

# An Overview of the U.S. Highway Vehicle Fire Problem

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April 13,2005



# To Be Covered

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- ◆ Data sources
- ◆ Size of problem and trends
- ◆ Vehicle type
- ◆ Causal factors
- ◆ Issues for emergency responders

# Data Sources

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- ◆ National estimates derived from
  - ◆ National Fire Incident Reporting System (NFIRS)
  - ◆ NFPA's annual fire department survey
- ◆ Projections, not a census

# Prevention and Protection

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- ◆ Prevent fires or protect if fire occurs
- ◆ Engineering
  - ◆ Product design
- ◆ Education
  - ◆ Change behavior
- ◆ Enforcement
  - ◆ Behavior
  - ◆ Inspections
  - ◆ Safety standards

# Size of the Problem: 1999-2001

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- ◆ Annual average of
  - ◆ 266,000 highway vehicle fires
  - ◆ 350 civilian fire deaths
    - ◆ Trauma deaths excluded
  - ◆ 1,230 civilian fire injuries
  - ◆ \$959 million in direct property damage

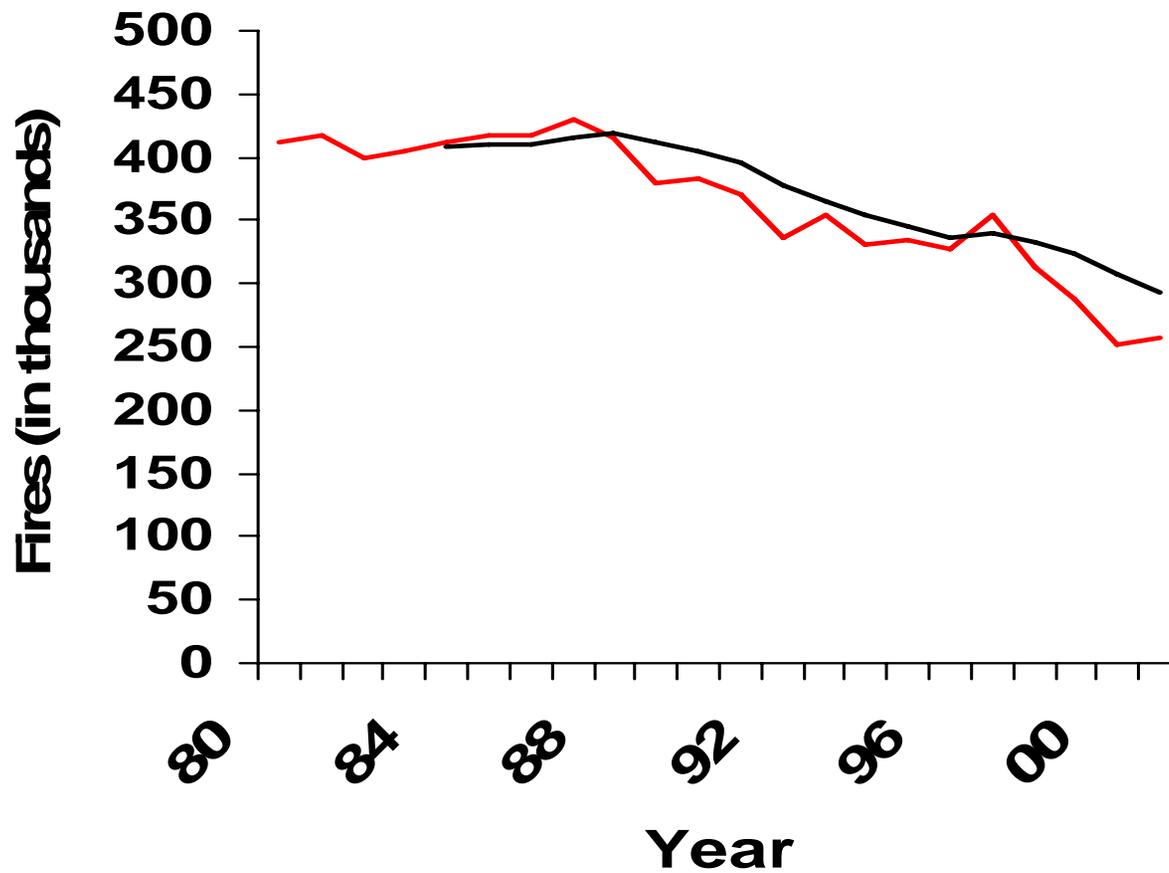
# Context

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- ◆ In 1999-2001,
  - ◆ 15% of US fires involved highway vehicles
  - ◆ 9% of fire deaths (non-9/11/01)
- ◆ 1 in every 750 highway vehicle fires resulted in death
- ◆ 3-5 times as many deaths as caused by non-home structure fires

# Highway Vehicle Fires by Year

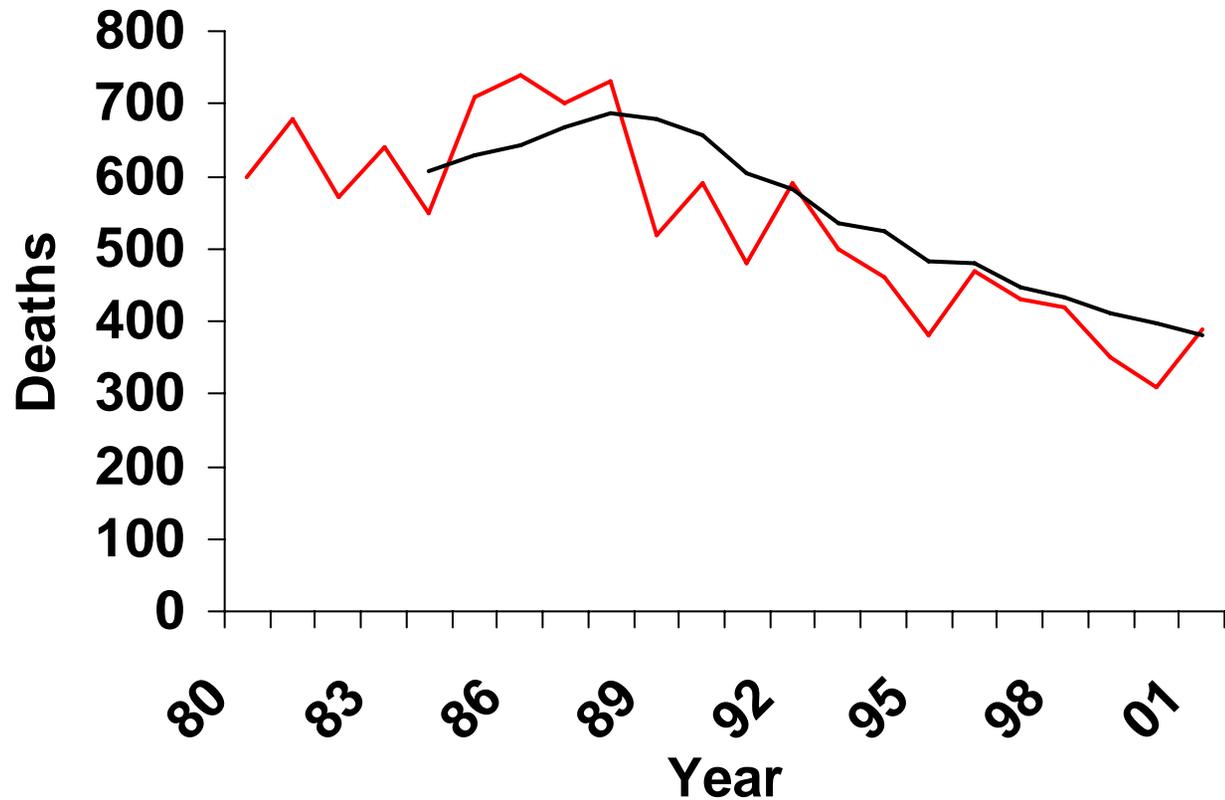
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Black line shows rolling averages

