

Acute Illness Associated With Sulfuryl Fluoride Exposure – United States, 2000-2015

Research Excellence Initiative
February 8, 2017

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Background

- A family became sick after house fumigation on August 19, 2015.
- Fumigation was conducted with sulfuryl fluoride (SF) and chloropicrin.
- Son, daughter, mother, and grandmother went to emergency department.
- 9-year-old son reported serious illness.



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Structural Fumigation

- Pest control method that involves filling the airspace within the structure with a toxic gas.
- A tarp or tent is used over the structure to trap the gas inside.
- The gas penetrates cracks, crevices, and pores in the wood to eliminate pests.
- SF is the most commonly used fumigant in structural fumigations.

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Structural Fumigation (Tenting)



Source: <https://en.wikipedia.org/wiki/Fumigation>

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Fumigation Process

- **Treatment period:** fumigant is introduced and held under a tarp for a specified period of time.
- **Aeration:** process of evacuating all of the fumigant from the tarped structure.
- **Official clearance:** when it is safe for humans to reenter the fumigated area without the use of respiratory protection.

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Pesticide Poisoning Surveillance and Investigation

- Pesticide-related illness and injury is a reportable condition in Florida.
- Reports are investigated by county health departments.
- Agencies involved in the investigation are the Florida Department of Agriculture and Consumer Services, the Florida Poison Information Center Network, and the Florida Department of Health.

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Investigation Findings

- 9-year-old son was hospitalized for 19 days and placed in a rehabilitation center for an additional 20 days for basal ganglia injury.
- Grandmother, mother, and daughter were released home on that same day with a diagnosis of chemical inhalation.
- Father did not seek medical treatment.

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Violations of Pesticide Use

- Revoked license of the business and pest control operator who conducted fumigation.
- Violations identified
 - Failure to have functioning devices to measure SF concentrations.
 - Failure of the operator to participate in the manufacturer's training and stewardship plan.

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Determination of Poisoning

- SF exposure was the most likely cause of illness among all five family members.
- Father was classified as probable case, and other four were classified as confirmed cases of SF-related illness.
- The son had high severity of illness and others had low severity of illness.

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RESTRICTED USE PESTICIDE DUE TO INHALATION TOXICITY

For sale to and use only by Certified Applicators or persons under their direct supervision and only for those uses covered by the Certified Applicator's certification.



ZYTHOR 08/08/10

Use to control existing infestations of all life stages of listed pests such as drywood termites, beetles (old house borer, powderpost, deathwatch), bedbugs, clothes moths, German cockroaches and rodents (rats, mice). Use to control existing infestations of non-egg life stages only of insects such as dermestid beetles (furniture carpet, carpet) and cockroaches (oriental, American, brown-banded). Use to control existing infestations of above ground Formosan termites.

For use in disinfecting structures such as dwellings, buildings, warehouses, mobile homes. For use in disinfecting vehicles such as automobiles, buses, recreational vehicles, surface ships, shipping containers, rail cars, (except aircraft). For use in disinfecting materials (construction) and furnishings (household effects).

When using, observe local, state and federal rules and regulations concerning the use of warning agents, detection devices, respiratory protection, protective clothing, security requirements and posting of warning signs.

ACTIVE INGREDIENT

Sulfuryl fluoride..... 99.3%

OTHER INGREDIENTS.....

0.7%

TOTAL.....

100.0%

Si usted no entiende la etiqueta, busque a alguien para que se la explique a usted en detalle. (If you do not understand the label, find someone to explain it to you in detail.) In case of emergency endangering health or the environment involving ZYTHOR, call 1-800-363-4352.

Ensysyex II, Inc.

2713 Breezewood Ave., Fayetteville, NC 28303 USA

FIRST AID

In all cases of overexposure, when symptoms such as nausea, difficulty in breathing, abdominal pain, slowing of movements and speech or numbness in extremities are exhibited, get medical attention immediately. Take affected person to a doctor or emergency treatment facility.

If inhaled: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably by mouth-to-mouth, if possible. Call a poison control center or doctor for further treatment advice.

If liquid is on skin or on clothing: Immediately apply water to contaminated area of clothing before removing. Once area has thawed, remove contaminated clothing, shoes and other items covering skin. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

If liquid is in eye: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Liquid fumigant in the eye may cause damage due to refrigeration or freezing. Call a poison control center or doctor for treatment advice.

HOT LINE NUMBER

Have the product container or label with you when calling a poison control center or doctor, or when going for treatment. You may also call 1-800-424-9300 for emergency medical treatment information.

NOTE TO PHYSICIAN

ZYTHOR is a gas that has no warning properties such as odor, color or eye irritation. (Chloropicrin, which is used as a warning agent in conjunction with ZYTHOR, is the active ingredient in tear gas and will cause tearing.) Early symptoms of exposure to ZYTHOR are respiratory irritation and central nervous system depression. Excitation may follow. Slowed movement, reduced awareness and slow or garbled speech may be noted. Prolonged exposure can produce lung irritation, pulmonary edema, nausea and abdominal pain. Repeated exposure to high concentrations can result in significant lung and kidney damage. Single exposures at high concentrations have resulted in death. Treat symptomatically.

READ THIS ENTIRE LABEL BEFORE USING THIS PRODUCT. ALL PARTS OF THIS LABEL ARE EQUALLY IMPORTANT FOR SAFE AND EFFECTIVE USE OF THIS PRODUCT. AS NECESSARY, CONSULT WITH THE LEAD STATE PESTICIDE REGULATORY AGENCY TO DETERMINE OR REMAIN INFORMED OF THE CURRENT REGULATORY STATUS, REQUIREMENTS AND RESTRICTIONS CONCERNING THE USE OF THIS PRODUCT FOR FUMIGATION IN THE STATE OF INTENDED USE. CALL ENSYSTEX II, INC. (PHONE 1-866-367-8467) IF YOU HAVE ANY QUESTIONS OR DO NOT UNDERSTAND ANY PART OF THIS LABEL.

APPLICATION PERSONNEL MUST PARTICIPATE IN ENSYSTEX II'S ZYTHOR TRAINING AND STEWARDSHIP PLAN

THE ZYTHOR APPLICATOR'S MANUAL IS PART OF THE LABELING FOR ZYTHOR.

Notice: Before buying or using this product, read "Terms and Conditions of Use," "Warranty Disclaimer," "Inherent Risks of Use" and "Limitation of Remedies" sections of this label. If terms are unacceptable, return at once unopened.

