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Increasing Awareness of Proper Disposal Practices of Unwanted Household Medications in
Muskingum County, Ohio.

Joe Shaeffer MSN

Doctor of Nursing Practice Final Scholarly Project


In Partial Fulfillment of the Requirements for the Degree

Doctor of Nursing Practice

Otterbein University

Spring 2019

DNP Final Scholarly Project Committee:

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Executive Summary

The purpose of this project is to decrease the footprint of the opioid epidemic by increasing awareness of proper disposal of unwanted, leftover, and expired household medications. The opioid epidemic is negatively affecting many U.S. communities. One way to combat the epidemic is to increase proper disposal of unwanted household medications. Increasing awareness and participation of proper disposal of household medications, including opioids, will not only help to decrease the footprint left by the opioid epidemic, but will potentially decrease the amount of accidental overdoses in households, decrease the impact of improperly disposed medications on the local environment, and decrease the amount of medication involved crime in the community.

Orthopedic patients have been identified in this mixed method designed project as those who are more likely to receive an opioid prescription for bone and joint pain. A pre-survey of current medications disposal practices of healthcare workers in an orthopedic physicians practice provided a snippet of current disposal practices in the area. Following an educational event to the orthopedic office medical staff, one-month and three-month post surveys were completed. Additionally, healthcare worker influence was utilized as a catalyst in this project to spread the disposal information to the patients whom receive prescriptions via an informational flyer. Positive comments were provided to the primary investigator by the healthcare staff, during the presentation and in regards to the patient flyers and their distribution.

Results of the awareness appraisals revealed little to no statistical significance from the pre to post surveys. Recommendations would include increasing the sample size and location of the educational opportunities. Limitations included completion of post-surveys on shortened work breaks and a limited number of participants.

Introduction

Pharmaceutical sales have become a multi-billion dollar business in America. According to Kongar, Haznedaroglu, Abdelghany, & Bahtiyar (2015) the pharmaceutical industry generates revenues of 145 Billion dollars annually. Akhilla Reddy's article in *Oncologist*, (2014) revealed the U.S. consumes 80% of the world's supply of pharmaceuticals, including opiates, while constituting less than 5% of the world's population. The Centers for Disease Control & Prevention (CDC) exposed that on any given day in the U.S., 650,000 opioid prescriptions are dispensed. Caroline Wick acknowledged in her *Tulane Environmental Law Journal* article that 40% of all prescribed drugs go unused nationally (2014). Unfortunately, these unused medications have caused an over-abundance of leftover, unwanted, and expired medications in American homes.

Unwanted, leftover, and expired medications are those prescriptions or over the counter medications that are not fully taken by the consumer for various reasons. These medications often sit stagnant on home counter tops and in medicine cabinets. People often feel they should save their unused medications for a rainy day, and or for "what if" scenarios. These medications may take the form of tablets, pills, capsules, solutions, and even patches. Like most medications, they are dispensed in various strengths, consistencies, and flavorings.

Stationary household medications are potentially enabling an opioid epidemic that is present throughout America. The CDC designated that poisoning is the leading cause of injury death in the U.S. (2016). On an average day in the United States 91 people die from an opioid related overdose (CDC, 2016). Proper disposal of unused, unwanted, and or expired medications is an essential part of preventing these unintentional deaths. (Fleming et al., 2016).

A local orthopedic physician practice was identified as a viable place to house this project related to its increased potential to prescribe opioid prescriptions to those with bone and joint pain. A phone interview with Debbie Apperson, the orthopedic office nurse manager, estimated ten to fifteen prescriptions are handed out each day in the office (personal communication, May 29, 2018). A self-reporting pre-survey was deployed to nine orthopedic staff members to establish current knowledge and practice of proper medication disposal practices as well as awareness of current community disposal opportunities. After the pre-survey was collected, a primary educational intervention took place. The presentation helped to bolster a means of unfreezing old staff medication disposal habits while hoping to establish new practices. With crucial buy in from the staff, the investigator will rely on the medical team to distribute an informational flyer to all orthopedic patients that are given a prescription in the office for the next three months. That would equal a projected one thousand plus prescriptions prescribed in a three-month period from the physicians practice per Debbie Apperson's calculations (personal communication, May 29, 2018).

Utilization of the medical staff/patient relationship is considered a key modifying factor to change according to Nola Pender's health promotion model (Tomey & Alligood, 2006). The educational flyer provided from the healthcare workers to their patients will optimistically drive a positive process change in proper medication disposal. Post surveys deployed at one month and again at a three-month interval aid in supporting the investigator in defining possible changes in medication disposal practices, and identifying attitudes of the office staff regarding safe disposal of medications.

Problem Statement

In Muskingum County, “What is the effect of medication takeback opportunities on decreasing unwanted household medications compared with not utilizing proper medication disposal methods,” constituted the PICO question for this project. Increasing the knowledge of proper medication disposal methods and opportunities available to Muskingum County residents can potentially decrease the footprint of the opioid epidemic. Consequently, by increasing public awareness of proper medication disposal practices, a decrease in potential negative effects of other concerns such as accidental poisonings, crime rates, and environmental fears can occur. According to Athern, Linnebur, and Fabisiak (2016) many people surveyed are willing to change their old improper medication disposal habits when they learn that storing unwanted medications can lead to medication diversion, accidental poisonings, and or adverse environmental effects.

