



An Analysis of HEMS Accidents and Accident Rates

Ira Blumen, MD
UCAN

University of Chicago Medical Center
NTSB Public Hearing – February, 2009
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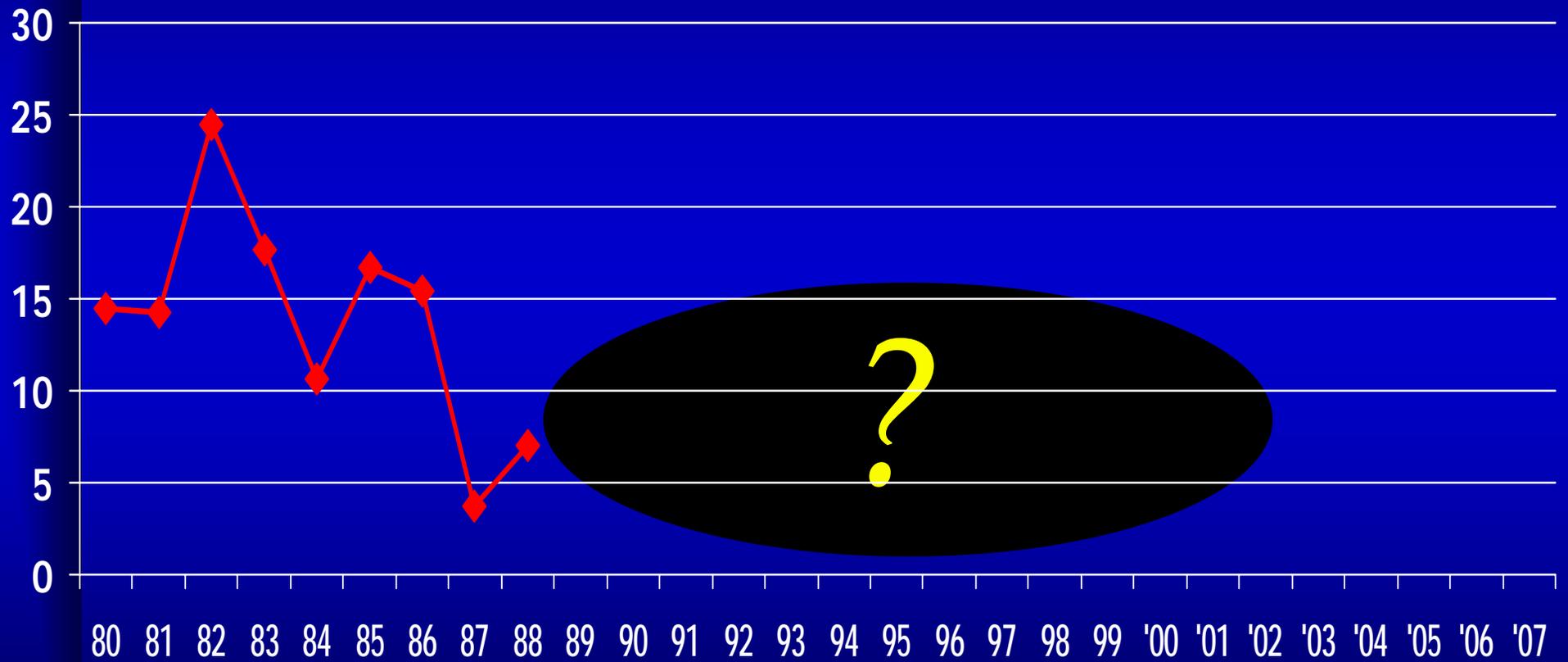
NTSB Report, 1988*



- ◆ 59 HEMS accidents
 - 47 patient missions
 - 12 “other”
- ◆ Accident rates
 - 12.34/100,000 flight hours
 - ***Nearly double other Part 135***
- ◆ Fatal Accident rates
 - 5.4/100,000 flight hours
 - ***Nearly 3.5 times other Part 135***

* “Safety Study -- Commercial Emergency Medical Service Helicopter Operations”

HEMS Accidents Rates / 100,000 Flight Hours



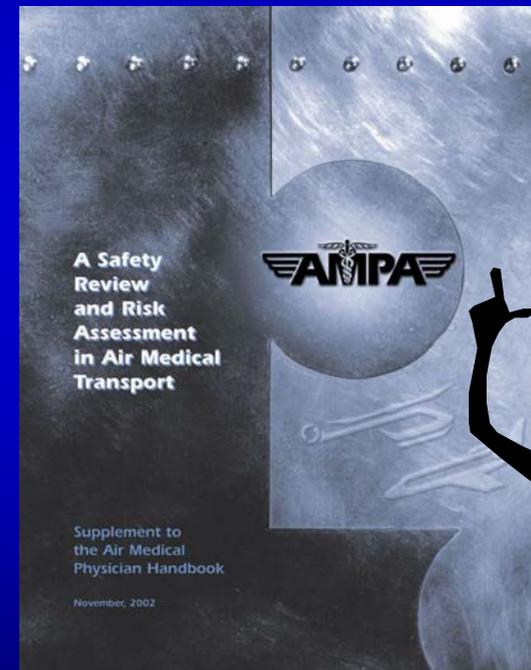


*“You can’t manage
what you can’t measure”*

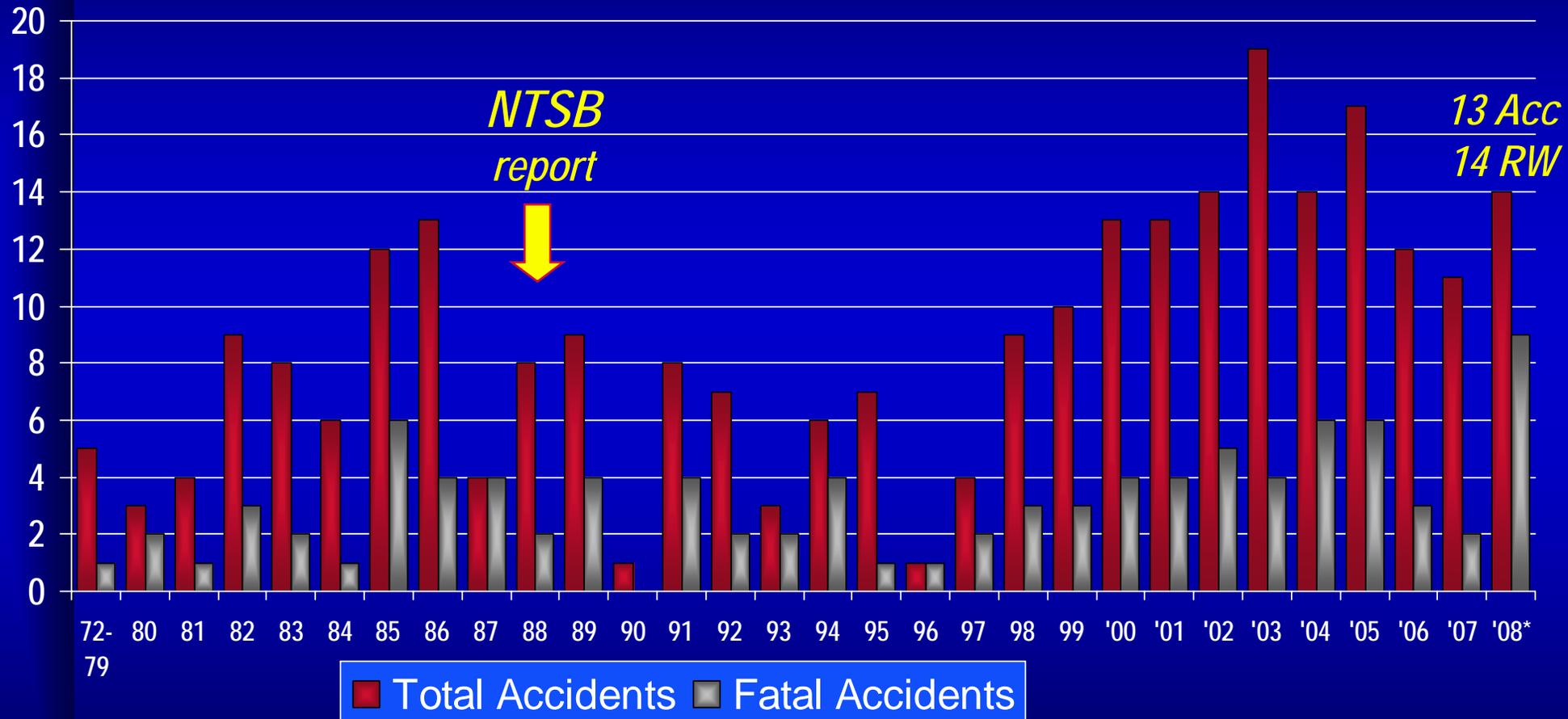
Our Study: 2002, 2005-2008



- ◆ Determine the magnitude of the HEMS “risk”
 - Accident rates
 - Fatal accident rates
 - Death rates
- ◆ Compare the risk to
 - Other occupations
 - High risk activities



