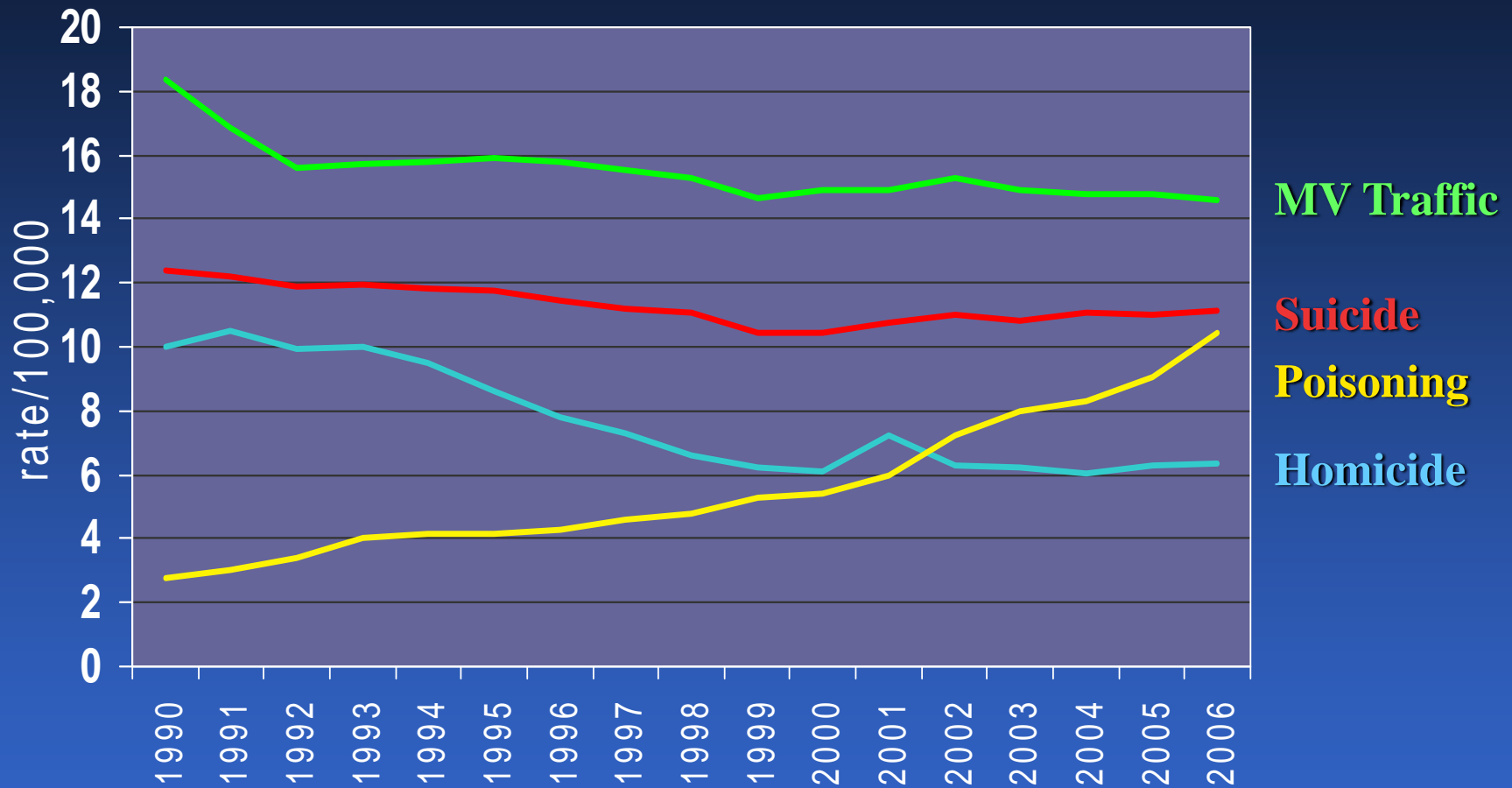# Feasibility of Enhanced Surveillance for Poisonings

hosted by the **Children's Safety Network**

2:00-3:30 pm EDT

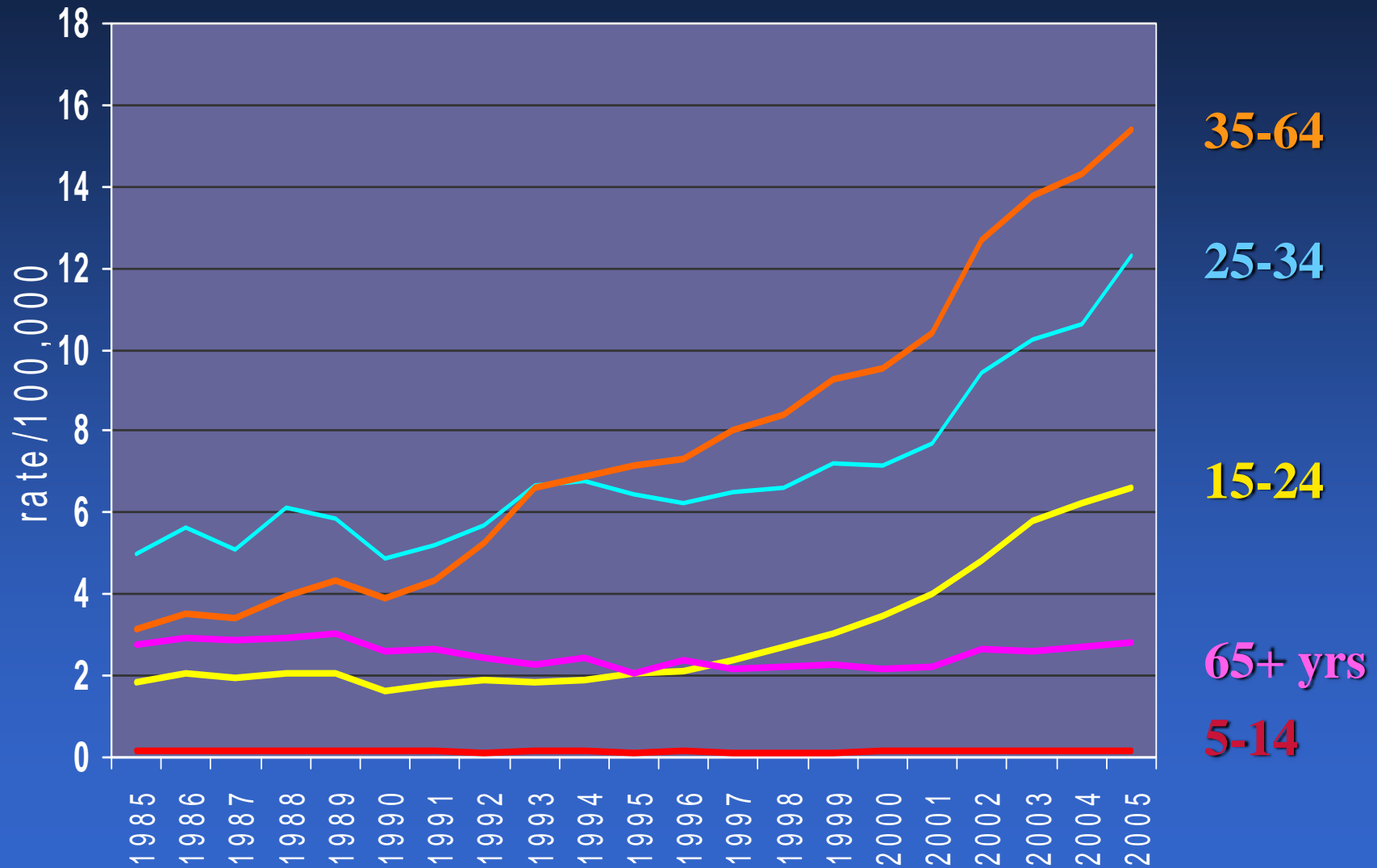On your telephone please dial 1-800-361-5659, and then type in pass code 220737#

Please be sure to mute the volume on your computer.

US Injury Deaths, 1990-2006

The rate of poisonings (unintentional and undetermined intent) more than tripled since 1990.