Background/Significance of the Problem

America is experiencing a drug and opioid epidemic where people are dying at an alarming rate. According to the United States (U.S.) Department of Health and Human Services (HHS), (2016) deaths from drug overdose has risen steadily over the past two decades becoming the leading cause of injury death in the U.S. The Centers for Disease Control and Prevention (CDC), (2016) indicated more than a half a million people have died from drug overdoses from 2000 to 2015. Almost nightly the national news channels discuss another person succumbing to the opioid epidemic. Shockingly, unintentional prescription overdoses now kill more Americans than cocaine and heroin combined (HHS, 2016).

Deaths from the opioid epidemic is not the only concern. The enormity of the opioid epidemic has become a financial drain on the nation’s healthcare system. Approximately, “\$55

billion in annual health and societal cost are related to prescription opioid abuse and misuse, with \$20 billion in spending due to related emergency department visits and hospitalizations” (Shafer, Bergeron, Smith-Ray, Robson, & O’Korn, 2016).

The State of Ohio is not immune to the opioid epidemic. Siegel (2017) states that Ohio currently has the highest number of opioid overdose deaths in the nation. According to Welsh-Huggins, a record 2,482 people died in Ohio from accidental overdose in 2014 (2016). The opioid epidemic is breaking the State of Ohio’s bank account as a result. Fatal and non-fatal poisonings are costing Ohioans \$3.6 billion dollars annually (Woodworth, 2013). The epicenter for Ohio’s opioid epidemic has been found in the Appalachian regions of the state (Winstanley et al., 2012). Apparently, addiction and the opioid epidemic are not age or gender specific in rural communities. The population hit by the highest overdose rates include white males, aged 25 to 54 years, living in the Midwest or Appalachian areas (HHS, 2016).

To illustrate that fact, Muskingum County, one of the thirty-two Appalachian counties in Ohio, is experiencing negative effects of the drug epidemic as well. Diana Zaato, epidemiologist for the Muskingum County Health Department revealed that as of the end of May 2018, 28 people have died due to the opioid epidemic (personal communication, May 30, 2018). Mrs. Zaato specified that a total of 20 Muskingum County residents died from the opioid epidemic in 2017 (personal communication, May 30, 2018). Shelly Schultz, (May 20, 2018) in her *Zanesville Times Recorder* newspaper article uncovered:

In 2017, there were 176 reported overdoses in Muskingum County – 20 of them were fatal. Muskingum County surpassed the 2017 death toll in the first four months of 2018.

From January through April 2018, Muskingum County has lost 21 individuals as a result

of overdose. Emergency personnel is dispatched to at least one overdose every day according to Zanesville Fire Chief Eric Waltemire. In Zanesville alone, emergency personnel responded to 115 overdoses from January to April 2018.

One of the obstacles faced in contesting the opioid epidemic is the amount of unwanted, leftover, and or expired medications sitting in household cabinets. Athern, Linnebur, and Fabisiak (2016) in their study exposed “yearly, one third of all dispensed prescription medications (approximately 200 million, or 1,000 tons) go unused in the U.S., leading to an excessive amount of medications requiring safe disposal.” Accumulation of these unused medications can occur for several reasons, including death of a family member, improvement in a treated condition, and medication discontinuation (Lystlund, Stevens, Planas, & Marcy, 2014). The concern of increased medications lying in U.S. homes increases with societies aging population. According to Kozak, Melton, Gernant, and Snyder (2016), “the amount of unused and expired medications in the U.S. is growing as the population ages and receives a greater number of prescriptions.” Having opioid type drugs sitting stationary in household cabinets increases the chances for addicts to obtain a desired drug high. Idle medications remaining in the household is a significant contributor to the growing rates of prescription drug abuse among Americans (HHS, 2016).

Safe destruction of the unwanted, leftover, and expired medications is crucial to decreasing the footprint of these medications in our communities. Educating community members on proper disposal of medications is an important primary patient safety measure (Nathan & Dement, 2015). Steve Carrel, CEO of the Muskingum Behavior Health Organization acknowledged that a lack of education on proper medication disposal practices is one of the contributing factors to the growing amount of stagnant medications in households (personal communication, April 28,

2018). According to Maeng, Tom, and Wright, only sixteen percent of the study participant's (n=528) had been educated by a healthcare professional regarding proper disposal methods (2017). Kennedy-Hendricks et al. (2016) revealed that less than 50% of study participants remembered receiving education on proper medication storage or disposal methods at the time of medication purchase. E.J. Stoepful, Assistant Director of Operations at Northside Pharmacies, located in Muskingum County, revealed that they do not currently provide information regarding proper medication disposal at the time of purchase to their customers (personal communication, May 29, 2018). This fact illustrates the dire need for such outreach education that could help to reduce the adverse effects of this opioid epidemic.

Additional Concerns

Unwanted, leftover, and expired medications lying around in households pose additional risk to society. According to Ma, Batz, Juarez, and Ladao, "unused or unwanted drugs in households expose vulnerable populations, including children, elders, & pets, to potential harm through inadvertent ingestion, as well as the potential harm through theft & assault" (2014). These vulnerable populations may not be able to identify how lethal of a threat these drugs may pose. Athern et al., (2016) revealed accidental exposure to medications in the home is a major cause of unintentional poisoning in children. Consequently, poisonings are the leading cause of injury death in the U.S. (Chen, Hedegaard, & Warner, 2014).

