



Comparative Rates of Mortality and Major Medical Effect Among Commonly Prescribed Opioid Analgesics

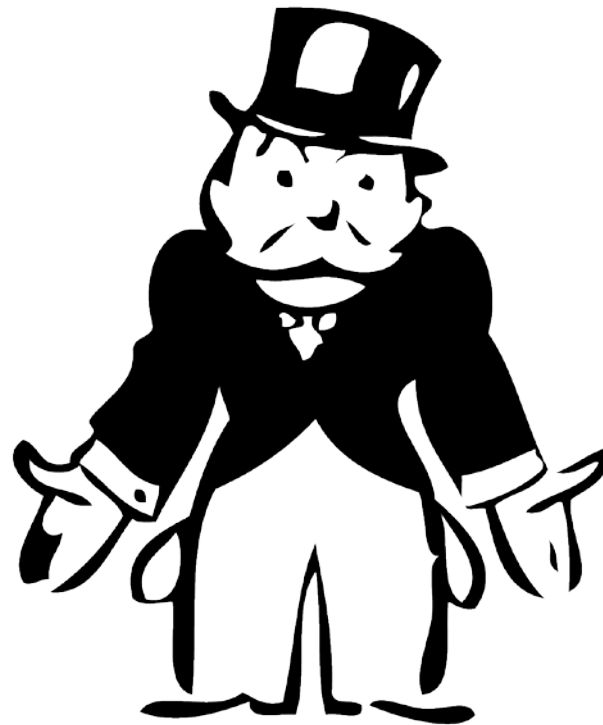
Calls to US Poison Centers Reporting Opioid Overdose Due to Intentional Abuse and Misuse Exposures

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No financial conflicts of interest to disclosure.





Well, first....

Prescriptions on the rise

Nonmedical use on the rise

ED visits on the rise

Mortality on the rise



Prescription Opioid Variety

Hydrocodone

Oxycodone

Tramadol

Propoxyphene

Codeine

Oxymorphone

Methadone

Hydromorphone

Meperidine

Fentanyl

Morphine



Which opioids are most responsible?

Do those most implicated in deaths reflect availability?

Does **potency** matter?



Methods: Source Data

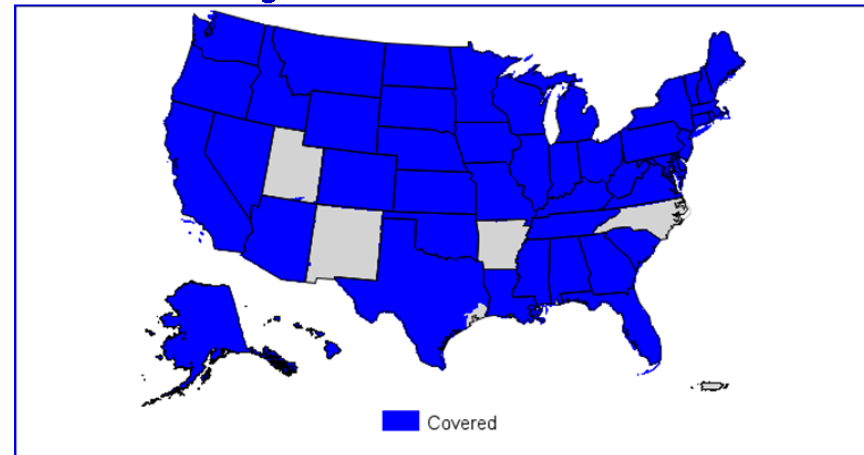
■ RADARS[®] System Poison Center Program

- Database of surveillance information
- 48 regional US Poison Centers in 46 states covering 93% of total US population.
- 2.3 million exposure cases per year.

■ IMS Health: National prescription rates

- Amount of drug dispensed

Poison Center Program—2014





Methods: Study Criteria

- 54 Months, Jan 2010 – Jun 2014
- Poison Center cases of opioid exposure
 - *Oxycodone, hydrocodone, morphine, hydromorphone, oxymorphone, & tramadol*
- Exclusion criteria:
 - Non-Tablet form
 - E.g. **Fentanyl**: parenteral route of administration
 - Multiple product exposures



Methods: Primary Outcome

■ Death or Major Medical Effect*

* Categorized according to American Association of Poison Control Centers (AAPCC)

**Life-threatening or significant
disability or disfigurement**

Examples: Repeated seizures, respiratory compromise requiring intubation, V-Tach with hypotension, cardiac or respiratory arrest, esophageal stricture, & DIC...



