeseen circumstances that make it necessary to terminate their participation.

15. *A clear description of the method of compensation/reimbursement:* In order to ensure the effective implementation of this program, the researchers require that all participants of the one-day symposium be in attendance in full. Acknowledging the potential necessity for participants to suspend their routine work obligations in order to attend, the researchers have assumed the financial burden associated with attendance. This statement expresses appreciation for the participants' voluntary decision to participate in the symposium. As compensation, each participant will be granted an amount of Php 650.00 upon the successful completion of the study and as reimbursement for skipping their work during the day of the symposium. The participants will also be given Php 200.00 for their transportation costs so in totality, they will receive Php 850.00 that will be given at the end of the program together with the distribution of certificates. Moreover, each participant will be awarded a souvenir, which will function as a memento to commemorate the significant contribution they made to the research. This methodology guarantees that the contributors are appropriately acknowledged and compensated for their effort and involvement.

a. The MEDispose Program is designed to be a cost-free experience for all participants. The researchers will shoulder the expenses for the venue, meals, and transportation, thereby ensuring that the participants incur no financial burden. The researchers deeply appreciate the participants' involvement in the pre-test, their attendance at the symposium, and their completion of the post-test. Their contributions are invaluable to the success of the program. In recognition of this, the researchers are committed to creating a comfortable and conducive environment for all participants throughout the duration of the program.
b. The venue chosen by the researchers is only near Toril, Davao City. With this, the researchers estimate a total of Php 200 for the fare of the participants going to the venue as well as going home.

16. *Protocol on Study Site Suitability:* The research will be held in the barrio of Toril, because of its relevance as an urban center and has a significant number of community pharmacies. Since the study will be conducted outside of the premises of San Pedro College, the research mentor will accompany the researchers in conducting the study.

a. The research mentor acts as a guiding force for the researchers, providing knowledge, encouragement, and support. Additionally, the mentor assists with defining precise research objectives, tracking advancement, and offering comments to guarantee the study continues on track.
b. The researchers will conduct a study on community pharmacies focused in Toril, Davao City wherein the researchers will create a list of potential pharmacies through online research, local business directories, or local health department contacts. The researchers will physically visit these pharmacies to introduce themselves, explain the study's purpose, and inquire about the pharmacist's interest. If the pharmacist expresses interest, they will be provided with detailed information about the study, potential risks and benefits, and the rights of participants. If they agree, they will sign an informed consent form. The study will be conducted at a convenient time, ensuring ethical and respectful recruitment and allowing a wide range of potential participants.
c. The researcher will visit community pharmacies in Toril to personally engage with pharmacists willing to participate. Contact information will be collected securely, with access restricted to authorized personnel and only necessary details gathered to comply with privacy regulations.
d. For the orientation, personalized invitations will be sent to confirmed participants, detailing the date, time, venue, and agenda. During the session, participants will receive a thorough overview of the study's objectives, methodology, responsibilities, and timeline. Emphasis will be placed on the study's relevance to participants and the community to foster engagement and commitment.

17. *SPC-REC approval of the study*: the researcher has developed a research study titled "MEDispose: A Program Improving the Attitude and Knowledge of Community Pharmacists on Proper Disposal of Expired Pharmaceuticals in Davao City" which has been submitted to and approved by the SPC ICF/ACF for the purpose of addressing the problems of pharmaceutical waste in a community pharmacy setting also to assessed the knowledge and attitude toward pharmaceutical waste in order to reduce the pharmaceutical waste in the community pharmacy.

a. The ICF acknowledges that it has thoroughly reviewed the study protocol, informed consent form, and any other relevant study documents, and has approved the study for initiation in accordance with applicable regulations and ethical standards.
b. The researcher agrees to promptly disclose this to the ICF any complaints or concerns related to the conduct of the study, including but not limited to issues concerning participant safety, informed consent procedures, protocol deviations, or any other matters that may impact the rights or welfare of study participants.
    i. The researcher shall ensure that all study activities are conducted in accordance with the approved protocol, informed consent procedures, and applicable regulations
    ii. The ICF shall provide oversight of the study to ensure compliance with ethical standards and regulatory requirements.
    iii. Both parties shall maintain open communication and collaborate as necessary to address any issues or concerns that may arise during the course of the study.
c. All information shared between the researchers and the ICF, including but not limited to study protocols, participant data, and compliant disclosures, shall be considered confidential and shall not be disclosed to third parties without the informed consent of both parties, except as required by law or regulation
d. This Contract shall remain in effect for the duration of the study, unless terminated earlier by mutual agreement of the parties or as otherwise provided herein.

