



# Improving Pesticide Exposure and Toxicity Education among Healthcare Providers

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## CLINICAL PROBLEM

Every year 1.1 billion pounds of pesticide active ingredient are used in the United States (CDC, 2019). The population at risk for hazardous exposures of pesticides includes over 2 million full-time agricultural workers and their family members (Cramer, Wulf, Wendl, & Keeler, 2019). Over 130,136 pesticide related calls are made to poison control per year and an average of 20,116 cases are treated in health care facilities, yet studies have shown that there are evident gaps in pesticide knowledge among healthcare providers (Langley & Mort, 2012; Cramer, Wulf, Wendl, & Keeler, 2019).

## PURPOSE

The purpose of investigating this issue is to implement a solution that incorporates evidence-based strategies to improve provider pesticide knowledge.

## REVIEW OF THE LITERATURE

### ❖ Pesticide Knowledge and Practices:

The literature demonstrates evident gaps in provider confidence and ability to recognize and appropriately manage pesticide related illnesses (Lekei, Ngowi, Mkalanga, & London, 2017; Trasande et al., 2010).

### ❖ Evaluating Pesticide Education and Effectiveness:

Studies show that using an educational intervention focusing on general pesticide knowledge in addition to gaps identified by survey or interviews has shown positive outcomes in improving pesticide knowledge among providers (Cramer, Wulf, Wendl, & Keeler, 2019; Sibani, Jessen, Tekin, Nabankema, & Jors, 2017).

## APPROACH TO THE CONDUCT OF THE PROJECT

The setting occurred at La Clinica, a federally qualified health center that serves Southern Oregon. Participants of this project included health care providers at mobile health center migrant camps and providers at other La Clinica health center sites. Anticipated challenges are related to participation among providers who may not have the time to attend.



<https://publichealth.org/services/mobile-health/>

## IMPLEMENTATION

Using SurveyMonkey a pre-assessment of pesticide knowledge was collected followed by a 30-minute educational intervention related to pesticides. Due to COVID-19 this intervention was delivered through PowerPoint on a video conference. The intervention included a brief introduction on pesticide use, pesticide safety to be able to educate patients, recognizing acute pesticide related illnesses in the health care setting, patient work-up, including pesticide diagnostic testing that can be utilized and lastly management and follow up. A final post intervention assessment was also collected. There were 10 participants during the educational intervention presentation but only 5 of them completed the pre-interventional survey. I believe this number could have been higher if I administered the surveys in person and allowed time for completion before beginning the intervention and after.

### Pesticide Assessment

- Most pesticides do not have a specific treatment other than supportive care (T/F)
- The use of multiple types of PPE reduces the chance of pesticide related illnesses (T/F)
- What are challenges in using PPE among farmworkers?
  - Farmers are unwilling to use PPE
  - Lack of PPE education
  - Cost
  - Availability
- What is the most common route of pesticide exposure?
  - Inhalation
  - Dermal
  - Ingestion
  - None of the above
- What is the most important way to diagnose pesticide related illness?
  - Diagnostics
  - Physical exam
  - History
  - None of the above
- Acute pesticide poisoning s/s can include:
  - Miosis, bradycardia, hypotension, vomiting (T/F)
  - Tachycardia, hypertension, muscle weakness, paralysis (T/F)
  - Headache, confusion, psychosis, tremor, seizure, ataxia (T/F)
- Antidotes for organophosphate poisoning exist (T/F)
- How often should patient labs be monitored after an acute pesticide related illness?
  - Every 2 hours
  - Twice monthly
  - Weekly
  - Once monthly
- What is the primary cause of death from organophosphate poisoning?
  - Muscarinic symptoms
  - Nicotinic symptoms
  - Both A & B
  - None of the above
- There are various pesticides that can be analyzed in clinical laboratories (T/F)
- Both plasma and RBC are needed when measuring cholinesterase blood levels (T/F)
- Atropine temporarily reverses muscarinic effects of cholinesterase inhibitors (T/F)
- Pralidoxime relieves:
  - Muscarinic symptoms
  - Nicotinic symptoms
  - Both A & B
  - None of the above

## OUTCOME EVALUATION

SurveyMonkey was used for pre and post assessment collection. Paired t-tests were then used to analyze data. Lastly, a bar graph was created to depict pre and post test scores and mean test scores. Ethical issues were not anticipated with this educational intervention project. The only anticipated costs associated was the gift card raffle for participating providers.

## OUTCOMES

The literature studied prior to the project implementation identified gaps in provider pesticide knowledge and positive outcomes of educational interventions (Cramer, Wulf, Wendl, & Keeler, 2019; Lekei, Ngowi, Mkalanga, & London, 2017; Sibani, Jessen, Tekin, Nabankema, & Jors, 2017; Trasande et al., 2010). My project findings concurred with these studies being that providers average survey score was 46% before the educational intervention and 79% after. Individual pre-test scores ranged from 30%-61% and post-test scores ranged from 69% to 84%. Paired t-tests were used to further analyze data and found there to be significant improvement between participant pre and post intervention survey scores ( $p=0.003$ ).



## RECOMMENDATIONS & LIMITATIONS

Feedback from providers included that the educational intervention was useful and needed. Providers who work in the mobile health unit which serves migrant farmworkers felt it would benefit them in their current and future practice. Other providers felt that although it was useful information it may not apply to their practice often. The potential to sustain this intervention and increase influence is likely in community settings where pesticide related illnesses may be more likely to appear. In this particular federally qualified health center, the mobile unit that focuses on migrant farmworker health may find this intervention more applicable compared to other areas of focus such as school-based health centers. This intervention could also be applied to other regions in the state or to different states that have increased agricultural employment. Although only five participants answered survey questions this educational intervention showed positive outcomes which could be beneficial for healthcare workers, facilities, and patients.

## SUMMARY & NEXT STEPS

Despite changes made to the project due to COVID-19, implementation of the educational intervention to improve healthcare provider pesticide knowledge showed to be effective. Implementing the intervention and administering surveys in person as well as increasing provider participation can be potential next steps to further strengthen validity of survey data collection and to better display the positive correlation between pre and post intervention data.



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