

A Review of the Toxicity of Picaridin Containing Insect Repellent Reported to the National Poison Data System

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Introduction

- The threat of arboviruses such as Zika Virus may increase the use of insect repellents.
- Currently the Centers for Disease Control and Prevention (CDC) recommends the use of Environmental Protection Agency (EPA) registered insect repellents with one of the following active ingredients:
 - DEET
 - Picaridin
 - IR3535 (3-[N-Butyl-N-acetyl]-aminopropionic acid, ethyl ester)
 - Oil of lemon eucalyptus (p-menthane-3,8-diol)



All Countries and Territories with Active Zika Transmission

-<http://www.cdc.gov/zika/geo/active-countries.html>

Objective

- Picaridin exposures may rise due to increased use as an alternative to DEET products.
 - DEET (IUPAC name: N,N-Diethyl-e-methylbenzamide, or N,N-diethyl-meta-toluamide)
- Very little data available on acute exposures
- Aim:
 - Review data from the U.S. National Poison Data System (NPDS) regarding exposures of insect repellents containing picaridin, and compare those to insect repellents containing DEET, or other insect repellents not containing DEET.

Background

- Picaridin (Icaridin, KBR3023)
 - Piperidine derivative insect repellent
 - MOA: Decreases the insect's ability to locate humans by blocking the olfactory stimuli on human skin
 - Available as an aerosol, pump spray, liquid, cream, towelette wipes, balsam or stick
 - Formulations: 10 to 20% picaridin
 - Available in Europe since 2001 and United States since 2005
 - Reportedly has low toxicity in animals



Methods

- NPDS was queried for all human exposure cases reported to U.S. poison centers involving single agent ingestions of insect repellents (both intentional and unintentional) between 2000 and 2014.
- Records for AAPCC (American Association of Poison Control Centers) generic codes for insect repellents with DEET, insect repellents without DEET were retrieved.
 - A subset of picaridin product codes were assessed
 - Insect repellents of unknown type were not included in the analysis
- Data analyzed included demographic, exposure characteristics, clinical effects, and medical management of these exposures.

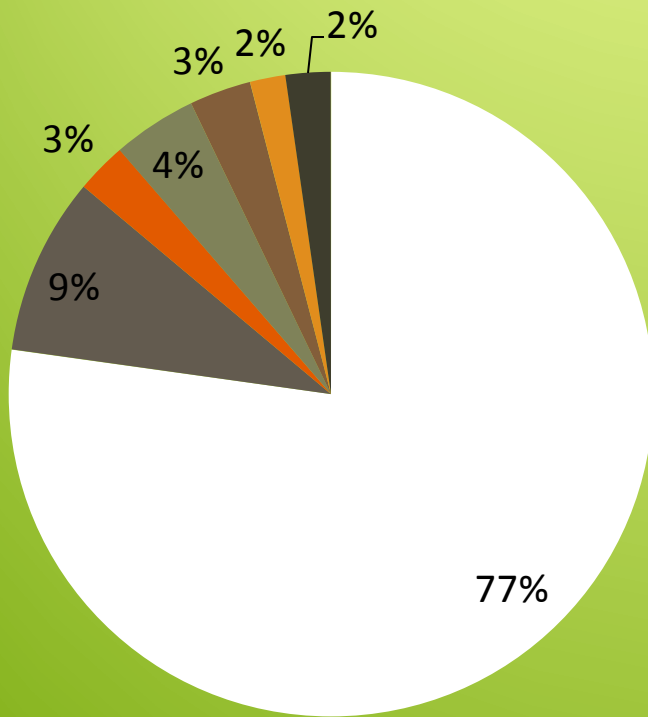
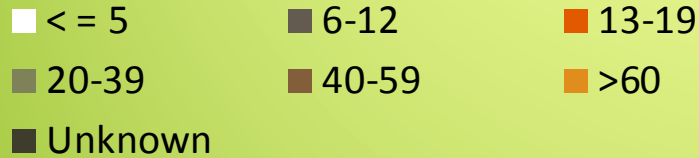
Results

- Demographics

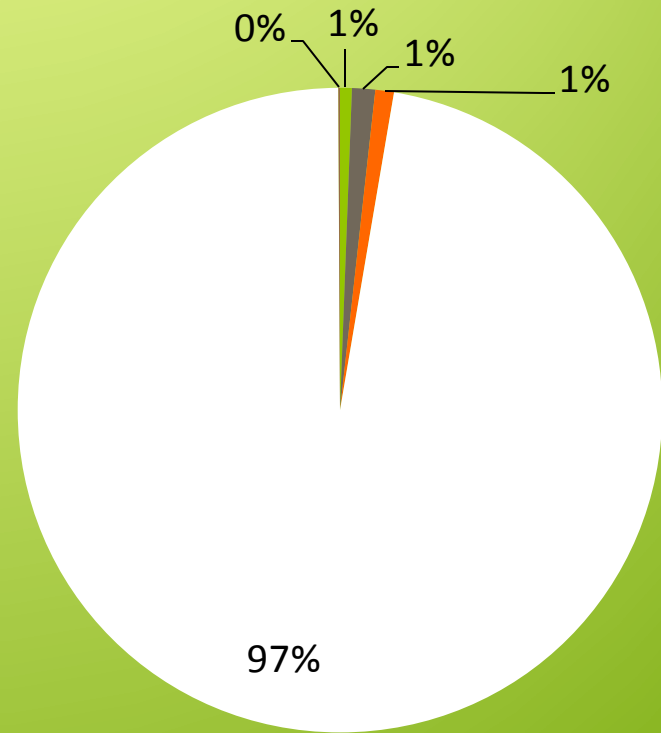
- 68,429 insect-repellent exposures reported.
- Picaridin products accounted for 2% (n=282) of insect repellents without DEET.
- Most cases occurred in children < 6-years old (77.2%)
- The majority were general unintentional exposures across all age groups (91.0%).