18. *Protocol for SPC-REC monitoring*: This procedure outlines the steps for monitoring research ethics throughout the duration of a study. Research ethics monitoring ensures that studies are conducted in compliance with ethical principles, regulations, and institutional policies to protect the rights and welfare of participants.

a. Upon study approval, the researcher shall submit study protocol, informed consent forms, and any amendments to the SPC-REC for review and approval before commencing the study
b. Submission of Possible Timeline, although conducting research and collecting data have possible changes. However, the researcher shall inform the SPC-REC in order to make changes on its timeline and will allow the researcher to have accurate data and adequate research study.
c. Data monitoring: the SPC-REC will review data collection procedures, participant enrollment, adverse event reporting, and other relevant data to ensure participant safety and data integrity
d. Reporting: the researcher shall submit a written report of the progress on the study and the SPC-REC shall provide recommendation and communicate with the researcher in order to help with the study in order to be in line with the ethical principle of research

19. Protocol of measurement/collection of research findings: The goal of this protocol is to specify procedures for safely collecting research findings from the community while simultaneously mitigating any potential negative effects on community members, ensuring responsible and ethical dissemination and implementation of the results.

a. *Data collection instrument*: Develop or adapt data collection instruments, such as surveys, questionnaires, interviews, or observation protocols, to measure relevant variables and outcomes. Pilot test the instruments to assess their clarity, comprehensibility, and reliability before full-scale implementation.
b. *Standardization of collection*: Train data collectors on the research protocol, data collection instruments, and ethical guidelines to ensure consistency and accuracy in data collection.
c. *Data Collection Process*: Schedule data collection sessions or appointments with participants at convenient times and locations in pre-test. After the program the researcher will conduct a post test that will be dissminate at the same day of the symposium and collected after they answer (they are given 1 hour to answer), if it is not possible to be collected then the researcher will make an agreement of making a schedule for their post-test for the participant
d. *Data Management and Security*: Ensure compliance with data protection regulations and guidelines to safeguard participant confidentiality and privacy.
e. *Data Analysis Plan*: Develop a detailed data analysis plan outlining the statistical methods and techniques to be used for analyzing the collected data. Ensure alignment between the research objectives, data collection methods, and analysis plan to address the research questions effectively.
f. *Documentation and Reporting*: Maintain comprehensive documentation of all aspects of the data collection process, including protocols, consent forms, data collection instruments, and participant records. Prepare detailed reports or documentation summarizing the data collection procedures, including any challenges, limitations, or deviations from the protocol.

By addressing these ethical considerations, the "MEDispose" program can promote responsible and ethical conduct, respect the rights and well-being of participants, and contribute positively to the community and the environment.

CHAPTER 3
DATA ANALYSIS AND INTERPRETATION

This chapter presents the data collected and provides a comprehensive analysis and interpretation of the results. The primary objective is to examine the findings in relation to the research questions and hypotheses outlined in Chapter 1. The data analysis involves both descriptive and inferential statistical techniques to offer a detailed understanding of the patterns and relationships within the data.

Interpretation of data:

Level of mean:	**Interpretation:**	**Description:**
3.40 - 4	Very High	Fully informed
2.60 - 3.39	High	Informed
1. 80 - 2.59	Moderate	Partially informed
1.00 - 1.79	Low	Not Informed

LEVEL OF KNOWLEDGE IN PHARMACEUTICAL WASTE

Table 1 & 2 presents the mean level knowledge among the community pharmacists in Davao city in regards to pharmaceutical waste disposal, the table below presents the before and after result of the educational intervention. The Items are based upon the international pharmaceutical waste guideline (WHO), which is being validated by a pharmacist expert.