Carolyn Wick in her (2014) article discussed that "leftover drugs can exacerbate a growing public health concern, if drugs are not disposed of properly, they can wind up in the wrong hands (intentionally or innocently)." Some drug abusers and entrepreneurs can retrieve their medications by other means. Kozak (2016) exposed in his study that an estimated 34% of people

(n=200) shared their medications or participated in medications diversion, an issue that is concerning given the alarming rate of opioid abuse. Medication diversion practices that can influence community crime rates. Crime associated with prescription drug abuse is on the rise (Jacobson, 2012). Ronelle Barnett, a Treatment and Prevention Specialist from the Muskingum Behavior Health Organization exposed:

Reports of local Muskingum County realtors having problems during open house events. Apparently drug seeking entrepreneurs were teaming up on unsuspecting realtors. One person would ask questions and distract the attendant while the other would rummage through the home owner's cabinets. They were looking for left over medications that could be consumed or easily concealed, and sold on the streets. It is easy to see why drug dealers and addicts are looking for these easy money making opportunities. A thirty-day prescription of OxyContin, a pain killer medication, can be sold on community streets for upwards of \$1,000 per thirty-day supply. That represents tax free money that supplements their income. (personal communication, March 18, 2017)

The environmental imprint left by improper disposal of unwanted, leftover, and expired medications is concerning. Steve Carrel, Chief Executive Officer of Muskingum Behavior Health detailed that many people tend to dispose of unused, unwanted, or expired medications in the toilet or trash (personal communication, April 28, 2018). According to Aschenbrenner (2015), "the Environmental Protection Agency (EPA) recommends against flushing medications because drug molecules can pass through treatment systems which are not typically equipped to remove drug particles, and then enter rivers or lakes, groundwater, or community drinking supplies." Multiple drug particles may accumulate in the nation's surface water and waterways. In 2002, the U.S. Geological Survey sampled 139 streams across 30 states and found that 80%

had measurable concentrations of medications, including steroids, and reproductive hormones (Taras, Haste, Berry, Tran, & Singh, 2014). Wick (2014) discovered that of the chemicals and pharmaceuticals studied, sewage treatment plants only remove approximately half of the medication effectively. Drinking multiple glasses of water a day as recommended by numerous healthcare agencies and professionals exposes Americans to prescription medications. Wick further revealed that sewage municipalities often sell bio-solids, for use in fertilizers, to various farmers and companies around the country (2014). Revealing that not only are we drinking drug particles, but we are eating drug particles on a daily basis as well. According to Lauer, Kettell, and Davis (2010), “drugs that are flushed or disposed of with household or institutional trash are a smaller source of potential contaminants, but one that we can control by changing our disposal practices.”

Conclusion

The opioid epidemic is a complex issue, but there are some steps that Americans can implement to help minimize the footprint of the problem. Primary and secondary treatment efforts are needed to combat the opioid epidemic (Winstanley, et al. 2012). Education and knowledge of options to any problem is a key component to successful interventions. Kozak et al., (2016) argued that “not only does the community need educated regarding proper disposal methods, but physicians, pharmacist, nurses, funeral directors, school administrators, need educated as well.” As healthcare professionals, nurses can lead the educational efforts to decrease the effects of these medications in our communities. Primary prevention methods can include distributing general information flyers, increasing signage of current available take-back opportunities, and utilization of local media outlets to increase awareness in hopes to decrease the footprint of pharmaceutical waste. Pharmaceutical and medical waste is a concern related to

its ability to cause injury potential for disease transmission, and environmental pollution (Udofia, Gulis, & Fobil, 2017). The time to educate the importance of proper disposal of unwanted, leftover, and expired medications in Muskingum County is now.

Project Description/Design

Theoretical Framework

The Nola J. Pender Health Promotion Model (HPM) is the chosen theoretical framework to help guide the investigators project. Pender's HPM provides structure to aid in the assessment of an individual's path to change in regards to health promoting behaviors. Pender's framework starts with identifying the person's characteristics and previous experiences that include prior related behaviors and personal factors related to influencing a change in behavior (Kelley, Sherrod, & Smith, 2009). Pender ascertains an understanding of an individual's characteristics and prior experiences will ultimately effect the behavioral outcome (Tomey & Alligood, 2006). Tomey and Alligood revealed individual characteristics include personal factors such as: biological, psychological, and sociocultural influences (2006, p.455). Other influential characteristics identified as noteworthy include an individual's perceived benefit of action, perceived barriers to change, perceived self-efficacy, an activity related affect, as well as interpersonal, and situational influences (Tomey & Alligood, 2006). Another key element in Pender's framework identified by the investigator included, "interpersonal relationships with family, peers, and healthcare providers can affect decisions made regarding health promoting behaviors" such as the proper disposal of medications (Kelley, Sherrod, & Smith, 2009). Professional relationships between nurses and their patients can become a catalyst to positive

change in an individual's health modification behavior. Peer support is critical in changing old, unsafe habits, and adopting a new safer routine.