# Highway Vehicle Fire Deaths by Year

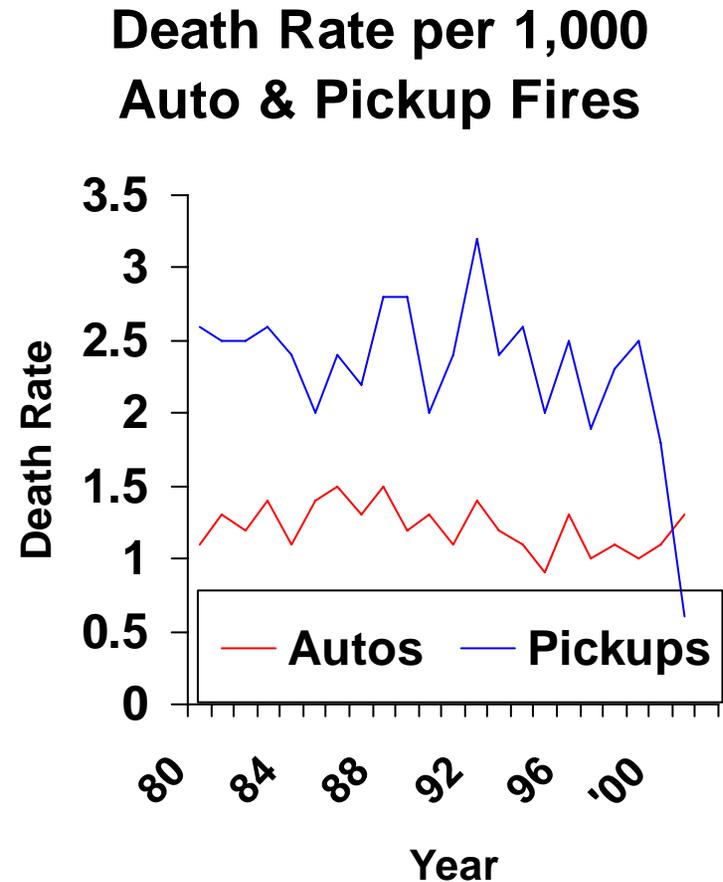
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Black line shows rolling averages

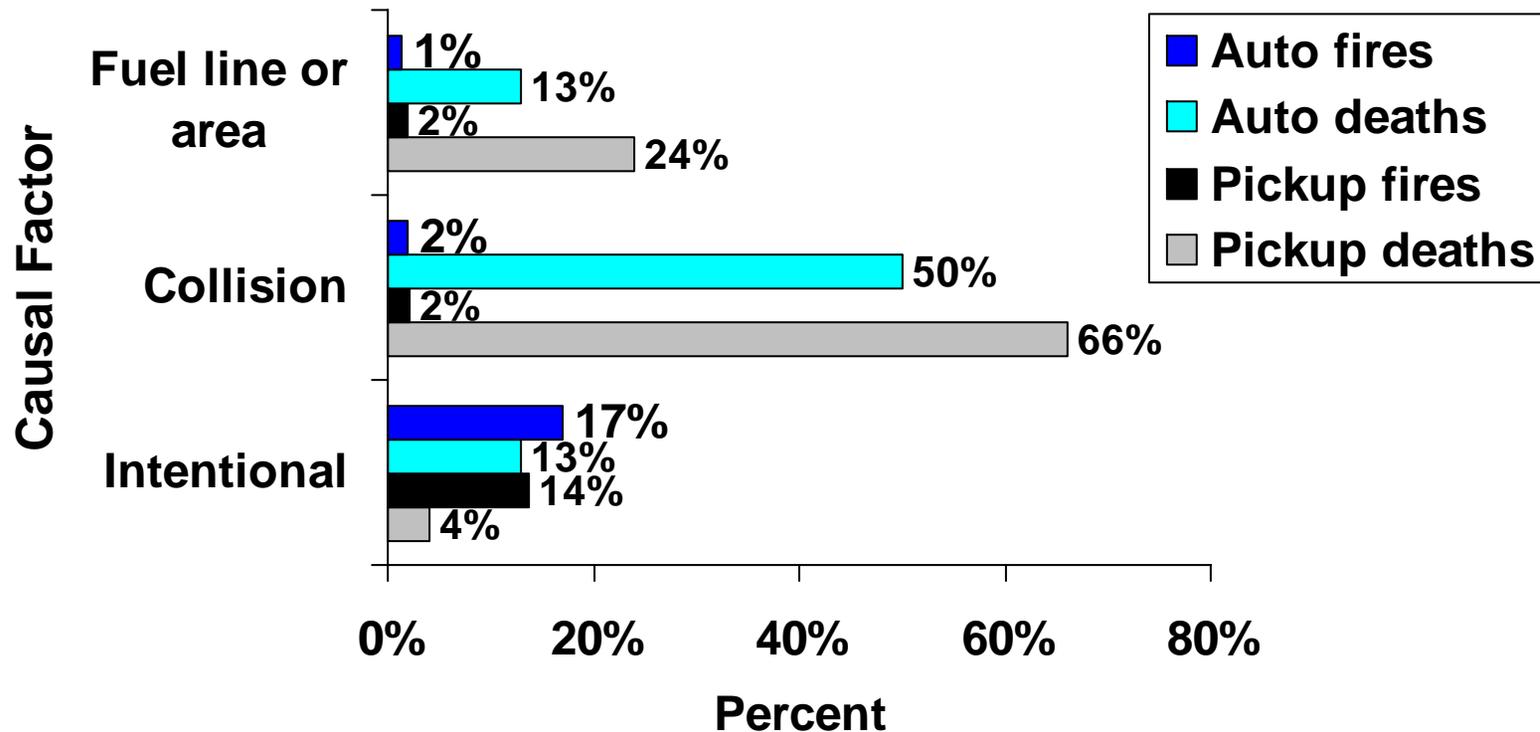
# Type of Vehicle Involved

- ◆ 80% cars, taxis, limos or ambulances
- ◆ 5% pick-ups or other small trucks
- ◆ 3% general use, dump or fire trucks
- ◆ 2% semi's
- ◆ 7% unclassified passenger vehicle
- ◆ <1% tank trucks
- ◆ No code for SUVs