TABLE 1.
Level of Knowledge on Proper Disposal of Expired Pharmaceuticals Before the Use of Medispose

ITEMS	**MEAN**	**STANDARD DEVIATION**	**DESCRIPTION**
1. Antibiotics should not be disposed immediately on a sewer system because there is a possibility of antibiotic resistance of bacteria in the system	3.25	0.85	Informed
2. Liquid antibiotics may be diluted with water, left to stand for several weeks and discharged to the sewer. This used a waste encapsulation procedure	2.8	0.77	Informed
3. Drugs containing opioids can be flushed in a designated treated water system. This include drug containing buprenorphine, fentanyl, hydrocodone, hydromorphone, methadone, and other opioids	2.25	0.85	Partially Informed
4. Drugs contain the term “sodium oxybate” can be flushed	2.4	1.00	Partially Informed
5. Diazepam rectal gel can be flushed	2.55	1.10	Partially Informed

6.	Disinfectants must be diluted and flushed in fast-flowing water course of small quantities of diluted disinfectant (max. 50 litres per day under supervision)	2.7	0.73	Informed
7.	Aerosol canisters can be disposed in waste encapsulation or landfills, but do not burn it due to a possible explosion	2.65	0.93	Informed
8.	Packaging, paper, and cardboard can be burned in open containers.	2.45	0.89	Partially Informed
9.	Solids, semi-solids, powders, and controlled substance must can be incinerated in chamber	2.65	0.75	Informed
10.	IV's (D5W & NaCl) can be flushed	2.65	0.93	Informed
11.	In disposing of pills, tablets and capsules. It should not be crushed and place it in a container and disposed in a incinerator	3.15	0.67	Informed
12.	Toxic heavy metals should be incinerated in high temperature chamber	2.75	0.91	Informed
13.	Chemo agents (residue, bulk) must be incinerated in high temperature	2.5	0.95	Partially Informed
14.	Metered dose inhaler and nasal spray can be thrown in a normal waste in the garbage	2.9	0.79	Informed
15.	Pills and capsules are easily damaged by heat and moisture	3.35	0.75	Informed
16.	Aspirin pills break down into vinegar and salicylic acids when damaged by heat and moisture which can irritates the stomach	2.85	0.75	Informed
17.	Do not give medicine that has changed colour, texture, and smell. Even if it has not passed the expiry date	3.4	0.75	Fully Informed

18.	Once the antibiotic is reconstituted, most need to be discarded after 1 to 2 weeks	3.25	0.79	Informed
19.	The burning of expired medicines can release toxic substances which can be inhaled by the people	3.15	0.75	Informed
20.	The DEA suggest mixing medicinal tablets and capsules with undesirable substances, like coffee grounds or kitty litter and tossing the mixture into the trash inside a sealed bag or container (don't crush)	2.45	0.76	Informed
	AVERAGE	**2.805**	**0.43**	**Informed**

The pre-test results indicate that some pharmacists are not fully informed about pharmaceutical waste, as evidenced by their low scores. This lack of comprehensive knowledge suggests a significant gap in their understanding, which could potentially impact their ability to manage pharmaceutical waste safely and effectively. The low scores highlight the urgent need for targeted educational interventions to address these deficiencies. By improving their knowledge through such programs, pharmacists can enhance their practices, contributing to better environmental management and public health safety. These findings underscore the importance of ongoing education and training to ensure that all pharmacists are equipped with the necessary knowledge to handle pharmaceutical waste responsibly.

