



# Data linkage methodologies to study alcohol-related mortality

ICE on Injury Statistics September 29<sup>th</sup>. 2012

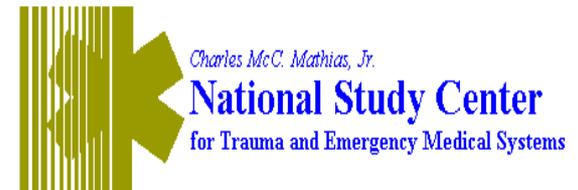
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# Outline

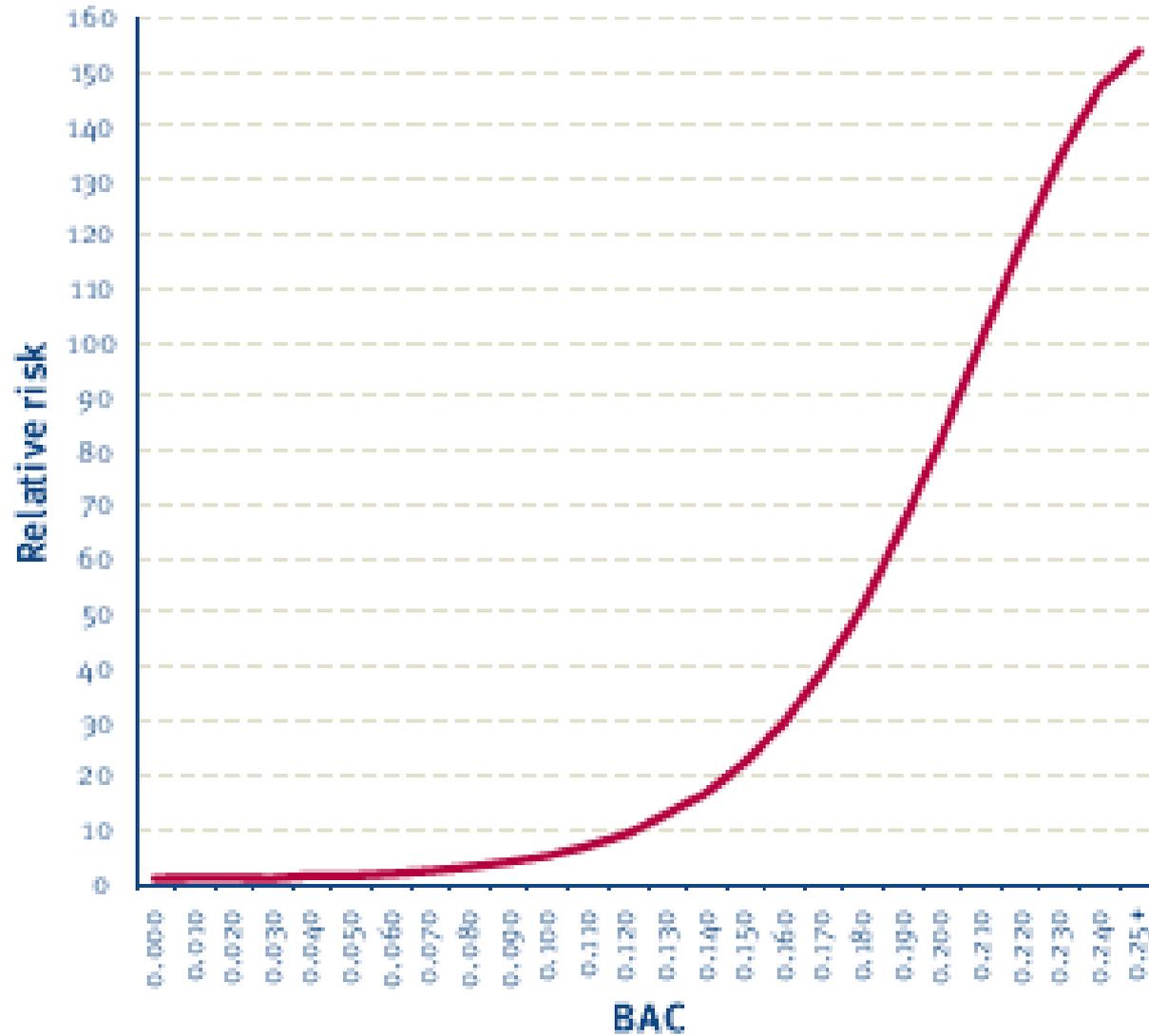
- Aim to illustrate the value of data linkage in injury studies and informing clinical practice
- Injury cohort study alcohol and trauma outcome and mortality
  - Background trauma recidivism
  - Data sources
  - Previous preliminary study
    - Methods and results
- Stimulate discussion of data linkage in the ICE