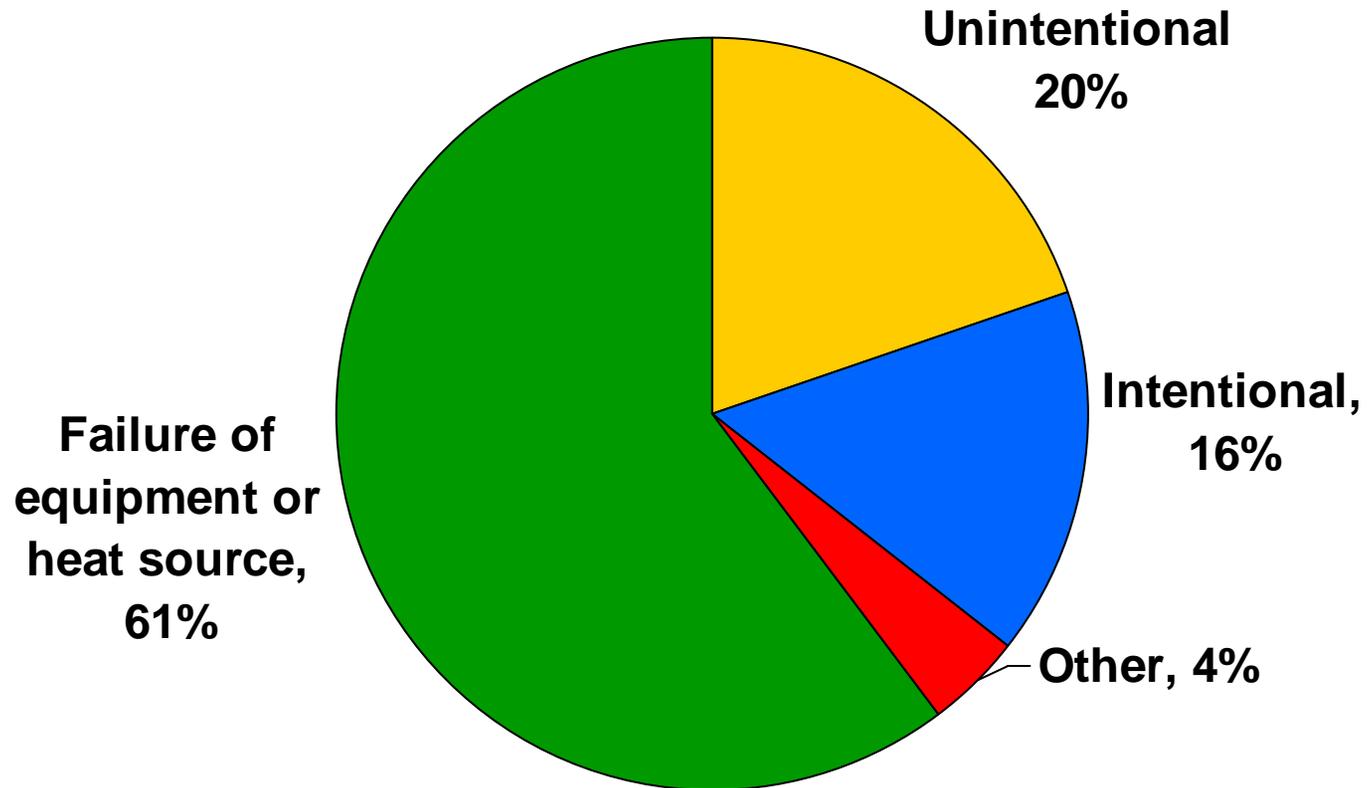
# Auto vs. Pickup Fires & Deaths

Selected Causal Factors for 1999-2001



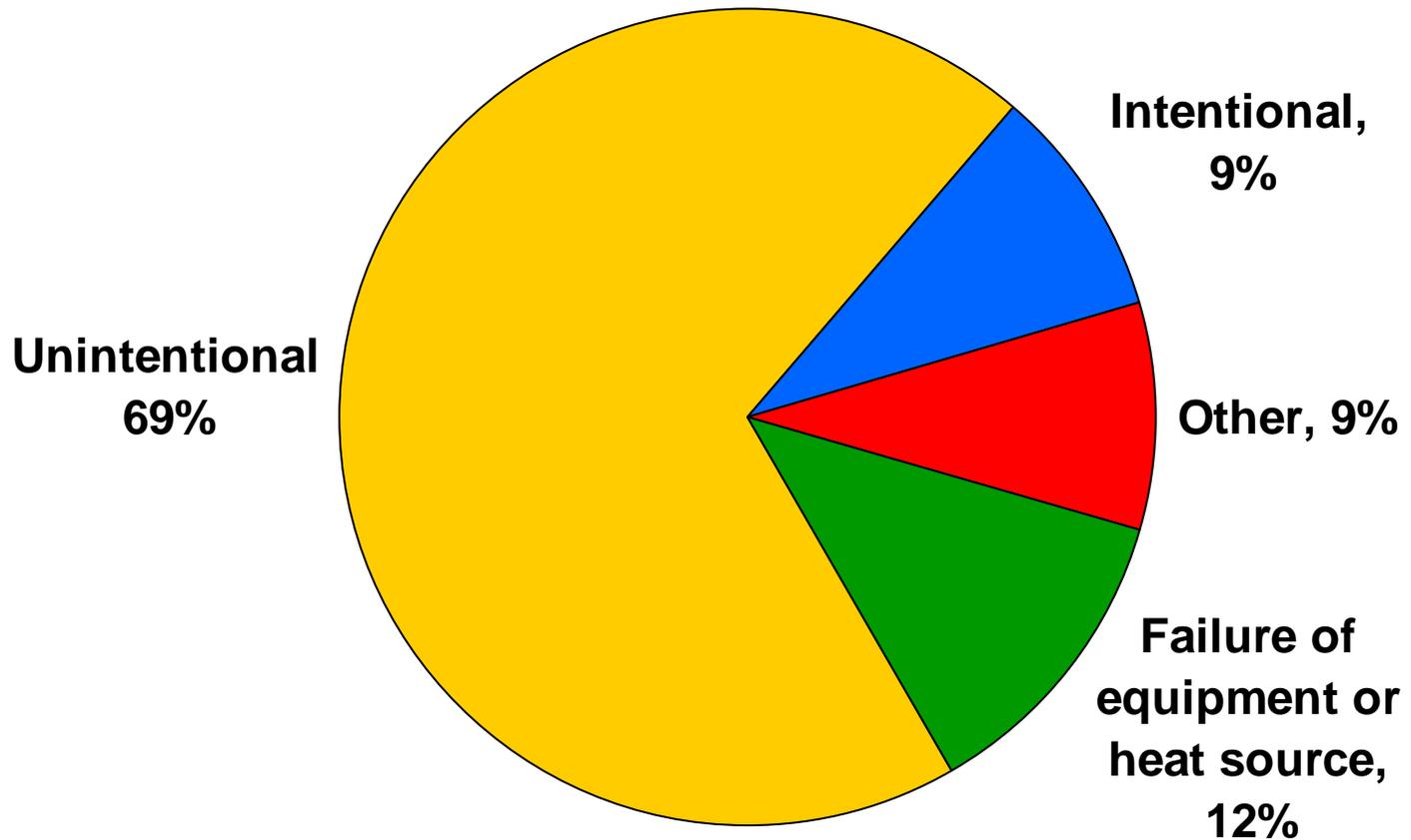
# Broad Causes of Highway Vehicle Fires