EPA Reg. No. 81824-1

EPA Establishment Numbers (Circled letters after Establishment Numbers below

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Morbidity And Mortality Weekly Report

Notes from the Field

Acute Sulfuryl Fluoride Poisoning in a Family — Florida, August 2015

Prakash R. Mula, MBBS¹; Grethel Clark, MPH²;
William L. Jackson, MD¹; Geoffrey M. Calvert, MD³

On August 19, 2015, the Florida Department of Health (FDOH) was notified by the Florida Poison Information Center Network and a local hospital of possible sulfuryl fluoride poisonings affecting a family in Martin County, in southeastern Florida. Sulfuryl fluoride is a highly toxic (toxicity category I) gas fumigant used for termite control of homes and buildings.* FDOH personnel in Martin County commenced an investigation and identified a family of five (a grandmother, mother, father, son, and daughter) exposed to sulfuryl fluoride after their house was fumigated. The Florida Department of Agriculture and Consumer Services (FDACS) advised that the fumigation was performed by a licensed

urinary toxicology profile was negative. He was admitted to the pediatric intensive care unit and was intubated for the first 2 days of hospitalization for airway protection from aspiration. Computerized tomography scan of the brain showed no cerebral edema or evidence of bleeding. On August 18, he developed choreoathetosis that progressed to involve both arms, legs, and both sides of his face; a brain magnetic resonance imaging study was consistent with basal ganglia injury. He underwent two rounds of hemodialysis to assist with fluoride ion removal, although documentation of his serum fluoride concentration was not found in the medical record. After excluding carbon monoxide and heavy metal poisoning, anoxic brain injury, and metabolic disorders, the treating physicians attributed his neurologic findings to sulfuryl fluoride poisoning, manifested by basal ganglia necrosis. Because there is no specific antidote for

Source: www.cdc.gov/mmwr/volumes/65/wr/mm6527a4.htm

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Objective

- Article to assess the burden of SF poisoning in U.S.
- Analysis will include cases from the Sentinel Event Notification System for Occupational Risk (SENSOR)-pesticide program, National Poison Data System (NPDS), the California Department of Pesticide Regulation (CDPR) Pesticide Illness Surveillance Program (PISP), and the Incident Data System (IDS)

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Institutional Review Board

Mission:

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Vision: To be the Healthiest State in the Nation

Rick Scott
Governor

Celeste Philip, MD, MPH
Surgeon General and Secretary

NOTIFICATION OF DEPARTMENT OF HEALTH DETERMINATION OF EXEMPTION

August 26, 2016

To: Prakash Mulay

Protocol Title: Acute illness associated with sulfuryl fluoride exposure – United States, 2000-2015

Review Type: Staff Review

Approval Date: August 26, 2016

The Ethics and Human Research Protection Program determined your study qualifies for one or more exemptions from federal regulations governing research involving human participants.

If there is a change in the activity, it may no longer qualify for exemption. Please contact the Ethics and Human Research Protection Program to determine if changes in your project require IRB review.

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Data Sources

- 2000 to 2013:
 - Sentinel Event Notification System for Occupational Risks(SENSOR)-Pesticides
 - California Department of Pesticide Regulation (CDPR)
- 2000 to 2015:
 - National Poison Data System (NPDS)
 - U.S. Environmental Protection Agency (EPA), Incident Data System (IDS)

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Data Analysis

- Matched cases from SENSOR-Pesticides, CDPR, NPDS, and IDS data
- Excluded duplicate cases, cases with exposure to more than two substances, and cases with less than two signs/ symptoms
- Descriptive statistics using SAS software 9.4

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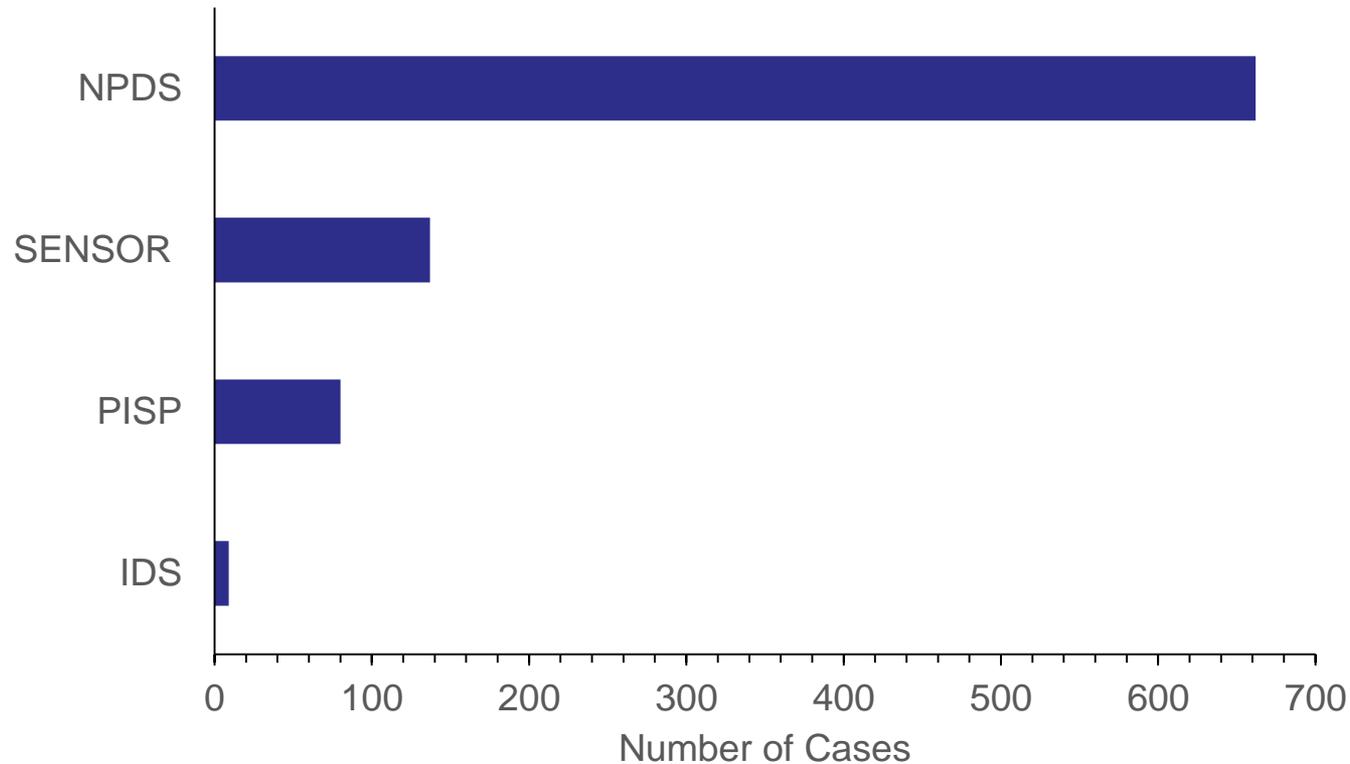
Preliminary Results

