

Use of the National Poison Data System (NPDS) for National Public Health Chemical Exposure and Illness Surveillance

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Objectives

- Provide an overview of NPDS
- Describe system use for public health surveillance
- Identify events detected using syndromic surveillance
- Illustrate use during outbreaks



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What is NPDS?

- Operated by the American Association of Poison Control Centers (AAPCC) in collaboration with CDC NCEH
- Web-based application
- Near real-time data from 60 regional Poison Centers (PCs)
- Only source for national surveillance for chemical exposures and associated health effects from PCs



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NPDS Surveillance Goals

- Improve public health surveillance for chemical, toxin, and other hazardous exposures and associated human illness
- Identify and characterize hazardous exposure events to enable a rapid and appropriate public health response
- Track potential cases and provide situational awareness



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Poison Centers



- National toll-free number available 24/7
- Specialists in poison information (SPIs) include medical toxicologists, RNs, PharmDs, others
 - Collect and code call data using standard protocols
 - Give information to public and clinicians
 - Provide exposure/case management
- Calls from
 - Public (85%)
 - Clinicians (15%)



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NPDS Data Elements

- Date/time of call
- PC managing call
- Caller zip code, state
- Species
- Age
- Sex
- Call type (exposure, information)
- Reason for call
- Acuity
- Exposure
- Exposure quantity
- Exposure duration
- Exposure route
- Number of substances
- Exposure site
- Caller site
- Management site
- Multiple patients
- Clinical effects
- Decontamination
- Management
- Treatment
- Medical outcome
- Level of healthcare provided



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NPDS Functionality

- User defined surveillance definitions
- Automated anomaly identification and notification via email to definition subscribers
- Anomaly line lists, access to individual call records, and tracking of anomaly findings
- National maps of callers meeting surveillance definitions
- Interactive reports with data export capability



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Surveillance Methods: Cluster Detection

- Call volume
 - Number of hourly calls (total, human exposure)
 - Threshold: historical baseline average + 3 standard deviations (SD)
- Clinical effects (CEs)
 - 131 signs, symptoms, laboratory abnormalities
 - Number of clinical effects during 24 hr period
 - Threshold: historical baseline average + 2 SD



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Surveillance Methods: Identifying Individual Potential Cases

- Case-based (CB) definitions
 - Individual callers meeting user defined criteria
 - Exposure to a specific substance
 - One or more clinical effects
 - Demographic characteristics
- May detect sentinel cases
- Useful when the agent and/or symptoms of affected persons are known



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Anomaly Characterization Process

- National anomalies reviewed by AAPCC toxicosurveillance team and NCEH
- Regional PCs contacted as required for additional information
- Confirmed PH issues communicated to state PH and NCEH



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Anomaly Characterization Criteria

- CE anomalies
 - Reportable disease
 - Toxin or chemical of potential use by terrorists
 - Disease, toxin, or chemical exposure involving multiple persons and a common exposure
 - Commercial product part of a PH investigation
 - Illness not usually associated with the exposure
- CB anomalies
 - Confirmation from
 - Lab data
 - Clinicians, PH officials
 - Persons potentially affected by a PH emergency (i.e. hurricane) or outbreak



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CE Anomaly Review

- Retrospective analysis 6/01/08 to 5/31/09
- 586 anomalies on 291 (80%) days
- Median per day=2 (range 1 to 4)
- AAPCC classification
 - 501 (85.5%) of no PH significance
 - 85 (14.5%) of PH significance



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CE Anomalies of PH Significance

- Multiple anomalies associated with the following event types
 - Food borne illnesses (10)
 - School exposures (5)
 - Occupational exposures (5)
 - Unintentional exposures
 - Carbon monoxide (5)
 - Pesticides (3)
 - Mold (3)
 - Botulism (1)
 - Others (4)
 - Unexpected drug reactions (2)



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Use of NPDS for Outbreak Response

- Conduct national surveillance
 - Identify potential cases
 - Track temporal and spatial distribution
 - Characterize illness symptoms and severity
- Engage individual PCs through AAPCC
 - Code calls appropriately
 - Assist with surge capacity and triage calls
 - Report potential cases to state HD



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Example Outbreak Response: Hurricane Ike

- Landfall 9/13/08 in Galveston, TX
- CDC Emergency Operations Center (EOC) activated
- CB definition used to identify calls to PCs regarding unintentional CO exposure
- 97 calls from 9/13/08 to 9/30/08
 - TX (66%)
 - KY (26%)
 - LA (8%)



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Hurricane Ike



- Aggregate data reported to
 - CDC Air Pollution and Respiratory Health Branch
 - CDC EOC
 - State PH officials
- Indicated the magnitude of unintentional CO exposures across multiple affected states
- Identified most highly affected geographic areas
- Corroborated CO morbidity and mortality reported by other data sources



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Example Outbreak Response: Salmonella Typhimurium Outbreak

- Large outbreak of *S. typhimurium* fall 2008 – winter 2009
- 100s of cases identified, >100 hospitalizations
- Peanut butter/paste identified as source
- Widespread food recalls



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Salmonella Typhimurium Outbreak