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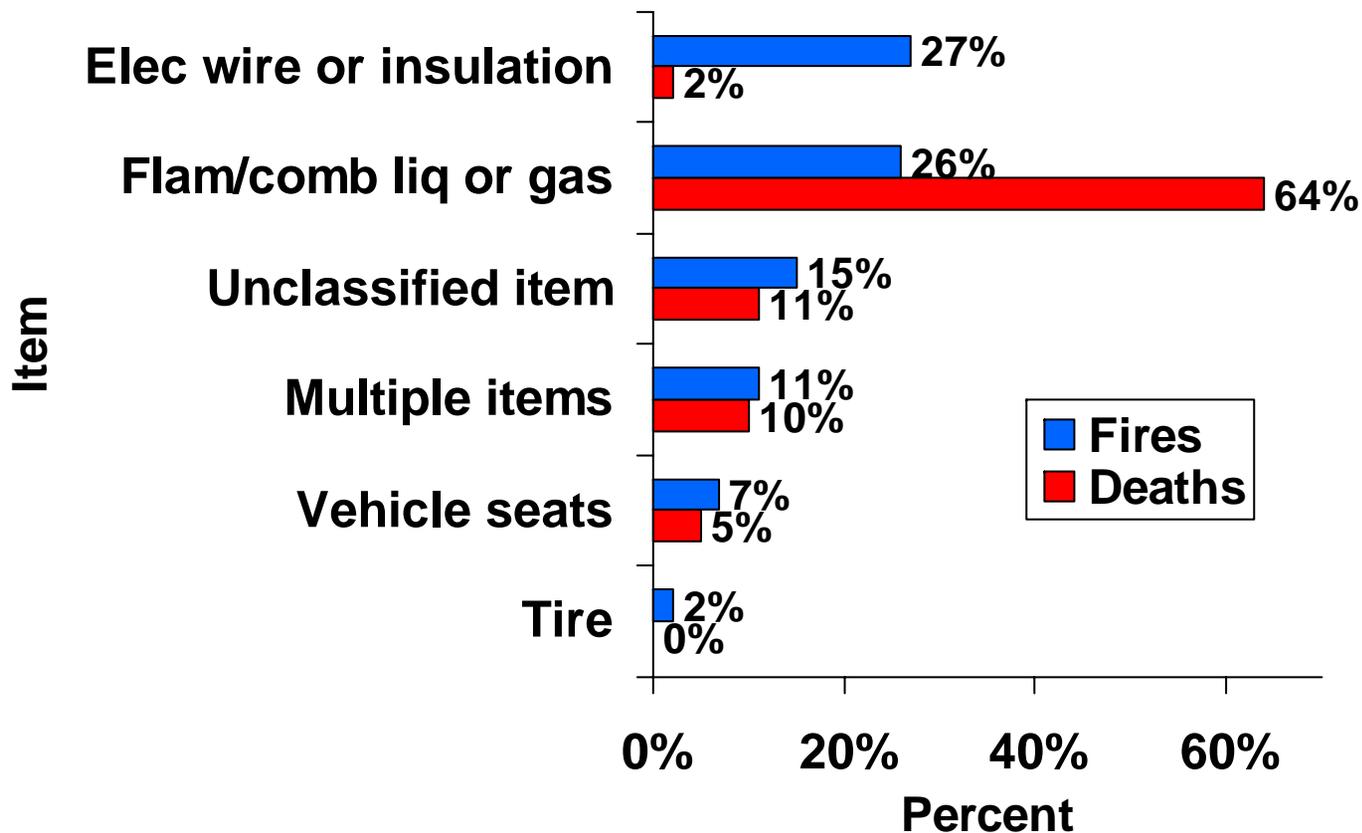
# Broad Causes of Vehicle Fire Deaths

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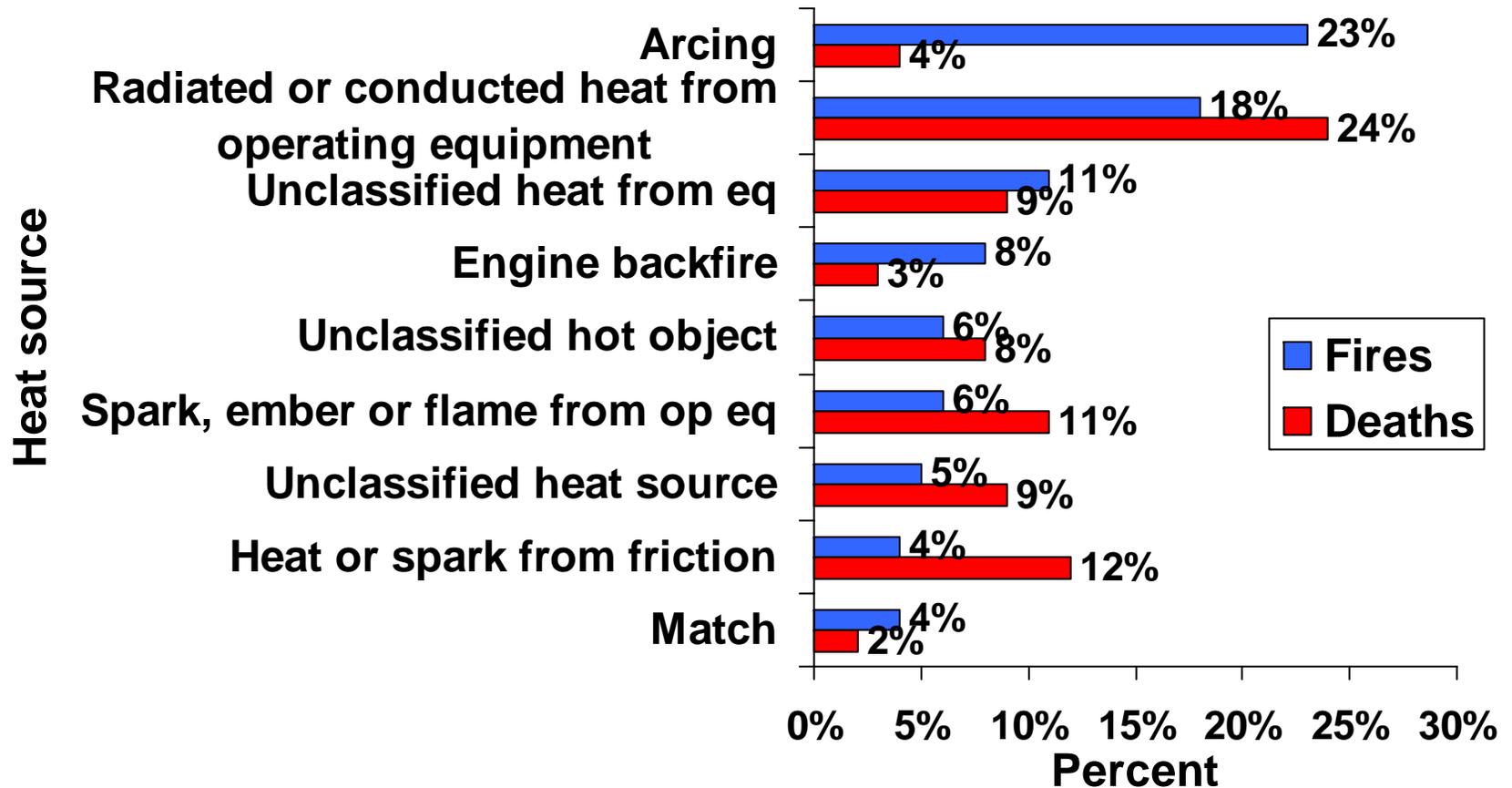