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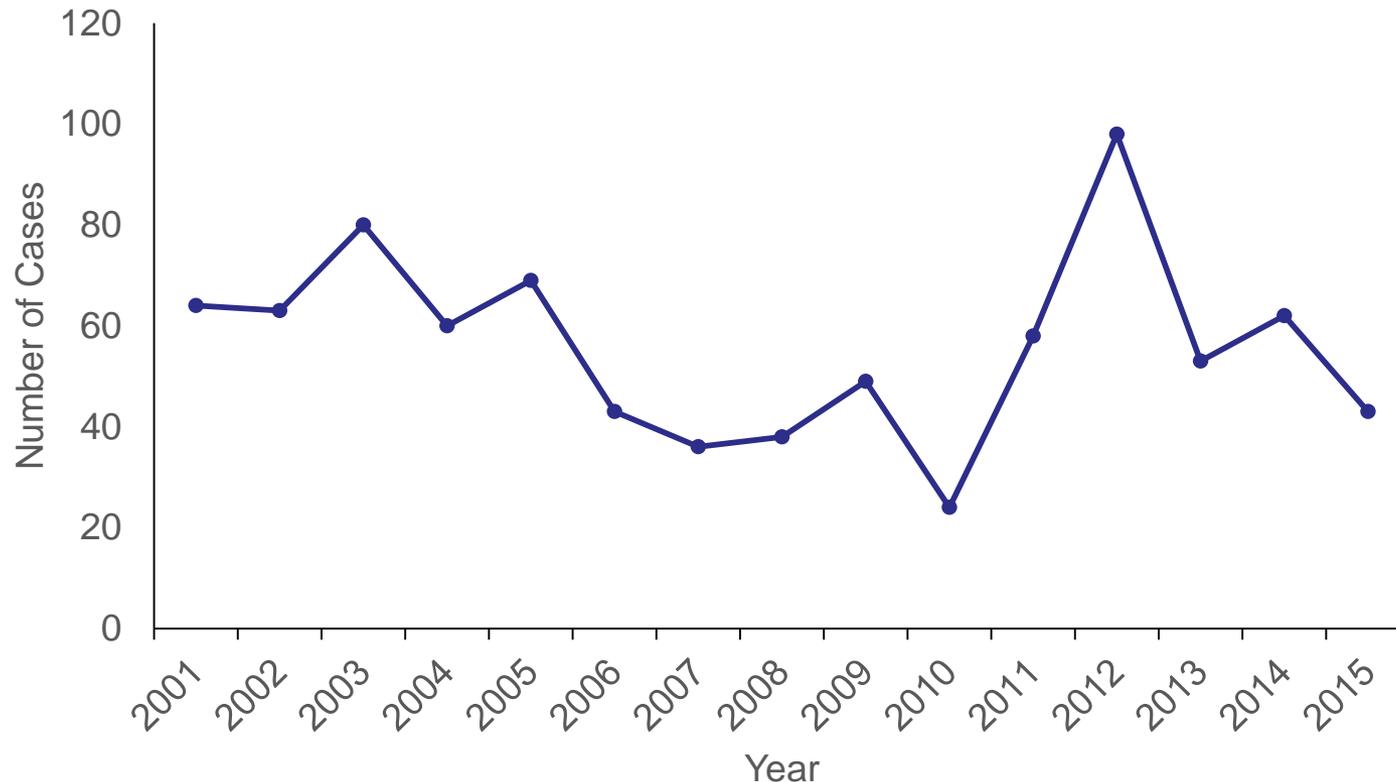
SF-Related Illness By Data Source, 2000–2015 (n=888)



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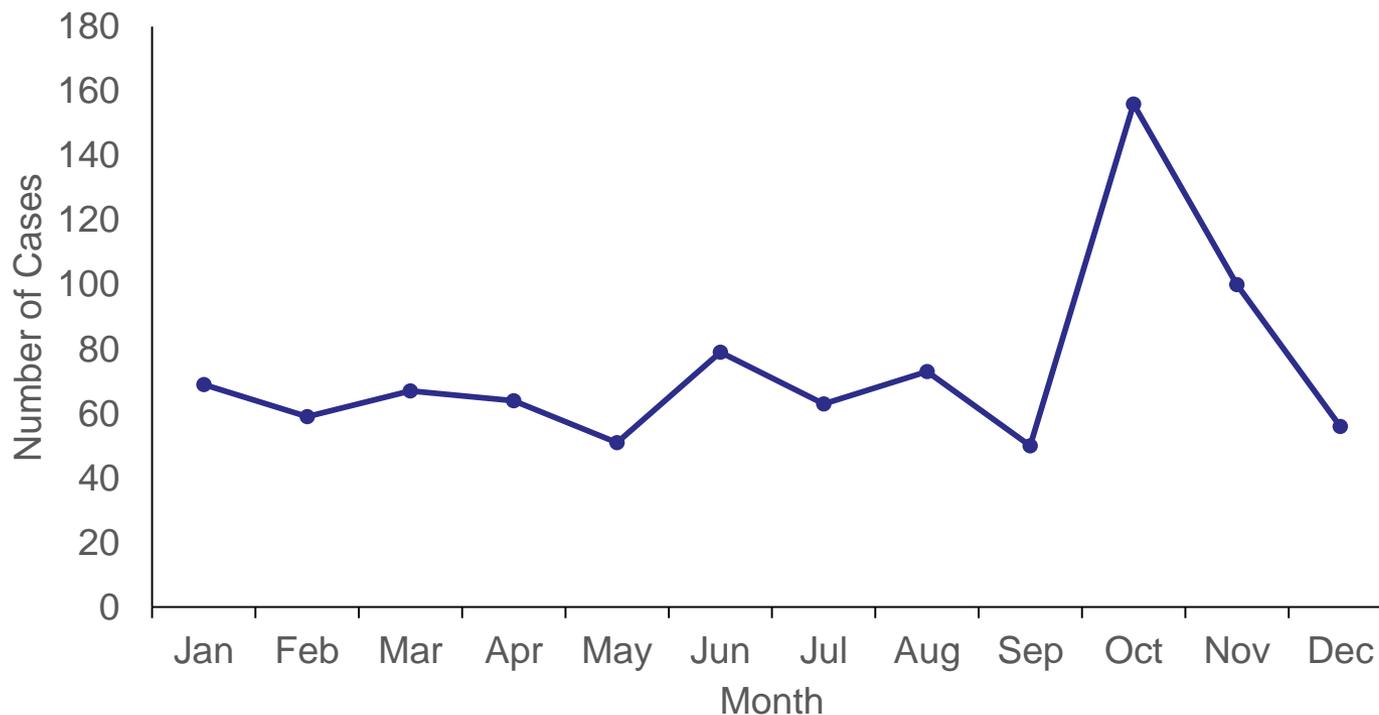
SF-Related Illness By Exposure Year, 2000–2015 (n=888)