U.S. HEMS Accidents and Fatal Accidents



**Dedicated and dual-purpose through December 31, 2008*

Accidents and Injuries: 1972-2008

- ◆ 264 accidents
 - 256 dedicated HEMS
 - 8 dual-purpose aircraft
 - 98 (of 264) with fatalities
- ◆ 797 individuals
 - 264 fatalities
 - 89 serious
 - 104 minor
 - 340 uninjured



through December 31, 2008

Focus: 1998-2008



- ◆ 146 HEMS accidents
 - 55% off all HEMS accidents since 1972
 - 141 dedicated HEMS
 - 5 dual purpose
 - 50 (of 146) fatal
 - 47 HEMS
 - 3 dual purpose



through December 31, 2008

Focus: 1998-2008



- ◆ 430 individuals
 - 131 fatalities
 - 105 HEMS crewmembers
 - 6 dual purpose crewmembers
 - 16 patients
 - 4 others
 - 49 serious
 - 42 minor
 - 208 uninjured



HEMS: 1998-2008 (146 accidents)



Avg. accidents/yr

1988-1997: 5.0

98-08: 12.4
 Fatal Accidents: 4.5

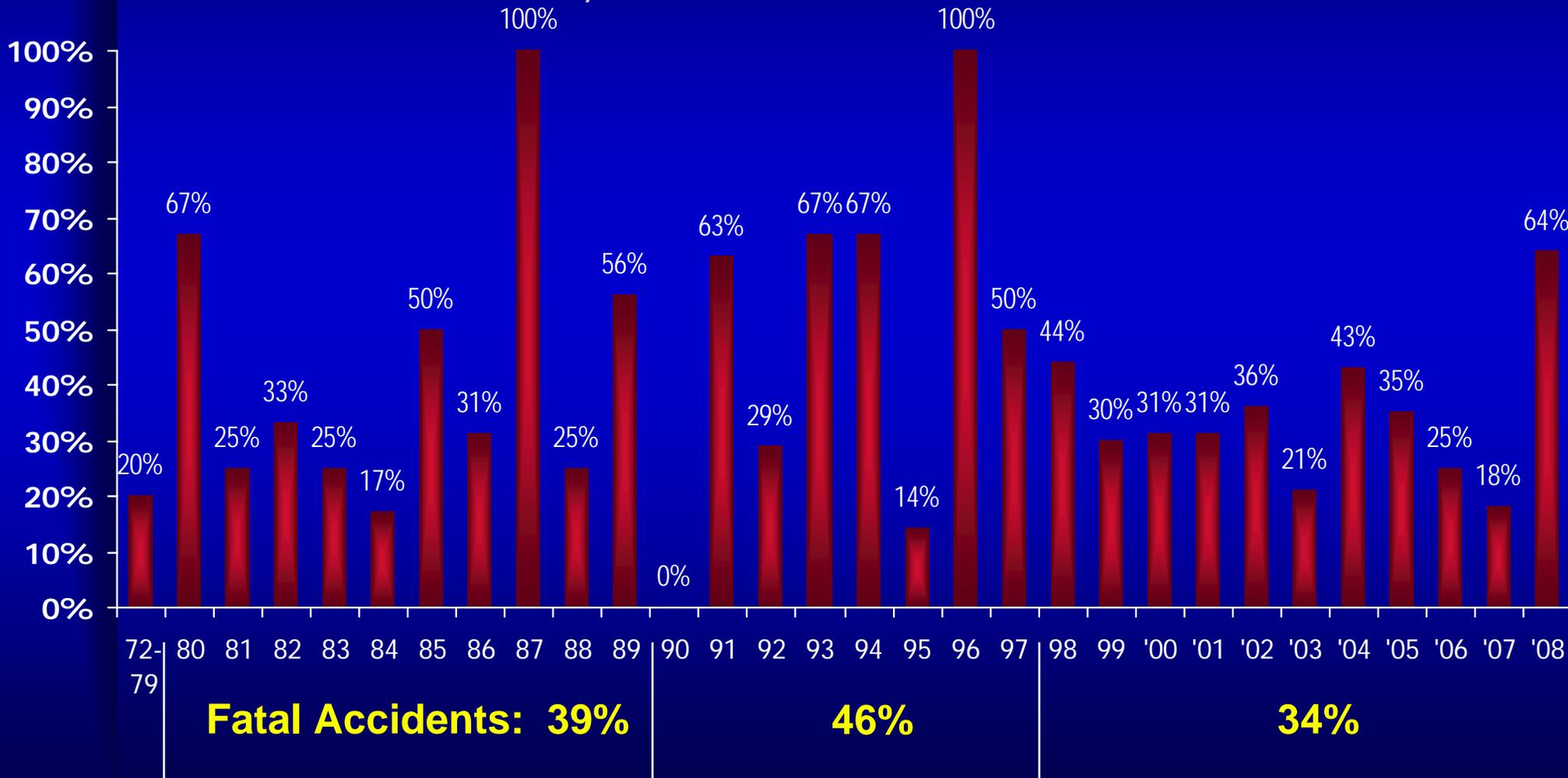


*Dedicated and Dual-purpose
 through December 31, 2008*

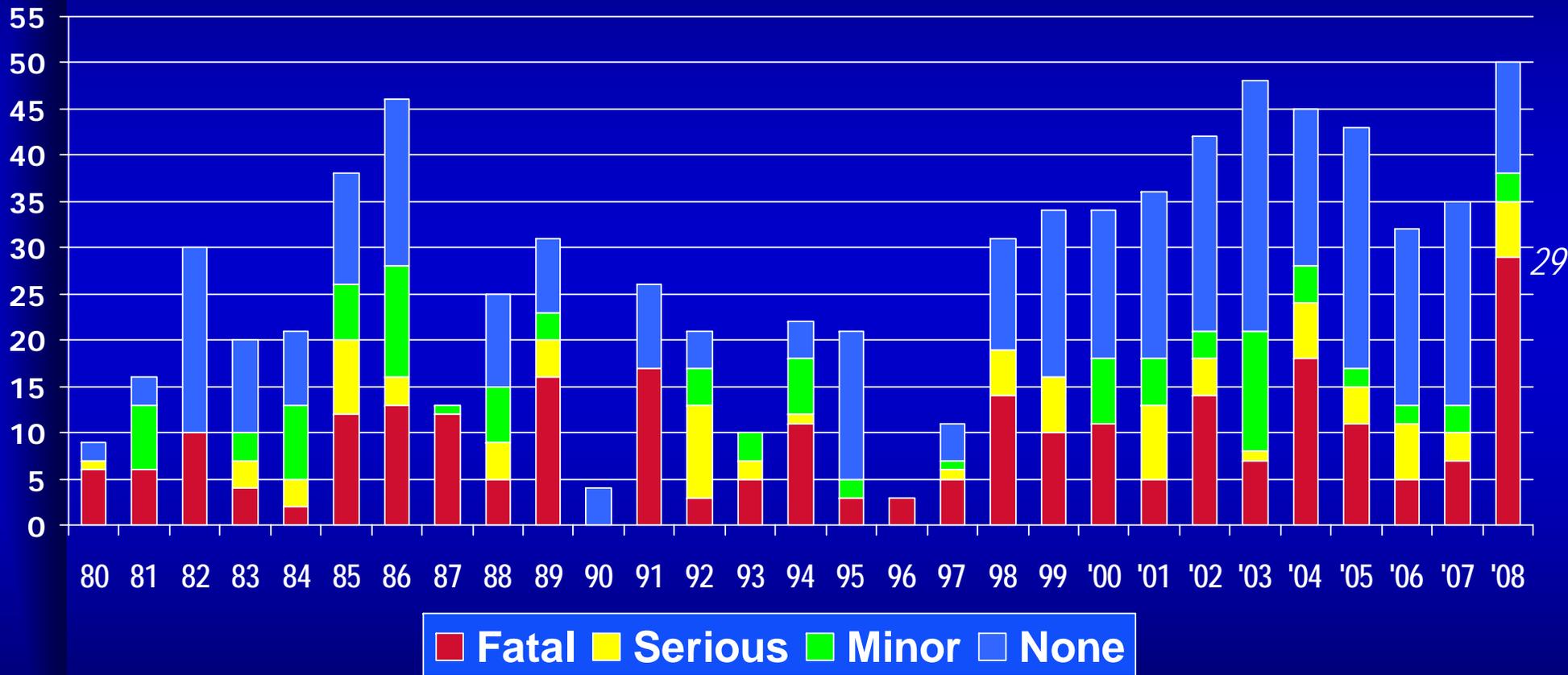
Percentage of Fatal Accidents



Dedicated and Dual-Purpose aircraft



HEMS Fatalities and Injuries



*Dedicated and dual-purpose
through December 31, 2008*

When and Why?