# Item First Ignited

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# Heat Source



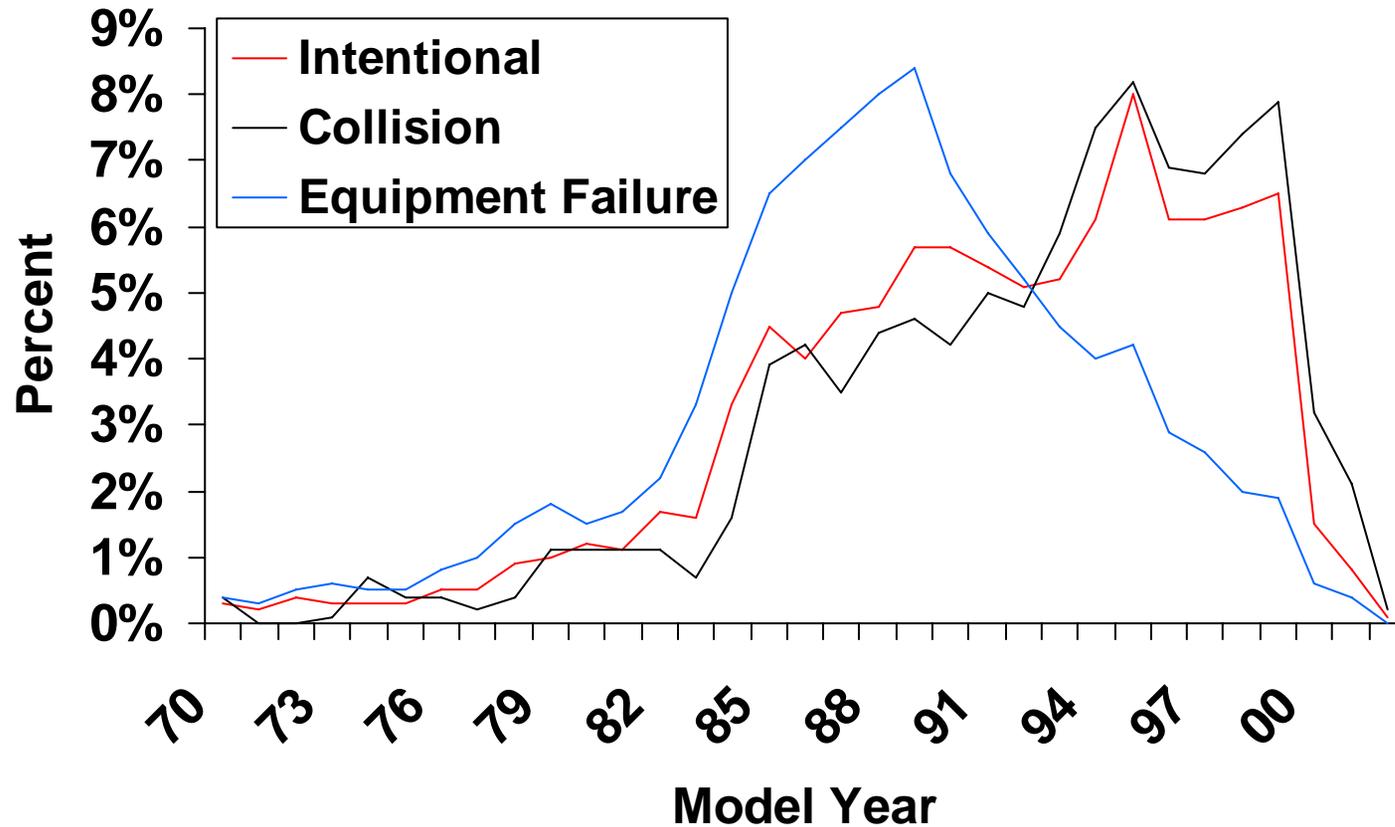
# Factors Contributing to Ignition

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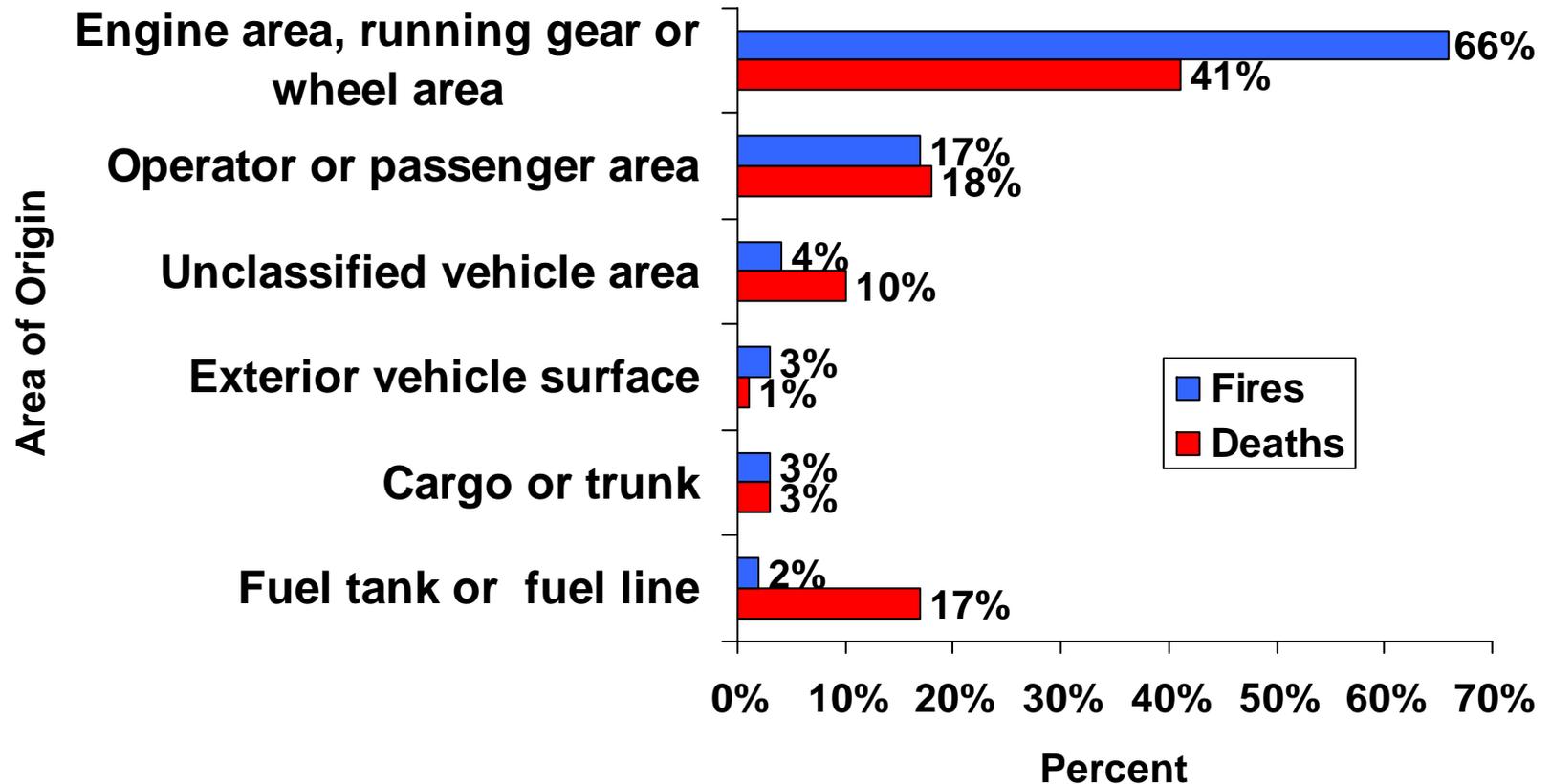
- ◆ Top three for fires
  - ◆ Unspecified short circuit arc 16%
  - ◆ Leak or break 15%
  - ◆ Unclassified mechanical 11%
- ◆ Collisions or overturns
  - ◆ 2% of fires
  - ◆ 52% of deaths
  - ◆ One of every 28 collision fires resulted in death