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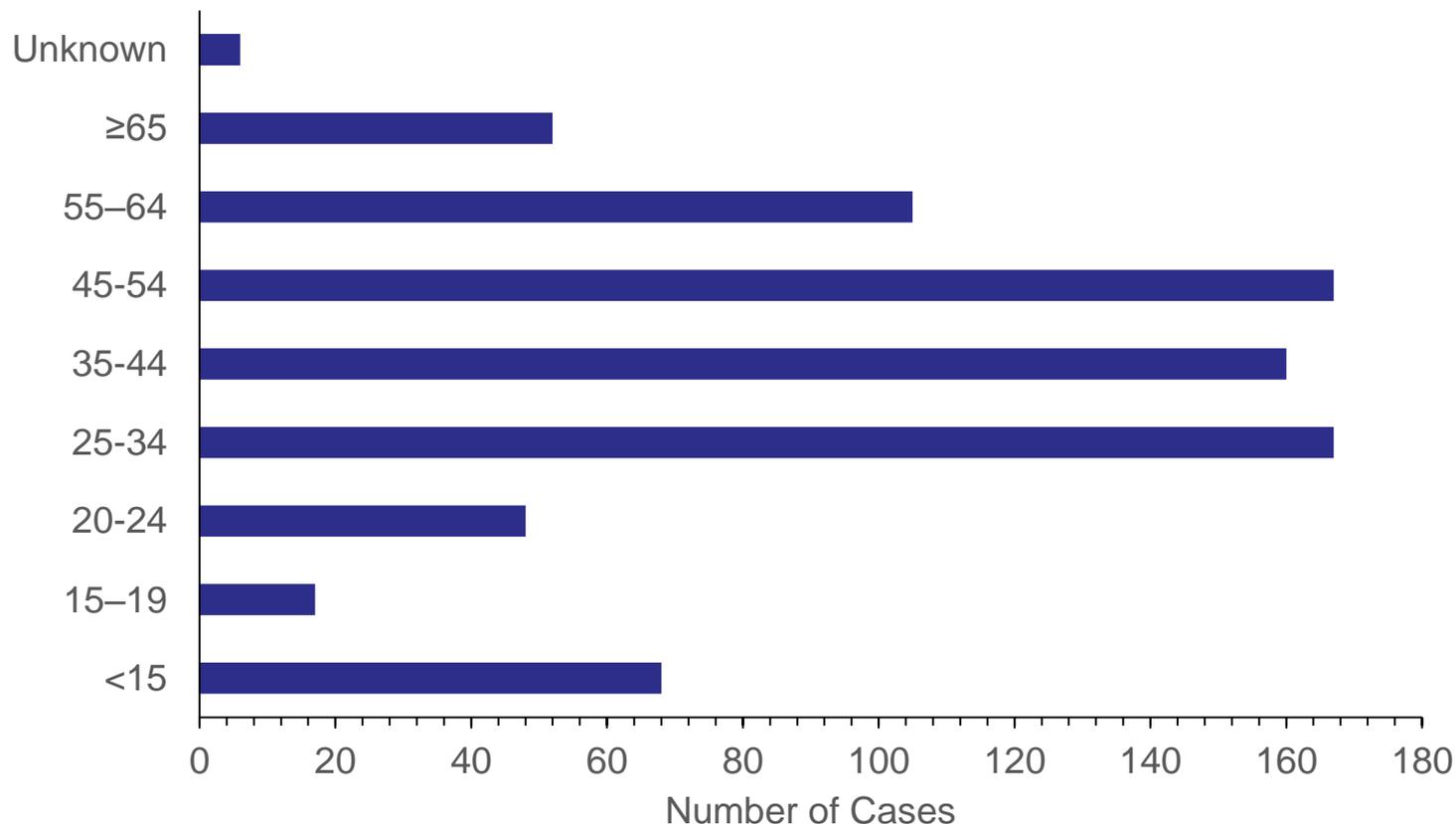
SF-Related Illness By Exposure Month, 2000–2015 (n=888)



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SF-Related Illness By Age Group, 2000–2015 (n=888)



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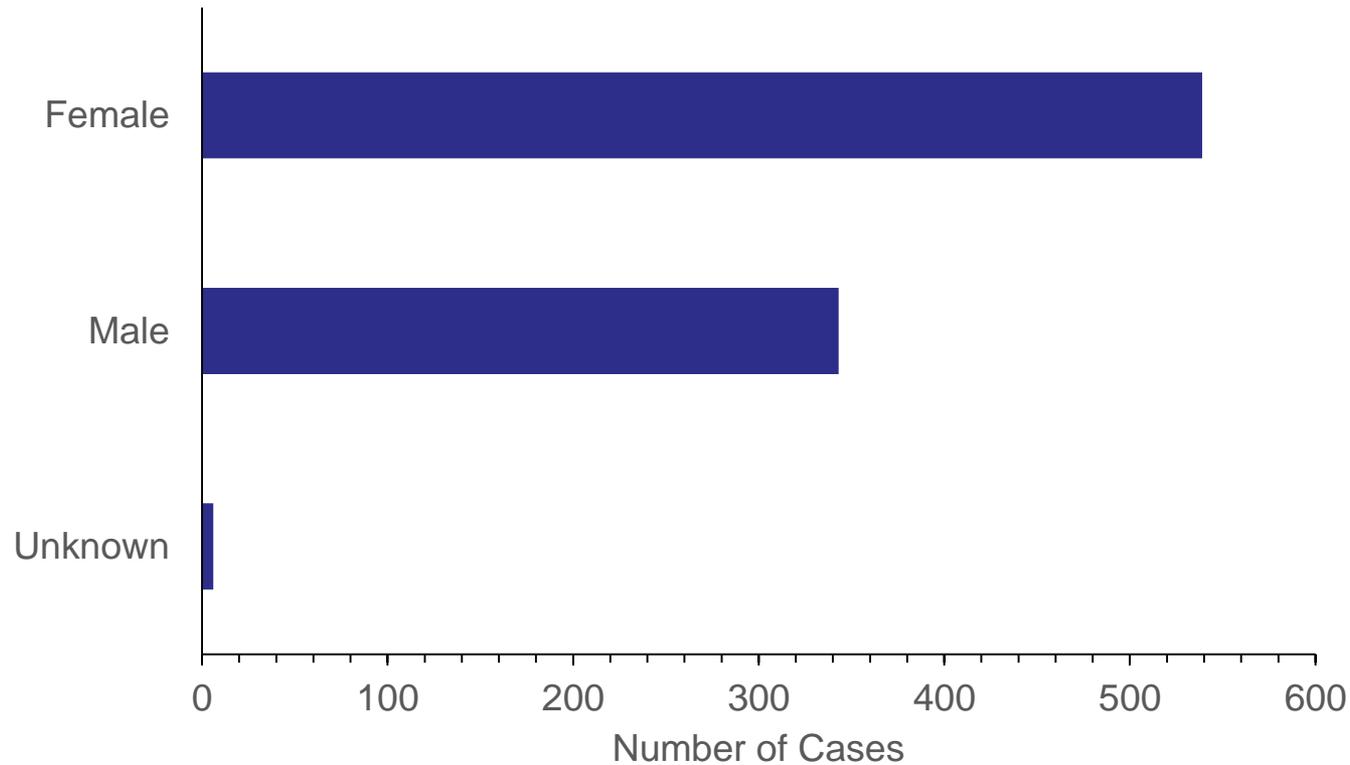
Age (Years)

- Mean – 40
- Mode – 30
- Median – 40
- Range – 0.5 to 89

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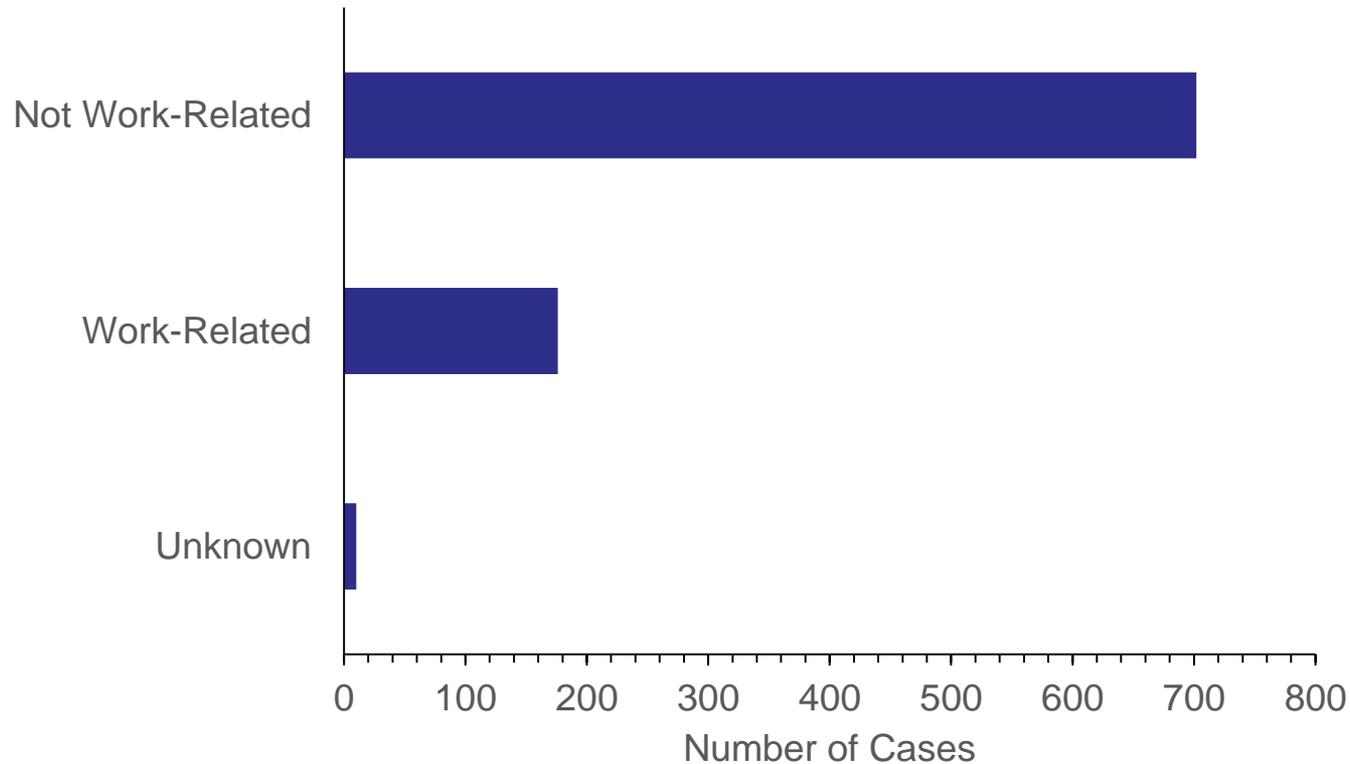
SF-Related Illness By Gender, 2000–2015 (n=888)