Harvard Injury Control Research Center

Poisoning Deaths, by Age Group

Harvard Injury Control Research Center

Prescription Drug Mortality: Women in Rural Virginia

MJ Wunsch[1], K Nakamoto[2], PA Nuzzo[1], G Behonick[3], W Massello[4], SL Walsh[1]

1. Center on Drug Abuse, University of Kentucky, Lexington, KY
2. Department of Marketing, Virginia Tech, Blacksburg, VA
3. University of Massachusetts Medical School, UMass Memorial Forensic Toxicology Laboratory, Worcester, MA
4. North Dakota State Forensic Examiner, Bismarck, ND

Acknowledgements

Purpose

The purpose of this study was to conduct an in-depth review of cases of drug poisoning deaths among females, as classified by the Office of the Chief Medical Examiner, Western Virginia 1997-2003.

Methods

- Identified all female cases where drug poisoning was assigned as cause of death by the Office of Chief Medical Examiner (OCME), Western District, Virginia between 1997-2003.

- Each decedent case includes the following data
  - Autopsy reports & death certificates
  - Hospital records, pharmacy logs, & physician notes
  - Death scene investigations
  - Toxicological results
 - Documentation of a prescription in decedent name

Demographics (n=330 females)

- 95% Caucasian; 38% rural areas; 50% metropolitan

- Mean age 42.8 years; 60% of cases 35-54 years old

- 32.7% did not complete high school

  - 65.4% employed; 20% disabled

- Rural areas disproportionately affected[7]

  - Rural death rate 2.51/100,000 population

  - Metropolitan death rate 1.87/100,000 population

Medical and Psychiatric Problems

- 35.2% BMI > 30 (n=116)

- 36.7% Chronic pain diagnosis (n=121)

  - Fibromyalgia, lower back pain

- 20% Anxiety diagnosis (n=66)

- 52.4% Depression (n=173)

- 26.4% Previous suicide attempt (n=87)

Trend: Manner of Death
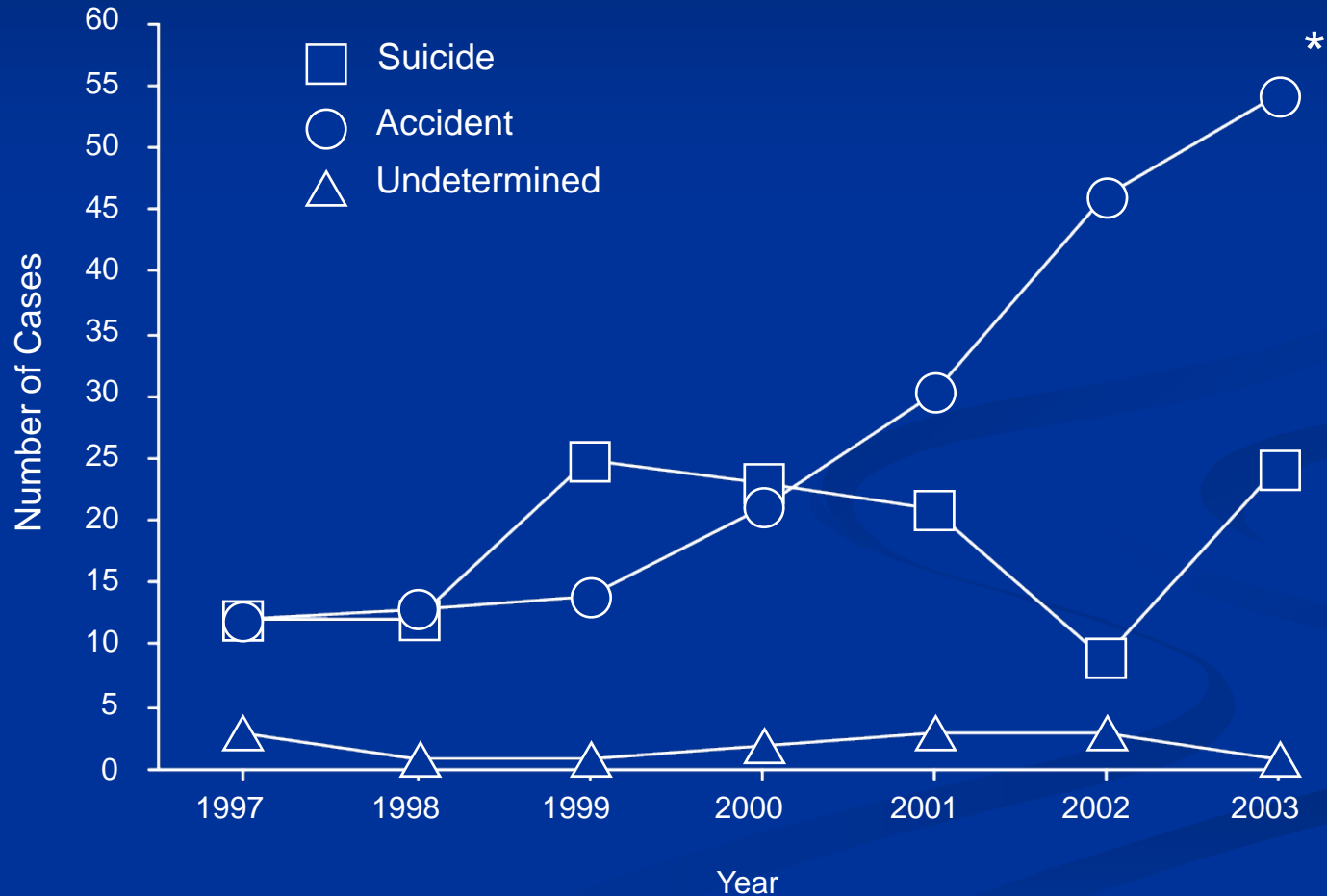
*Significant increase over time (p<0 .0001)

Cause of Drug Poisoning Deaths

- 56.4% Polydrug Toxicity (n= 186)

- 36.7% Single Drug Toxicity (n= 121)

- 6.9% Drug-related Causes (n= 23)

Toxicology Findings

- 72.4% Opioids (n=239)

- 60.9% Antidepressants (n=201)

- 48.8% Sedatives/anxiolytics/muscle relaxants (SAMR) (n=161)

- 95% at least one of three drug classes

- 27% all three classes identified (n=89)

- 10% Cocaine (n=33) & <1% Heroin (n=3)

Trend: Toxicology Results
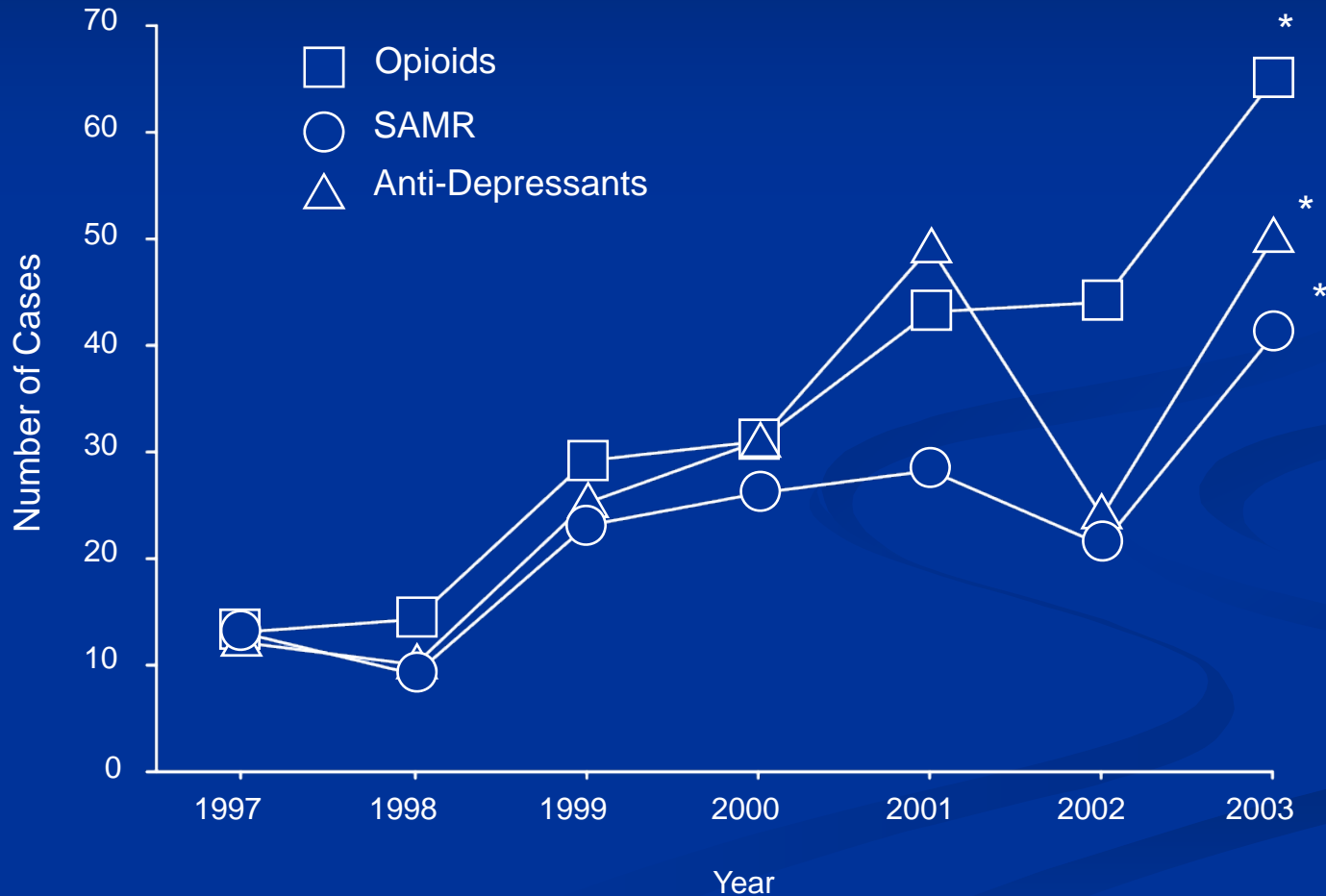
*Significant difference across years (p<0.01)