Conceptual Framework

Kurt Lewin's change theory provides a conceptual theory to help drive the transformational project. Gershwin (1995) discussed how Lewin's change theory consists of three basic steps: unfreezing old habits, educating on, and implementing the behavioral change, and refreezing the newly learned concepts. To unfreeze old habits, the investigator provided a pre-survey to identify old habits and current practices of the population. Like Pender, the investigator took into consideration an individual's characteristics and past experiences as being influential in their prior habits formed. After the pre-survey was completed, the implementation of change would occur in a lunch and learn educational format that clearly described the benefits and potential road blocks of changing current practices. The implementation of change in this project consisted of educating healthcare staff on the benefits to proper disposal of unwanted, leftover, and expired medications. The refreezing process of the newly learned behavior included the investigator providing evidence of existing safe disposal opportunities offered to the focused demographic area. With the help of healthcare professionals, and the interpersonal influences established between staff and their patients, as Pender describes, the safe disposal opportunities would be shared with patients via a flyer. The distribution of an informational flyer potentially increased awareness and enhance participation in proper drug disposal in Muskingum County.

Project Objectives

The opioid epidemic is negatively affecting many Americans across the U.S., Ohio, and Muskingum County. One aspect contributing to the enormity of the opioid epidemic is the

amount of unwanted, leftover, and expired medications that originate from community households. The purpose of this project is to increase awareness and usage of community members in regards to proper disposal techniques of unwanted, leftover, and or expired medications, including opioids. Project objectives included: identifying current medication disposal practices in the community, identifying proper disposal opportunities available in the community of interest, and increasing the knowledge and utilization of proper medication disposal practices in hopes to decrease the footprint of improper disposal practices in the community.

Methodology

A quantitative mixed methods design was applied to support the investigator's establishment of relationships between influencing variables. A cross-sectional pre-survey was deployed at the beginning of a lunch and learn event to identify current medication disposal practices as well as to identify a current level of understanding regarding proper medication disposal practice offered in the community. Education was then provided to the population of interest during the lunch and learn opportunity to increase knowledge and awareness to the identified concerns and available community resources. A cross-sectional post-survey was deployed at a one month and a three-month interval to aid in identification of potential subsequent issues. A Chi-Square independence test was applied to analyze the survey data obtained.

Population

Following University Institutional Review Board (IRB) approval, the determined population of interest centered on the staff at a local Muskingum County orthopedic physician

practice. A signed consent to participate was obtained after a verbal project explanation was given during the initial educational event. Human subject confidentiality was protected with the use of anonymous surveys deployed throughout the three month project. An orthopedic physician practice was identified as a probable partner based on its increased potential to prescribe opioid prescriptions to those with bone and joint pain. In keeping in line with DNP essential VI - inter-professional collaboration for improving patient and population health outcomes - the population and sample encompassed the nine orthopedic office practicing nurses, and medical assistants (MA). A collaborative approach was seen as a positive influence in the potential successful change in behavior. The inclusion criteria would include all nine nurses, and MAs who come in contact with orthopedic patients in the designated office on a daily basis. The sample population was recruited through a lunch in learn event during a specified lunch hour in the office's boardroom space. A phone interview with Debbie Apperson, nurse manager of Orthopedic Associates, revealed that the staff of the specified orthopedic practice would be delighted to help with the investigators project initiative (personal communication, May 29, 2018). The demographics of the nine sample members is revealed in Table 1.

| Table 1. Project Demographics (n=9) | | | |
|--|-----------------------------------|---|------|
| Gender: | | | |
| | Female | 9 | % |
| Age | | | |
| | 18-29 | 3 | 33.3 |
| | 30-39 | 3 | 33.3 |
| | 40-49 | 2 | 22.2 |
| | 50 and above | 1 | 11.1 |
| Position: | | | |
| | Nurse | 2 | 22.2 |
| | CMA/STNA | 7 | 77.8 |
| Time in position: | | | |
| | 0-5yrs | 7 | 77.8 |
| | 5-10yrs | 1 | 11.1 |
| | 10-15yrs | 1 | 11.1 |
| License: | | | |
| | 0-5yrs | 3 | 42.9 |
| | 5-10yrs | 1 | 14.3 |
| | 10-15yrs | 2 | 28.6 |
| | 20-25yrs | 1 | 14.3 |
| Live in Muskingum County | | 9 | 100 |
| Who is Living at Home? | | | |
| | Alone | 0 | 0 |
| | Spouse/Significant Other | 8 | 89.9 |
| | Adult Children age>25yrs | 0 | 0 |
| | Young adult children age 18-25yrs | 3 | 33.3 |
| | Minor children age <18yrs | 8 | 88.9 |
| | Parents | 1 | 11.1 |
| Highest level of education completed? | | | |
| | High School | 1 | 11.1 |
| | Vocational/Technical School | 1 | 11.1 |
| | Associates Degree/Some College | 6 | 66.9 |
| | Bachelor's Degree | 1 | 11.1 |
| How do you prefer to obtain new information? | | | |
| | Television | 6 | 66.7 |
| | Newspaper | 0 | 0 |
| | Radio | 1 | 11.1 |
| | Facebook/Social Media | 5 | 55.6 |

Instruments/Measures

Study validity was supported through the investigator's use of anonymous pre surveys (Appendix B) and post surveys (Appendix C) of the orthopedic office staff's current beliefs and practices regarding disposal habits of unwanted medications in their homes. Nola Pender's Health Promotion Model (HPM) was utilized as a concept map to aid in identification of influential items, such as socioeconomics, and situational factors that might impact staff behaviors. Kurt Lewin's change theory provided a conceptual framework to follow during implementation of the project. An informational flyer (Appendix D) was distributed by the office staff to spread awareness of the proper medication disposal information to the orthopedic patients who received prescriptions during their office visit. Review of study pre and post survey findings assisted with identification of potential facilitators and barriers while supporting study reliability.