TABLE 2.
Level of Knowledge on Proper Disposal of Expired Pharmaceuticals After the Use of Medispose

ITEMS	**MEAN**	**STANDARD DEVIATION**	**DESCRIPTION**
1. Antibiotics should not be disposed immediately on a sewer system because there is a possibility of antibiotic resistance of bacteria in the system	3.9	0.31	Fully Informed
2. Liquid antibiotics may be diluted with water, left to stand for several weeks and discharged to the sewer. This used a waste encapsulation procedure	3.85	0.37	Fully Informed
3. Drugs containing opioids can be flushed in a designated treated water system. This include drug containing buprenorphine, fentanyl, hydrocodone, hydromorphone, methadone, and other opioids	3.25	0.91	Informed
4. Drugs contain the term "sodium oxybate" can be flushed	3.55	0.61	Fully Informed
5. Diazepam rectal gel can be flushed	3.65	0.49	Fully Informed
6. Disinfectants must be diluted and flushed in fast-flowing water course of small quantities of diluted disinfectant (max. 50 litres per day under supervision)	3.65	0.59	Fully Informed

7. Aerosol canisters can be disposed in waste encapsulation or landfills, but do not burn it due to a possible explosion	3.8	0.41	Fully Informed
8. Packaging, paper, and cardboard can be burned in open containers.	3.85	0.37	Fully Informed
9. Solids, semi-solids, powders, and controlled substance must can be incinerated in chamber	3.65	0.49	Fully Informed
10. IV's (D5W & NaCl) can be flushed	3.55	0.69	Fully Informed
11. In disposing of pills, tablets and capsules. It should not be crushed and place it in a container and disposed in a incinerator	3.7	0.47	Fully Informed
12. Toxic heavy metals should be incinerated in high temperature chamber	3.65	0.49	Fully Informed
13. Chemo agents (residue, bulk) must be incinerated in high temperature	3.55	0.51	Fully Informed
14. Metered dose inhaler and nasal spray can be thrown in a normal waste in the garbage	3.75	0.44	Fully Informed
15. Pills and capsules are easily damaged by heat and moisture	3.75	0.44	Fully Informed
16. Aspirin pills break down into vinegar and salicylic acids when damaged by heat and moisture which can irritates the stomach	3.65	0.49	Fully Informed
17. Do not give medicine that has changed colour, texture, and smell. Even if it has not passed the expiry date	3.8	0.41	Fully Informed
18. Once the antibiotic is reconstituted, most need to be discarded after 1 to 2 weeks	3.85	0.37	Fully Informed
19. The burning of expired medicines can release toxic substances which can be inhaled by the people	3.7	0.47	Fully Informed
20. The DEA suggest mixing medicinal tablets and capsules with undesirable substances, like coffee grounds or kitty litter and tossing the mixture into the trash inside a sealed bag or container (don't crush)	3.5	0.61	Fully Informed
AVERAGE:	**3.68**	**0.31**	**Fully Informed**

The data analysis conclusively shows that the MEDispose symposium had a positive impact on the knowledge levels of community pharmacists regarding pharmaceutical waste management. This not only demonstrates the value of educational initiatives but also underscores the need for continuous professional development to address ongoing and emerging issues in pharmaceutical waste management.

This structured interpretation of the data highlights the importance of educational interventions in enhancing professional knowledge and practices, ultimately contributing to better environmental and public health outcomes.

While the education program on pharmaceutical waste has positively impacted community pharmacists by enhancing their understanding and awareness, it has also revealed a concerning trend in the post-test results. Despite the overall improvement, certain areas of the post-test showed a decrease in the pharmacists' level of knowledge. This suggests that while the program was effective in many respects, there are specific aspects that may require further clarification or reinforcement to ensure comprehensive and lasting understanding among the participants.

LEVEL OF ATTITUDE TOWARD PHARMACEUTICAL WASTE

The table 3 & 4 presents the mean of the attitude level of community pharmacists toward handling pharmaceutical waste in davao city, the table below present the before and after result of the educational intervention. The Items are based upon the international pharmaceutical waste guideline (WHO), which is being validated by a pharmacist expert.