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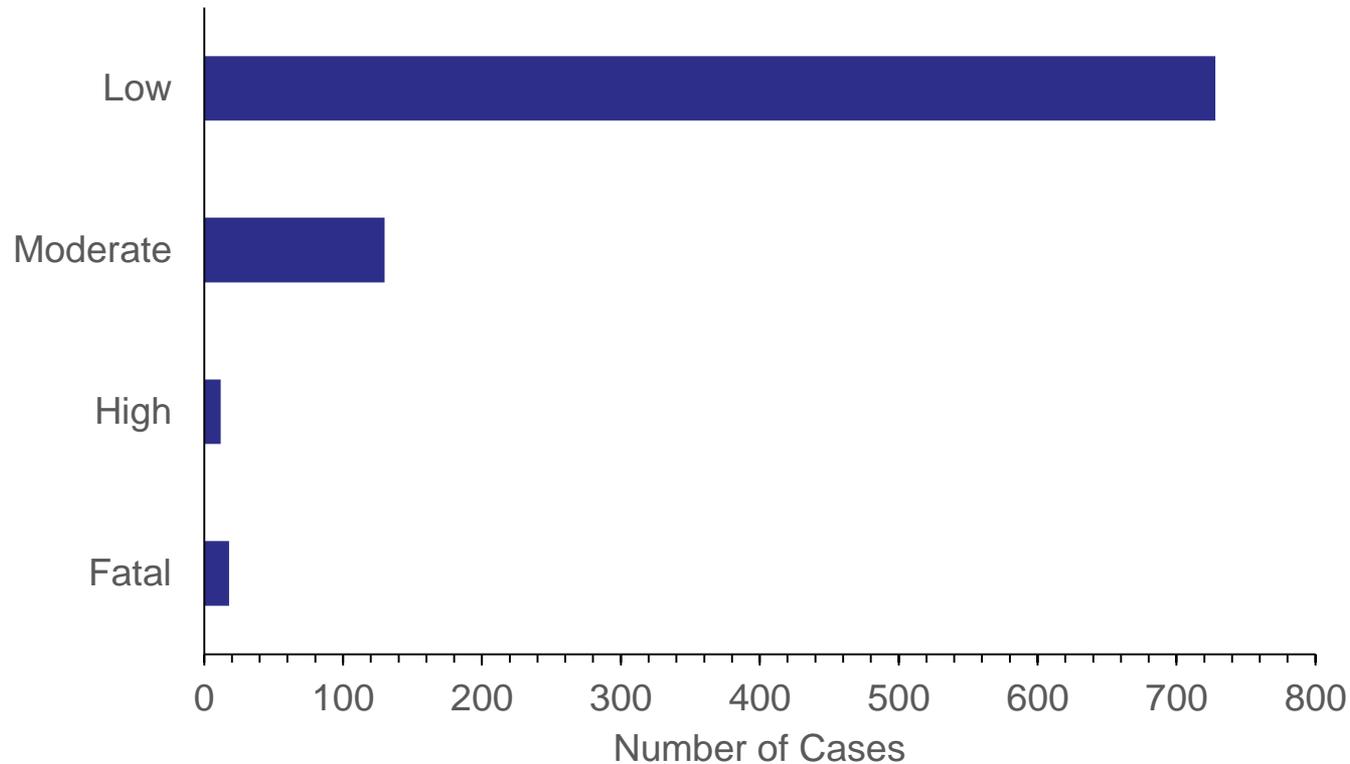
SF-Related Illness By Relation to Work, 2000–2015 (n=888)



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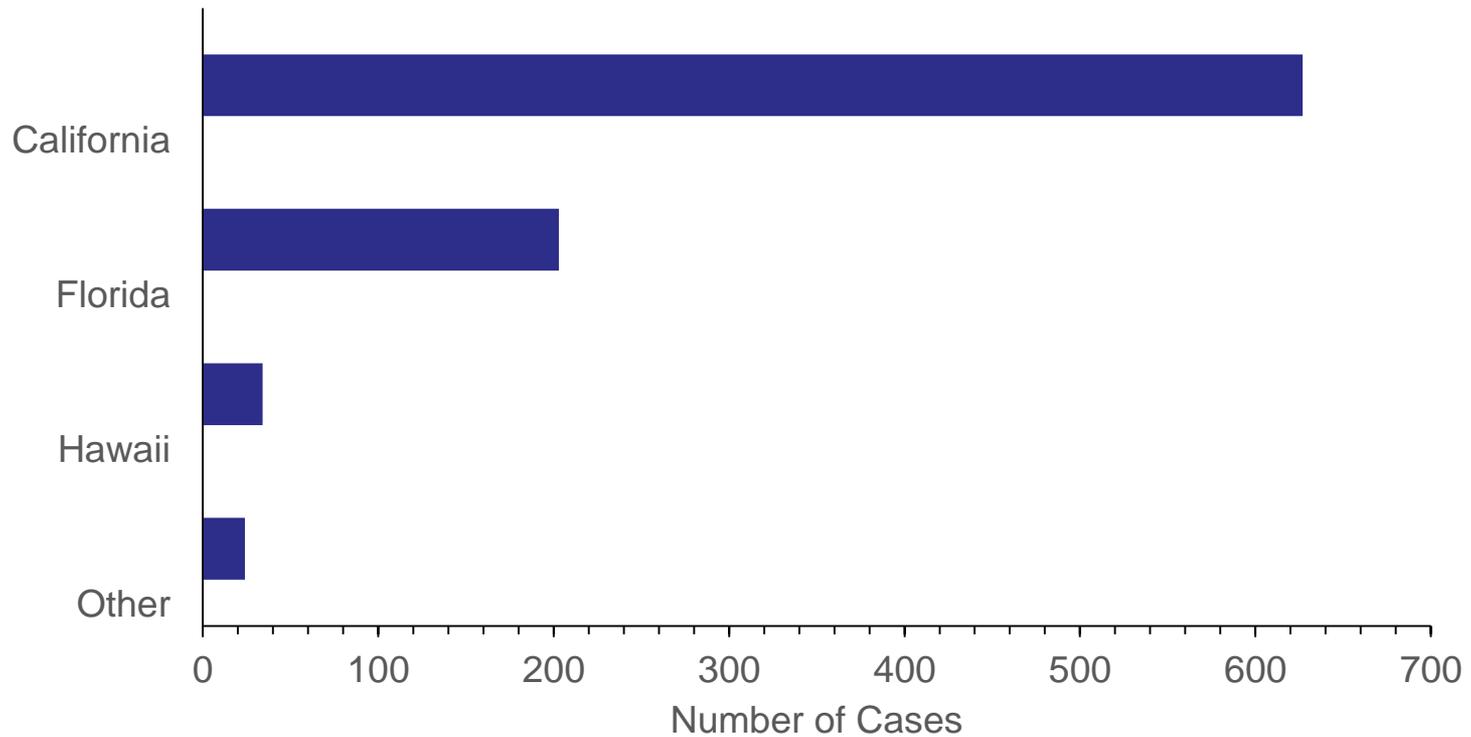
SF-Related Illness By Severity of Illness, 2000–2015 (n=888)