Decedents with Prescriptions

- 48% Opioids (n= 158)

- 58% Antidepressants (n= 191)

- 67.1% SAMR (n= 221)

- 46.1% had been prescribed all three drug classes (n= 152)

Concordance: Drug Present & Prescribed

Drug Present	% with Prescriptions
Opioids (n=239)	
Hydrocodone	45.5
Oxycodone	30.5
Methadone	27.4
Morphine/Codeine	24.2
Propoxyphene	23.9
Antidepressants (n=201)	
Fluoxetine	58.3
Citalopram	53.9
Amitriptyline	52.6
Sertraline	21.3
Venlafaxine	15.2
SAMR (n=161)	
Trazadone	69.6
Alprazolam	60.0
Carisprodol	52.9
Butalbital	50.0
Diazepam	40.3

Conclusions

- Significant overall increase in polydrug deaths, particularly accidental, among 330 female cases

- Majority of cases were 35-54 years old and rural areas were disproportionately affected

- Many decedents held prescriptions for multiple drugs with potential for drug interactions

- Toxicology was positive for some drugs in the absence of a prescription, perhaps illicitly obtained

Cluster of Deaths: 35-54 year old women

- Illicit drug use and non-medical use of pharmaceuticals is reported among younger people[8]
- Why are women in this age group dying with prescription drugs on toxicology?
  - Poor adherence to medication instructions
  - Do not report illicit use/nonmedical use
  - ⬆ medical problems= ⬆ prescriptions
  - Unaware of risks of deviating from "taking as directed" for prescribed medications

Interventions

- Patient education
  - Appropriate use of prescription medications
  - No sharing or borrowing of Rx medications[8,9]
  - Danger of unapproved drug combinations
- ⬆ Physician attention to adherence to regimen
  - Pill counts, communication with pharmacist
  - Engaging family member to help manage pills
  - Use State Prescription Monitoring Program

Literature Cited

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3. CDC. Unintentional poisoning deaths, 1999-2004. *MMWR Weekly. (56): 5.* Vol 56; 2007:93-98.

4. Paulozzi LJ, Budnitz DS, Xi Y. Increasing deaths from opioid analgesics in the United States. *Pharmacoepidemiol Drug Saf.* Sep 2006;15(9):618-627.

5. Hall AJ, Logan JE, Toblin RL, et al. Patterns of Abuse Among Unintentional Pharmaceutical Overdose Fatalities. *JAMA.* 2008; 300(22): 2613-2620.

6. Wunsch MJ, Nakamoto K, et al Deaths in Rural Virginia: A Description of the High Prevalence of Accidental Fatalities Involving Prescribed Medications. *American Journal on Addictions.* 2009; 18(1):5-14.

7. US Census Bureau. Census 2000 Redistricting Data (Public Law 94-171)

8. Simoni-Wastila, L., G. Ritter, et al. (2004). "Gender and other factors associated with the nonmedical use of abusable prescription drugs." Subst Use Misuse **39**(1): 1-23.

9. Petersen EE, Rasmussen SA, et al. Prescription medication borrowing and sharing among women of reproductive age. *J Womens Health (Larchmt).* Sep 2008;17(7):1073-1080.

NC's Unintentional Poisoning Surveillance Linkage Projects

Feasibility of Enhanced Surveillance for Poisonings- Poison Workgroup & Children's Safety Network

June 5th, 2009

Scott Proescholdbell, MPH, Injury Epidemiologist
Head, Injury Epidemiology & Surveillance Unit
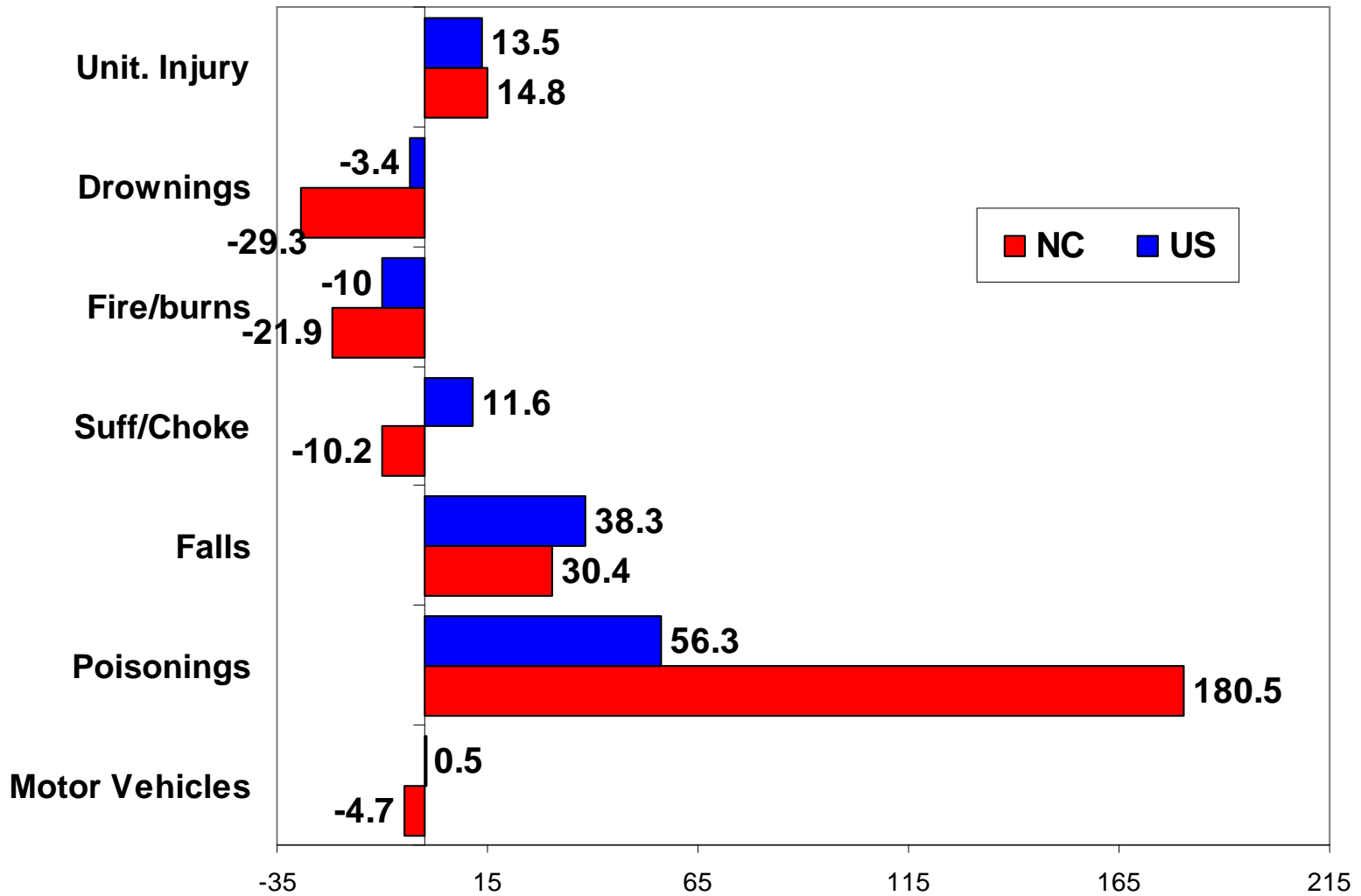NC Injury and Violence Prevention Branch