Mean Scale	Interpretation	Description
4.20 - 5.00	Always	Strongly agree
3.40 - 4.19	Usually	Agree
2.60 - 3.39	About half of the time	Moderate
1.80 - 2.59	Seldom	disagree
1.00 - 1.79	Never	Strongly Disagree

TABLE 3

Level of Attitude on Proper Disposal of Expired Pharmaceuticals Before the Use of Medispose

ITEMS	Mean	Sd	Description
1. I highly give conscious care for the safety of the public and the environment when it comes to proper pharmaceutical waste disposal of expired drugs.	4.5	0.889	Strongly Agree
2. I have patience in following the guidelines of proper waste disposal of expired pharmaceutical products.	4.45	0.759	Strongly Agree
3. I enthusiastically encourage other personnel regarding the importance of proper disposal of expired pharmaceutical drugs.	4.5	0.761	Strongly Agree
4. I portray a positive attitude towards proper waste disposal of expired pharmaceutical products.	4.4	0.821	Strongly Agree
5. I comply with the city government in terms of business practice and waste disposal guidelines	4.5	0.761	Strongly Agree
6. I am open to new practices and new information on proper waste disposal of expired pharmaceuticals.	4.5	0.946	Strongly Agree
7. I am fast in adapting new regulations or methods in proper waste disposal of expired pharmaceutical products.	4.25	1.07	Agree
8. I cooperate with my colleagues and ensure the safety of staff and pharmacy when it comes to proper waste disposal..	4.4	0.821	Strongly Agree

9. I consistently prioritize and effectively manage waste disposal of expired drugs, even during busy periods, demonstrating a high level of responsibility and commitment	4.25	0.91	Agree
10. I guide and train pharmacy staff on the importance of proper pharmaceutical waste disposal.	4.25	0.851	Agree
11. I am willing to lend a hand if my colleague needed help in disposal of expired pharmaceutical products.	4.4	0.821	Strongly Agree
12. In the face of mistakes or damages made by a coworker in garbage disposal, I maintain a calm and courteous manner.	4.35	0.813	Strongly Agree
13. I diligently manage pharmaceutical inventory to minimize the accumulation of expired or unused pharmaceutical products.	4.35	0.813	Strongly Agree
14. I return expired or unused drugs to the manufacturer a month before the expiry date.	4.4	1.142	Strongly Agree
15. I regularly do inventory checkups or audits in order to determine which drugs need to be disposed of or returned.	4.35	0.988	Strongly Agree
16. I am willing to provide counseling to the patient if they raise concern with regards to the disposal of expired pharmaceutical products.	4.55	0.759	Strongly Agree
17. I find a way to dispose expired drugs properly if they missed to return to the company	4.25	1.07	Strongly Agree
18. I segregate the waste in proper order following the proper disposal guidelines of expired pharmaceutical products.	4.45	0.945	Strongly Agree
19. I follow the proper guideline in disposing expired liquid dosage form.	4.35	0.745	Strongly Agree
20. I strictly follow proper storage requirement in order to prevent early onset of product instability due to incorrect temperature.	4.4	0.94	Strongly Agree
Average	**4.393**	**0.767**	**Very High**

The pre-test results reveal that participants exhibit a high level of positive attitude not only toward pharmaceutical waste management but also toward collaborating with their colleagues in team-building efforts related to this issue. This indicates that community pharmacists are not only aware of the importance of proper pharmaceutical waste handling but are also committed to working together to improve practices in this area. Their strong, positive

attitude toward teamwork and collective responsibility lays a solid foundation for further educational interventions. With enhanced knowledge and skills, these pharmacists are well-positioned to lead and support effective and sustainable pharmaceutical waste management initiatives within their professional communities.

TABLE 4

Level of Attitude on Proper Disposal of Expired Pharmaceuticals After the Use of Medispose