1998-2008 

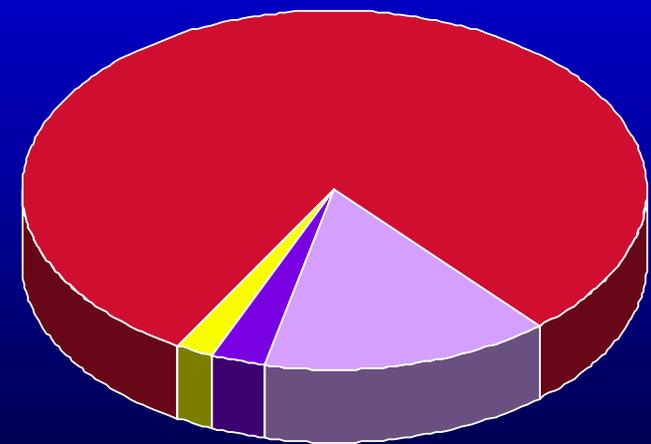
- ◆ Night: 49% of the accidents
- ◆ Scenes: 49% of the accidents during patient-related missions



When and Why?

1998-2008 

- ◆ Probable cause. . . .
 - “Human error” – 77%
 - Weather-related
 - Collision with objects
 - Mechanical – 17%
 - Other – 3%
 - Undetermined – 2%



When and Why?

1998-2008



- ◆ In flight collision with objects
 - 33 accidents*(3.3/yr)
 - 3 fatal
- ◆ CFIT
 - 21 accidents*(2.1/yr)
 - 19 fatal
- ◆ 54 of 128 = 42% of all accidents* (*with final reports)
- ◆ 1990-1998 – 8 (Frazer)
 - < 1/yr
 - 8 of 45 = 18% of all accidents

When and Why?

1998-2008 

- ◆ Weather-related accidents
 - 19% of all accidents
 - Fatal Accidents
 - 56% of weather-related accidents were fatal (compared to 34% of all accidents having a fatality)



Accident Data vs. Rates

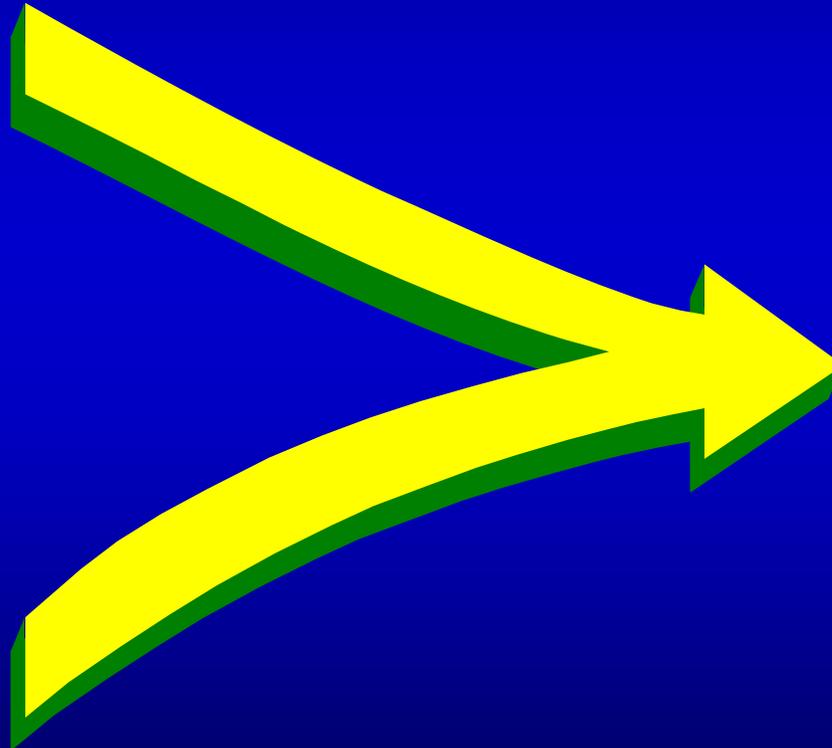


- ◆ Raw numbers
- ◆ Meaningful comparison
 - Compare like groups
 - Normalized data
 - Accident or incident rate
 - Per 100,000 flight hours
 - Per 100,000 departures
 - Per 100,000 patients transported
 - Etc.