Acknowledgments (1)

- NC Office of the Chief Medical Examiner (OCME)
  - Krista Ragan, Death Investigator
  - John Butts, Chief Medical Examiner
- NC Div. Public Health Injury and Violence Prevention Branch
  - Sherry Tang, UNC School of Pharmacy Student
  - Dee Dee Downie, CDC PHPS Fellow
  - Sharon Schiro, NC-VDRS
  - Tammy Norwood, NC-VDRS

Acknowledgments (2)

- NC Div. Mental Health/Developmental Disabilities/Substance Abuse Services
  - NC Controlled Substances Reporting System
    - William Bronson
    - Johnny Womble
- NC Law Enforcement
  - State Bureau of Investigation
  - Local Law Enforcement Agencies
    - Durham County
    - Wilkes County
    - New Hanover County

Percentage change in rates per 100,000 of Injury Deaths: NC 1999-2007 & US 1999-2005

Category	US	NC
Unit. Injury	13.5	14.8
Drownings	-3.4	-29.3
Fire/burns	-10	-21.9
Suff/Choke	11.6	-10.2
Falls	38.3	30.4
Poisonings	56.3	180.5
Motor Vehicles	0.5	-4.7

Legend: ■ NC (red) ■ US (blue)

Axis values: -35, 15, 65, 115, 165, 215

North Carolina
Injury & Violence
PREVENTION Branch

Traditional Source of Information on Poisoning Deaths: State Death Certificates

- Underlying cause of death in broad categories, e.g., X40, X41, X42, X50 etc.

- Contributing causes, e.g., T-codes

- Victim's demographics
  - Age   Seasonality
  - Race/Ethnicity   Trends over time
  - Sex
  - Place of residents

24

North Carolina's Linkage Projects for Unintentional Poisonings: Methods
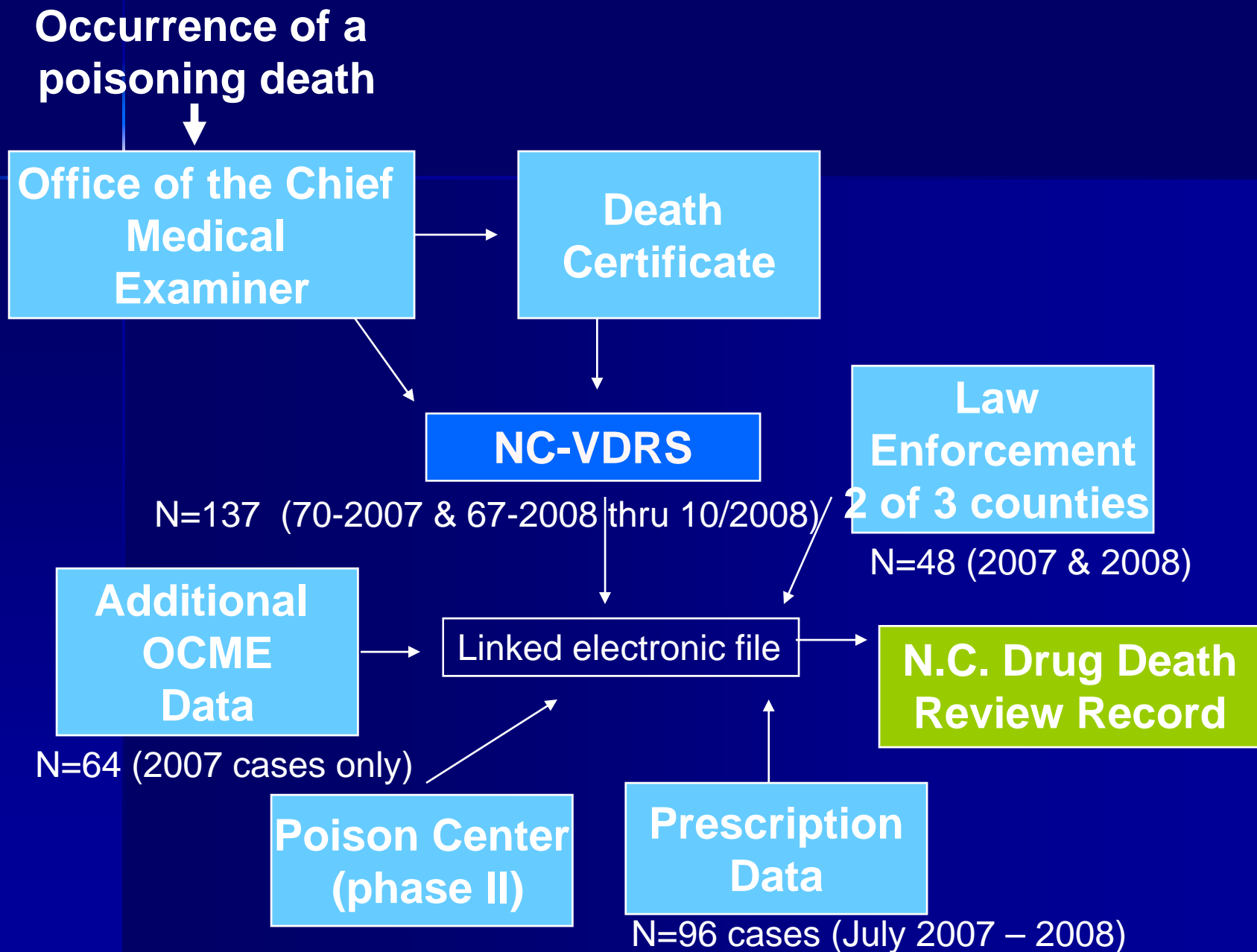
- Link unintentional/undetermined poisoning Death Certificates from 3 counties to ME Reports, using NC-VDRS database set-up.

- Abstract additional ME records using modified data collection form used in 2002 EpiAid Poisoning Study and WV in 2008.

- Link DC and ME data to NC-CSRS data.

- Link DC and ME data to law enforcement data.

North Carolina
Resident Unintentional and Undetermined Poisoning Death Rates
2006-2007

