

# Analysis of severe injury reports for the oil and gas industry in the US

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**NSERC**  
**CRSNG**



**UNIVERSITY OF CALGARY**  
FACULTY OF SCIENCE  
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# Severe Injuries

- HSE (Health, Safety, and Environment)
- Severe Injuries: severe work-related injuries, defined as an amputation, in-patient hospitalization, or loss of an eye
- *Occupational Safety and Health Administration of the United States Department of Labor*
- Mandatory regulation since January 1<sup>st</sup>, 2015
- Paid-leave
- Non-fatal



- Reports contain information such as:
  - Date of the incident
  - Employer
  - Location (address and coordinates)
  - NAICS (industry identification number. Oil and Gas starts with 21)
  - If employee was hospitalized and/or suffered amputation
  - Type of the injury
  - Part of the body
  - Source of injury
  - Secondary source of injury
  - Description of the injury

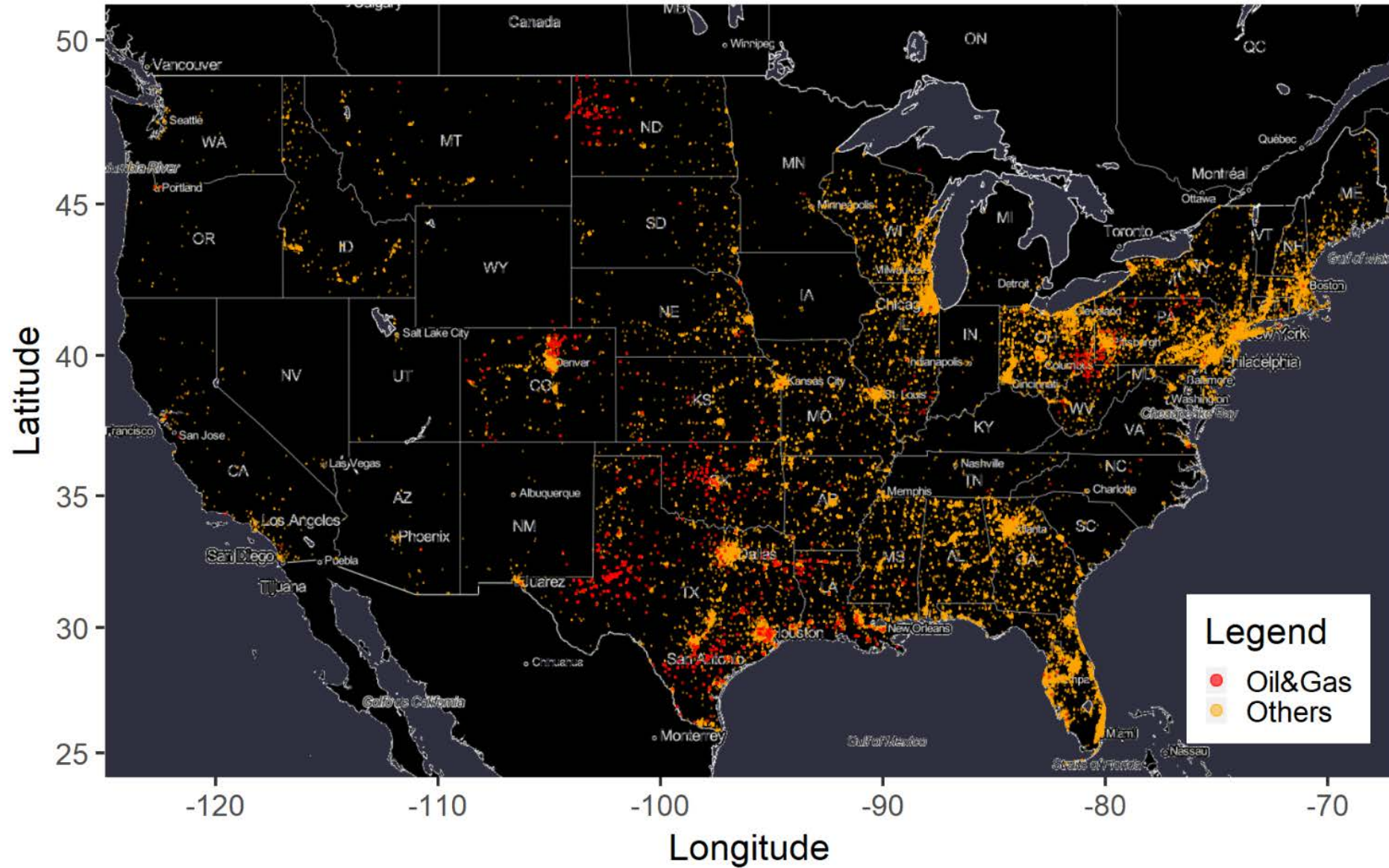


# Severe Injuries

Injury	Part of the Body	Description
Fractures	Lower leg(s)	Three correctional facility guards were escorting a restrained federal prison inmate when he became disruptive, requiring the use of force. Two guards and the inmate fell onto the Lieutenant's right leg, fracturing his fibula. He was transported to the hospital and released the following day.
Amputations	Arm(s), unspecified	The employee's arm was caught at the head roller of raw material hopper Line #1. The arm was surgically amputated to free him from the bagging machine.