HEMS Accident and Fatal Accidents Rates



Number of accidents and fatal accidents



Normalized Data



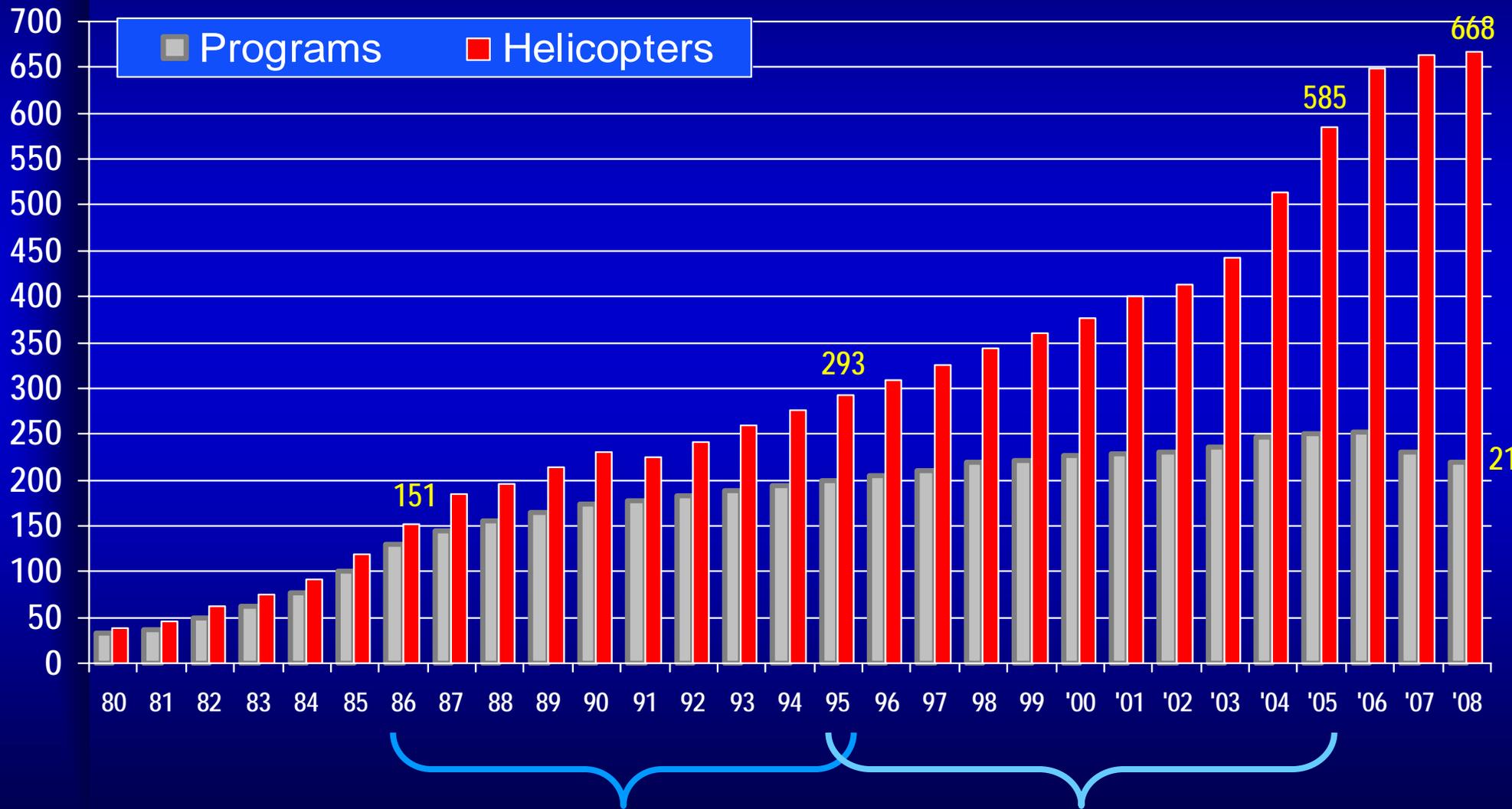
**Number of hours flown*

Methodology

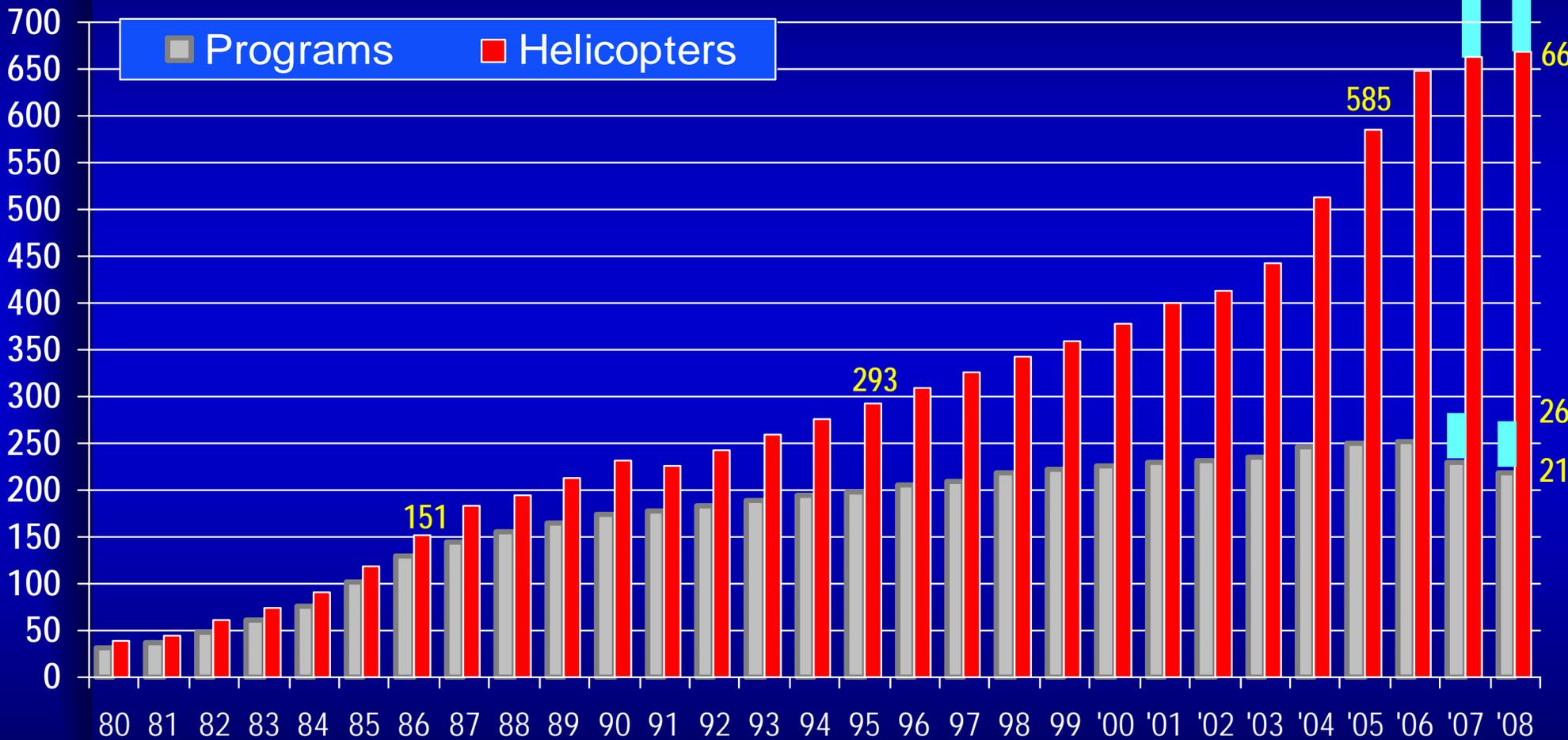
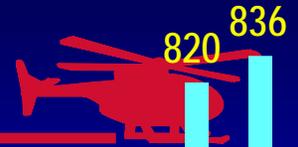


- ◆ 2000-2002
 - Determine exposure data for 16 of 22 years (1980-2001)
 - Published data, surveys, etc.
 - Web survey
 - Operator survey (5)
 - Manufacturer survey
- ◆ Updates: 2005, 2006, 2007, 2008
 - Database analysis (ADAMS, AMT-R)
 - Operator survey (9, 15, 20)

Dedicated HEMS Programs and Helicopters



HEMS Programs and Helicopters



"Exposure" Data Collection: Operator Survey



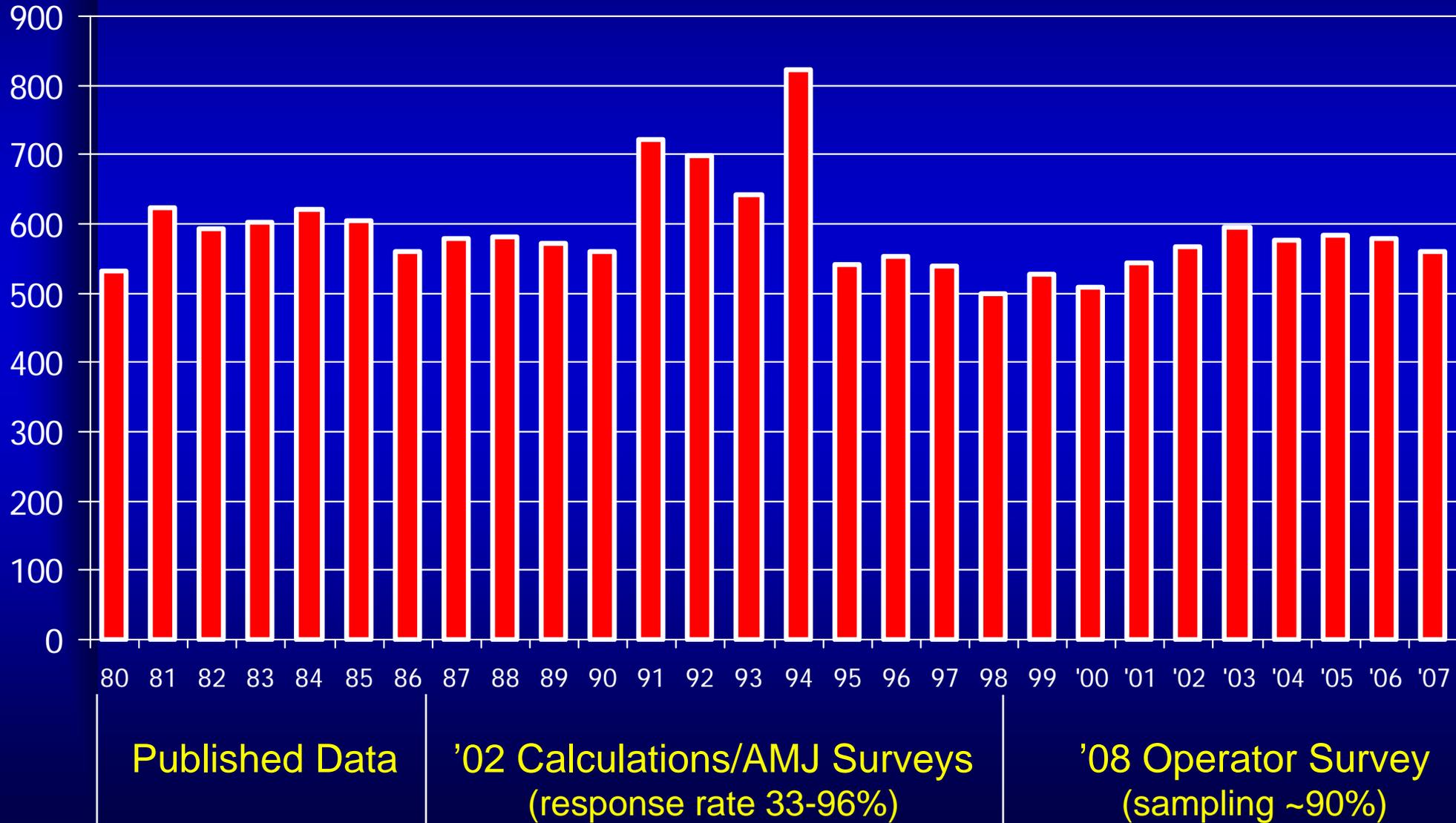
- ◆ 2002: 5 largest operators
- ◆ 2005, 2006: 9 operators with > 10 helicopters
- ◆ 2007: 15 operators with > 5 helicopters
- ◆ 2008: 20 operators
- ◆ Limitations
 - Lack of available data for earlier years
 - Paper trail vs. computer
 - "End of fiscal year" data