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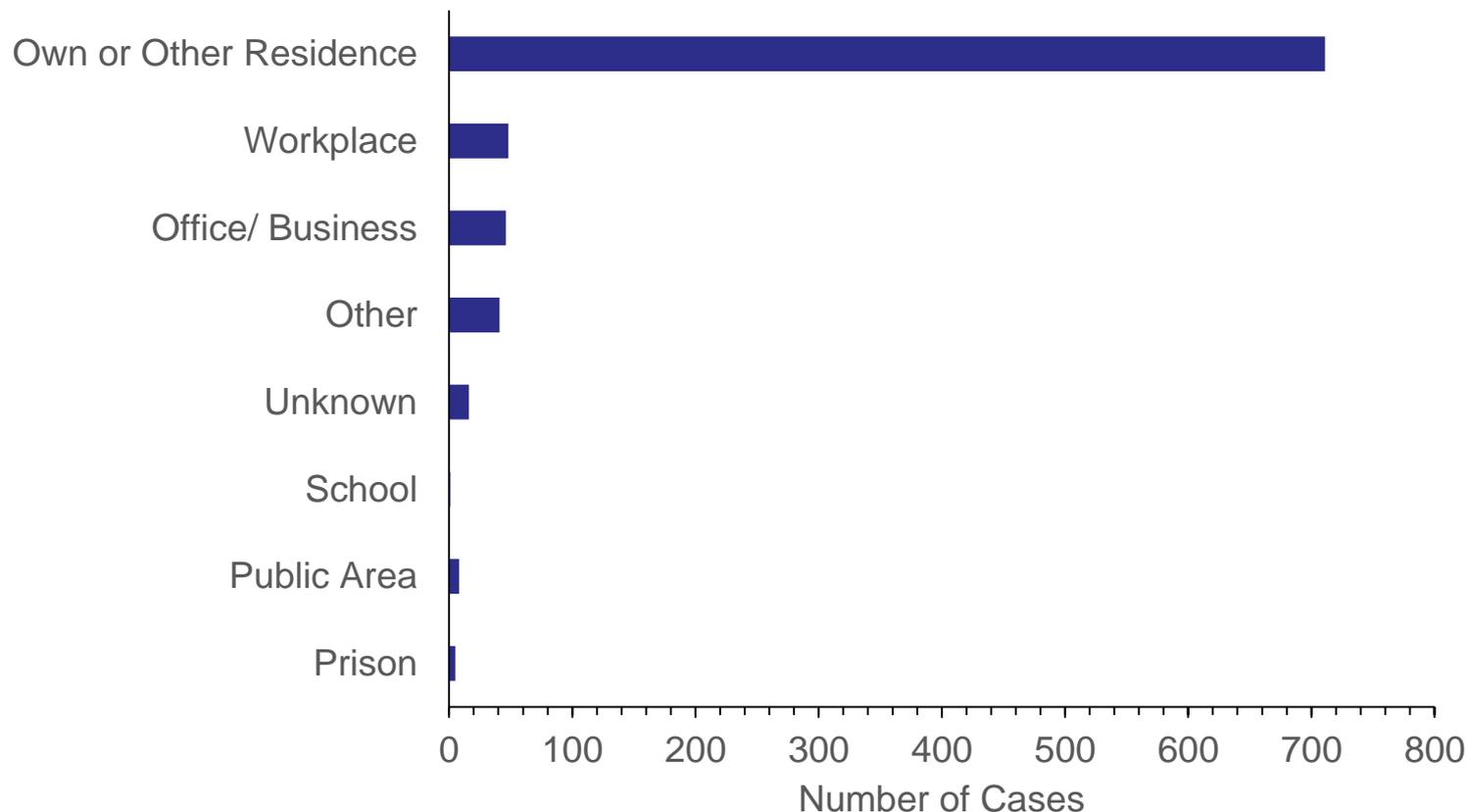
SF-Related Illness By State, 2000–2015 (n=888)



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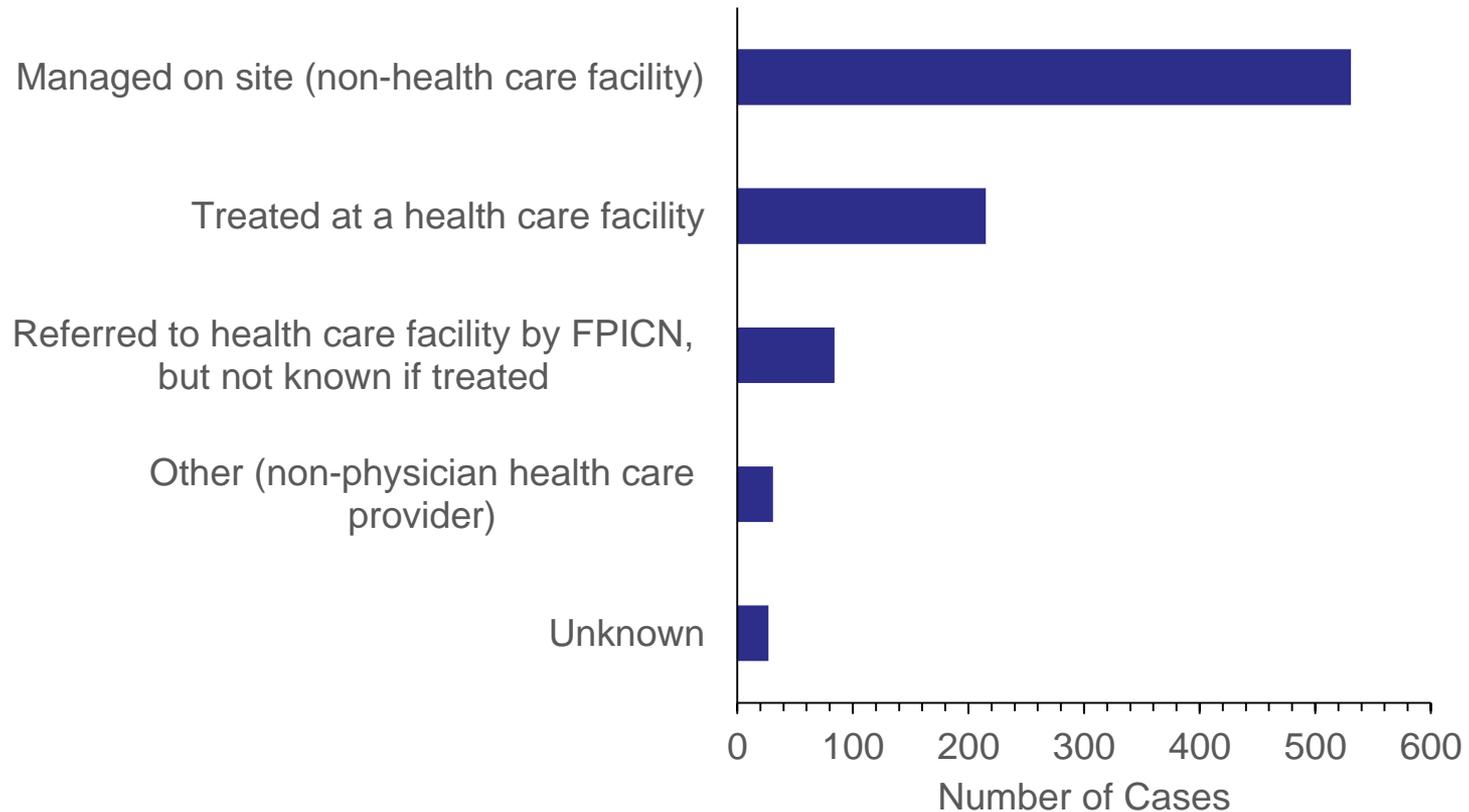
SF-Related Illness By Exposure Site, 2000–2015 (n=888)