# Map of Injuries



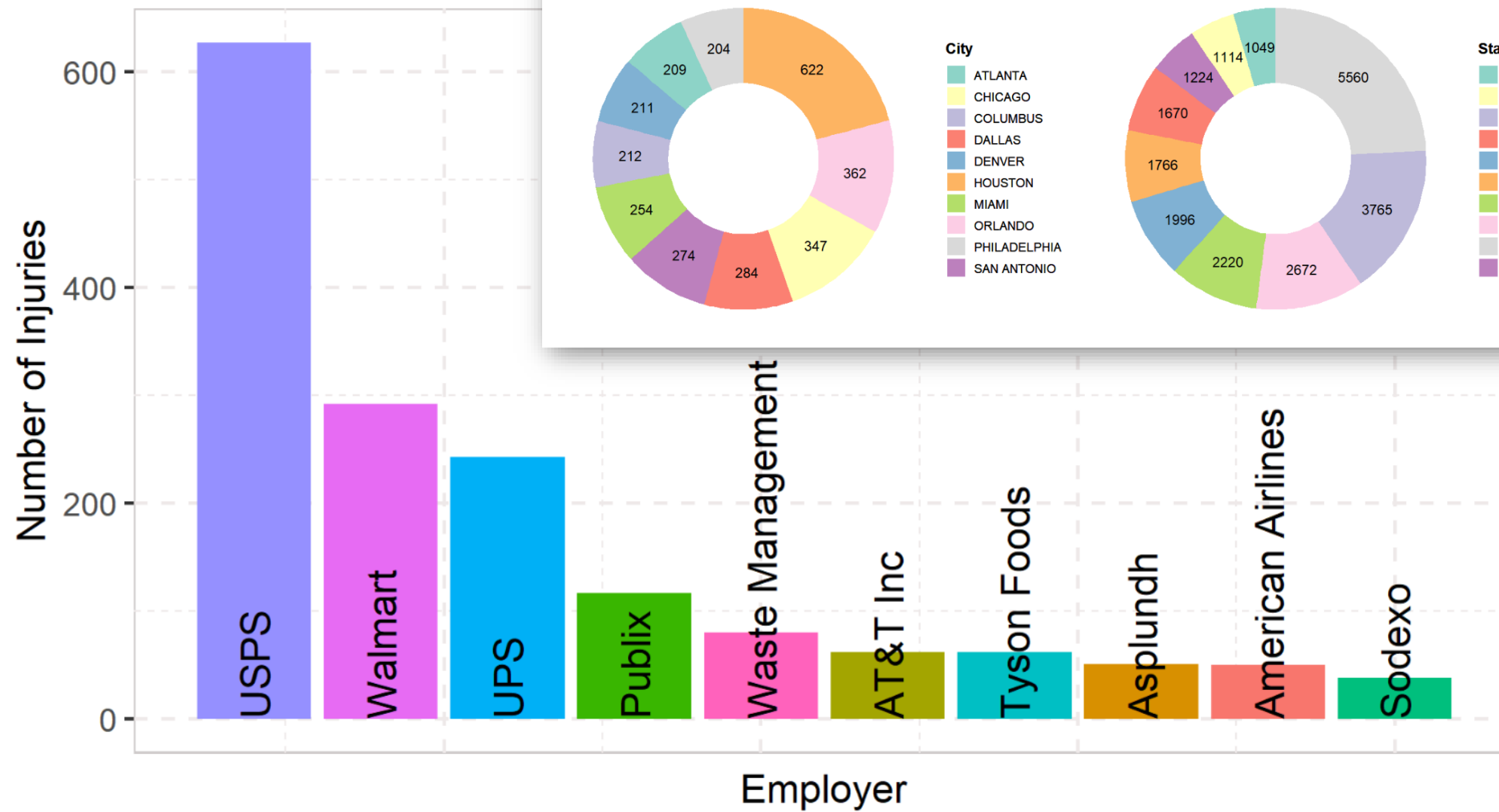


# By Hospitalization

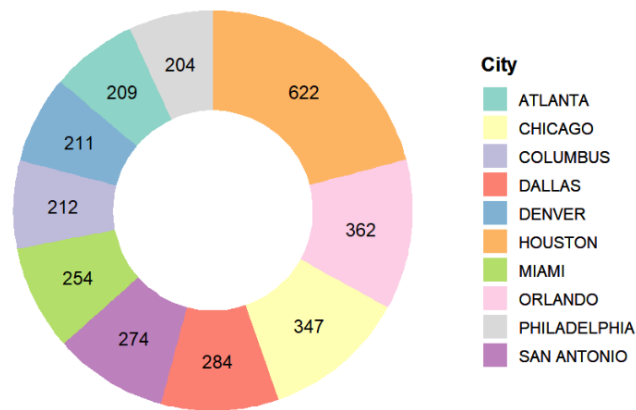


# All Industries (by Hospitalization)