# Hazards of alcohol and acute injury risk well known

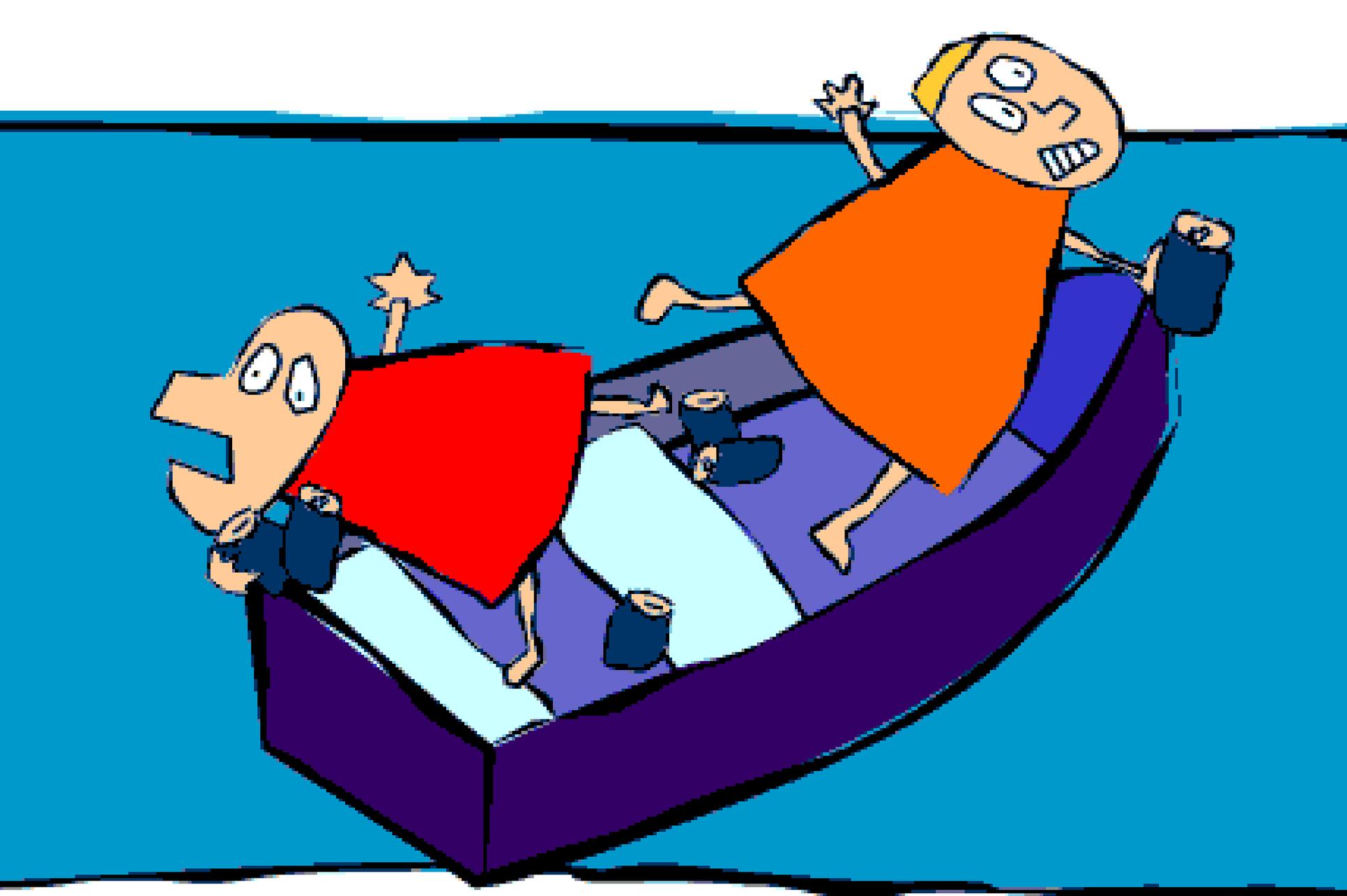
Don't Mix and Drive, WPA poster ca. 1937



## Relative risk of crash involvement by BAC.



Adapted: Compton, R.P., Blomberg, R.D., Moskowitz, H., Burns, M., Peck, R.C. & Fiorentino, D. (2002) Crash rate of alcohol impaired driving. Proceedings 16th International Conference on Alcohol, Drugs and Traffic Safety (ICADTS), Montreal



DON'T GO OVERBOARD WITH THE BOOZ

# What do we know about the long term effects of alcohol

- Belinda Gabbe followed up trauma patients to see how they recover
  - Expensive active follow-up even with efficient methods such as in Victoria?
- Can we passively follow-up these patients using data linkage to evaluate outcomes?
  - If discharged alive from a trauma center do the patients die of another injury?

# Background

- 26-52% of men and 14-24% of women admitted to trauma centers test positive for alcohol at the time of admission
- 25%-50% of trauma patients have a diagnosis (DSM-III-R) of alcohol abuse or dependence at the time of admission
- Up to 50% of trauma patients test positive for another drug of abuse