# Model Year for 2001 Fires

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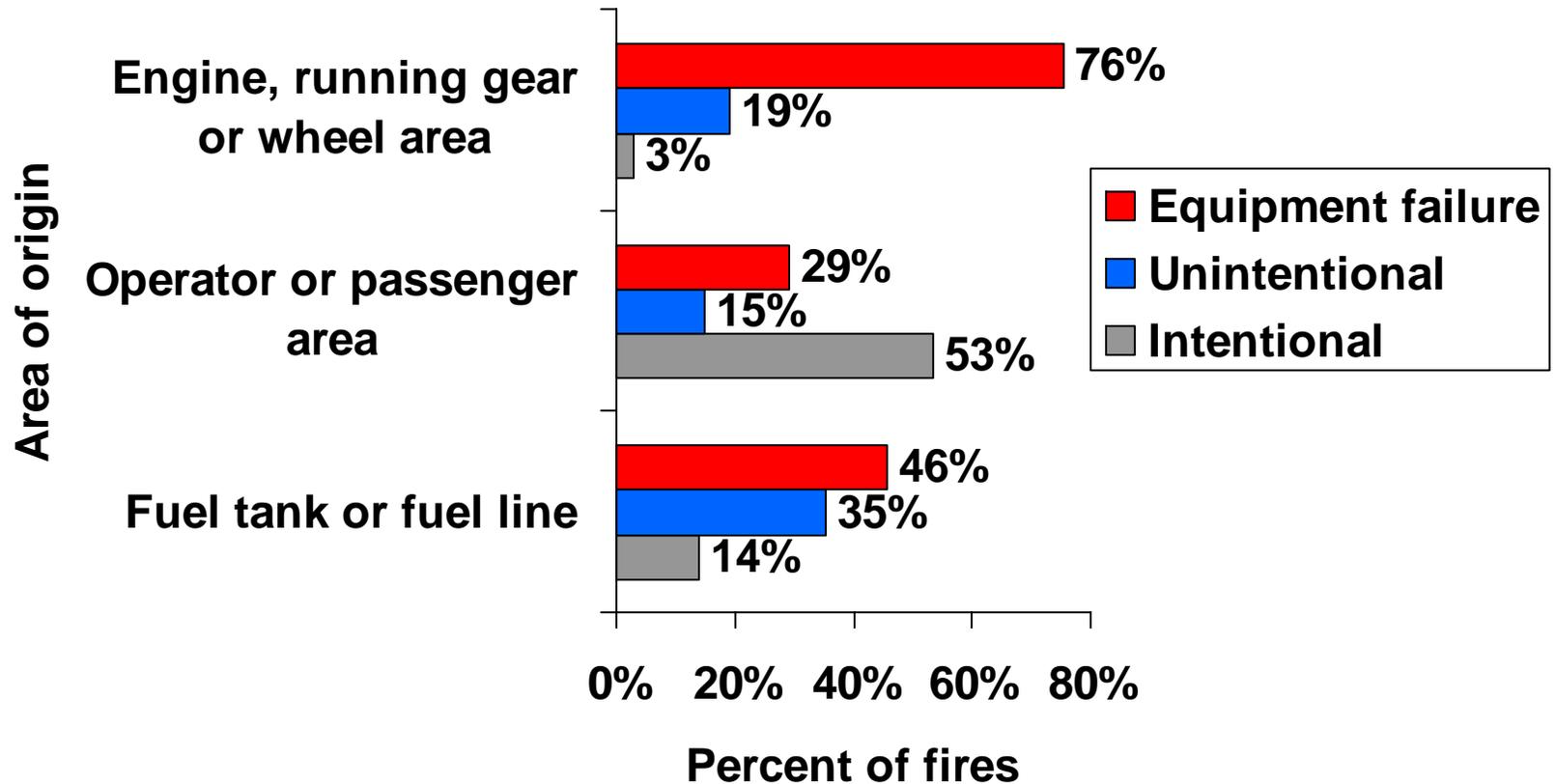


# Highway Vehicle Fire Areas of Origin



# Broad Causes

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# Fires Starting in Engine Area

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- ◆ 175,100 fires (66%)
  - ◆ 140 deaths (41%)
- ◆ Item first ignited
  - ◆ Electrical wire or cable insulation in 33%
  - ◆ Flammable or combustible liquids or gases in 32%
    - ◆ Mostly (80%) gasoline

# More on Engine Fires

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- ◆ Heat source
  - ◆ Arcing 26%
  - ◆ Radiated heat from equipment 23%
  - ◆ Unclassified heat from equipment 13%
  - ◆ Backfire 11%
- ◆ Factors contributing to ignition
  - ◆ Leak or break 21%
  - ◆ Unspecified short circuit arcs 15%
  - ◆ Collisions in 2% of fires, but 66% of deaths

# Operator or Passenger Area

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- ◆ 45,100 fires (17%)
  - ◆ 60 deaths (18%)
- ◆ Item first ignited
  - ◆ Seats 33%
  - ◆ Electrical wire or cable insulation 20%
  - ◆ Multiple items 16%
  - ◆ Flammable or combustible liquids or gases 11%