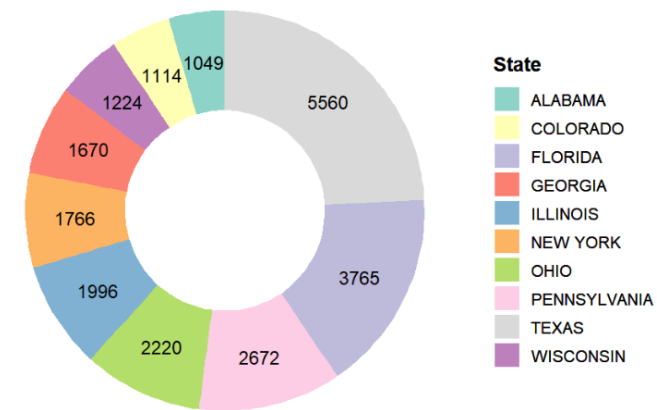
## Top 10 Employers



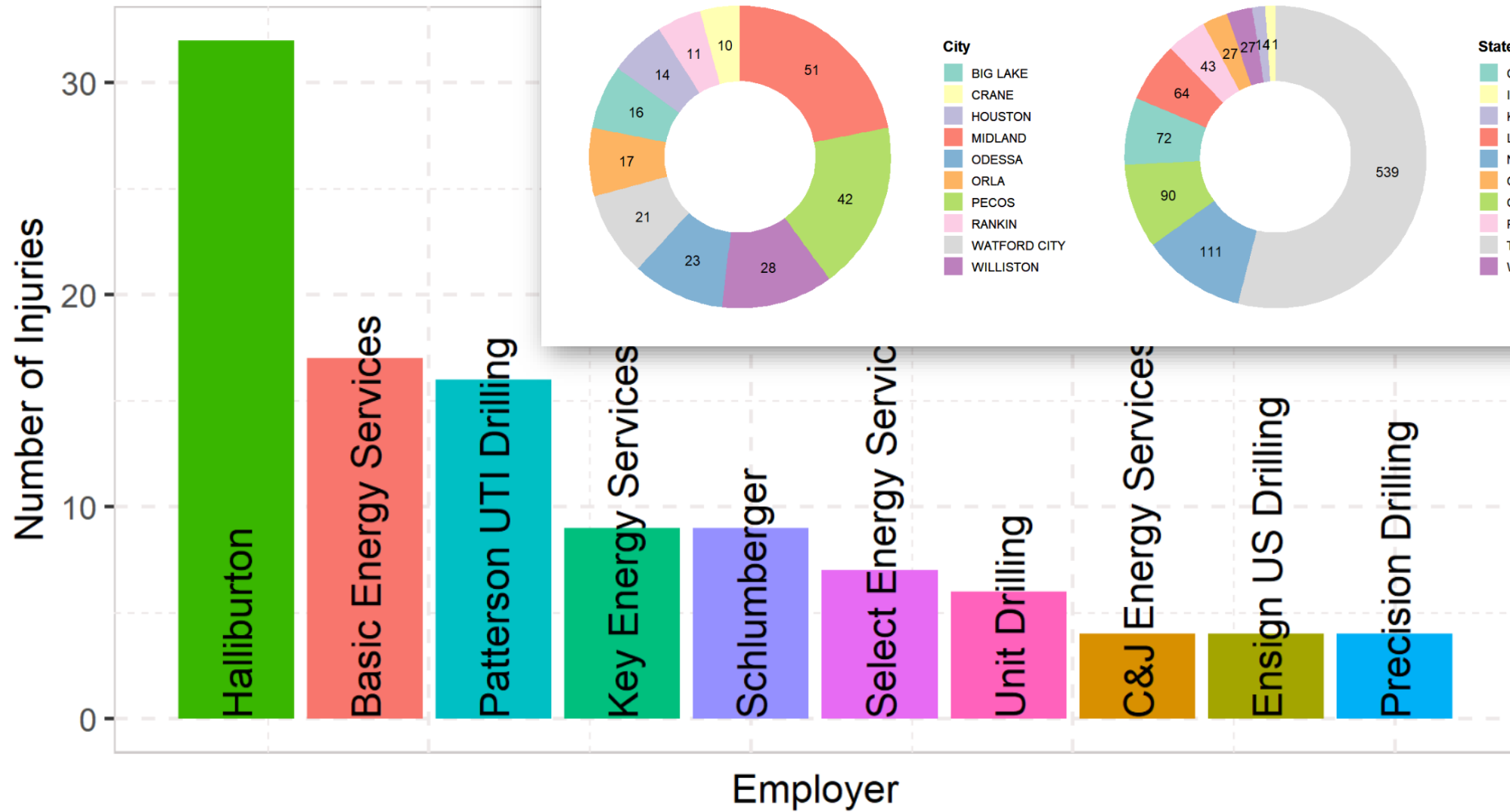
## 10 most dangerous cities (all) by hospitalization