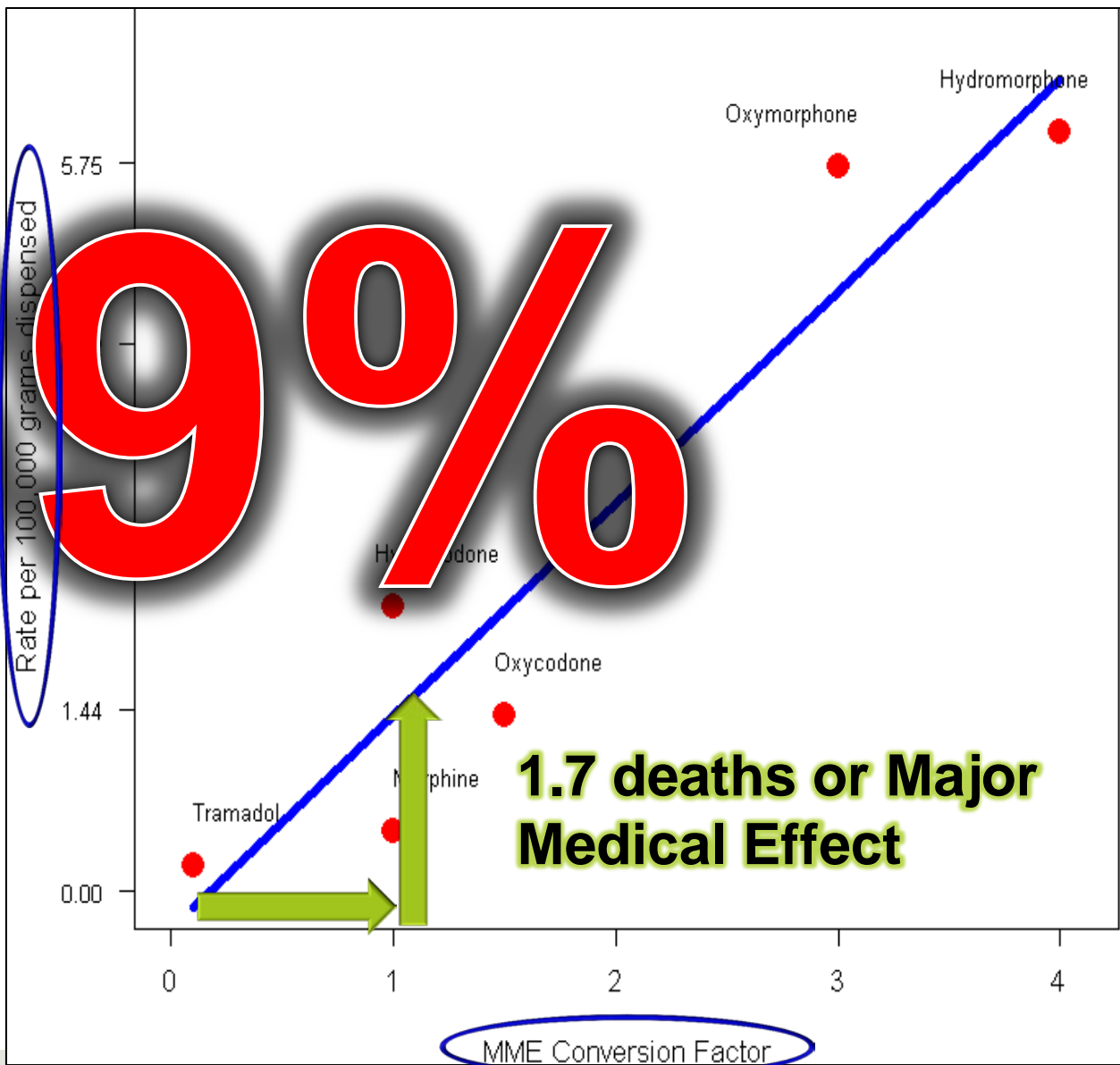
Results: 11,380 cases

Rank Order	Opioid Drug	Rate of Death or Major Medical Effect per 100,000 Grams	MME
1	Hydromorphone	5.99	4
2	Oxymorphone	5.73	3
3	Hydrocodone	0.21	1
4	Oxycodone	0.21	1.5
5	Morphine	0.48	-
6	Tramadol	0.21	0.1

28x



89%



MME Conversion Factor



Results: NNH

- Number of Grams dispensed to cause one Death or Major Medical Effect

Opioid Drug	Number of Grams Dispensed to Cause one Death or Major Medical Effect (NNH)
Hydromorphone	16,686
Oxymorphone	17,450
Hydrocodone	44,506
Oxycodone	71,719
Morphine	208,398
Tramadol	486,700



Conclusions

More **drug** → More **outcomes...**
...at greater rates with more **potent** opioids

- Death and Major Medical Effect occur at vastly **different rates** among opioid analgesics
- **Potency** demonstrates a **highly positive linear relationship** with **Death** and Major Medical Effect



For every **1** death there are...



10 treatment admissions for abuse⁹

32 emergency dept visits for misuse or abuse⁶

130 people who abuse or are dependent⁷

825 nonmedical users⁷



Limitations

- RADARS System database includes **reported** cases
 - Representing only a fraction of total exposures

- **Single-substance cases** reflect the majority (89%) of all exposures captured by RADARS®
 - Only 42% of fatalities are due to single-substance exposures



References

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- Substance Abuse and Mental Health Services Administration. Results from the 2010 National Survey on Drug Use and Health: volume 1: summary of national findings. Rockville, MD: Substance Abuse and Mental Health Services Administration, Office of Applied Studies; 2011.
- McDonald DC, Carlson KE. Estimating the prevalence of opioid diversion by "doctor shoppers" in the United States. PLoS One 2013;8(7):e69241.

Acknowledgements

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Dispensing Denominators

- # units (grams) dispensed
- # prescriptions
- # pills dispensed
- # individuals filling prescriptions