Project Timeline

Initially the investigator was hoping to start the project by August 17th, 2018 as to not push the post-surveys into the holiday season. As a result of a delay in IRB approval and scheduling conflicts with the orthopedic office manager, the project was installed on September 26th, 2018. Consequently the one month and three month post surveys were pushed into the holiday season. The one month and three month post-surveys were deployed on October 24th, 2018, and December 19th, 2018. It was noted that the pre survey and one month post survey had nine participants. Unfortunately, the three month post survey dropped to six participants as it was disbursed the Wednesday before Christmas.

Budget

The project budget can include both direct and indirect costs (Moran, Burson, & Conrad, 2017). Direct costs revolve around the amount of materials needed for the three-month project period of implementation. Costs for this project will include food for the lunch and learn, as well as printed flyer materials for distribution (Table 2). The medical office is open five days a week, making the estimated total number of flyers needed to be roughly 1,000 for the three-month project.

| Table 2. Project Cost Analysis | | |
|---------------------------------------|-----------------------|---|
| Direct Cost Item | Estimated Cost | Actual Cost (n=9) |
| Lunch (14 staff) | \$100 | 9/26/2018- Olive Garden= \$137.54 with tip. |
| Printed Flyers (1000 count) | \$500 | \$408 |
| Printed Take-Away & Surveys | \$50 | \$40 |
| Investigators Time (\$10/hr x 20hr) | \$200 | Time Donated |
| Statistician's Time (\$10/hr x 5hr) | \$50 | Time Donated |
| Total Cost- | \$900 | \$585.54 |
| | | |
| Indirect Cost Item | Estimated Cost | Actual Cost |
| 0 | 0 | 0 |
| | | |

Outcomes/Evaluations

Data Analysis

Descriptive and inferential statistics were applied in the analysis of data points via the three surveys collected over the three-month period. A Chi-Square test was installed to discern the survey data. Information analysis was completed using Statistical Package for the Social Sciences (SPSS) data software by a statistician.

The surveyed demographical information (Table 1) revealed thought-provoking data. One hundred percent of the participants live in Muskingum County (n=9). Sixty-six percent of the sample were between the ages of eighteen and thirty-nine. Younger adult responses may modify the survey data as they may have less household medications to dispose of, and/or less opportunity to have received a past prescription medication. A large majority of participants (88.9%) have children or elderly living in the home, increasing the risk of accidental poisoning. A large majority of participants agreed that television and social media platforms such as Facebook and Twitter were the preferred means of obtaining new information. These communication platforms could aid in future consideration of projects in regards to increasing project awareness.

Review of the household medication storage by location data (Table 3) indicated that zero project participants currently secure their household medications. Most contributors choose to place medications in an unlocked household cabinet. The practice of leaving medications unlocked in the home provides an increased risk of accidental poisonings by children, elderly, and pets. Ease of access to unlocked household medications may increase the risk of criminal behaviors taking place in the home as well. An interesting message was noted in an uptick in the action of hiding household medications from the pre-survey and the one month follow up survey. This uptick subsided in the three-month survey possibly due to the decreased number of participants in the three-month post survey.

| Table 3. Household Medication Storage by Location Over Time in % | | | |
|--|-----------------|-----------------|-----------------|
| | Time 1 (n=9) | Time 2 (n=9) | Time 3 (n=6) |
| Where everyone can see them | 11.1 | 11.1 | 11.1 |
| Hidden but not locked | 66.7 | 77.8 | 66.7 |
| Under lock & key | 0 | 0 | 0 |
| Other | 22.2 | 11.1 | 11.1 |

The medication disposal of time section of the surveys (Table 4) exposed a common practice of the majority of participants currently flushing or throwing away unwanted medications in waste receptacles. On a positive note, there appeared to be a change in disposal habits as a result of the educational event with a slight decrease in the practice of flushing and throwing away household medications from the pre-survey to the one-month follow-up. Unfortunately, the proper disposal participation measurement plateaued in the three-month post survey. Additional positive change behaviors presented itself by one participant giving unwanted medications to their doctor or pharmacy for proper disposal during the one-month time frame post educational event. This illuminates that the educational event met the goal of the investigator by changing a person's unhealthy unwanted medication disposal practices. A potentially negative concern (Table 4) revealed there to be a desirable practice of hoarding medications for "What-If" scenarios even after the educational event. The practice of hoarding medications puts the participant and their families at an increased risk of accidental poisoning and crime possibilities.

| Table 4. Medication Disposal Over Time in % | | | |
|--|-----------------|-----------------|-----------------|
| | Time 1 (n=9) | Time 2 (n=9) | Time 3 (n=6) |
| Giving them to my doctor/pharmacy for disposal | 0 | 11.1 | 0 |
| Flushing down the toilet | 22.2 | 0 | 0 |
| Throwing in the trash | 22.2 | 11.1 | 0 |
| I do not routinely dispose of my medications | 22.2 | 33.3 | 22.2 |
| I do not dispose of my medications because I may need them later | 44.4 | 44.4 | 50 |
| Other | 0 | 11.1 | 11.1 |