Data Sampling

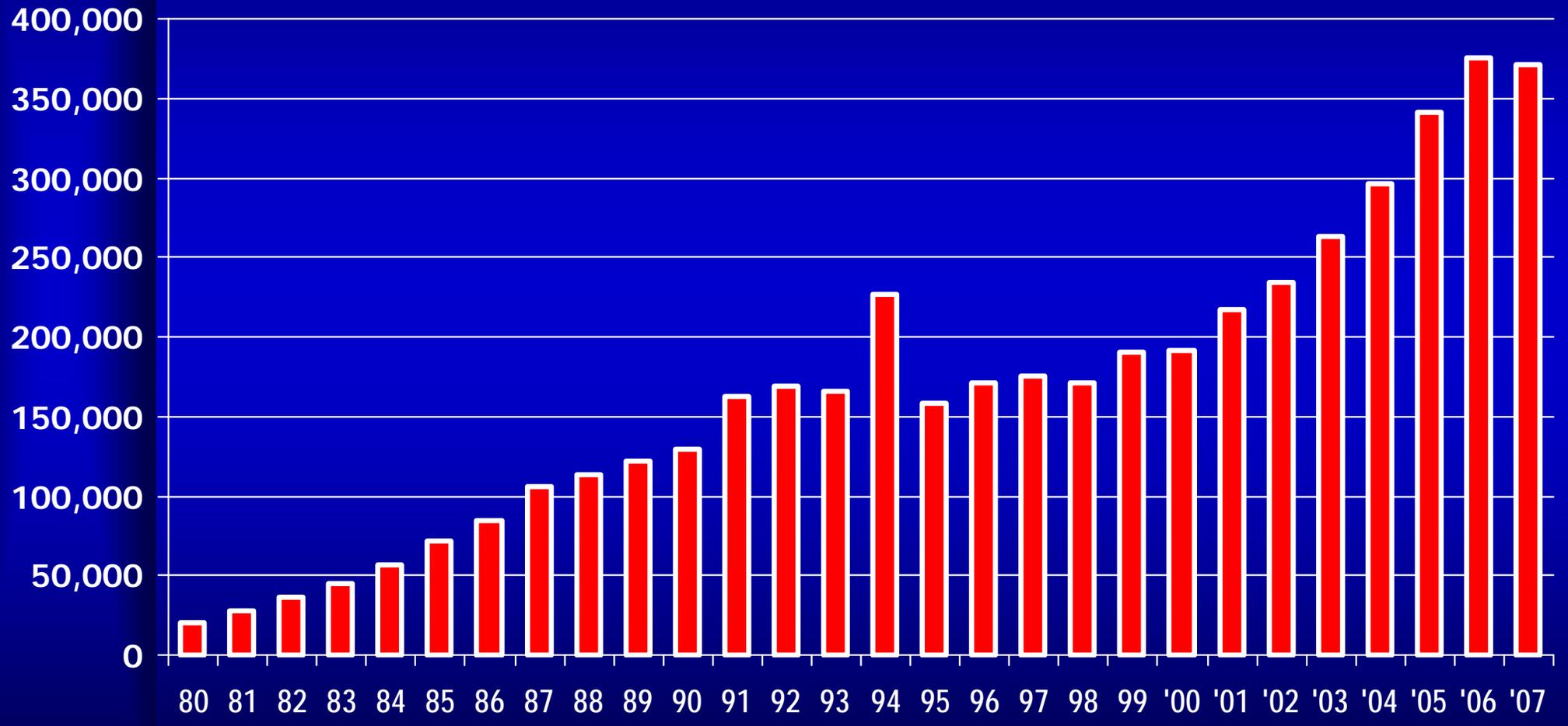


- ◆ Programs
 - ~80% of all programs
- ◆ Helicopters
 - ~90% of all helicopters

Average Flight Hours per Helicopter



HEMS Total Flight Hours



Estimated Total Flight Hours, 1972-2007: 4,700,000

GAO

United States Government Accountability Office

Report to the Chairman, Subcommittee
on Aviation, Committee on
Transportation and Infrastructure,
House of Representatives

February 2007

AVIATION SAFETY

Improved Data Collection Needed for Effective Oversight of Air Ambulance Industry



GAO-07-353



"FAA estimated that air ambulances amassed about 900,000 flight hours annually from 1999 to 2003 and that the number of flight hours increased to 1.6 million in 2004. However, as noted, the reliability of these estimates is questionable, given various shortcomings . . ."

1999-2003



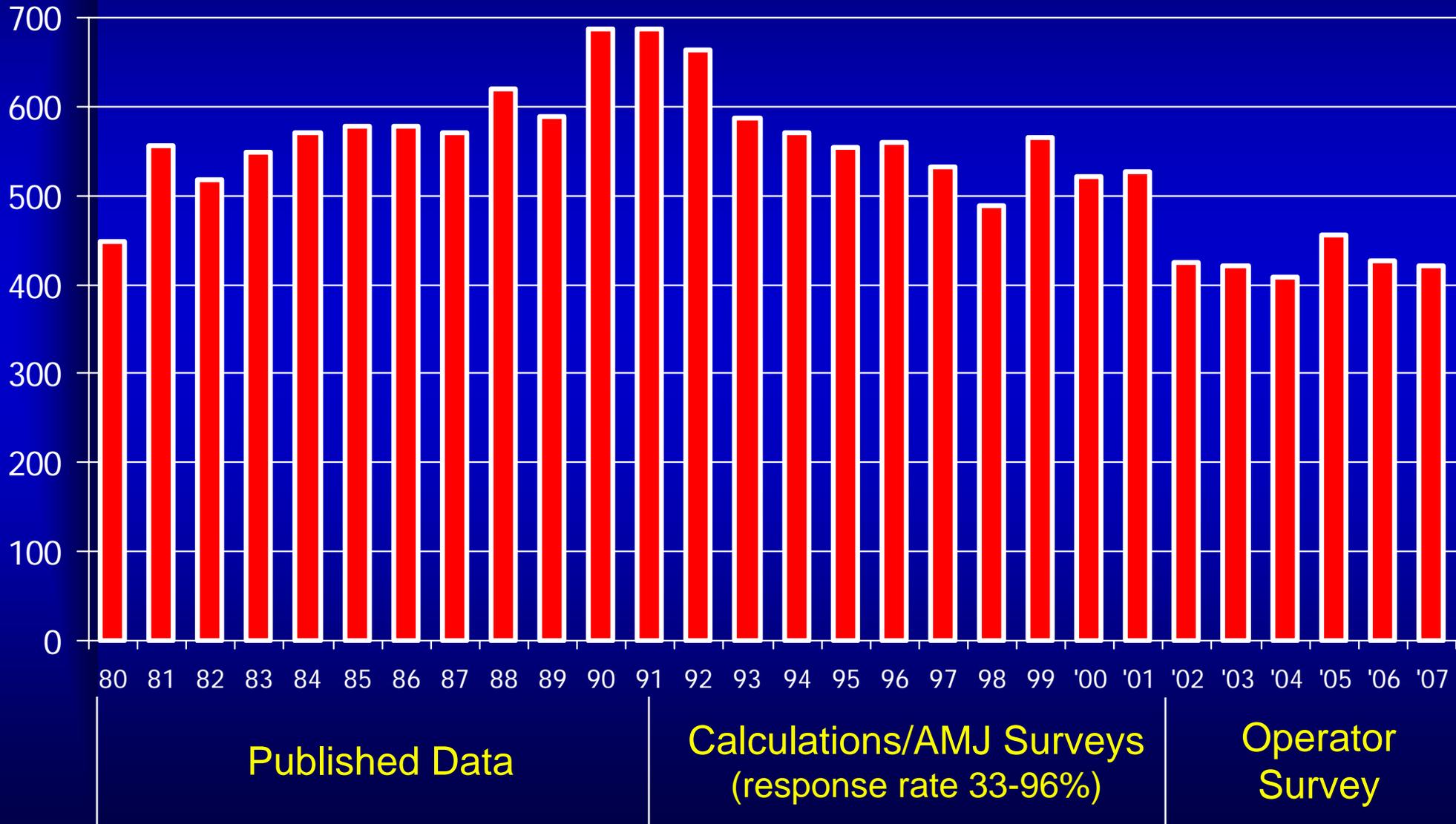
- ◆ 900,000 flight hours (FAA/GAO)
 - 443 helicopters (OSI-HEMS)
 - = 2,031 hrs per helicopter
- ◆ Operator survey (OSI-HEMS)
 - Capturing >90% of the helicopters
 - 587 hrs per helicopter
 - Estimate 260,000 total flight hours