ITEMS	Mean	Sd	Description
1. I highly give conscious care for the safety of the public and the environment when it comes to proper pharmaceutical waste disposal of expired drugs.	4.85	0.489	Strongly Agree
2. I have patience in following the guidelines of proper waste disposal of expired pharmaceutical products.	4.8	0.523	Strongly Agree
3. I enthusiastically encourage other personnel regarding the importance of proper disposal of expired pharmaceutical drugs.	4.7	0.571	Strongly Agree
4. I portray a positive attitude towards proper waste disposal of expired pharmaceutical products.	4.75	0.55	Strongly Agree
5. I comply with the city government in terms of business practice and waste disposal guidelines	4.85	0.489	Strongly Agree
6. I am open to new practices and new information on proper waste disposal of expired pharmaceuticals.	4.65	0.587	Strongly Agree
7. I am fast in adapting new regulations or methods in proper waste disposal of expired pharmaceutical products.	4.55	0.686	Strongly Agree
8. I cooperate with my colleagues and ensure the safety of staff and pharmacy when it comes to proper waste disposal..	4.7	0.571	Strongly Agree
9. I consistently prioritize and effectively manage waste disposal of expired drugs, even during busy periods, demonstrating a high level of responsibility and commitment	4.65	0.671	Strongly Agree
10. I guide and train pharmacy staff on the importance of proper pharmaceutical waste disposal.	4.8	0.523	Strongly Agree

11. I am willing to lend a hand if my colleague needed help in disposal of expired pharmaceutical products.	4.65	0.587	Strongly Agree
12. In the face of mistakes or damages made by a coworker in garbage disposal, I maintain a calm and courteous manner.	4.75	0.55	Strongly Agree
13. I diligently manage pharmaceutical inventory to minimize the accumulation of expired or unused pharmaceutical products.	4.7	0.571	Strongly Agree
14. I return expired or unused drugs to the manufacturer a month before the expiry date.	4.65	0.587	Strongly Agree
15. I regularly do inventory checkups or audits in order to determine which drugs need to be disposed of or returned.	4.75	0.55	Strongly Agree
16. I am willing to provide counseling to the patient if they raise concern with regards to the disposal of expired pharmaceutical products.	4.7	0.571	Strongly Agree
17. I find a way to dispose expired drugs properly if they missed to return to the company	4.6	0.681	Strongly Agree
18. I segregate the waste in proper order following the proper disposal guidelines of expired pharmaceutical products.	4.65	0.671	Strongly Agree
19. I follow the proper guideline in disposing expired liquid dosage form.	4.7	0.571	Strongly Agree
20. I strictly follow proper storage requirement in order to prevent early onset of product instability due to incorrect temperature.	4.7	0.571	Strongly Agree
Average	**4.707**	**0.471**	**Very High**

The post-test results following the educational intervention indicate no significant difference in the attitude levels toward pharmaceutical waste

compared to the pre-test, as both tests consistently show high values. This suggests that participants already possessed a strong positive attitude toward pharmaceutical waste management prior to the intervention. The sustained high scores reflect their ongoing commitment and awareness regarding the importance of proper pharmaceutical waste handling.

This consistency implies that the community pharmacists have a deeply ingrained recognition of the significance of managing pharmaceutical waste responsibly. Their pre-existing positive attitude likely stems from an intrinsic understanding of the environmental and public health implications associated with improper disposal of pharmaceutical products. Therefore, while the educational program effectively reinforced their attitudes, it did not produce a significant change, as the foundation of their attitudes was already solid.

Furthermore, this outcome highlights that educational efforts in this area might need to focus more on enhancing practical skills and knowledge rather than solely on attitude adjustment. Since the pharmacists already exhibit a high level of commitment, future interventions could benefit from targeting specific competencies and operational practices to ensure that their positive attitudes translate into effective and consistent waste management behaviors. The results underscore the importance of ongoing professional development and training to maintain and build upon the strong ethical framework already present among these healthcare professionals.

TABLE 5

Test of Difference in the Level of Knowledge and Attitude on Proper Disposal of Expired Pharmaceuticals Before and After the Use of Medispose

	Before	After	t-value	p-value	Remarks
Knowledge	2.805	3.68	-6.939	<.001	Significant
Attitude	4.393	4.707	-1.653	0.115	Not Significant

Table 5 presents the results of the test of difference in the respondents' level of knowledge and attitude on the Proper Disposal of Expired Pharmaceuticals before and after the use of Medispose. The findings indicate a significant increase in the knowledge of the respondents, from a mean score of 2.805 to 3.680. This increase is statistically significant, as evidenced by a t-value of -6.939 and a p-value of <.001, which is below the set alpha level (0.05). This suggests that Medispose was effective in enhancing the community pharmacists' knowledge on the subject.