Further survey data revealed two participants were aware of some unwanted medication drop off locations, but only one participant actually partook in one of the regions medication drop off events (Table 5). Two of the nine participants were willing to pay a little extra to help pay for the cost of proper medication disposal in the future. Nearly half of the participants would like to be incentivized in some way to participate in proper medication disposal. These cost incentive findings could aid in future studies in regards to increasing proper medication disposal participation.

| Table 5. Awareness & Participation Questions Over Time in % | | | |
|--|-----------------|-----------------|-----------------|
| | Time 1 (n=9) | Time 2 (n=9) | Time 3 (n=6) |
| Are you aware of medication drop off locations in your area? | 22.2 | 11.1 | 16.7 |
| Have you ever participated in a medication drop off program? | 11.1 | 11.1 | 16.7 |
| Would you be willing to pay for a medication take back opportunity, such as paid envelopes, or tax on your medication purchases? | 22.2 | 22.2 | 66.7 |
| Would being compensated in some way encourage you to participate in a medication take back opportunity? | 44.4 | 66.7 | 50.0 |

One of the most positive influential project statistics that emerged from the educational event was at least seventy-five percent of the participants felt they changed their daily disposal

habits as a result of the educational experience (Table 6). The dramatic change in current practice validates the need for community education in Muskingum County. The project flyers were found to be educational and appeared to be appreciated by the orthopedic patients and project participants. Through the functional use of Nola Pender's HPM, the healthcare staff appeared to positively influence their patients and community members.

| Table 6. Impact of Training in % | | |
|--|-----------------|-----------------|
| | Time 2 (n=9) | Time 3 (n=6) |
| Have your household medication disposal practices changed as a result of the educational event provided by the investigator? | 75.0 | 83.3 |
| Have you received positive feedback from the orthopedic patient's regarding the handout flyer? | | |
| the patient learned something new | 87.5 | 44.4 |
| the flyer was easy to understand | 57.5 | 44.4 |
| the patient (or his/her family) will be using the drop-offs | 50.0 | 22.2 |
| Have you shared any information obtained during the educational event with any of the following since the event occurred? | | |
| Family | 88.9 | 66.7 |
| Friends | 44.4 | 22.3 |
| Community Members | 11.1 | 33.3 |
| Other Healthcare Professionals | 44.4 | 50.0 |

The qualitative survey portion revealed satisfaction with the delivery of the educational event (Table 7). Overwhelmingly the participants thought pharmacies, and physician offices were ideal locations to provide the educational flyer in the future. Other flyer locations included bank lobbies, grocery stores, and sharing the flyer via social media platforms such as Facebook. These data points are influential in furthering the projects footprint in the region for the near future.

| Table 7. Qualitative Survey Questions and Answers | |
|---|---|
| Post-Survey Qualitative Questions | Sample of Answers |
| Where would you suggest placing the flyers in the future? | <ol style="list-style-type: none"> 1. "Grocery Stores, Banks" 2. "At Pharmacy Pick-up Counters/Windows" 3. "At the pharmacy, waiting rooms at Hospitals/Doctor's office" 4. "Doctor offices, Pharmacies" 5. "Check out/in waiting room" 6. "Pharmacy, Grocery Stores" 7. "Pharmacies/Doctors' offices" |
| Are there any changes to the training you would like to suggest? If so what? | <ol style="list-style-type: none"> 1. "No it was Great" 2. "No" 3. "none" 4. "No" 5. "No" 6. "No" |
| Any other feedback you would like to give the investigator about the project? | <ol style="list-style-type: none"> 1. "The info about the contamination is interesting, I think elaboration on this would be enjoyable." 2. "No" 3. "none" 4. "placing flyer on FB to be shared to the public" 5. "No" 6. "No" |

Outcome Analysis

Prior to project implementation, prominent people in Muskingum County were not aware of the disposal opportunities available. For example, Muskingum County Sheriff Matt Lutz stated that he was unaware of all of the opportunities Muskingum County residents had available to them in the community related to proper medication disposal practices (personal communication, April 28th, 2018). A phone interview with E.J. Stoepful, R.Ph., Assistant Director of Operations at Northside Pharmacy revealed his lack of knowledge of what opportunities the community provided for medication disposal as well (personal communication,

June 12th, 2018). After project implementation, there appears to be a surge in the participation in proper medication disposal practices in the county. Stoepful, discovered an increase in usage at the Bell Street location medication kiosk in the last month (personal communication, 10/27/2018). Sheriff Lutz revealed noticing a rise amount of medications being dropped off at the Sheriff Department Medication disposal location in the recent month or two (personal communication, 11/23/2018).

Success of the project was measured by the level of increased knowledge and awareness of proper disposal practices of the office staff as differentiated from the survey data obtained. Although the project contained a small population sample, the data supported a positive change in medication disposal habits as a direct result of the projects implementation. Seventy-five percent of contributors indicated that their medication disposal habits have been modified as a result of this project. With this concept in mind, this project has been successful in changing behavior in the community. A behavioral change that might appear small in nature, but could potentially make the community safer, cleaner, and more robust for years to come.