Rate per 100,000 Population
0.00 - 8.13
8.14 - 14.00
14.01 - 22.29
22.30 - 31.91
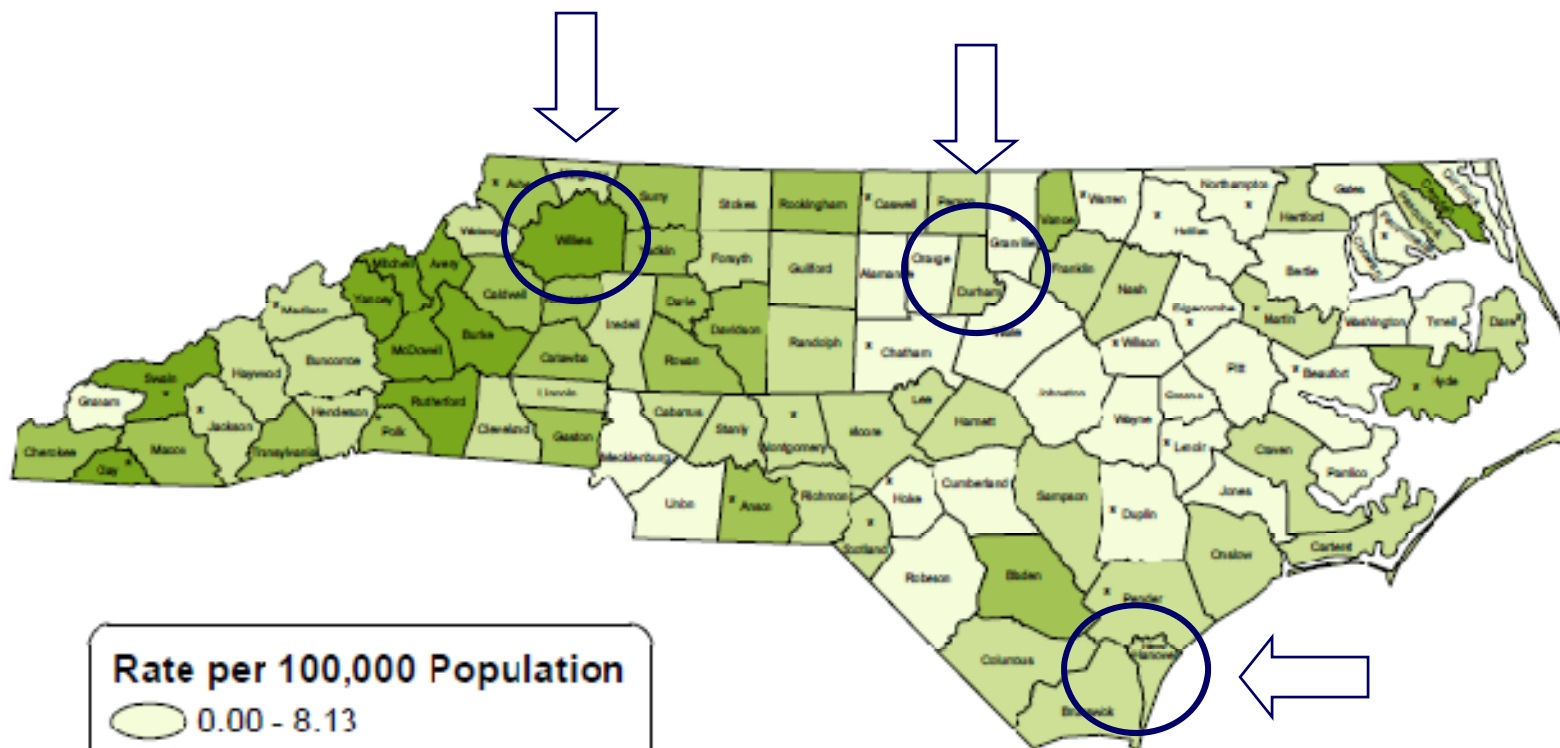
*Note rates based on less than 10 deaths are unreliable and should be interpreted with caution.

NC State Center for Health Statistics

Utilization of NC-VDRS model

Occurrence of a poisoning death

Office of the Chief Medical Examiner

Death Certificate

NC-VDRS

Law Enforcement 2 of 3 counties

N=137 (70-2007 & 67-2008 thru 10/2008)

N=48 (2007 & 2008)

Additional OCME Data

Linked electronic file

N.C. Drug Death Review Record

N=64 (2007 cases only)

Poison Center (phase II)

Prescription Data
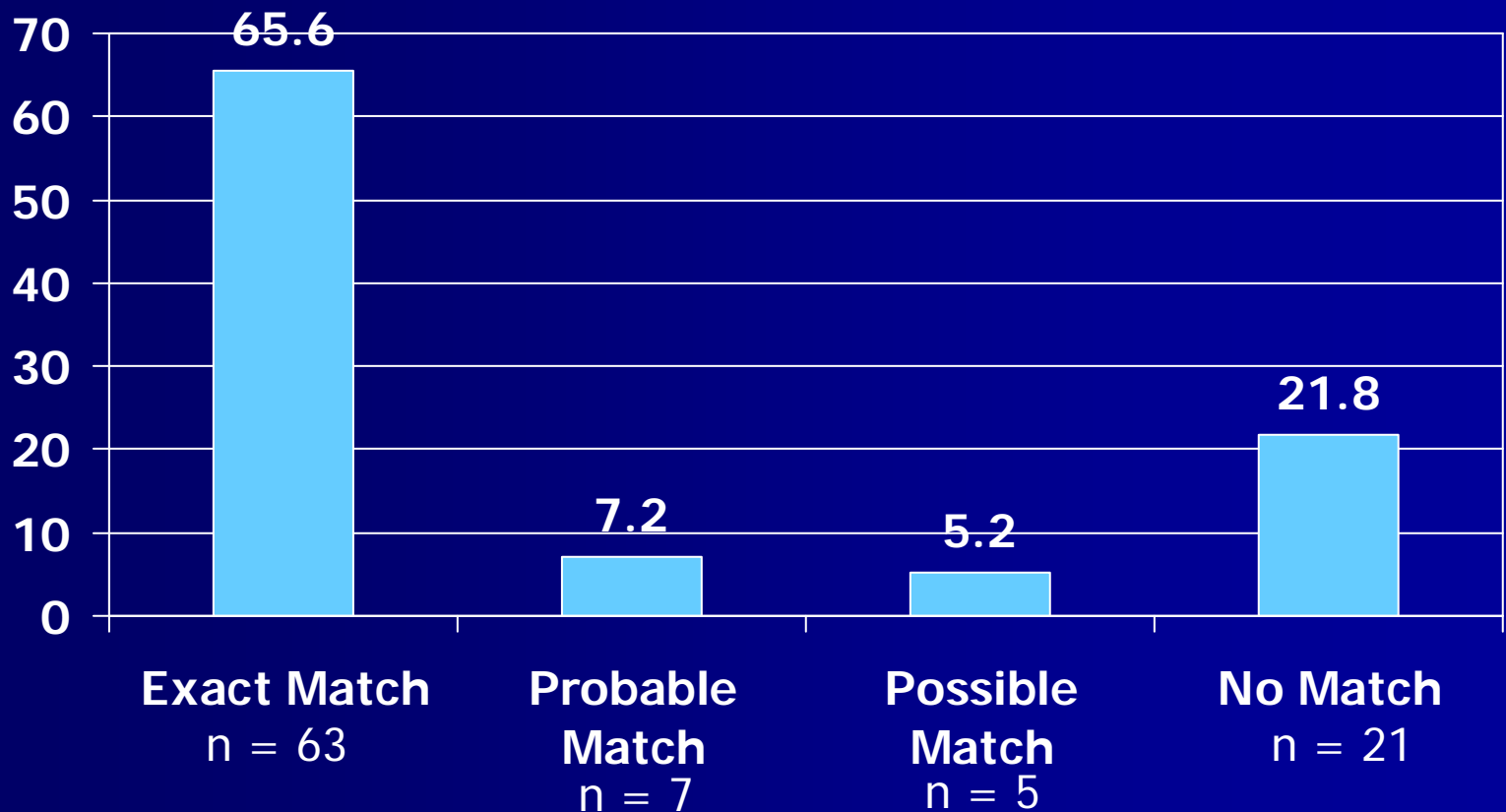
N=96 cases (July 2007 – 2008)