- AAPCC implemented peanut butter/paste product code
- NPDS used to identify persons reporting exposure, January and February 2009
 - 1427 calls from 50 states
 - 1020 (71%) reported clinical effects
- Aggregate state call data reported daily to CDC Enteric Diseases Epidemiology Branch



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Ongoing Surveillance: H1N1

- AAPCC implemented a code to track calls for H1N1 in late April, 2009
- 4/27/09 to 11/18/09, 485 human exposure calls from 16 states
- 456 (94.0%) from FL
 - FL DOH requested that all 3 FL PCs set up a hotline for clinicians as of 10/1/09
 - Healthcare worker triage
 - Information
 - Adverse vaccine reaction reporting
 - Data uploaded in real-time to NPDS and FL ESSENCE



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Ongoing Surveillance: H1N1 Vaccine

- AAPCC implemented codes for the injected and mist H1N1 vaccines
- 10/6/09 to 11/18/09, 489 human exposure calls from 27 states
 - 287 (58.7%) from FL
 - 106 (21.7%) from OH
- 414 (84.7%) reported an adverse drug reaction
- Outcome
 - 2 (0.4%) major effect
 - 14 (2.9%) not followed, but potentially toxic exposure
 - 31 (6.3%) moderate effect
 - 138 (28.2%) minor effect
 - 292 (59.7%) no/minimal/unrelated effect



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Conclusions

- NPDS has utility for detecting and characterizing exposures to hazardous substances and associated illnesses in near real-time
- Aggregate data shared with federal, state, and/or local PH officials
- Enhanced incorporation of PCs into the PH surveillance network may improve response and minimize morbidity and mortality



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Thank you!

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Extra Slides



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Further Information

- AAPCC Annual Report available at:
<http://www.aapcc.org/Annual%20Reports/06Report/2006%20Annual%20Report%20Final.pdf>
- Wolkin AF, et al. Early detection of illness associated with poisonings of public health significance. *Annals of Emergency Medicine*. 2006;47(2):170-6.



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Calls to PCs

- More than 4.2 million calls in 2007
- Exposure Calls
 - Concern about exposure to a substance
 - ~ 60% (2.6 million) calls
- Information calls
 - No exposure reported by caller
 - ~40% (1.6 million) calls
- Data entered into regional PC server as caller provides it
- Median time to upload to NPDS is 14 minutes



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Examples of Case-Based Definitions

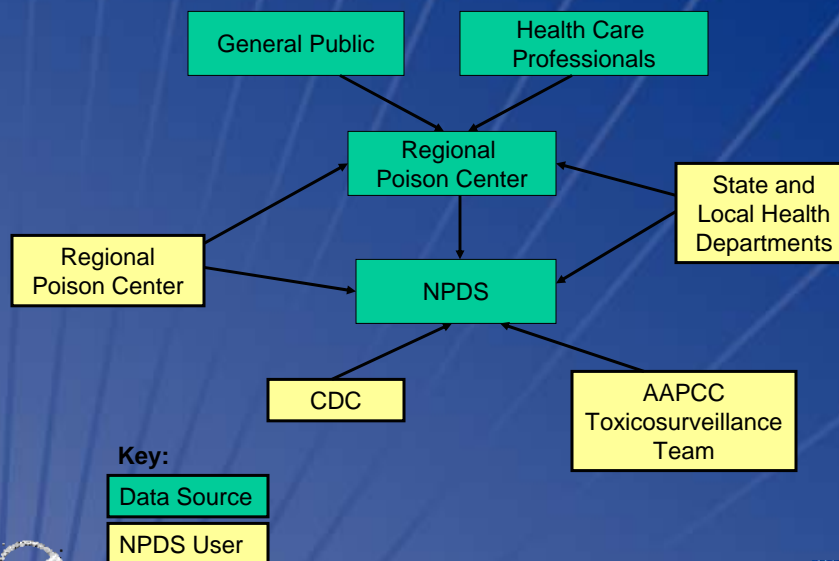
Definition Name	NPDS Query Description
Arsenic	Human exposure to arsenic (pesticide or excluding pesticide) with caller reported symptoms of hypotension, abdominal pain, diarrhea, and either nausea or vomiting
Botulism	Human exposure to botulism, or caller reported symptoms of blurred vision, photophobia, or visual defect without ocular irritation/pain, as well as symptoms of dysphagia or muscle weakness
Ciguatera	Human exposure to ciguatera
Cyanide	Human exposure with caller reporting symptoms of being agitated/irritable, coma, confusion, or drowsiness/lethargy, as well as acidosis and hypotension, where the exposure reported is not a known product of adult, pediatric, or unknown formulation and is not lithium, ethylene glycol, or methanol, and the call is not related to a suspected suicide
Nerve Agents	Human exposure with caller reporting symptoms of excess secretions, diaphoresis, or lacrimation, as well as either diarrhea or fecal incontinence
Ricin	Human exposure with caller reporting symptoms of vomiting and diarrhea and one of the following symptoms of abdominal pain, AST, ALT>1,000, or AST, ALT>100<=1,000, as well as one of the following symptoms of hypotension, ematemesis, renal failure, or oliguria/anuria where the exposure reported is not a known product of adult, pediatric, or unknown formulation



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NPDS Data Flow



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