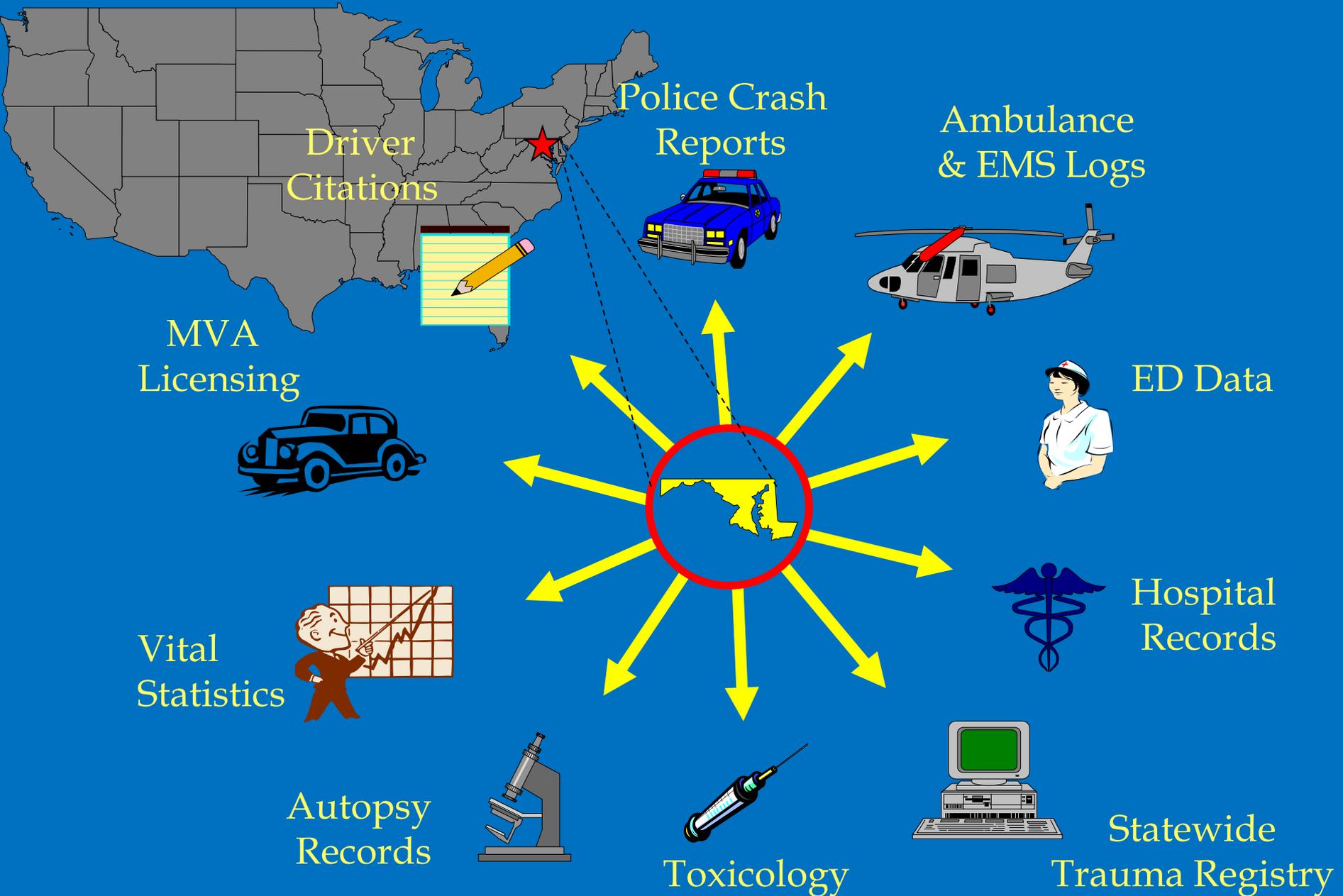
# Recidivism

- *Patients with alcohol use problems are more likely to sustain repeat injuries:*
  - Kaufman et al. ('98) and Sims et al. ('89) found higher rates of substance abuse among patients with two or more admissions to the same hospital
  - Rivara et al. ('93) reported that patients testing positive for alcohol had a 2.5X greater risk of readmission to the same hospital for injury
- Are they more likely to die of another injury and can we predict those at risk for dying of another injury?
  - Use of data linkage to evaluate this in Maryland

# Available Injury Data Sources

- Pre-Hospital
  - Police Crash Reports
  - EMS Runsheets
- Hospital
  - Emergency Dept. Data
  - Hospital Discharge Data
  - Trauma Registry Data
  - Toxicology Data
- Medical Examiner Data

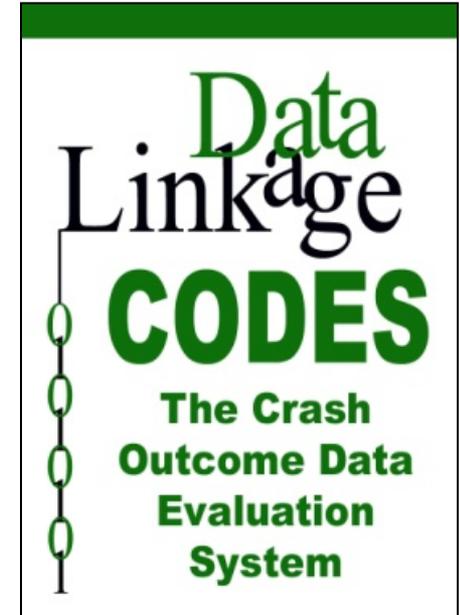
# Available Injury Data Sources in Maryland



# Our center (NSC) has long history data linkage for traffic records

- **CODES**

- Strong relationships built with state agencies
- Unique capacity for data linkage
- Greatly expands information available
  - Police crash reports
  - Department Motor Vehicle Administration
    - License files including convictions
    - Medical Advisory Board



- Comprehensive statewide medical examiner system
- Shock Trauma
  - Alcohol testing standard of care
  - Urine drug screening
- Earlier study linked trauma center data with death certificates

# A Longitudinal Study of Former Trauma Center Patients: The Association Between Toxicology Status and Subsequent Injury Mortality

Patricia C. Dischinger, PhD, Kimberly A. Mitchell, MS, Joseph A. Kufera, MA, Carl A. Soderstrom, MD, and Albert B. Lowenfels, MD

**Background:** Despite the current emphasis on injury prevention, little has been done to incorporate alcohol intervention programs into the care of the injured patient. The purpose of this study was to determine whether patients admitted to a trauma center with positive toxicology findings (TOX+) have a higher subsequent injury mortality than those without

such findings (TOX-).

**Methods:** We followed a cohort of 27,399 trauma patients discharged alive between 1983 and 1995 to determine subsequent mortality. Death certificates were obtained to identify the cause of death.