Small communities benefit from a close-knit atmosphere. With the use of verbal communication techniques, vital information can spread like a wild fire in these small areas. This spread of communication is free and important to the social range of the projects message. The healthcare staff's positive influence on the patient population is the second positive outcome derived from the data collected. The project contributors appeared to positively influence the Muskingum County community by spreading the message verbally as well as professionally via an informational flyer as described in Nola Pender's HPM. Free information is vital to the project's success moving forward in a cash strapped atmosphere as defined in the American Healthcare system.

Survey outcomes revealed possible methods of information delivery for future educational pathways with the use of social media platforms as well as conventional television methods. Other concepts identified for future medication disposal influences center around the concept of paying for proper disposal practices and or receiving compensation for participation. These basic concepts should be deliberated with further progression of this project implementation in the near future.

Limitations and Barriers

Limitations and barriers revealed in this project include the sample size, location, implementation timing, and cost of the project. Although a perceived positive change in habit had occurred with the project participants, a project statistical significance was not obtained. The perceived reason for the lack of statistical significance may lie in the small sample size and drop in participation of the three-month post-survey. The project timeline possibly inhibited participation in regards of the Christmas holiday season. Conducting surveys during the participants work day in retrospect was seen as a possible deterrent to survey involvement as well. Review of the survey responses revealed possible barriers in survey question clarity. Some answers to questions appeared, in hindsight, to be too similar in nature or perhaps too vague. Thus participants may have been persuaded to change answers as the surveys progressed, or aided in not answering all the questions during the completion process.

Further project cost would rely on an organization such as the local health department to ensure project implementation of a grander scale. Cost of flyer printing could be minimal based on the use of color and quality of paper. Further increase of project awareness could save money

in the forms of alternative communication methods such as local television, and Health Department Facebook/Twitter accounts.

Initial project barriers and limitations were speculated to include staff and patient buy in, cost of educational materials, cost of time and effort of orthopedic patient's potential change in disposal habits, and sustainability of the study. These initial thoughts after project implementation revealed not to be true as project participants shared positive comments such as "this is great information", or "we need to share this information" during the educational event. Further participant comments showed positive responses during follow-up survey interactions in the form of "the patients have enjoyed the flyers" and "I told my family at a birthday party, and they were all amazed at the opportunity for proper disposal in the area".

Conclusions/Recommendations

In conclusion, the power of education is evident in this small project. The project data supports the notion that one person can have a positive impact on a larger foundation. Through education, the negative effects of the opioid epidemic can diminish in a small town community. Education can unfreeze old habits, and instill new, safer habits in regards to proper household medication disposal. This project emphasized the power of the healthcare staff-patient relationship as well. Patients from our communities rely on the message given out by its healthcare workers. On a small scale the project unearths the importance behind the need for evidenced based practice (EBP), and the significance of the message delivered by healthcare workers in today's society.

Investigator recommendations includes consideration of further project implementation regarding time of the year and setting of the project. Additional research is needed into the

effects of improper medication disposal on human subjects, especially in the areas of cancer and disease prevalence in certain areas. Awareness needs to be spread to all healthcare workers across the United States, not just small areas in Ohio. People need to know that we are killing ourselves in a multitude of ways by consuming our unwanted medications. The corrections are easy, if we as citizens are made aware of the problem, and how to fix it. Increasing awareness is possible with project expansion and distribution of the project's flyers in areas suggested by the participants. Agencies like the local health department would be able to expand the project's footprint to multiple areas and counties utilizing their communication portals.

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APPENDIX A**Informed Consent Form for Project Participation****Otterbein University**

I freely and voluntarily consent to be a participant in a research project titled: "Increasing Awareness of Proper Household Medication Disposal in Muskingum County" to be conducted at the Orthopedic Associates office in Zanesville, Ohio from August 17, 2018, to December 3, 2018, with Joe Shaeffer as the principle investigator. I have been informed that my part will require approximately 45 minutes in total.

The purpose of this study is to identify current household medication disposal habits in a specific population, and provide education to the population to aid in increasing awareness of proper disposal opportunities in Muskingum County.

Participants will undergo one pre-survey, an educational event, and two post-surveys completed at one and three month intervals post-educational event. The population will also be asked to hand out flyers describing medication disposal opportunities available to those patients whom receive prescriptions from the Orthopedic Associates office for the duration of the project.

I understand any risk involved in my participation in this project will be minimal. I have been informed that my responses will be kept strictly confidential. My individual responses will not be revealed to anyone without my permission.

I certify that I am 18 years of age or older

I understand that I may withdraw my consent and discontinue participation in this project at any time without prejudice. I may also skip any questions or portions of the project that make me uncomfortable. I have been given the right to ask questions concerning the project, and any questions that I have about the project have been satisfactorily answered.

I understand that if I experience any emotional distress as a result of participating in this project, that I may contact Muskingum Behavioral Health at (740) 454-1266. I have been given a take away copy of this document and any other necessary information so that I may consult it at any time.

I have read and understand the above statements and conditions for my participation in this project. If I have additional questions, I can contact the Research Advisor, Dr. Brian Garrett at Brian.Garrett@otterbein.edu or (614)823-1614, or the Primary Investigator at joseph.shaeffer@otterbien.edu or (740) 826-6162.