Results: All Insect Repellent Exposures

All Insect Repellent Exposures by Age

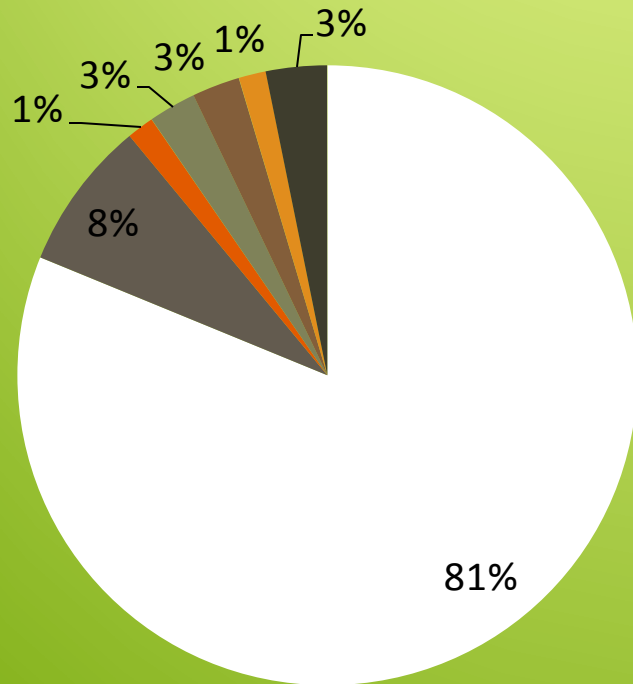


All Insect Repellent Exposures by Reason

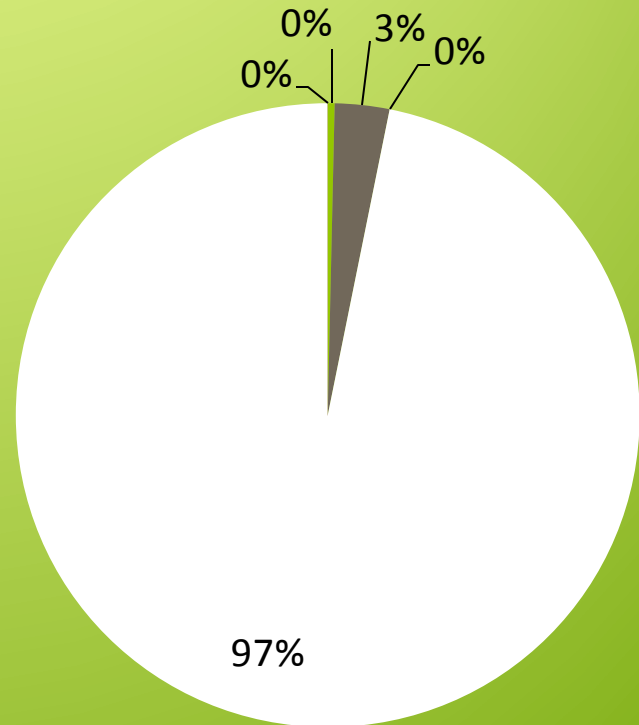
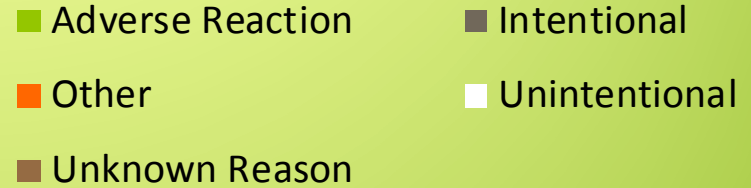


Results: Picaridin Only

Picaridin Only by Age



Picaridin Only by Reason



Clinical Effects of Picaridin

Most Frequently Reported Clinical Effects - Picaridin Only



Discussion

- Overall all insect repellents appear to have low acute toxicity.
 - Only mild to moderate symptoms after exposure
- One death was reported involving unintentional inhalational/dermal DEET exposure in a 45 year-old male.
 - Patient received CPR, intubated, intravenous fluids, and vasopressors.

Discussion

- Picaridin has shown to be as effective as DEET
 - May gain popularity as an alternative
- Clinical symptoms of picaridin exposure manifested as primarily ocular irritation/redness, vomiting, and oral irritation.
- Only one patient was admitted to a health-care facility
- Only one patient had more than minor toxicity

Discussion

- Initial findings suggest unintentional exposures can be managed on site, without referral to a healthcare facility
- Treatment: Irrigation and dilution of product from ocular or mucous membranes

Limitations

- NPDS data is limited and prevents calculation of exposure amount or dosage.
- Picaridin is a relatively newer insect repellent and not known to have severe toxicity, therefore exposures maybe underreported.

References

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Questions?