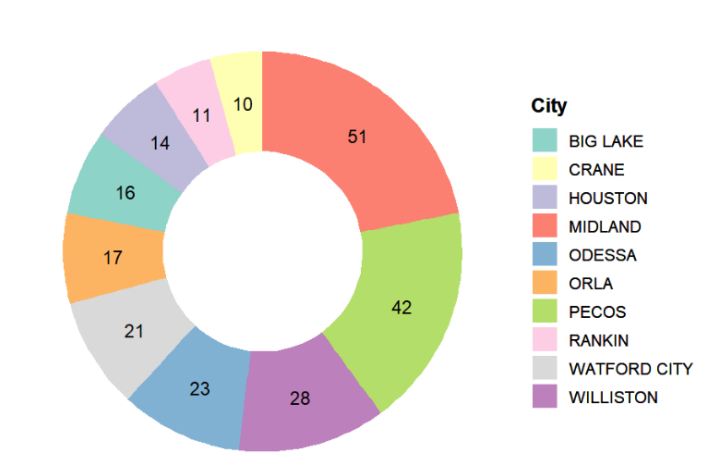
## 10 most dangerous states (all) by hospitalization



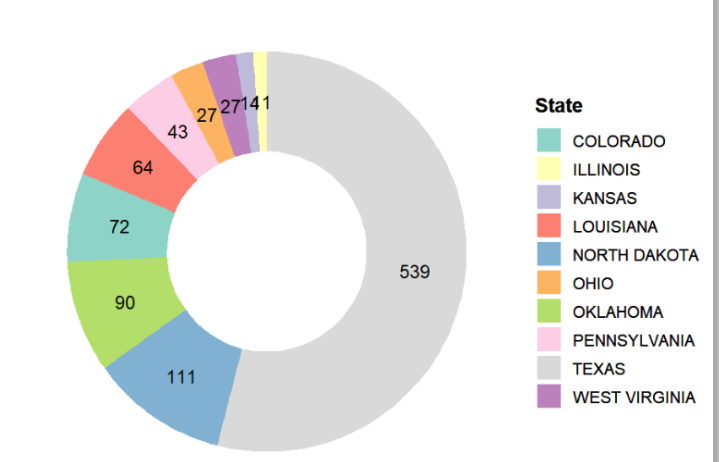
## Top 10 E



### 10 most dangerous cities (oil and gas) by hospitalization



### 10 most dangerous states (oil and gas) by hospitalization





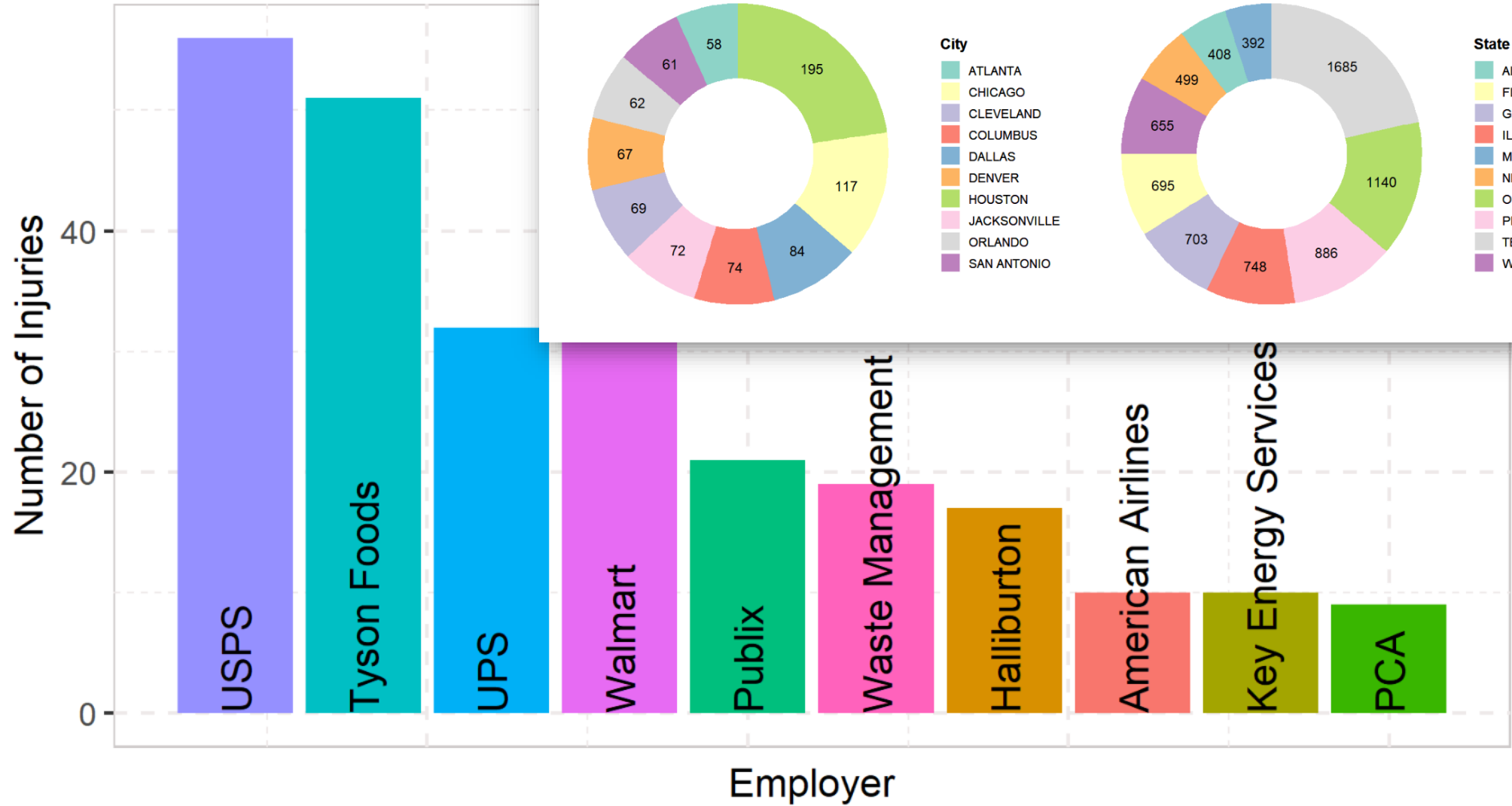