Percentage of deaths which mentions history of pain, overdose, substance abuse, mental health (n=64), NC Poison Study, 2008
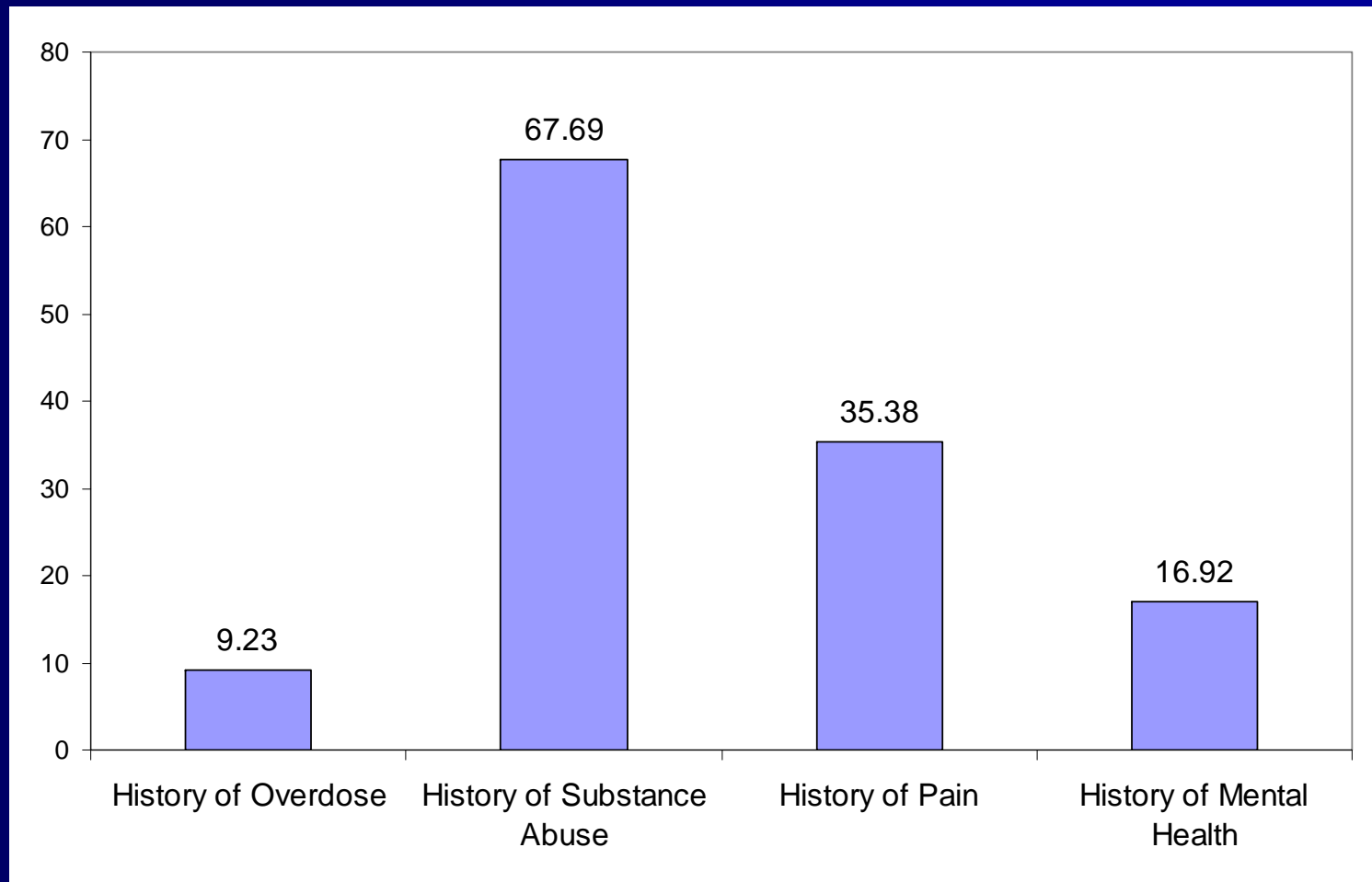
Preliminary data: 2007   History = past or current documented mention in record not verified/substantiated
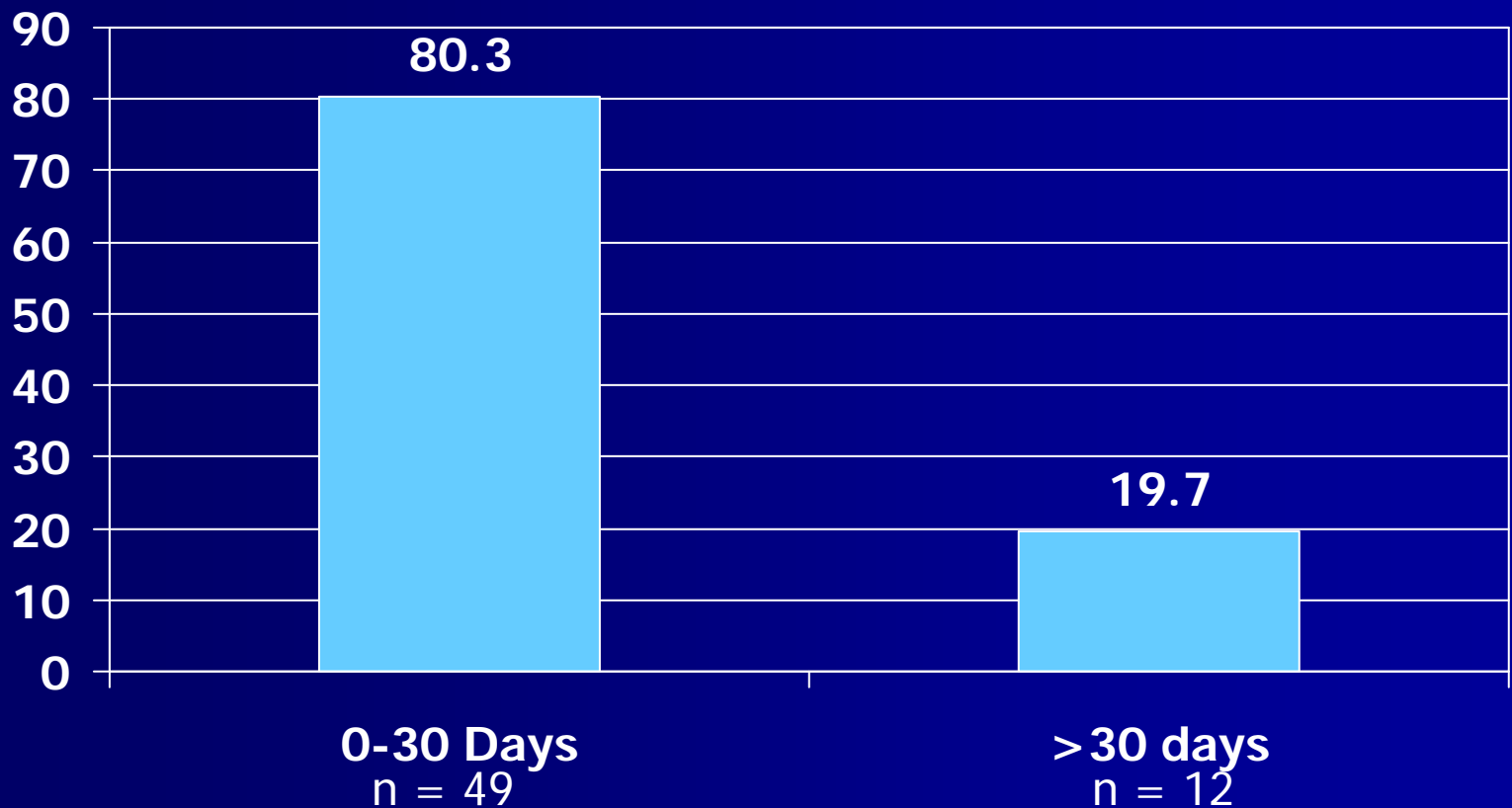
Overall Exact Match* Percentage: CSRS and DC

Regardless of type of prescription or possible link to death
Data sources: NC CSRS and NC Death Certificate records

N = 96

Percentage Exact Match*-
30 Days Prior to Death

Regardless of type of prescription or possible link to death. Date of death minus 30 days
Data sources: NC CSRS and NC Death Certificate records

N = 61

Lessons Learned

- A state-wide Drug Death Review Program (DDRP) is feasible and important.
- Some linkages already exist (NC VDRS) that can serve as models and utilized.
- Patterns might vary tremendously within single state.
- Multiple agencies are needed to address the issue in prevention (akin to CFPT).
- Developing and maintaining working relationships critical to establish review.
- Drug Death Review Program should have access to critical information needed to assess overdose from ME, law enforcement and prescription records.
- Every state should have PMP--public health and ME should have access to it written into the law.

Conceptual Model for N.C. Drug Death Reviews

Toxicology

Medical Practice

Medical Examiner

Pharmacy

Mental Health

NC Poisoning/Drug Death Review

Prescription Monitoring System

Public Health

Injury Prevention

Poison Centers

Law Enforcement

Conclusions

- A critical data gap exists in unintentional drug-related deaths in NC and many other states in the U.S.

- To adequately address this gap, existing tools used to determine if additional data can be readily and easily accessed to help provide the requisite epidemiologic data to more effectively reduce fatal and non-fatal overdoses from prescribed opioids in NC and the nation.

- This model could be used by others interested in addressing overdose issues in their jurisdictions.

Feasibility of Enhanced Surveillance for Poisonings

☠

New Jersey Poison Information and Education System (NJPIES) and Medical Examiner Data on Prescription Opioids

Objectives

- Describe our experiences
- Provide suggestions for future directions

How we Defined Problem

- Reported large number of OD deaths by ME Office
- NJPIES involved in outbreaks

Refined Problem

- Lack of assessment of data and strategies for prevention
- Coordination of multiple agencies

The Early Experience

• Collaboration between the New Jersey Poison Information and Education (NJPIES) and the New Jersey Department of Health and Senior Services (NJDHSS)

• Matching PCC exposure cases with hospital admissions poisoning E-coded in the Uniform Billing (UB) Data maintained by the New Jersey Department of Health and Senior Services (NJDHSS).