**Results:** TOX+ patients had an injury mortality rate approximately twice that of the TOX- group (1.0% vs. 1.0% vs.

$\leq 0.001$ ). Overall, 22.7% of the deaths were due to injury; the TOX+ rate was 34.7% versus 15.4% for the TOX-.

**CONCLUSION:** These data add strength to the premise that untreated substance abuse-related injury remains an untapped injury prevention opportunity.

**Key Words:** Injury, Mortality, Trauma, Substance abuse, Intervention

A study of over 27,000 Shock Trauma Center patients followed up to 14 years.

The death rate from a repeat trauma episode was 2 times higher for pts who tested for alcohol/drug



# Methods

- Study period: FY 84 - FY 95
- All patients discharged alive from trauma center and tested for alcohol (over 95% all cases)

## Mortality follow-up

- Follow-up period: 1.5 - 14.5 years
- Mortality search based on name and SS#
- Death certificates obtained each state
  - Very time consuming and labor intensive
- Abstraction of cause of death data
  - When available and not electronic
- Survival analysis

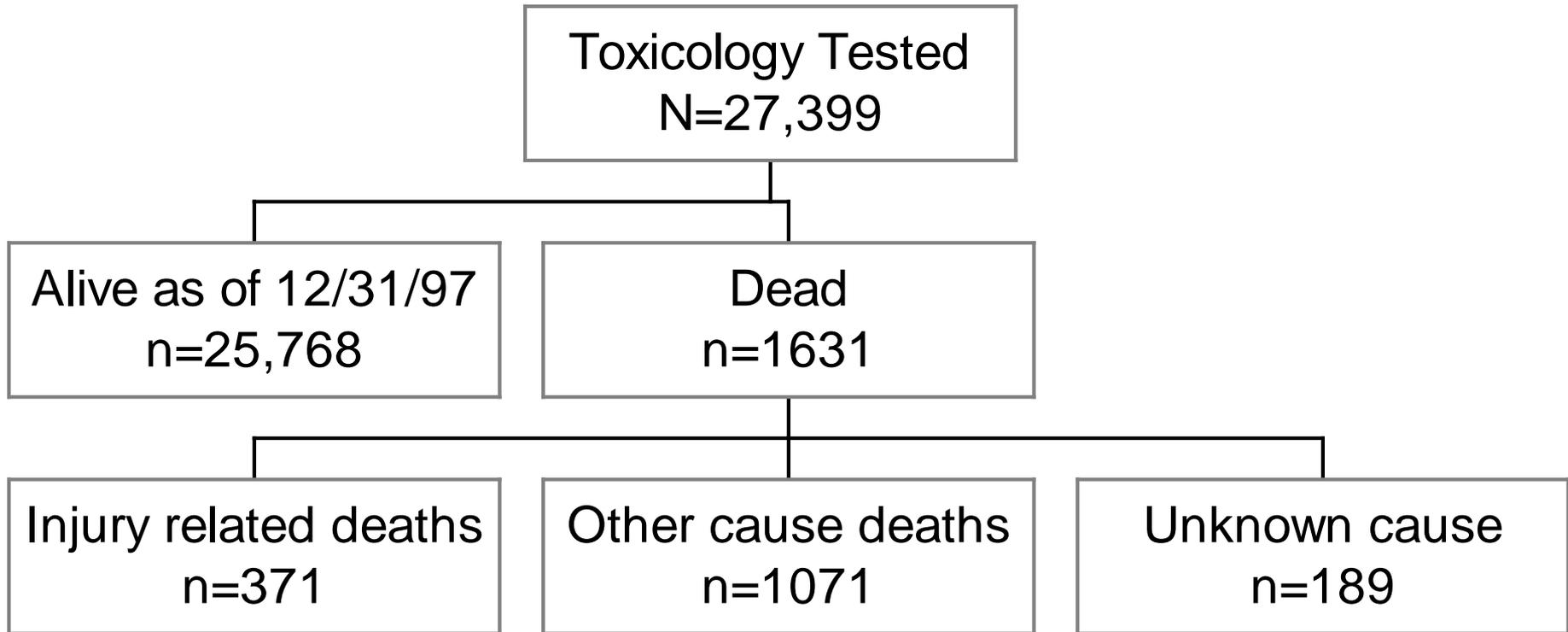
# Results:

## Overview of Study Population (N=27,399)

- Mean age= 34 years (80% < 45 years old)
- 72.6% male
- 68.5% white
- 80.7% unintentional injury
- 57.2% ISS 9 or greater
- 78.0% discharged to home