# By Amputation

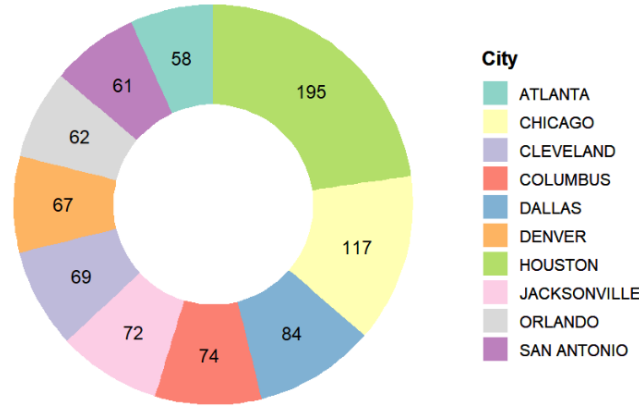


# All Industries (by Amputation)

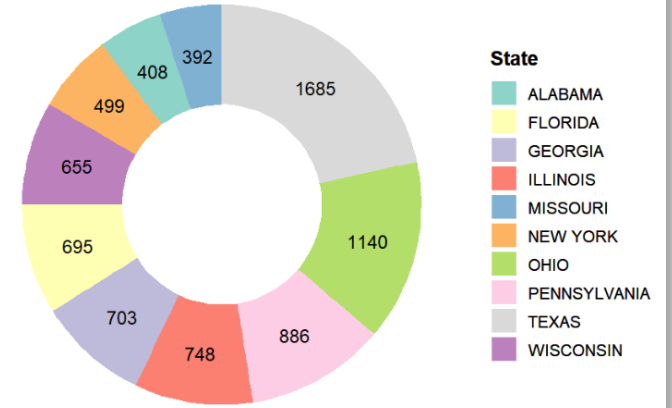
## Top 10 Employers



## 10 most dangerous cities (all) by amputation

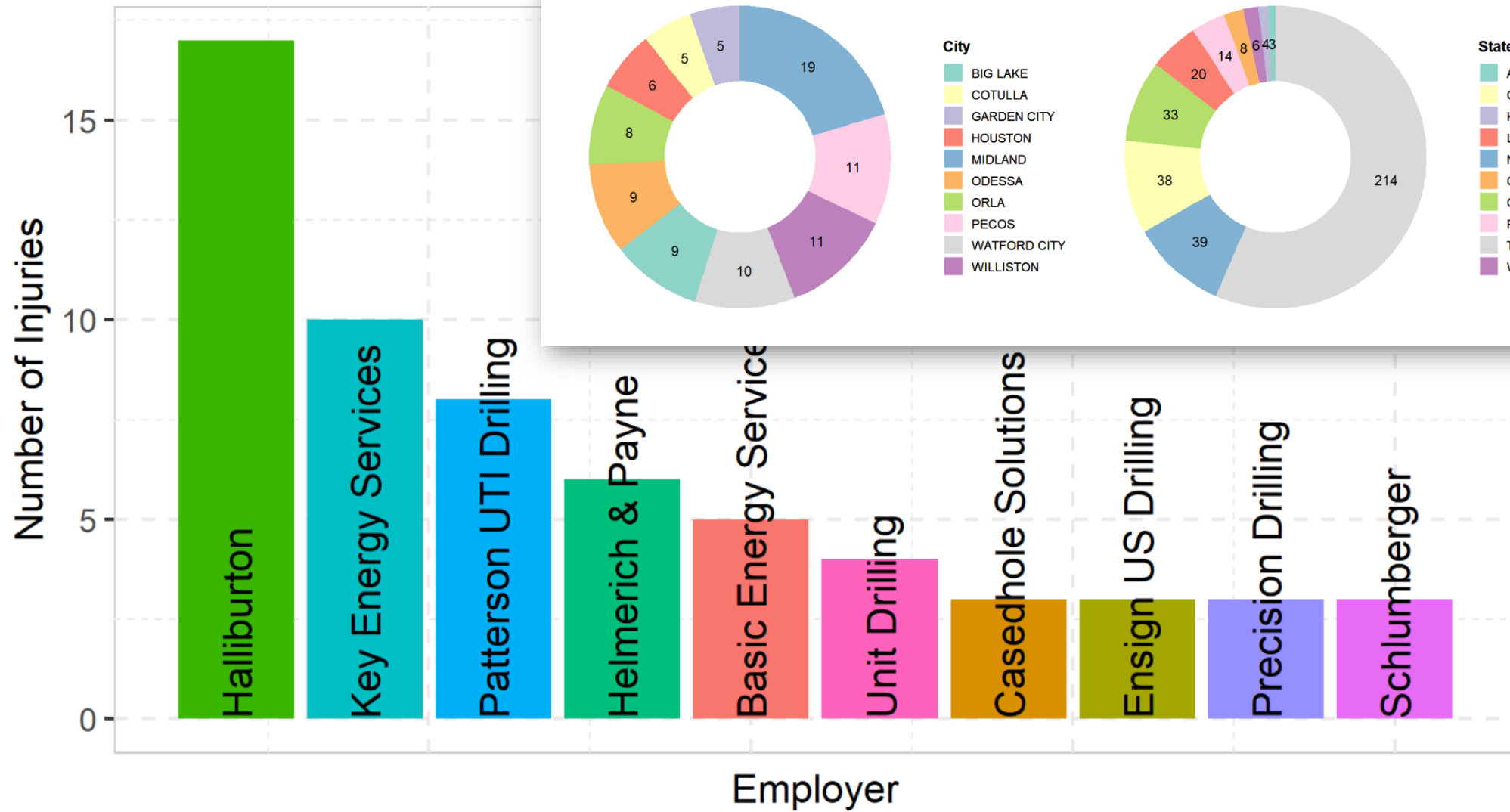


## 10 most dangerous states (all) by amputation

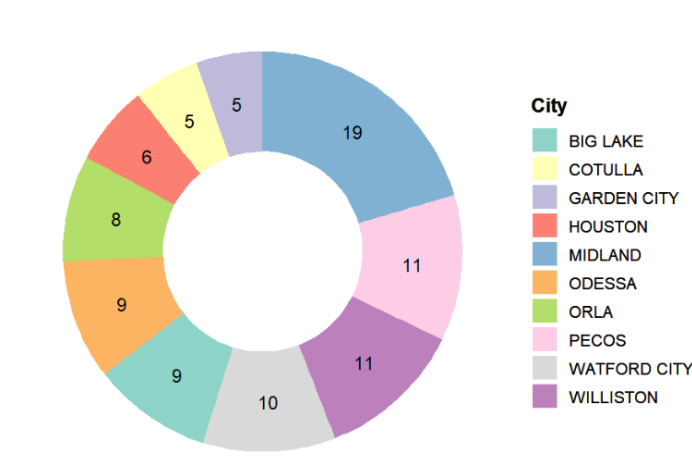


# Oil and Gas (by Amputation)

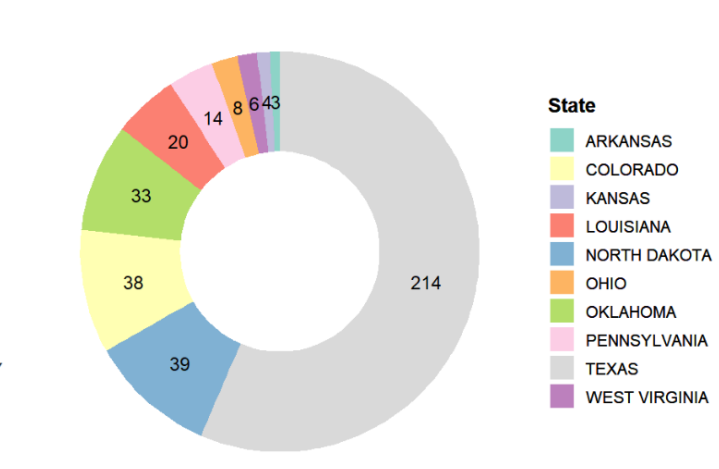