In terms of attitude, the respondents' mean score improved from 4.393 to 4.707 after using Medispose. However, this increase was not statistically significant, with a t-value of -1.653 and a p-value of 0.115, which is above the alpha level. Despite the lack of statistical significance, the positive change in the mean score still points to a potential effectiveness of Medispose in influencing the respondents' attitudes toward the proper disposal of expired pharmaceuticals in Davao City.

CHAPTER 4
DISCUSSION AND CONCLUSION

This section critically evaluates, discusses, and analyzes the importance of the findings considering the existing understanding of the study problem. It also explores any new insights that emerged from the thematic analysis of the data collected through symposium conducted and questionnaires administered by the researchers.

4.1 Knowledge of Community Pharmacist on Proper Disposal of Expired Pharmaceuticals

Our study conducted in Toril, Davao City revealed an immediate improvement in the knowledge of community pharmacists following a symposium and the distribution of MEDispose modules. However, we observed minimal changes in their attitudes.

Data indicates that community pharmacists initially exhibited an partially informed (mean score of 2.45) regarding the disposal of Diazepam rectal gel (Question #5), with some uncertainty about whether it could be flushed. However, following the symposium and distribution of educational modules, there was a slight improvement in knowledge, with the mean score increasing to a high level (3). Moreover, the a similar trend in understanding among community pharmacists regarding the disposal of drugs containing opioids (Question #3) and drugs containing "sodium oxybate" can be flushed (Question #4). Initially, pharmacists demonstrated a partially informed score (mean score of 2.25 and 2.4 respectively) on whether these medications could be flushed into a designated treated water system. However, following the symposium and distribution of educational modules, there was a notable

improvement, with the mean score increasing to a informed (mean score of 3.25) and fully informed (mean score 3.55) respectively during the post-test.

Moreover, the initial pre-test data for Questions #8 and #13, focusing on the disposal of packaging materials and chemotherapy agents respectively, revealed a partially informed knowledge among community pharmacists, with mean scores of 2.45 and 2.5. This suggests that pharmacists may have lacked comprehensive training or specific knowledge regarding the proper disposal methods for these materials. Factors such as misinformation, assumptions, and limited awareness of regulations may have contributed to these initially low scores. The complexity of disposal guidelines, particularly for materials like chemotherapy agents, could have further compounded the challenge of accurately interpreting and applying proper disposal practices. However, following the educational intervention, there was a notable increase in knowledge levels, with mean scores rising to 3.85 for Question #8 and 3.55 for Question #13 during the post-test. This suggests that the intervention effectively addressed knowledge gaps and equipped pharmacists with the necessary information to understand and adhere to proper disposal practices for packaging materials and chemotherapy agents.

These findings are in line with previous research that underscores the effectiveness of educational interventions in enhancing healthcare professionals' knowledge related to pharmaceutical waste management. For instance, a study conducted by Binu K.M et al. (2024) demonstrated that educational interventions can positively impact the knowledge, attitude, and practices of healthcare staff toward pharmaceutical waste management, echoing the outcomes of our study. Additionally, our results are consistent with the findings of research by Siew Mei Lai et al. (2021), which indicated that educational interventions focusing on the safe disposal of unused medications significantly improved participants' overall knowledge levels. This study emphasized the importance of educational initiatives in fostering environmentally responsible behaviors among healthcare practitioners, including the appropriate management of pharmaceutical waste.

pharmaceutical waste.

4.1 Attitude of Community Pharmacist on Proper Disposal of Expired Pharmaceuticals

The attitude of community pharmacists towards the proper disposal of expired pharmaceuticals is a significant factor in ensuring the safety and sustainability of our environment. During the pretest of the intervention, almost all of the community pharmacists already showed a very high level of attitude, with a mean score of 4.9, towards the disposal of expired pharmaceuticals. This gives substance to the result from a study conducted in Indonesia that found that almost all pharmacists were aware of the risks associated with improper disposal of expired and unused household medications, and they have acknowledged their responsibilities to protect the environment (Alfian, S., et al, 2023). Overall, both the pre-test and post-test showed high results regarding the attitude of the pharmacists.