# More on Operator Area Fires

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- ◆ Heat source
  - ◆ Arcing 27%
  - ◆ Uncl. open flame or smoking material 14%
  - ◆ Matches 13%
  - ◆ Unclassified heat from powered equipment 6%
  - ◆ Radiated heat from equipment 6%
  - ◆ Cigarettes 6%
- ◆ Collisions were factors in <1% of fires, but 30% of deaths

# Fuel Tank or Fuel Line Fires

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- ◆ 4,200 fires (2%)
  - ◆ 60 deaths (17%)
- ◆ Item first ignited
  - ◆ Flammable or combustible liquid or gas 70%
    - ◆ Gasoline in 80% of these
- ◆ Factor contributing to ignition
  - ◆ Leaks or breaks: 27% of fires, 13% of deaths
  - ◆ Collisions: 9% of fires, 50% of deaths

# More on Fuel Tank/Line Fires

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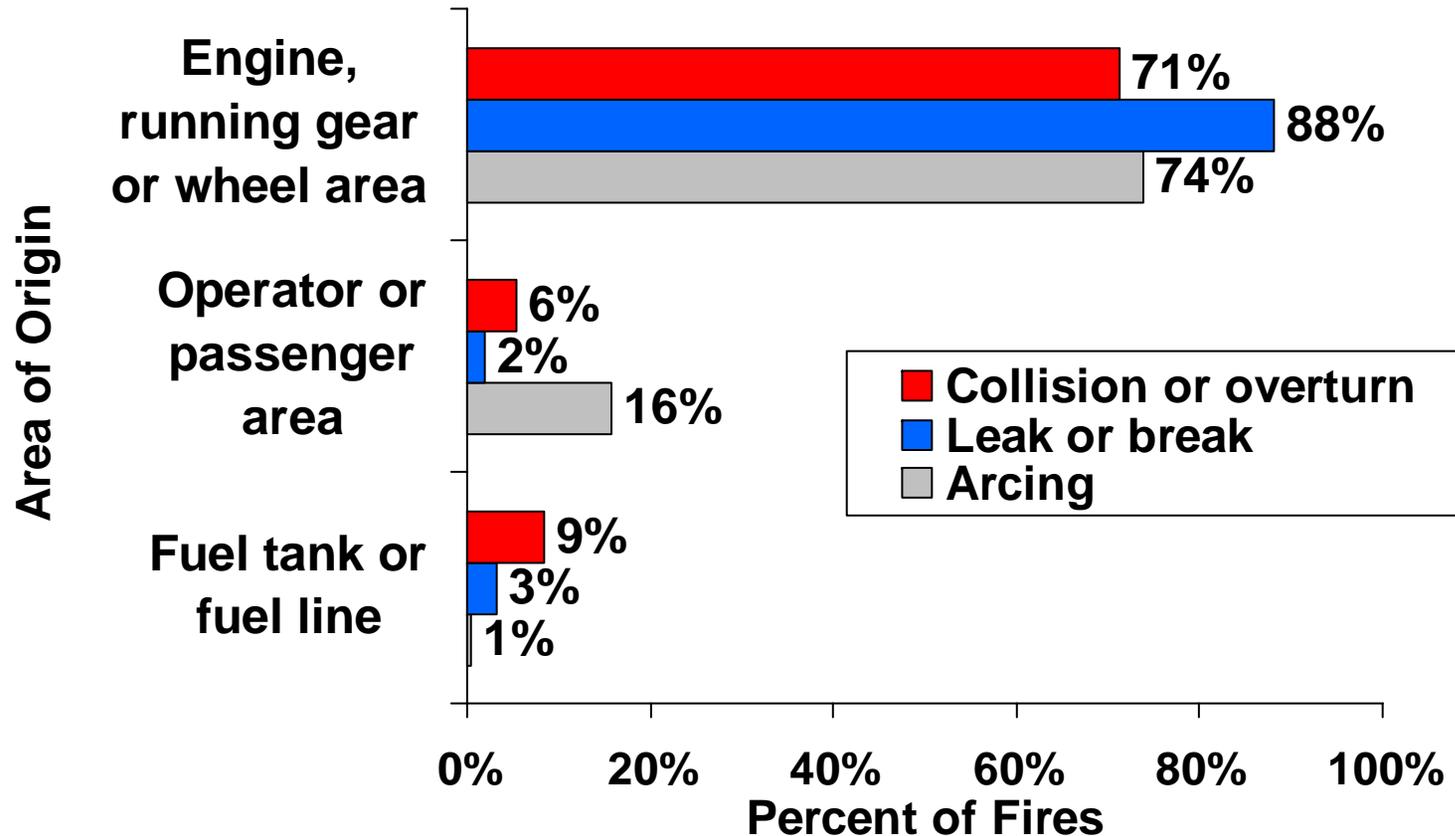
- ◆ Heat source
  - ◆ Radiated heat from equipment 23%
  - ◆ Spark from operating equipment 14%
  - ◆ Unclassified heat from equipment 10%
  - ◆ Unclassified hot object 9%
  - ◆ Arcing 7%