Top 10



10 most dangerous cities (oil and gas) by amputation



10 most dangerous states (oil and gas) by amputation



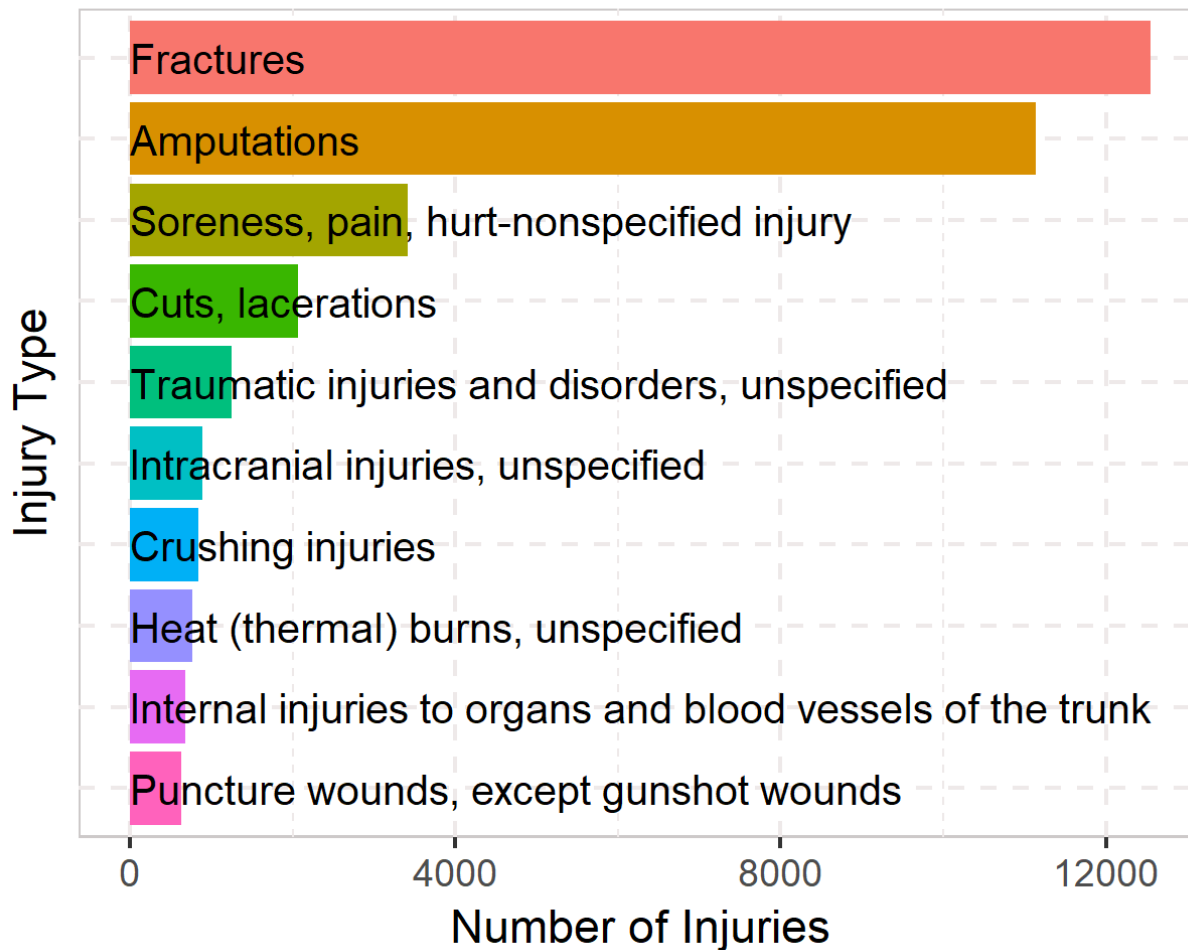


# Top 10 Injuries

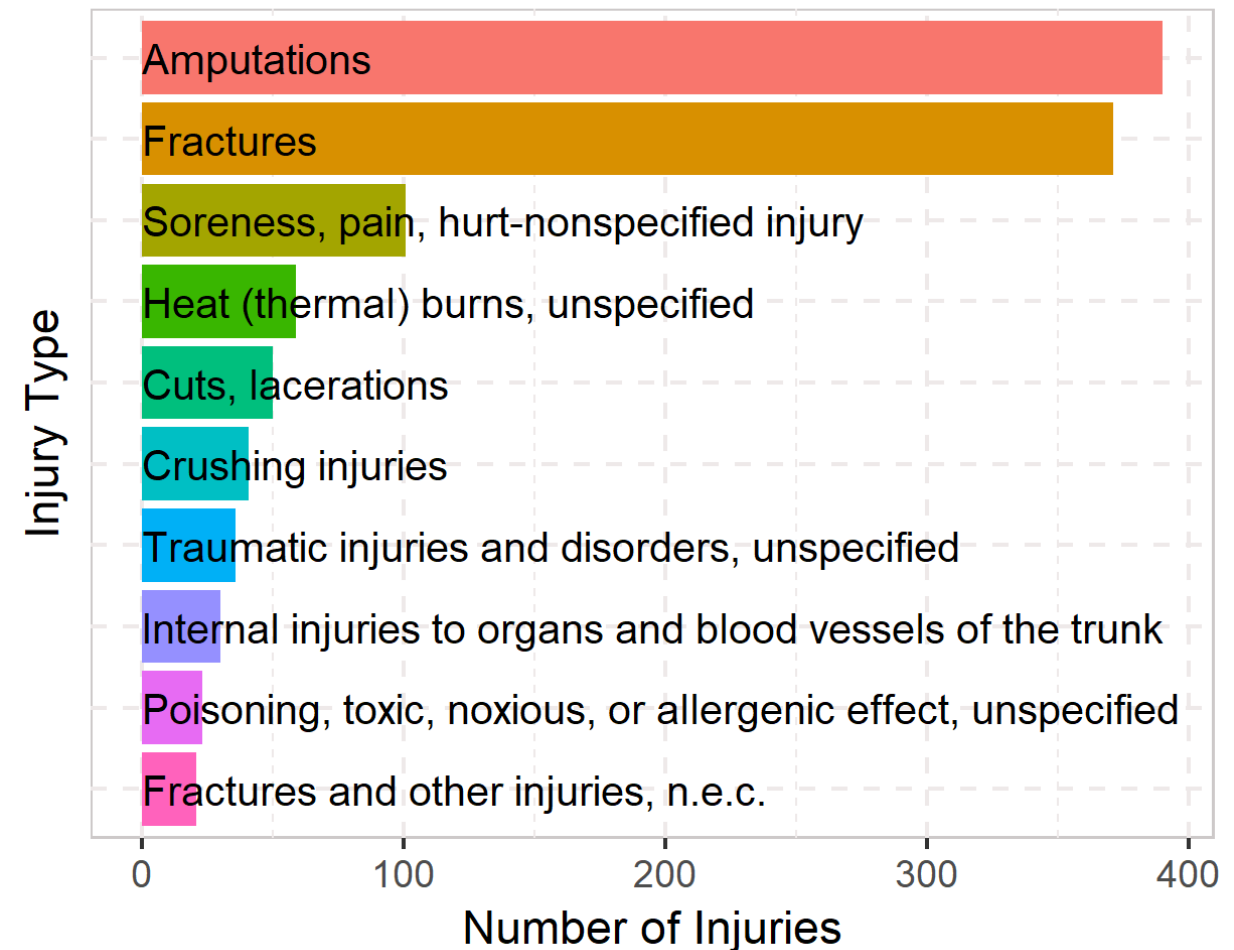


# Top 10 Injuries

## Top 10 Injuries (all industries)



## Top 10 Injuries (Oil&Gas industry)





# What can be done with the data?