2004

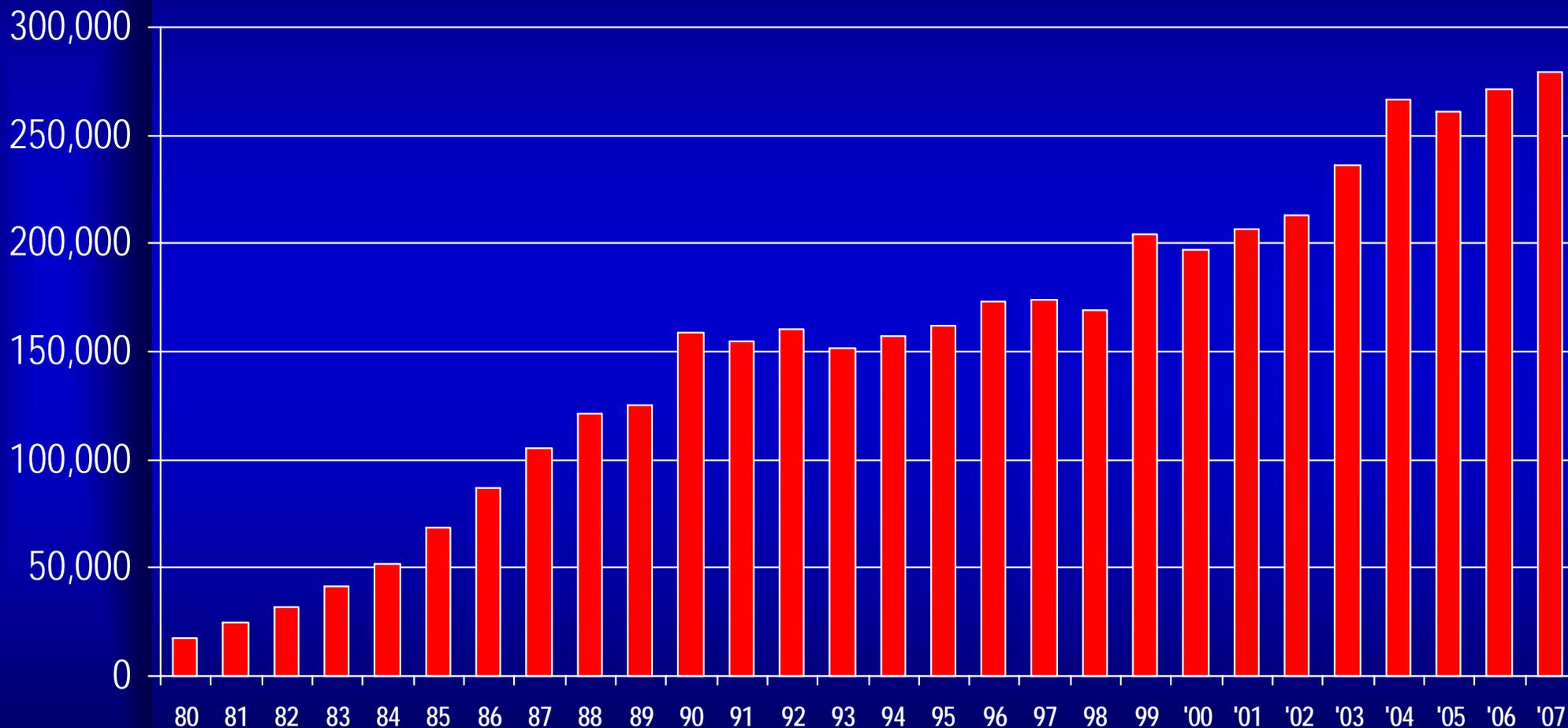


- ◆ 1,600,000 flight hours (FAA/GAO)
 - 513 helicopters (OSI-HEMS)
 - = 3,119 hrs per helicopter
- ◆ Operator survey
 - Capturing >90% of the helicopters
 - 571 hrs per helicopter
 - Estimate 293,000 total flight hours