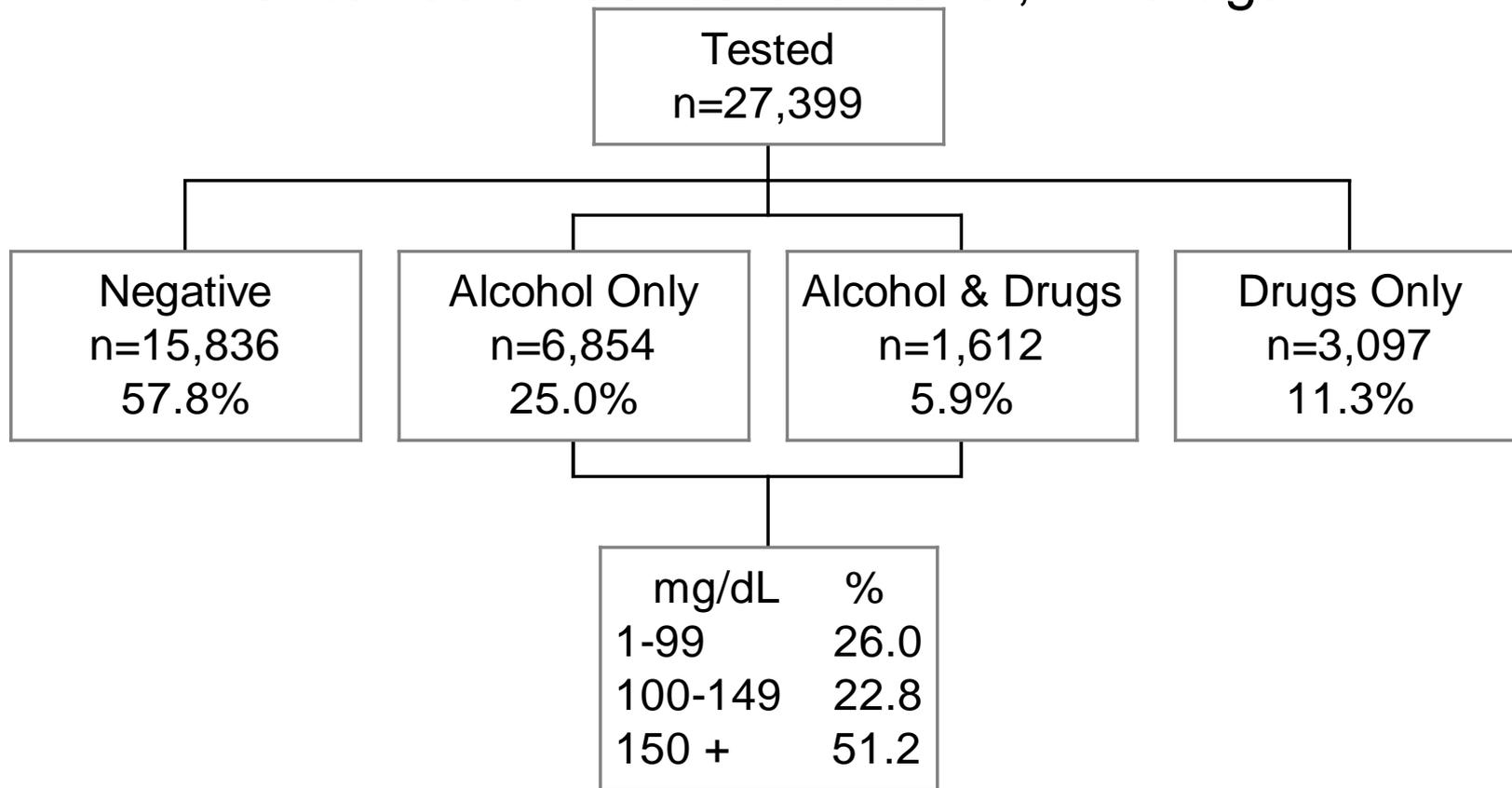
# Follow-up of Cases

Figure 1. Toxicology Tested Patients



# Toxicology Findings among the Cohort of 27,399 Patients\*

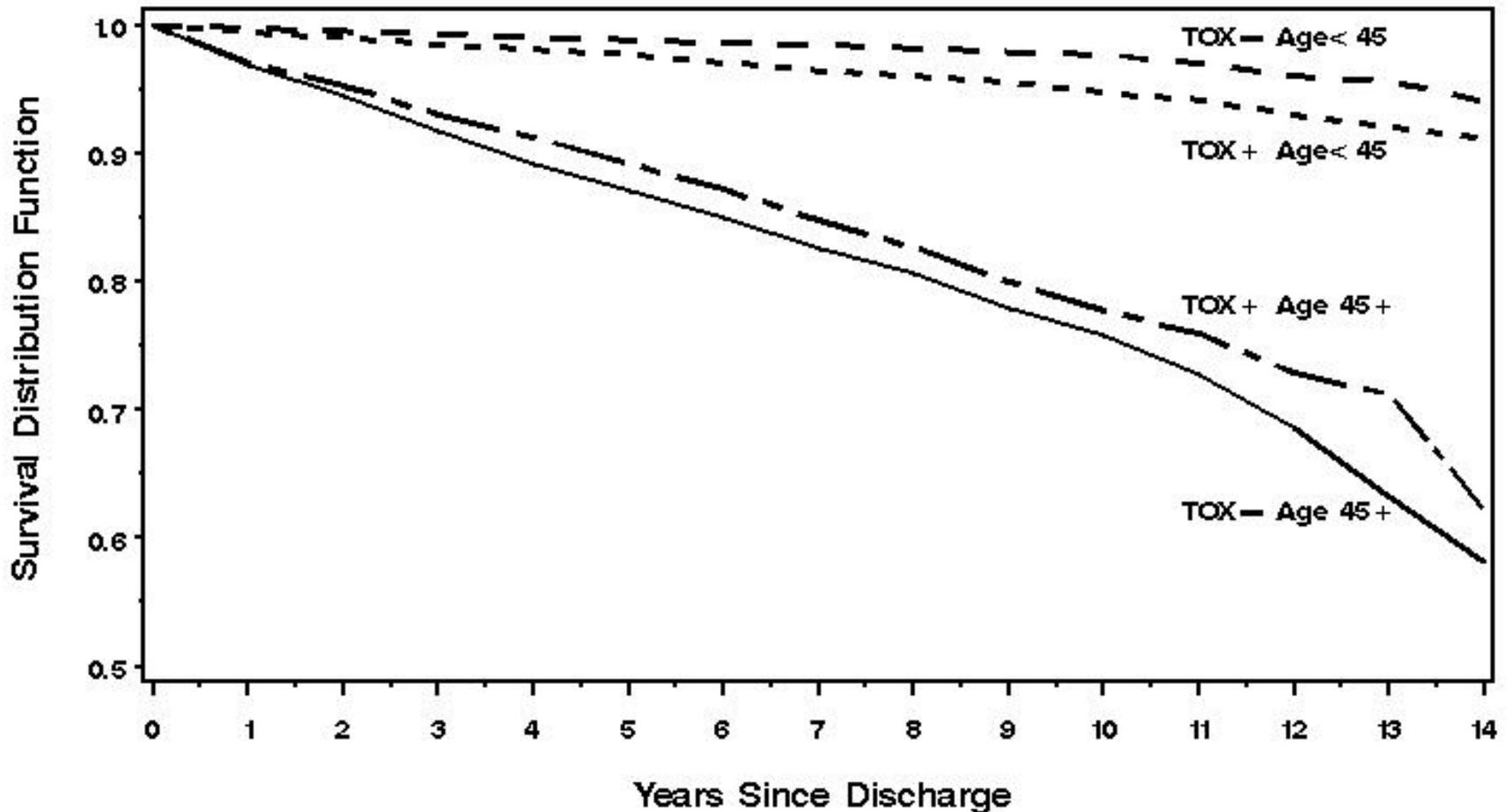
42.2% had any positive toxicology  
31% had evidence of alcohol, + - drugs