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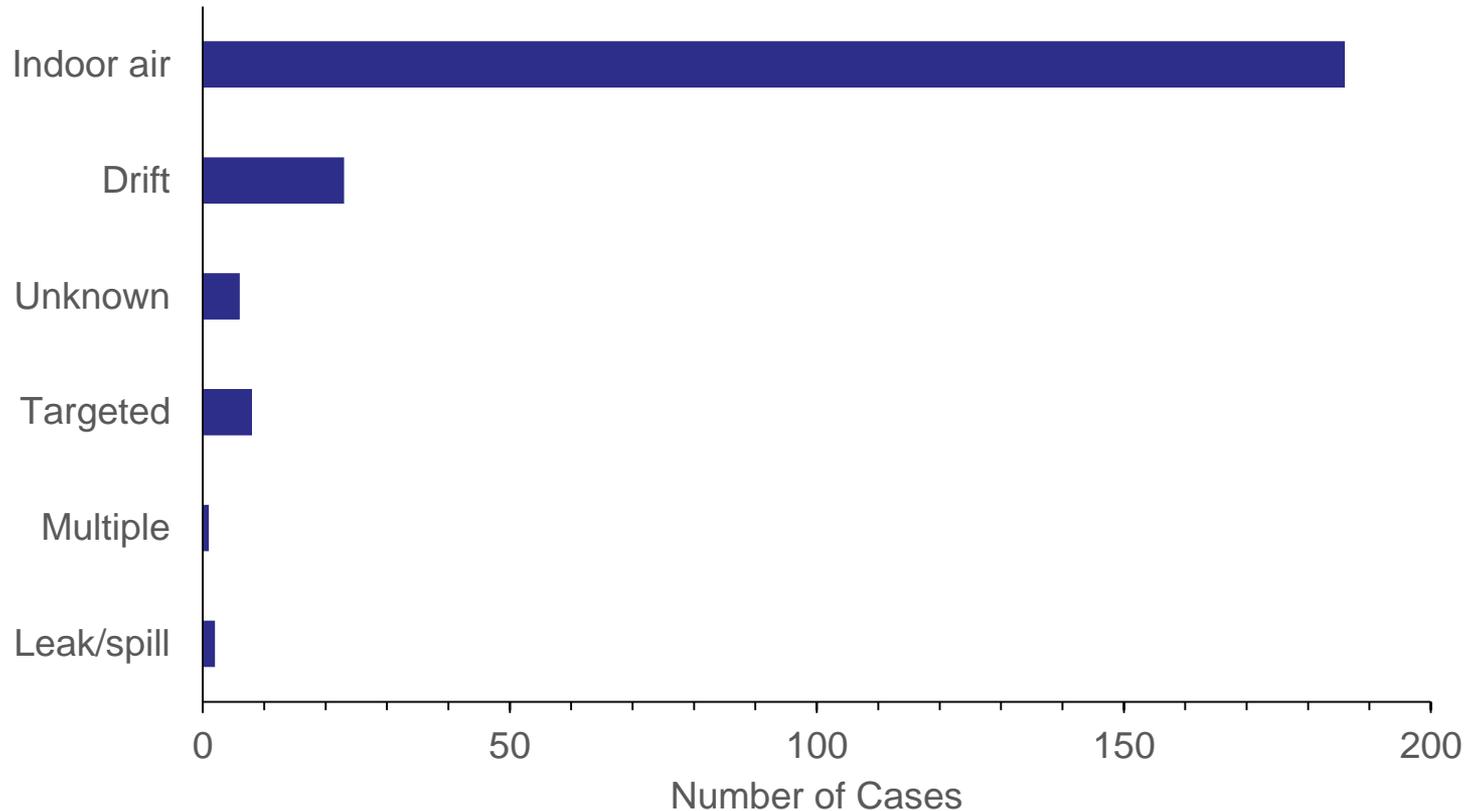
SF-Related Illness By Management Site, 2000–2015 (n=888)



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SF-Related Illness By Type of Exposure, 2000–2015 (n=226*)