• 1,719 non-fatal cases

• The length of hospital stay for patients who received assistance from the PCC ranged from 1-126 days (median=2), as compared to a range 0-220 days (median=5) for cases consultation was never received from PCC.

• The results of this study suggested that patients admitted to hospitals with poison-related exposures who receives consultation from PCC may be associated with reductions in average hospital stay.

The impact of a poison control center on the length of hospital stay for patients with poisoning. J Toxicol Environ Health A. 2007 Jan 15;70(2):107-10

Planned Study

- Examine whether assistance from the PCC is associated with decreased incidence of admission, length of stay or cost of services in ED.

- Three data sources: NJPIES' National Poison Data System (NPDS), Hospital Discharge, and Emergency Room records.

Working with Medical Examiner Database

• In the beginning of 2008, NJPIES reached out to the New Jersey State Medical Examiner's Office (OSME) to seek the cooperation between the two offices to address the issue on drug overdoses/deaths in the State of New Jersey

• Meetings were scheduled and additional governmental agencies and academic institutions were invited.

• After a few preliminary meetings, we scaled back the number of participating partners to concentrate more on the specific agendas.

Poison-Related Deaths Reported to the NJPIES between 2000 and 2007

Our Data

- All ages: 282 cases

- All ages with prescription drugs as exposure substances: 159 cases

- All ages with street drugs as exposure substances: 31 cases

- Prescription drugs as exposure substances between 4 and 25 years: 18 cases

- Street drugs as exposure substance between 4 and 25 years: 12 cases

OSME Data

- **There were over 700 drug OD deaths reported to the medical examiner's office for this age group between 2000 and 2007.**

We are not alone: discrepancies between ME and PCC Reported Numbers of Deaths

Journal	Am J Emerg Med, 1992 Mar;10(2):124-7	Ann J Emerg Med, 1993 Dec;22(12):1822-8	West J Med, 1995; 162:505-509
Title	Reliability of data sources for poisoning deaths in Massachusetts	Poisoning deaths not reported to the regional poison control center	Underreporting of fatal cases to a regional poison control center
State	Massachusetts	Rhode Island	California
Study Period	Jan 1986 - Dec 1989 (4-Year)	1986 - 1987 (2-Year)	Jul 1988 - Jun 1990 (2-Year)
Data Sources	(1) Massachusetts poison control system; (2) chief medical examiner's file; (3) Death certificate report	(1) Poison control center; (2) state medical examiner office	(1) Poison control center; (2) SF city and county medical examiner office
Total number of poisoning deaths	714	369	358
Prehospital death cases	551 (77%)	230 (62%)	245 (68%)
Hospital cases	163	139	113
Dead on arrival/not suspected poisoning	Unknown	27	Unknown
Number of death cases reported to the PCC	Unknown	33	5
Number of death cases that could, but were not receiving the possible benefit of PCC consultation	86 (52.8%)	79 (56.8%)	108 (96%)

Why They Do Not Reconcile ?

- At least 60% of ME cases were prehospital deaths

- Death on Arrival (DOA)

- Poisoning was not an initial suspected reason until the ME's investigation was performed

- Died soon after arriving at the hospital

- Health care providers may not have identified the need for toxicology consultation

- Patients may have died before the identification of a toxin and health care providers may not have called poison control center for assistance

Conclusions

• Keep all communication channels open between departments and agencies.

• Matching poison control center data to medical examiner's records are a challenge, but necessary.

• High percentage of prehospital death cases should be compared to emergency department and hospital deaths to see the differences and similarities in terms of substances involved. Such information can assist health educators in primary prevention efforts.

• Address the importance of early identification of poison-related exposures and the benefits of consultation with PCCs to the health care providers in order to reduce poison-related fatalities.

• Use prescription monitoring program records to obtain drug history baseline data. This approach may provide valuable information for the development of prevention strategies.

Our Intervention Strategies

- Regularly planned meetings between NJPIES, the NJ Medical Examiner's Office, and the Drug Enforcement Administration.

- Search for other collaborations

Feasibility of Enhanced Surveillance for Poisonings: Lessons from Massachusetts Maternal Mortality Review

Karin Downs, RN, MPH

5 June 2009

Purpose

- Describe instituting an injury review as a part of the Massachusetts Maternal Mortality Review in response to rise in maternal deaths due to poisoning

- Describe findings related to injury deaths from poisoning from two studies

- Identify recommendations from MMMR Committee

Massachusetts Maternal Mortality Review Committee

- Legislatively mandated – M.G.L. 111,24 A&B
- Reviews all maternal deaths in Massachusetts
- Multidisciplinary Team
- Recent decision to implement two separate reviews for medical and injury deaths
- Adding team members with expertise in substance abuse, domestic violence, mental health to injury review team

Definitions

- **<u>Pregnancy-associated death</u>:** the death of a woman while pregnant or within one year of termination of pregnancy, irrespective of cause (CDC/ACOG).

- **<u>Pregnancy-associated mortality ratio (PAMR)</u>:** number of deaths per 100,000 live births.

- **<u>Preventable death</u>:** a death that may have been averted by one or more changes in the health care system related to clinical care, facility infrastructure, public health infrastructure and/or patient factors.

Definitions

- **<u>Injury death</u>:** any death caused by violence, substance abuse, motor vehicle collisions, drownings or other external causes

- **<u>Medical death</u>:** any death caused by a medical condition related or unrelated to pregnancy

Assumptions on Substance Abuse Deaths

- Pregnancy Associated Deaths from substance abuse (SA) are preventable
- Often, women dying from substance abuse-related causes will die outside the hospital so little is known about past contact with health care providers and few recommendations can be made about prevention.

Methods of Maternal Mortality Review Process

- Case Finding
  - Hospital mandatory reporting <90 days
  - Vital record report
  - Linked file
- Case Review
  - Hospital medical records
  - Medical examiner reports
  - Death and birth certificates
  - Other reports (newspapers, reports to health care quality)

Case Review Process

- Answer 4 questions:
    - Was the death pregnancy-related?
    - Was the death preventable?
    - Was the woman screened during birth hospitalization for violence, substance abuse and depression?
    - What public health, clinical or institutional strategies might prevent similar deaths in the future?

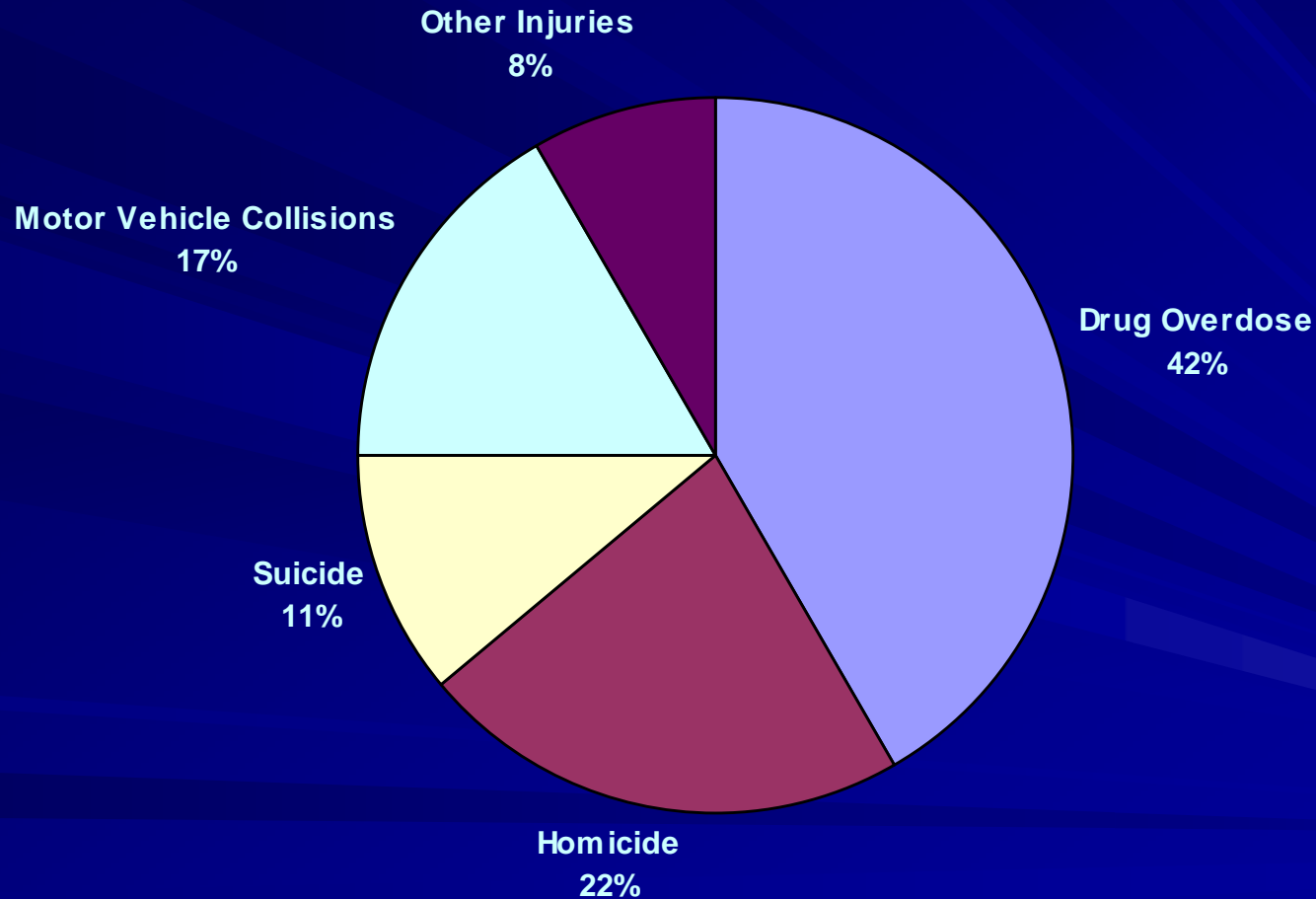# Distribution of Injury and Medical Causes of Death, MA, 1999-2005