However, based on the pre-test result, there is a very low level (mean score of of attitude of community pharmacists towards returning expired or unused drugs to the manufacturer a month before the expiry date of pharmaceuticals. This result is similar to a study conducted in Malaysia where the study revealed that medicine returns to service in community pharmacies are not common due to some reasons like lack of facilities in the management of unwanted, expired, and returned medicines (Chong, K., et al, 2020). The result is also inconsistent with those studies from different countries like Saudi Arabia, where they found that the primary disposal method for all dosage forms was to return them to the manufacturers (Alghadeer & Al-Arifi, 2021b).

A lower mean of community pharmacists also enthusiastically encourage other personnel and portray a positive attitude towards proper disposal of expired pharmaceutical products. Lower mean of community pharmacists was also found where they do not diligently and regularly manage and do inventories. According to a research by Kahsay, H. (2020), a significant number of community pharmacists had a positive attitude toward the disposal of unused and expired pharmaceuticals. This suggests that improved advice and guidance from medical experts might lead to improved practices for effective disposal. Positive attitudes among community pharmacists are crucial for promoting safe disposal practices, educating the public, protecting public health, and mitigating environmental impacts. Fortunately, the level of attitudes of the community pharmacists are already high from the beginning, and increased more after the MEDispose Intervention.

With these data, the study reveals that community pharmacists in the Philippines have consistent attitudes towards the disposal of expired pharmaceutical products, despite no significant difference between pre-test and post-test results. This consistency can be attributed to factors such as professional training, understanding of proper disposal methods, and regulatory environment. The data also indicates that these pharmacists possess the necessary attitudes for proper disposal, highlighting their role as responsible stewards of public health and safety. Overall, the study contributes to the growing body of literature on the role of pharmacists in environmental sustainability and public health, highlighting the commendable attitudes of these pharmacists

Conclusion

The MEDispose program successfully improved the knowledge of community pharmacists in Toril, Davao City, regarding the safe disposal of expired pharmaceuticals. Although there wasn't a statistically significant change in attitudes, there was a discernible positive shift, indicating progress in fostering a culture of responsible disposal practices. By addressing knowledge gaps and providing clear guidance, the program has laid a solid foundation for promoting environmental stewardship within the community pharmacy setting. However, ongoing efforts are crucial to consolidate these gains and ensure sustained adherence to proper disposal protocols. In essence, the MEDispose program has initiated a meaningful transformation towards safer and more responsible pharmaceutical disposal practices among local pharmacists, setting a precedent for continued improvement in public health and environmental conservation efforts.

Recommendations

The MEDispose intervention shows a small improvement in community pharmacist's knowledge regarding appropriate pharmaceutical waste disposal, with a positive change in attitude. To consolidate these gains and promote sustainable change, the following recommendations are made:

Coordination among the Philippine Pharmacists Association (PPhA), local government units, and national health authorities is necessary to implement clear and actionable policies regarding the disposal of pharmaceutical waste. Such policies must be crafted to seamlessly fit into community pharmacy practice and be backed by sufficient infrastructure, including easily accessible disposal bins and centralized collection schemes. Having such measures in place will make proper disposal a normal practice in all pharmacy outlets.

The Philippine Pharmacists Association (PPhA) is urged to include discussions on correct pharmaceutical waste disposal in their periodic seminars, especially those for pharmacists when they renew their license every three years. This topic should be included in the Continuing Professional Development (CPD) program to further enhance awareness and provide pharmacists with current information on safe and responsible disposal.

The MEDispose program can be broadened by emphasizing continuous education, community involvement, and incorporating simple disposal systems in the practice of pharmacy. Although the program was effective in enhancing knowledge, attempts can be made to promote long-term behavioral modification through continued training and public enlightenment. This way, a sustainable culture for prudent pharmaceutical disposal will be inculcated, having a positive impact on both public health and the environment.

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