# Major Causal Factors

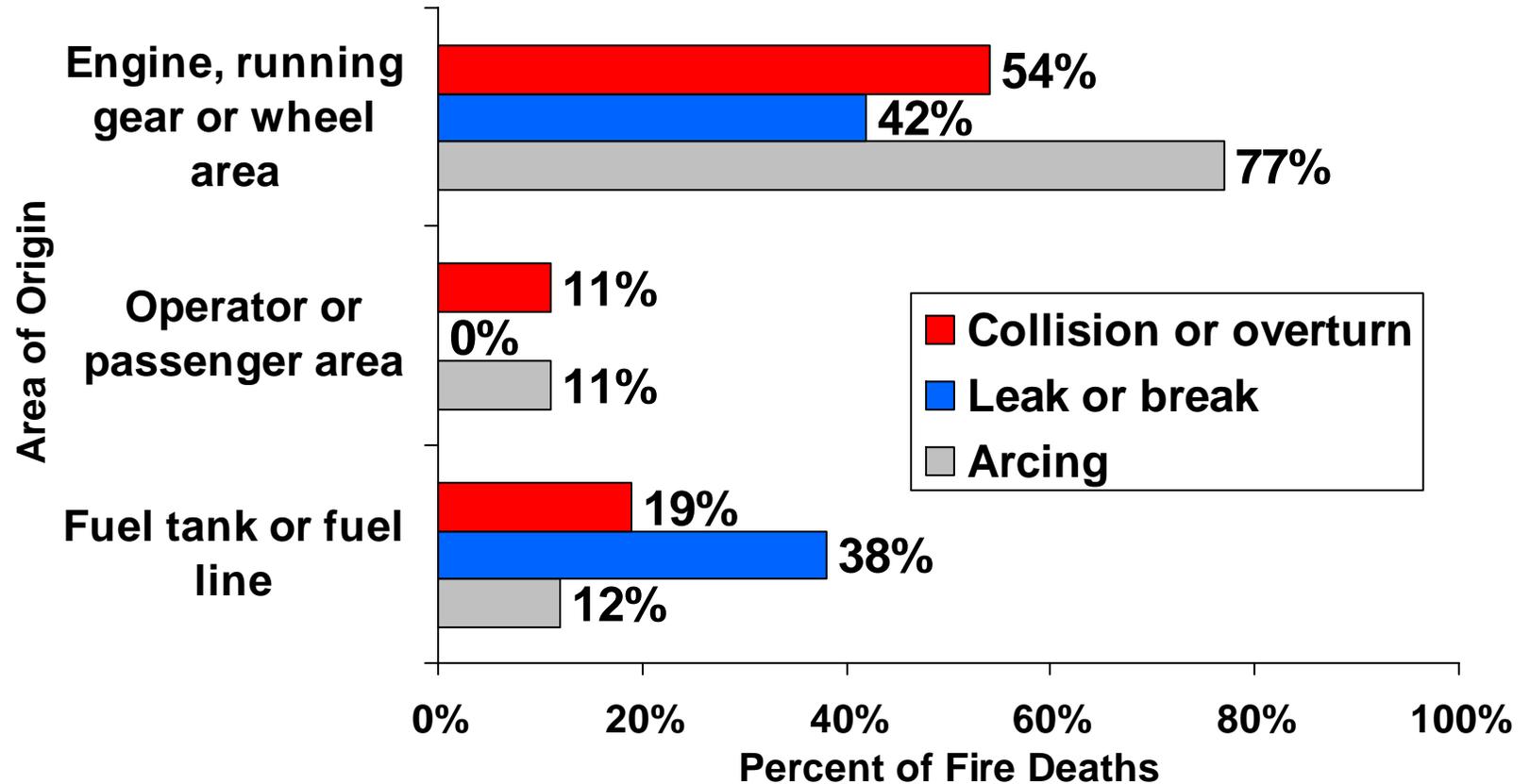
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- ◆ Heat source: arcing
  - ◆ 62,000 fires (23%)
  - ◆ 10 deaths (4%)
- ◆ Factor contributing to ignition: leak or break
  - ◆ 39,200 fires (15%)
  - ◆ 20 deaths (6%)
- ◆ Factor contributing: collision or overturn
  - ◆ 5,100 fires (2%)
  - ◆ 180 deaths (52%)

# Major Fire Causal Factors by Area

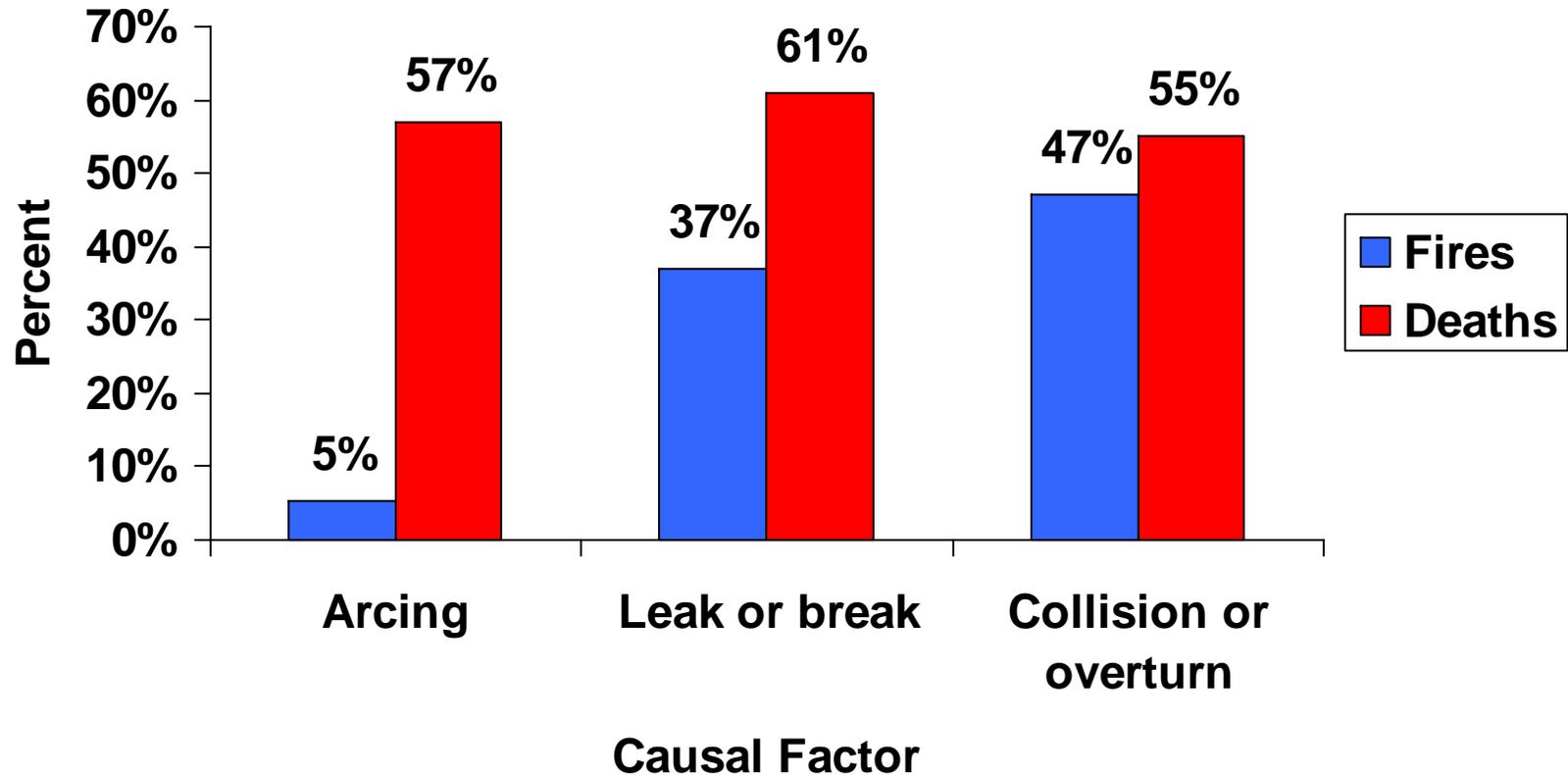


# Fire Death Causal Factors by Area



# Flammable/Combustible Liquid or Gas

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# Issues for Emergency Responders

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- ◆ Collisions
  - ◆ Rearrange components
  - ◆ Can obscure vehicle identification
- ◆ Responders need to locate and disable
  - ◆ Air bags
  - ◆ Power source
- ◆ New technology, designs, power
- ◆ Vehicle Safety Data Sheet decal?
  - ◆ Proposed by Firehouse.com's Ron Moore
  - ◆ <http://www.firehouse.com/extrication/archives/1999/july99.html>

# Summary

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- ◆ Highway vehicle fires account for 15% of US fires and 9% of US fire deaths
- ◆ Different causal patterns for fires and deaths
  - ◆ Most vehicle fires due to equipment failure
  - ◆ Collisions cause 2% of fires, but 52% of associated fire deaths
- ◆ General statistics point to areas for more detailed research