\* 93.5% of original cohort was tested

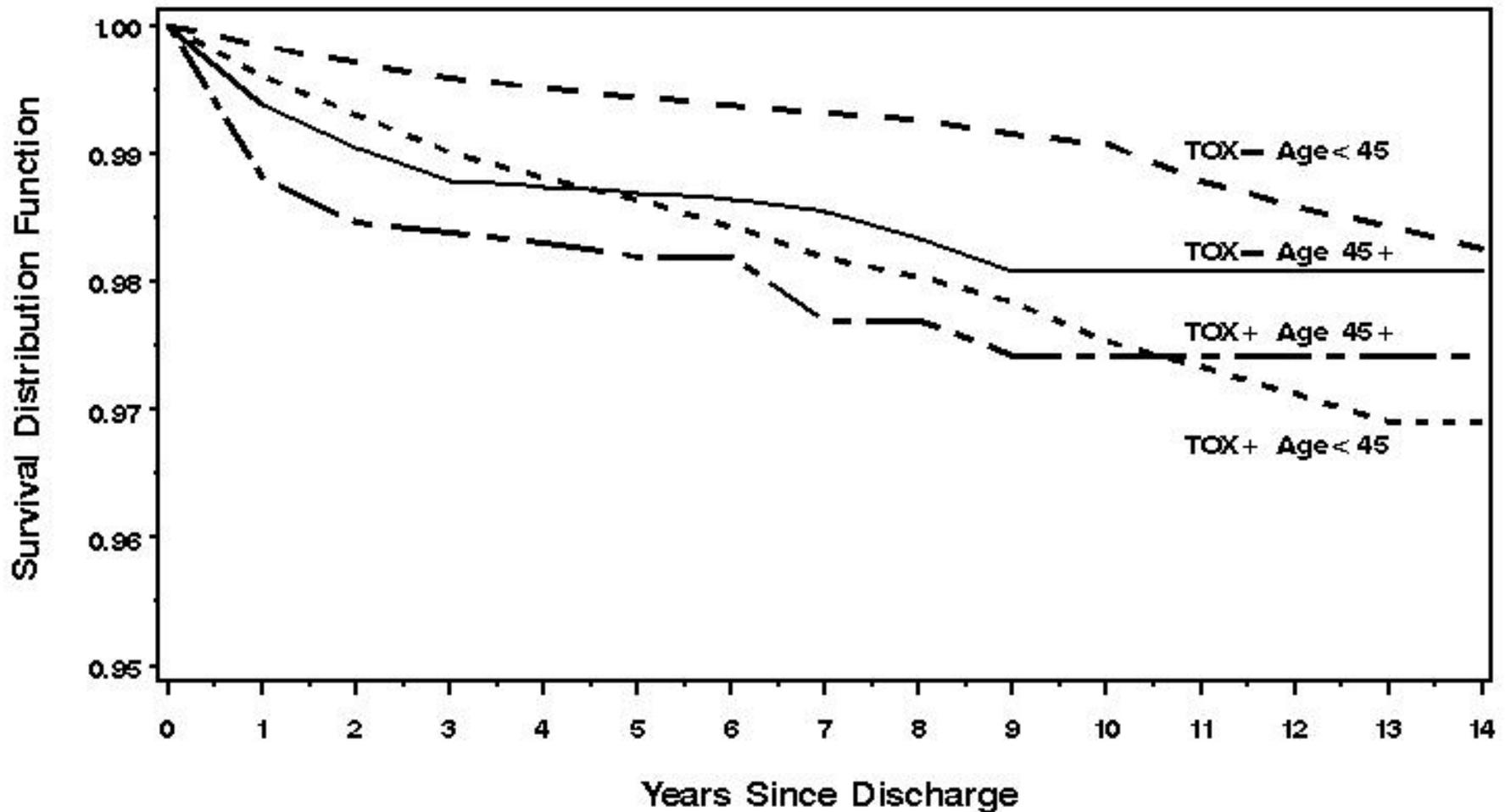
# Survival Rates for All Cause Mortality