Average Patients Flown per Helicopter

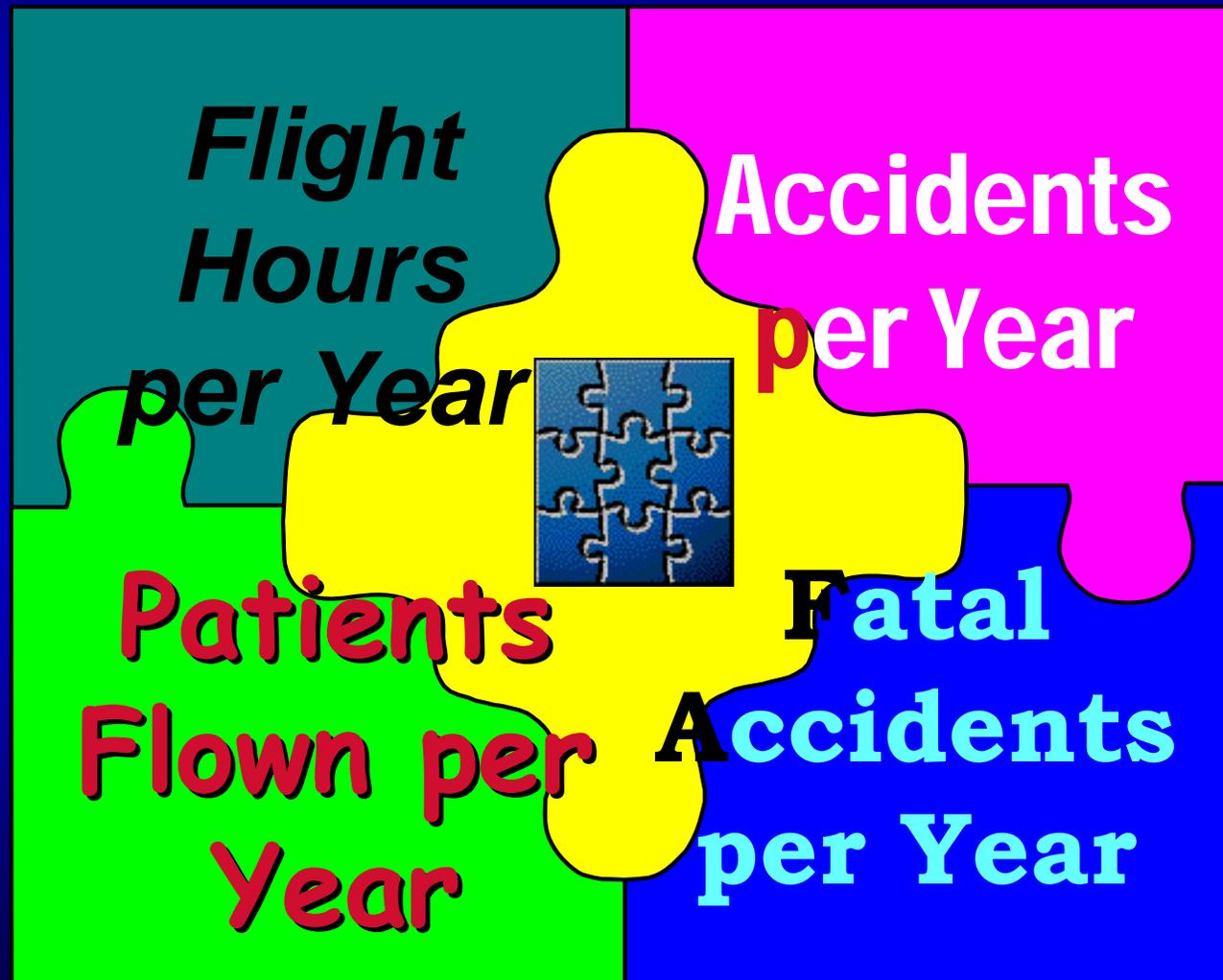


HEMS Patients Flown

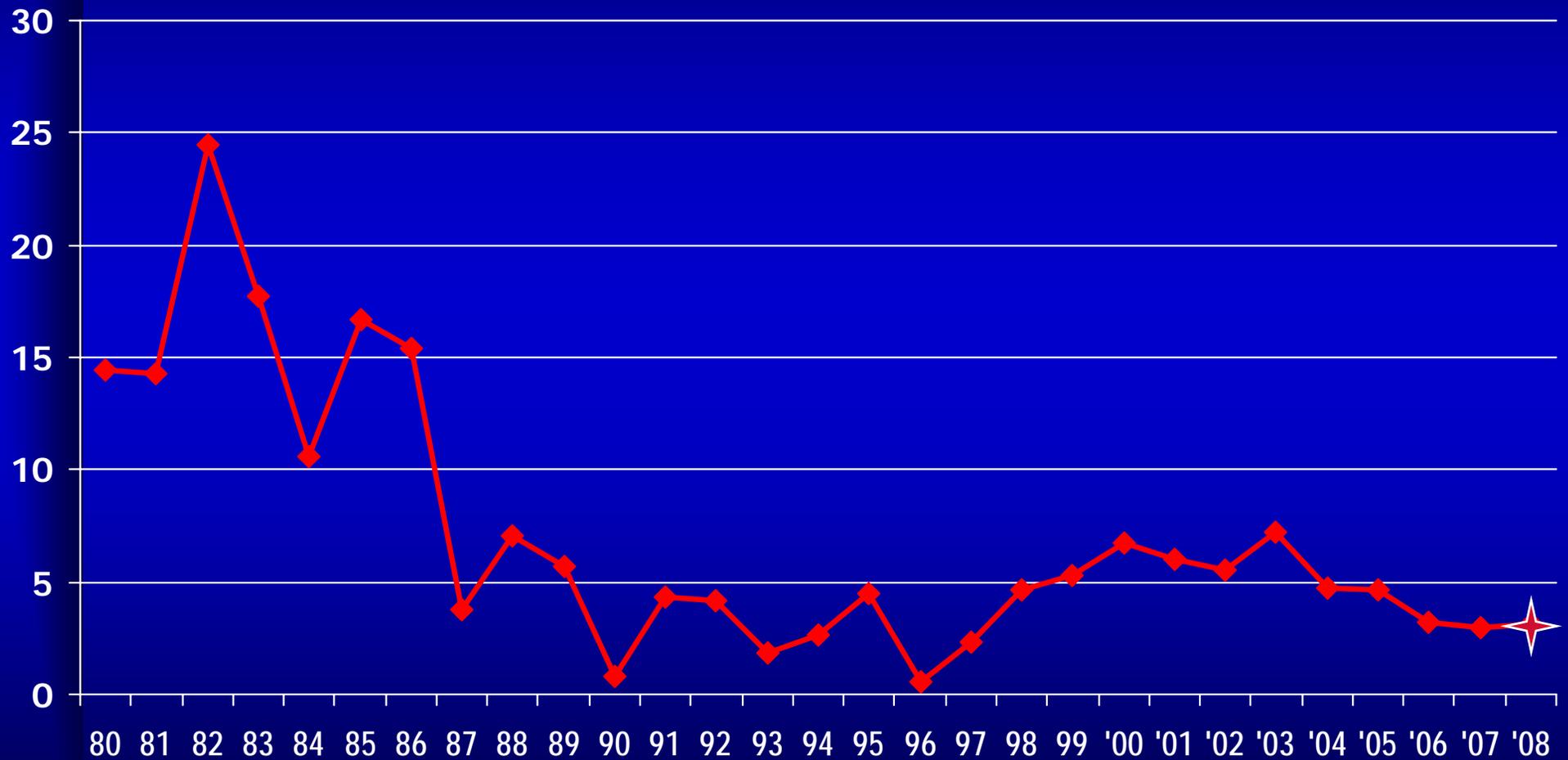


Estimated Total Patients Flown, 1972-2007: 4,300,000

Accident Rates

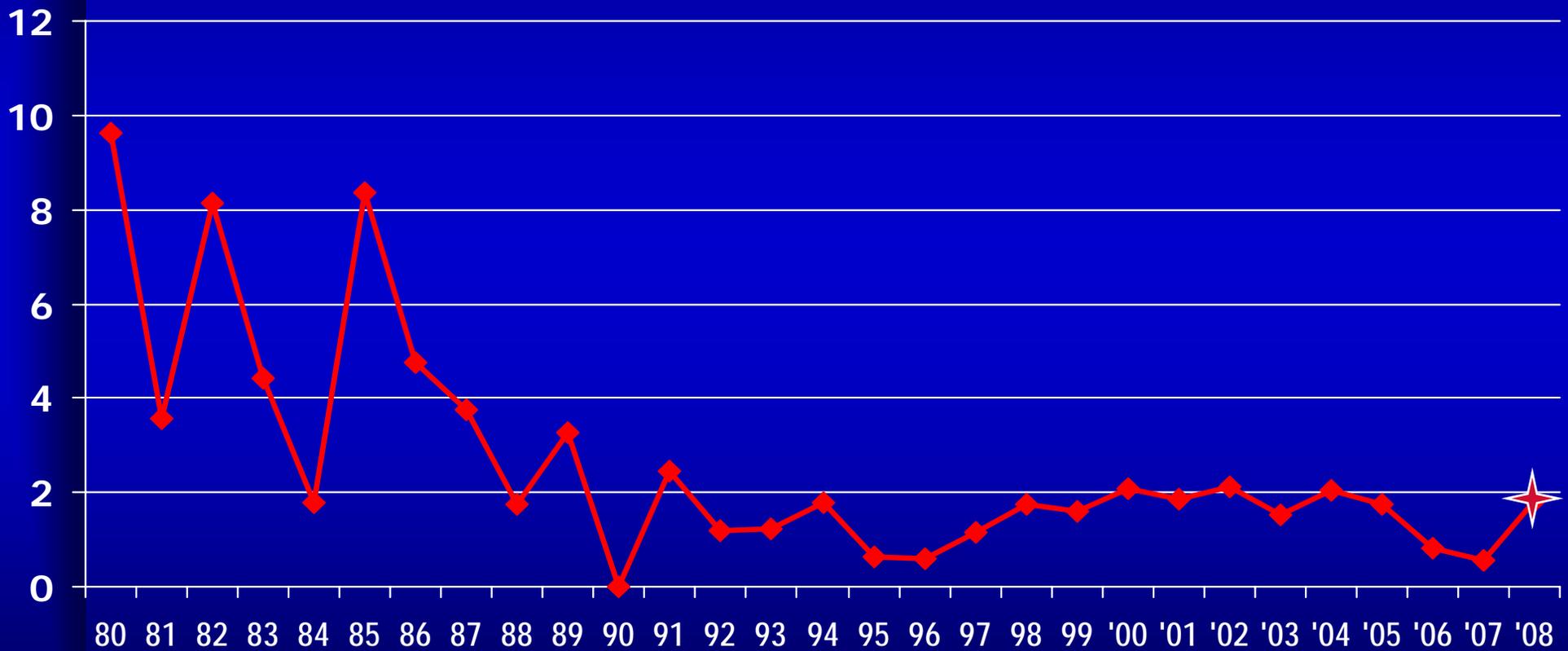


HEMS Accidents Rates / 100,000 Flight Hours



*Dedicated HEMS
through December 31, 2008*

HEMS Fatal Accident Rates / 100,000 Flight Hours