3%

32%

65%
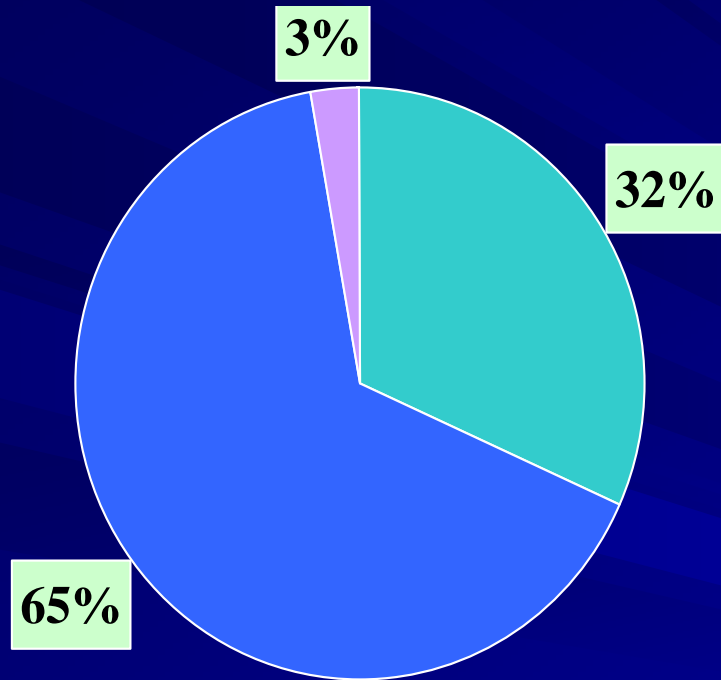
Over one-third of all pregnancy-associated deaths were caused by violence, substance abuse or unintentional injuries

■ **Injuries**   ■ **Medical**   ■ **Unknown**

N=212

Distribution of Injury Deaths, MA 1999 - 2005

Additional Findings

- Race/Ethnicity
  - PAMR for Blacks is 3X and for Hispanics 1.8X compared to Whites
  - Hispanic and White more likely to die from substance abuse, Blacks more likely to die from violence
- Public Payer - Injury
  - 7X higher than for private pay

Additional Findings

- **Age**
  - Older women more likely to die of medical causes
  - Younger women more likely to die of injury
- **Timing of Death**
  - Women with medical causes more likely to die while pregnant or in first 41 days post pregnancy
  - Women with injury causes more likely to die 180 – 265 days post pregnancy

Summary of Findings from a Study of Substance Abuse Deaths Using Linked Data, Massachusetts 1999 – 2002*

- 100 PA deaths between 1999-2002
- 13 (13%) related to substance abuse
- All 13 women delivered a live birth
- 77% non-Hispanic white

- 54% >= 30 years of age
- 54% completed 12 years of education
- 85% public health insurance

*Kristen Connor, BUSPH, MCH Epi Conference, 2005

Characteristics of Drugs Involved in 13 Substance Abuse-related Deaths*

- 54% more than one drug/narcotic
- 85% cocaine and/or opiates
- 30% antidepressants or benzodiazepines
- 15% alcohol
- 15% other unspecified prescription drugs

Of 13 women who died from substance abuse, 6 had a direct contact with health care system through previous hospitalization for substance abuse or mental illness.

- 3 women had multiple contacts

*Kristen Connor, BUSPH, MCH Epi Conference, 2005

Injury Death Review
April 2009

- Review of 8 deaths

- 7 died out of hospital

- Days from delivery 87 – 294

- Causes of death – polysubstance abuse, oxycodone, cocaine, codeine,

Recommendations from Injury Review

- Enhance screening and documentation
- Increase cross systems communication and collaboration
- Connect women with known history of mental health and substance abuse to postpartum services
- Promote universal access to behavioral health services

Recommendations from Injury Review

- Increase case management, outreach, and home-based services for women with mental health and/or substance use disorders
- Develop best-practice models of care
  - Chronic Disease Model
  - Models used in other countries
- Increase training in use of psychotropic medications and maternal mental health

Recommendations from Injury Review

- Extend the provision and availability of services beyond 6 week postpartum
- Incorporate child care services into treatment plan and options available to women
- Ensure continuity of care in the long recovery process

Acknowledgments

- Claudia Catalano
- Hafsatou Diop, MD, MPD
- Holly Hackman, MD, MPH
- Angela Nannini, PhD, FNP

Contact Information
- Karin.Downs@state.ma.us
  (617) 624-5967

Examining Poisoning Deaths: How Does a State Get Started?

Pam Archer, MPH

Injury Prevention Service

Oklahoma State Department of Health

Unintentional Poisoning Deaths Symposium

- **Funded by CDC core injury grant**
- **One day symposium**
- **Goals**
  - **Convene agencies/organizations**
  - **Educate participants**
  - **Share information on efforts**
  - **Develop action steps**

Unintentional Poisoning Deaths Symposium Action Steps

- **Educate professionals and promote use of Oklahoma PMP**
  - Medical board news brief
  - Presentations to professional boards
  - Medicaid
- **Link medical examiner deaths with PMP**
- **Encourage hospitals/clinics to use SBIRT**
- **Educate students in health professions**
- **Educate middle-aged adults**

Unintentional Medication Overdose Deaths Study

- **Analyzed medical examiner data from 1994-2006**
  - Manner of death unintentional
  - Cause of death drug or poison
  - Oklahoma residents
  - Excluded deaths solely due to illicit drugs and/or alcohol
- **Opioid retail sales data from Drug Enforcement Administration**

Unintentional Medication Overdose Deaths Study

- **2,112 fatal unintentional medication overdoses**

- **Highest among 35-44 year olds, males, and whites**

- **Methadone, hydrocodone, alprazolam, and oxycodone most common**

- **Illegal drugs also involved in 8% and alcohol in 19%**

- **From 1997-2006, 8-fold increase in deaths and 6-fold increase in opioid sales**

Unintentional Poisoning Deaths Database

- **Abstract information from medical examiner reports**
  - **Receive by email daily**
  - **Include name, demographics, narrative, toxicology and autopsy reports**
- **Case definition**
  - **Inclusion and exclusion criteria**

Unintentional Poisoning Deaths Database Variables

- **Personal identifiers**
- **Demographics**
- **Epidemiologic information**
- **Probable cause of death substances**
- **Source of drugs**
- **Stressors**
- **Substance abuse**
- **Mental health condition**
- **Other significant medical conditions**

Acknowledgements

- **Emily Piercefield, MD, DVM**
- **Tracy Wendling, MPH**
- **Mark Brandenburg, MD**

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- **Mark Brandenburg, MD**