- Standardize injury type from description
- Severity of injury from description
- Similarity of descriptions over time
- Forecasting

# How do we convert “descriptions” to variables?

- Words counting:

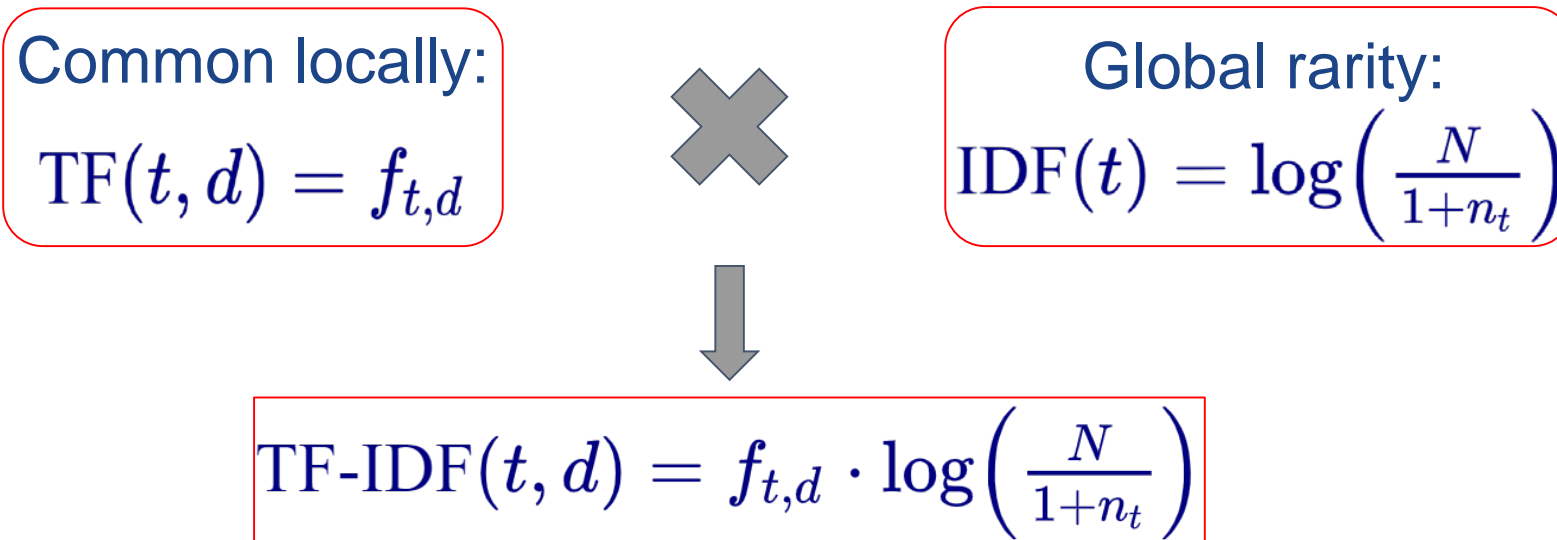
*“Let the cat out of the bag”*

*“Let the dog out of the bag”*

let	the	cat	out	of	bag	dog
1	2	1	1	1	1	0
1	2	0	1	1	1	1

## What about “stop words”?

- “a”, “the”, “an”, “in”
- TF-IDF (Term Frequency-Inverse Document Frequency)





## And now (our future work)?

- Start modeling!
- Remember: 168 types of injuries
- Improve variables conversion
- More data?



- CREWES sponsors
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