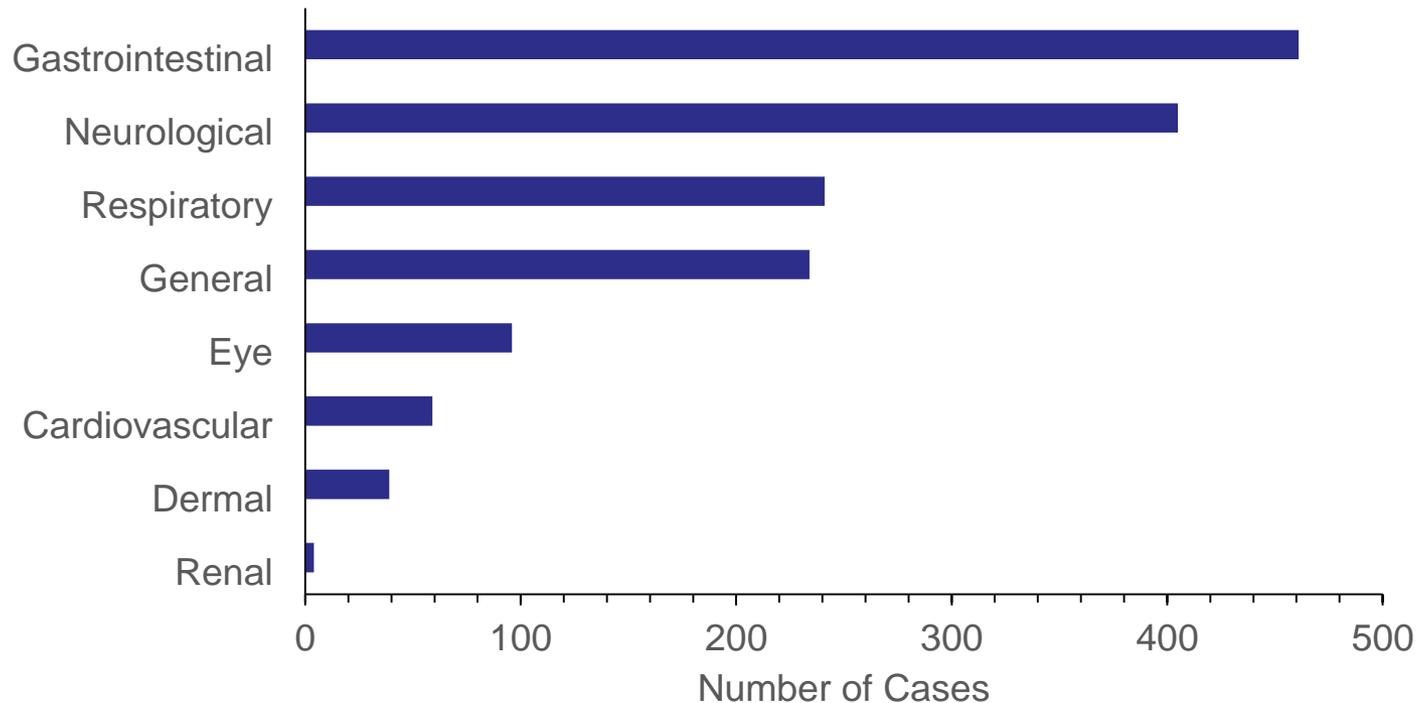


*NPDS data did not report type of exposure.

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SF-Related Illness By Signs/ Symptoms*, 2000–2015 (n=888)

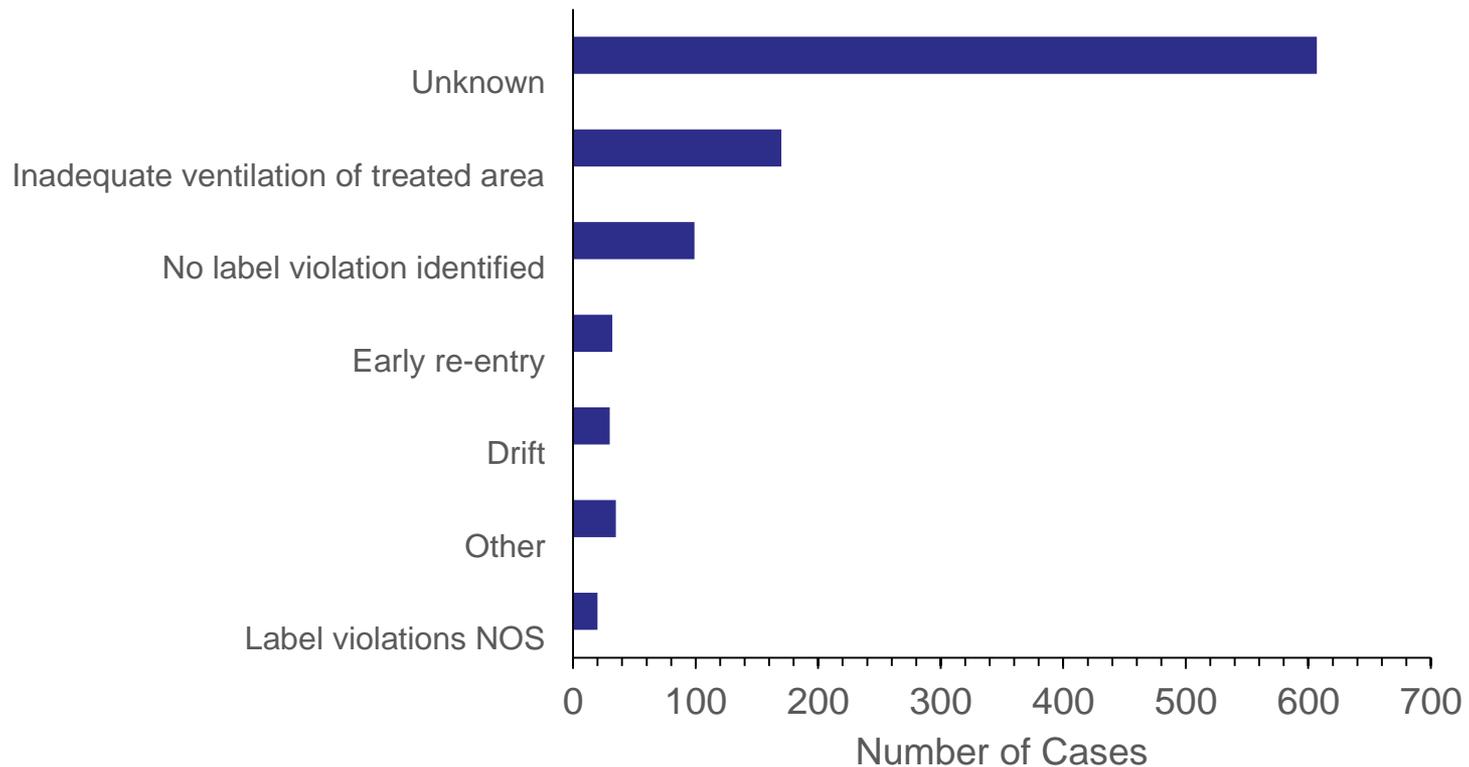


* All individuals reported 2 or more signs and symptoms.

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SF-Related Illness By Root Cause, 2000–2015 (n=888)



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Revised Certification Standards



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Safety Information Related to the Worker Protection Standard

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Pesticide Containers

Pesticide Containment

Revised Certification Standards for Pesticide Applicators

Esta página web está disponible [en español](#)

EPA has finalized stronger standards for people who apply restricted use pesticides (RUPs). These revisions to the Certification of Pesticide Applicators rule will reduce the likelihood of harm from the misapplication of toxic pesticides. Pesticide use will be safer with increased supervision and oversight. These revisions will help ensure that RUPs are used safely.

[EPA is making a pre-publication \(unofficial\) version of the final rule available until the official version is published in the Federal Register.](#)

On this page:

Related Information

- [See the Press Release](#)
- [Fact sheet on the Certification of Pesticide Applicators rule revision](#)
- [Current Certification of Pesticide Applicators rule vs. Revised rule](#)
- [Learn more about certification of pesticide](#)

Source: www.epa.gov/pesticide-worker-safety/revised-certification-standards-pesticide-applicators

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EPA Report



U.S. ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF INSPECTOR GENERAL

Chemical Safety

Additional Measures Can Be Taken to Prevent Deaths and Serious Injuries From Residential Fumigations

Report No. 17-P-0053

December 12, 2016



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Future Direction/Discussion

- Data analysis
- Prepare a manuscript
- Review and approval
- Submission to journal
- Comments and response

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Acknowledgements

- Dr. Jay Schauben, Florida Poison Information Center – Jacksonville
- Dr. Lucy Graham, California Department of Pesticide Regulations
- Dr. Geoffrey Calvert and Dr. Walter Alarcon, National Institute of Occupational Health
- Elizabeth Evans, Environmental Protection Agency

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Website: www.floridahealth.gov/healthy-environments/pesticide-poisoning/index.html



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