Stratified by admission toxicology status and age



# Survival Rates for Injury Mortality

Stratified by admission toxicology status and age



# Higher Risk of Injury Mortality in TOX+ Group Relative to TOX- Group

	<u>RR</u>	<u>95%CI</u>
Age < 45 years	2.33	1.83-2.98
Age 45+ years	1.40	0.90-2.19
Total cohort	2.07	1.68-2.55

# Conclusions

- Patients with positive alcohol/drug tests at the time of trauma center admission were more likely to die a premature death as the result of injury
- Among patients <45 years old, those with a positive toxicology finding had a significantly higher injury mortality rate
- Study did not have the power to look at how BAC level predicts mortality
  - New study much larger study size (10X)
    - Able to examine actual BAC levels
- Difficulty obtaining death certificates from each state
  - Lack multiple cause data
- National Death Index a more efficient way to identify deaths and used in our new study

# Alcohol Involvement in a Cohort of Trauma Patients: Trends and Future Mortality

New NIH grant builds on earlier study

Hypothesis: Risk of subsequent mortality following trauma admission increases dramatically as BAC increases

- Link 26 years trauma admissions with National Death Index
- Over 1 million person years of follow-up
- Use of data linkage to inform clinical practice
  - E.G. A BAC over 150mg/dl is a medical emergency as person has such a high risk of dying of another injury

# Alcohol Involvement in a Cohort of Trauma Patients: Trends and Future Mortality

- Linkage of 26 years of Shock Trauma discharges to the National Death Index (NDI)
- Social Security number, name, DOB sent to NDI
  - Determine those who die
  - Multiple causes of death
  - Over 1 million person years of follow-up
  - Builds resource for trauma registry to passively follow mortality on all STC cases for other mortality follow-up studies
  - Supported by: NIAAA Grant #1R01AA18707

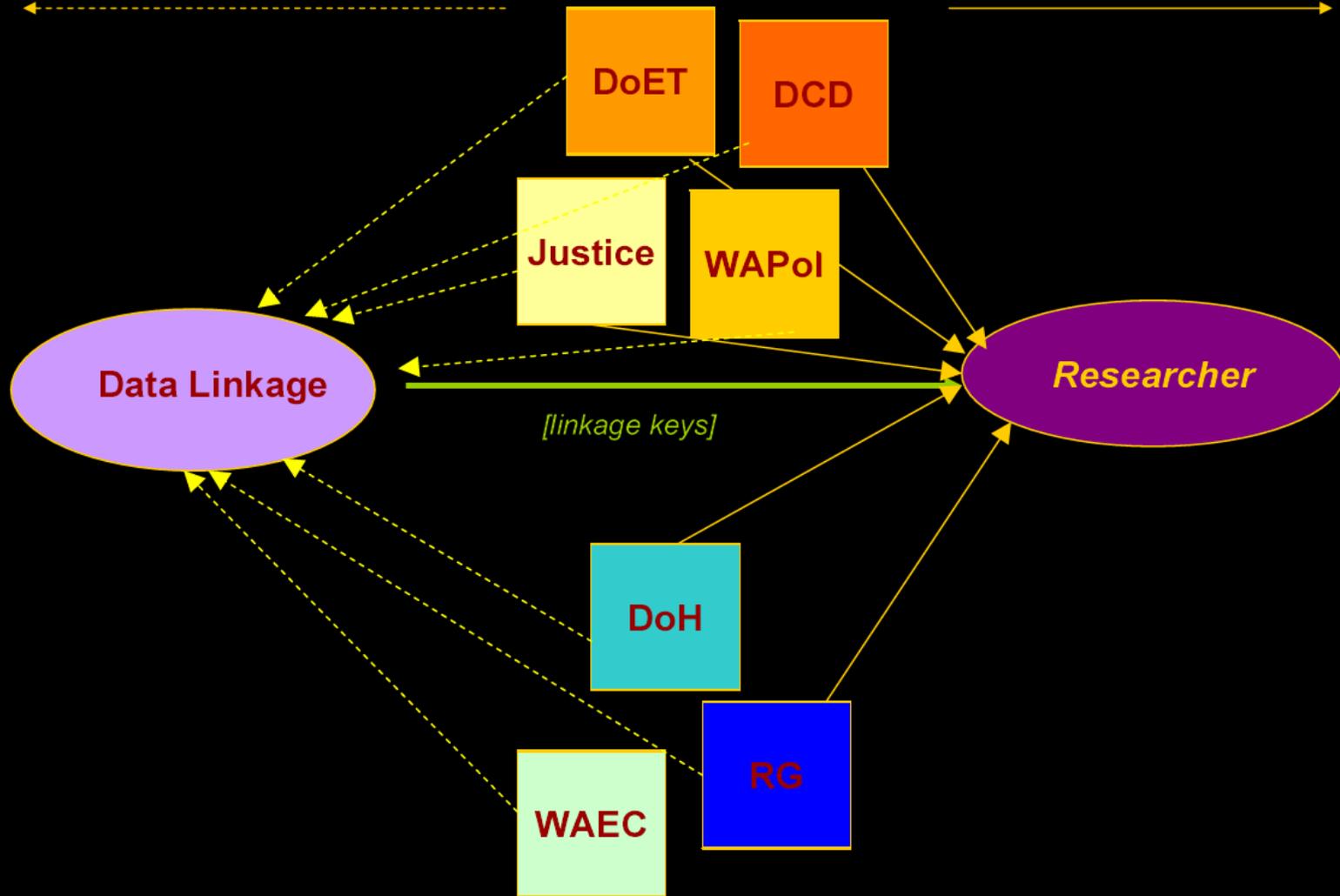
# Activities across the pond

- Australia
  - Western Australia used data linkage since 1970s.
  - <http://www.datalinkage-wa.org.au/>
  - SA-NT DataLink provides secure method of data linkage for research without linking data itself
    - <https://www.santdatalink.org.au/>
    - Centre for Health Record Linkage (CHeReL) Creates and maintain record linkage for NSW and ACT
- International Health Data Linkage Network
  - <http://www.ihdln.org/>