Participant

Date

APPENDIX B**Project Pre-Survey Questionnaire**

1. What is your gender?
2. What is your age? _____
3. What position do you hold at the practice (e.g. nurse, doctor, paraprofessional)?
4. How long have you been in this position?
5. If you hold a license (e.g. LPN, RN, PA, OTA) how long have you been in practice?
6. Do you live in Muskingum County?
 - ☐ Yes
 - ☐ No
7. Who is living at home? (Check all that apply)
 - ☐ Spouse/significant other
 - ☐ Adult Children (Age>25yrs)
 - ☐ Young adult children (age 18-25yrs)
 - ☐ Minor children (age<18yrs)
 - ☐ Parents
 - ☐ Alone
8. Highest level of education completed?
 - ☐ Did not finish high school
 - ☐ High School
 - ☐ Vocational/technical school
 - ☐ Associates degree/some college
 - ☐ Bachelor's degree
 - ☐ Master's degree
 - ☐ Doctor or equivalent

9. How do you prefer to obtain new information? (Check all that apply)

- ☐ Television
- ☐ Newspaper
- ☐ Radio
- ☐ Facebook/Social Media
- ☐ Other online sources, please explain:

☐ Other, please describe:

10. Where do you currently keep your household medications? (Check all that apply)

- ☐ Where everyone can see them
- ☐ Hidden but not locked
- ☐ Under Lock and Key
- ☐ Other, please describe:

11. How do you currently dispose of your unwanted medications? (Check all that apply)

- ☐ Giving them to my doctor/pharmacy for disposal
- ☐ Flushing down the toilet
- ☐ Throwing in the trash
- ☐ I do not routinely dispose of my medications
- ☐ I do not dispose of my medications because I may need them later
- ☐ Other, please describe:

12. Are you aware of medication drop off locations in your area?

☐ Yes

☐ No

13. Have you ever participated in a medication drop off program?

☐ Yes

☐ No

14. Would you be willing to pay for a medication take back opportunity, such as paid envelopes, or tax on your medication purchases?

☐ Yes

i. If so how much would you pay? _____

☐ No

15. Would being compensated in some way encourage you to participate in a medication take back opportunity?

☐ Yes

If so what compensation might encourage you? _____

☐ No

APPENDIX C**Project Post-Survey Questionnaire**

1. What is your gender?
2. What is your age? _____
3. What position do you hold at the practice (e.g. nurse, doctor, paraprofessional)?
4. How long have you been in this position?
5. If you hold a license (e.g. LPN, RN, PA, OTA) how long have you been in practice?
6. Do you live in Muskingum County?
 - ☐ Yes
 - ☐ No
7. Who is living at home? (Check all that apply)
 - ☐ Spouse/significant other
 - ☐ Adult Children (Age>25yrs)
 - ☐ Young adult children (age 18-25yrs)
 - ☐ Minor children (age<18yrs)
 - ☐ Parents
 - ☐ Alone

8. Highest level of education completed?

- ☐ Did not finish high school
- ☐ High School
- ☐ Vocational/technical school
- ☐ Associates degree/some college
- ☐ Bachelor's degree
- ☐ Master's degree
- ☐ Doctor or equivalent

9. How do you prefer to obtain new information? (Check all that apply)

- ☐ Television
- ☐ Newspaper
- ☐ Radio
- ☐ Facebook/Social Media
- ☐ Other online sources, please explain:

- ☐ Other, please describe:

10. Where do you currently keep your household medications? (Check all that apply)

- ☐ Where everyone can see them
- ☐ Hidden but not locked
- ☐ Under Lock and Key
- ☐ Other, please describe:

11. How do you currently dispose of your unwanted medications? (Check all that apply)

- ☐ Giving them to my doctor/pharmacy for disposal
 - ☐ Flushing down the toilet
 - ☐ Throwing in the trash
 - ☐ I do not routinely dispose of my medications
 - ☐ I do not dispose of my medications because I may need them later
 - ☐ Other, please describe:
-

12. Are you aware of medication drop off locations in your area?

- ☐ Yes
- ☐ No

13. Have you ever participated in a medication drop off program?

- ☐ Yes
- ☐ No

14. Would you be willing to pay for a medication take back opportunity, such as paid envelopes, or tax on your medication purchases?

- ☐ Yes
 - i. If so how much would you pay? _____
- ☐ No

15. Would being compensated in some way encourage you to participate in a medication take back opportunity?

- a. Yes
- b. No
 - i. If so what compensation might encourage you?

16. Have your household medication disposal practices changed as a result of the educational event provided by the investigator?

- ☐ Yes
- ☐ No

17. Have you received positive feedback from the orthopedic patient's regarding the handout flyer?

Please check all that apply:

- ☐ The patient learned something new
- ☐ The flyer was easy to understand
- ☐ The patient (or his/her family) will be using the drop-offs.
- ☐ Others (please list): _____
- ☐ No

18. Have you shared any information obtained during the educational event with any of the following since the event occurred? Please check all that apply:

- ☐ family,
- ☐ friends
- ☐ community members
- ☐ other health care professionals
- ☐ Others (please list): _____
- ☐ No

19. Is there any other feedback has you received from the orthopedic patient's that have received the handout flyer besides what we ask above?

20. Where would you suggest placing the flyers in the future?

21. Are there any changes to the training you would like to suggest? If so what?

22. Any other feedback you would like to give the investigator about the project?