

## INTRODUCTION

- Carbon dioxide (CO<sub>2</sub>): colorless, odorless=poor warning properties
- Death from asphyxiation
- Air levels
  - Ambient air: 377 ppm (0.04%)
  - NIOSH Exposure limit: 5000 ppm
  - NIOSH STEL (15 min): 30,000 ppm
  - IDLH: 40,000 ppm (4%)
- Epidemiology: The incidence of fatality associated with CO<sub>2</sub> poisoning is unknown.

## OBJECTIVE

What is the incidence of carbon dioxide associated fatalities in the US between 1/1/2001 and 12/31/2011?

## MATERIALS & METHODS

- Retrospective review of multiple publicly available databases
- Sources: National Poison Data System annual reports, Pub Med, Web of Science, Lexis Nexis (media database), National Electronic Injury Surveillance System
- Case definition: *any death in the United States from January 1 2001 to December 31 2011 associated with inhalational exposure to carbon dioxide.*
- Each case reviewed by a medical toxicologist (MT) as referring to CO<sub>2</sub> & being a unique case
- Exclusion Criteria:
  - Identified as a duplicative case
  - Intentional automobile exhaust or gas embolism during laparoscopic procedures after gas insufflation.

## RESULTS

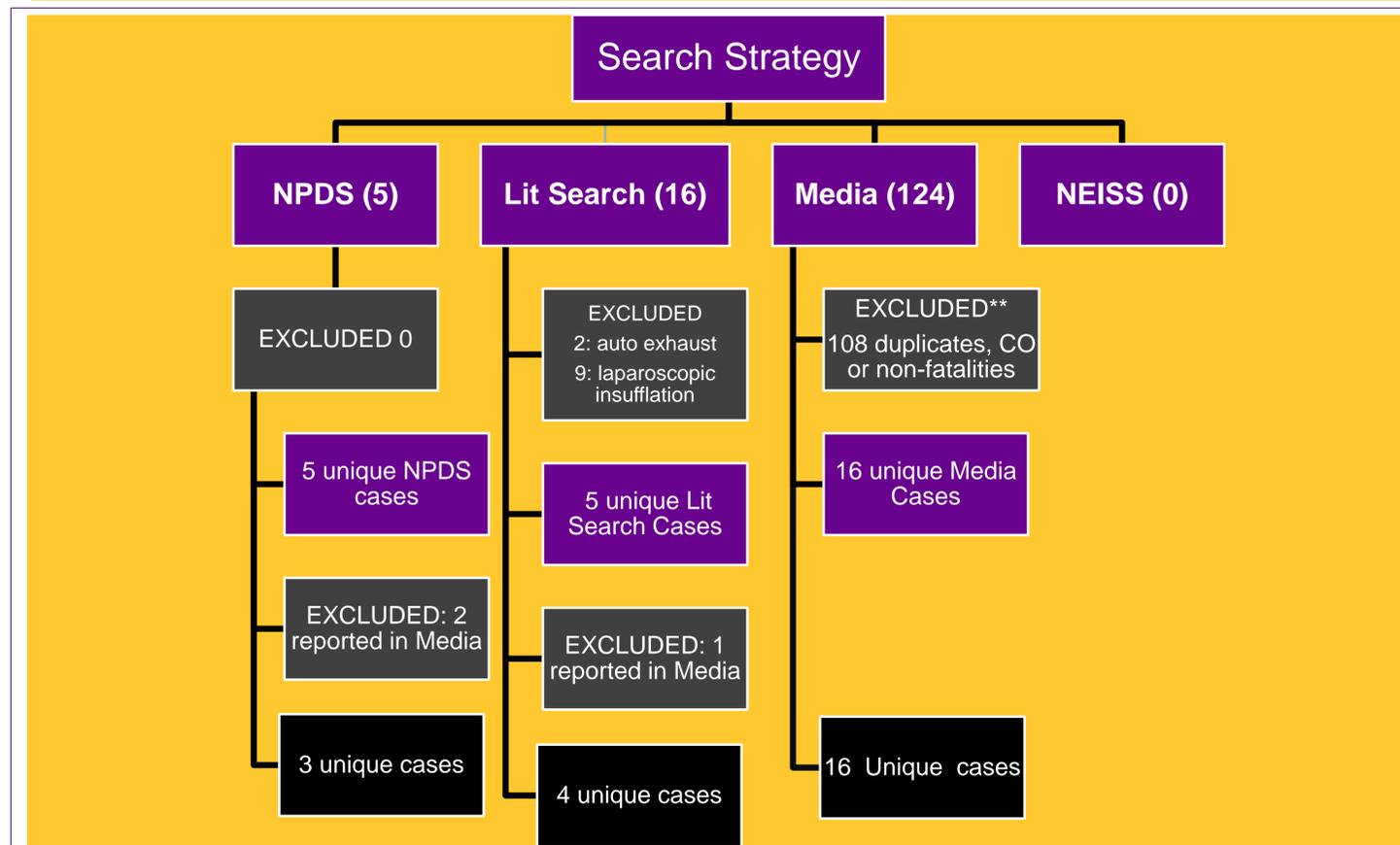


Figure 1: Flowchart of search strategy and results (# of cases)

\*\*Most cases reviewed by the MT judged not to be referring to a CO<sub>2</sub> inhalational death were in reference to COPD/asthma, carbon monoxide, or used the word fatal without the patient dying.

**Demographics:** Age range: 19-80 yrs, 69.5% unintentional (when intention was known), 52% occupational, 22% multi-person

### Interesting Cases:

Worker in a vault triggered a CO<sub>2</sub> based fire suppression system to signal she was trapped

Alternative practitioner treated patient with an inhaled 3:2 (CO<sub>2</sub> / O<sub>2</sub>) mixture for depression

Customers in McDonalds bathroom collapsed after leak from CO<sub>2</sub> beverage system through piping in walls into bathroom

## DISCUSSION

- Difficult to determine true incidence: wide variety of reporting mechanisms
- News media search yielded the most cases
- Most cases were unintentional and work related
- *Major limitations*
  - News media deaths cannot be confirmed
  - Fatalities from cases in journal articles could have occurred outside the search dates
  - No mandatory reporting mechanism
- **Therefore, this is only an estimate of incidence**

## Conclusions

We identified 23 unique cases of carbon dioxide associated fatalities in the United States in an eleven year time period, with a unique scenario for nearly every fatality.



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