# Data linkage Western Australia

[id#, name, address, date of birth]

[health, education & behaviour]



# New Zealand

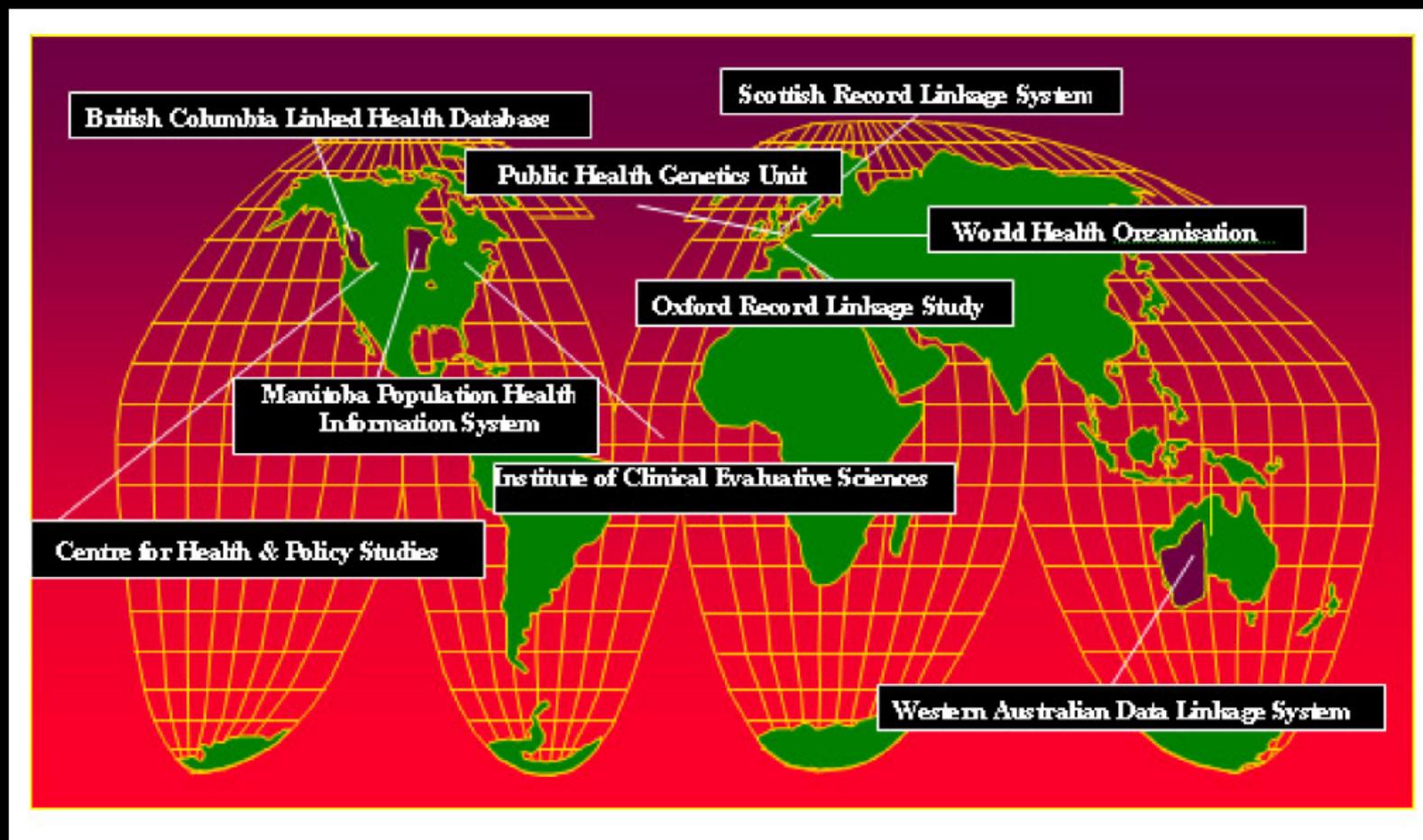
- Long history of data linkage
- Health Identification number
  - Allows linkage of health data sources
    - Identify repeat admissions
    - Link prior hospitalization with mortality data
- Link hospital and traffic crash records
  - “substantial numbers of cyclist only crashes.. not captured in the TCR database. Langley Inj Prev 2003;**9**:376-379

# New Zealand ACC

- Linkage of Trauma Registry and Accident Compensation Corporation Data
  - Investigating the impact of major trauma in childhood  
(Jackson, Kool, Christie, Hamill, Dansey, Ameratunga)
- Determined the feasibility of linking trauma registry data with ACC data
- Provides opportunity to link hospital data with long-term health data on injuries
- Similar to workers compensation for all injuries

# The Lonely Planet Guide for Data Linkage

Emma Brook, University of Western Australia

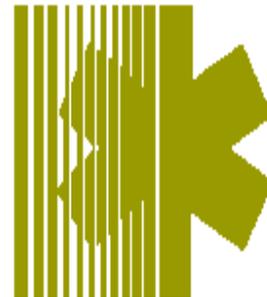


# Questions???

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