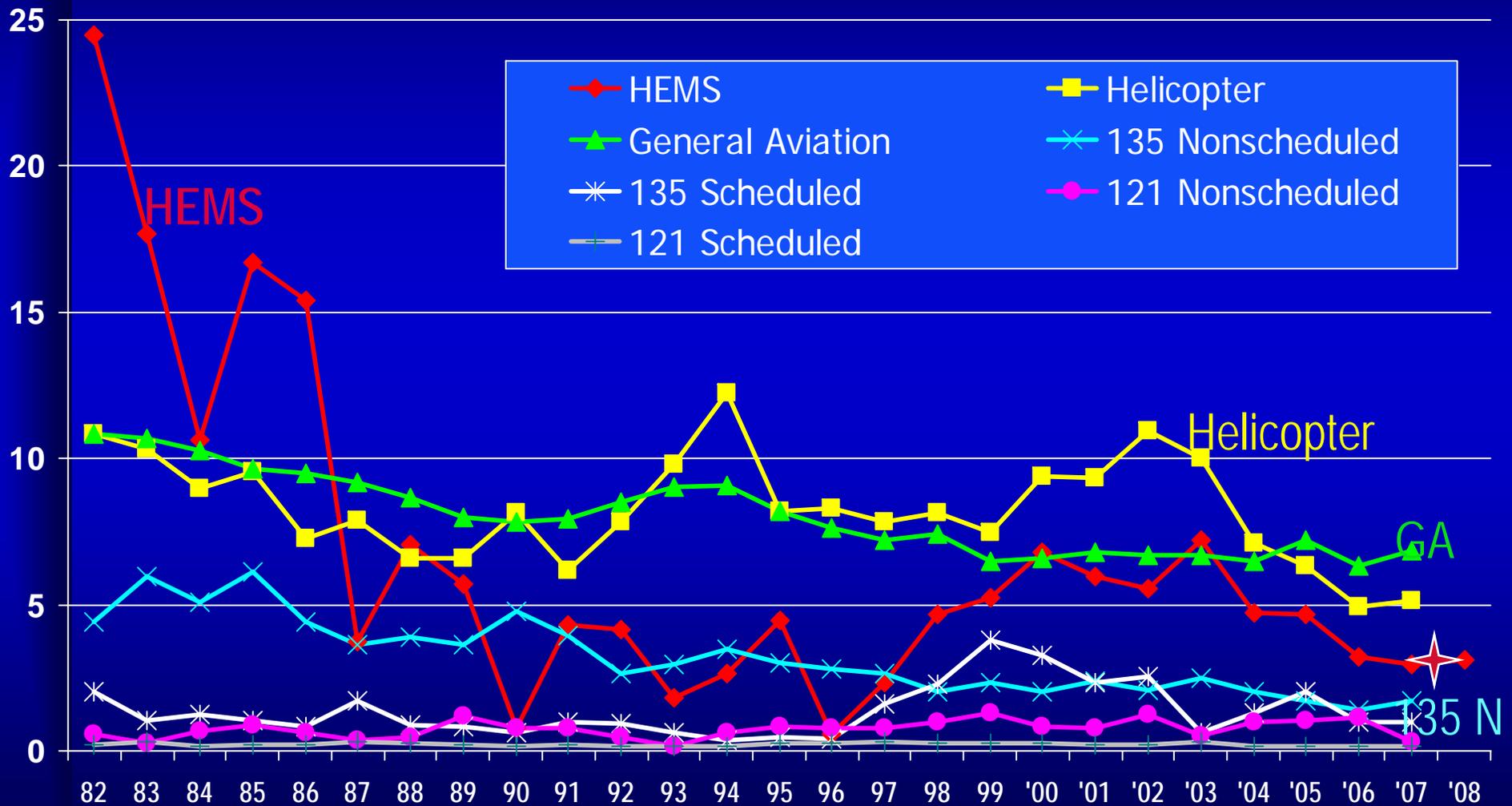


*Dedicated HEMS
through December 31, 2008*

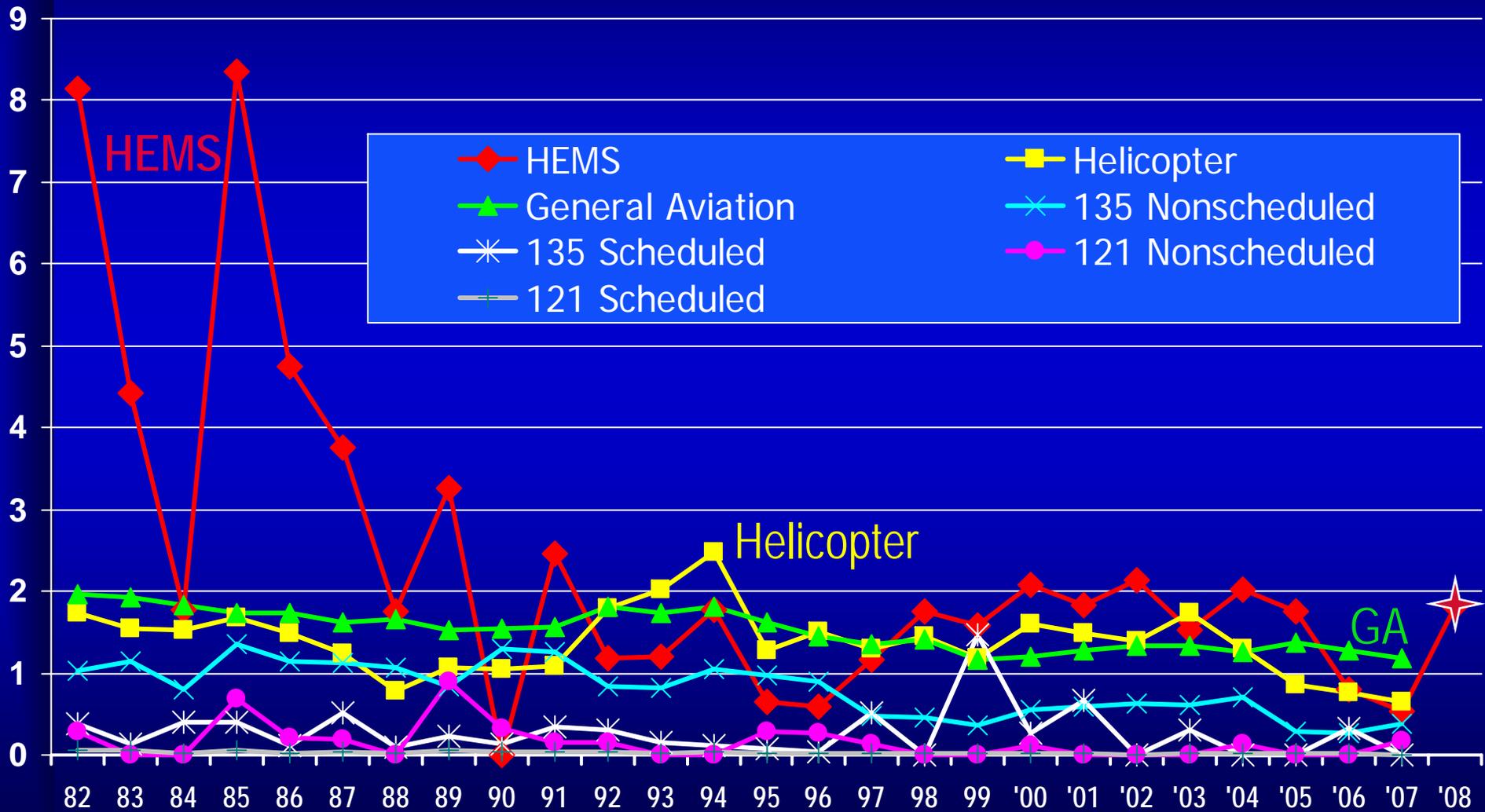


A Comparison of HEMS to Other Types of Aviation in the U.S.

Accidents Rates / 100,000 Flight Hours



Fatal Accidents Rates / 100,000 Flight Hours



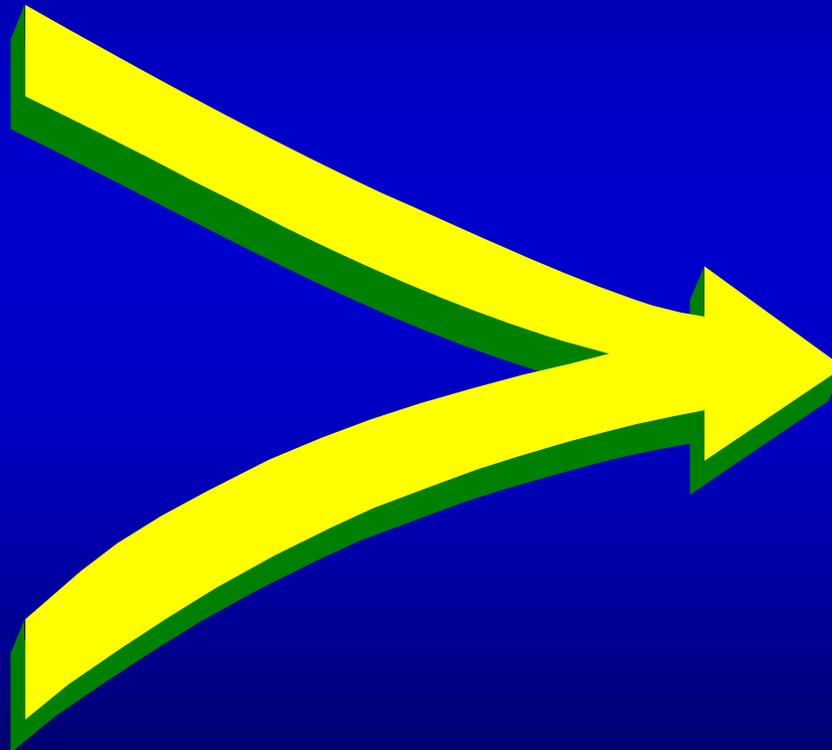


A Comparison Of Individual Risk

Determining Risk



Number of crew injuries or fatalities per year

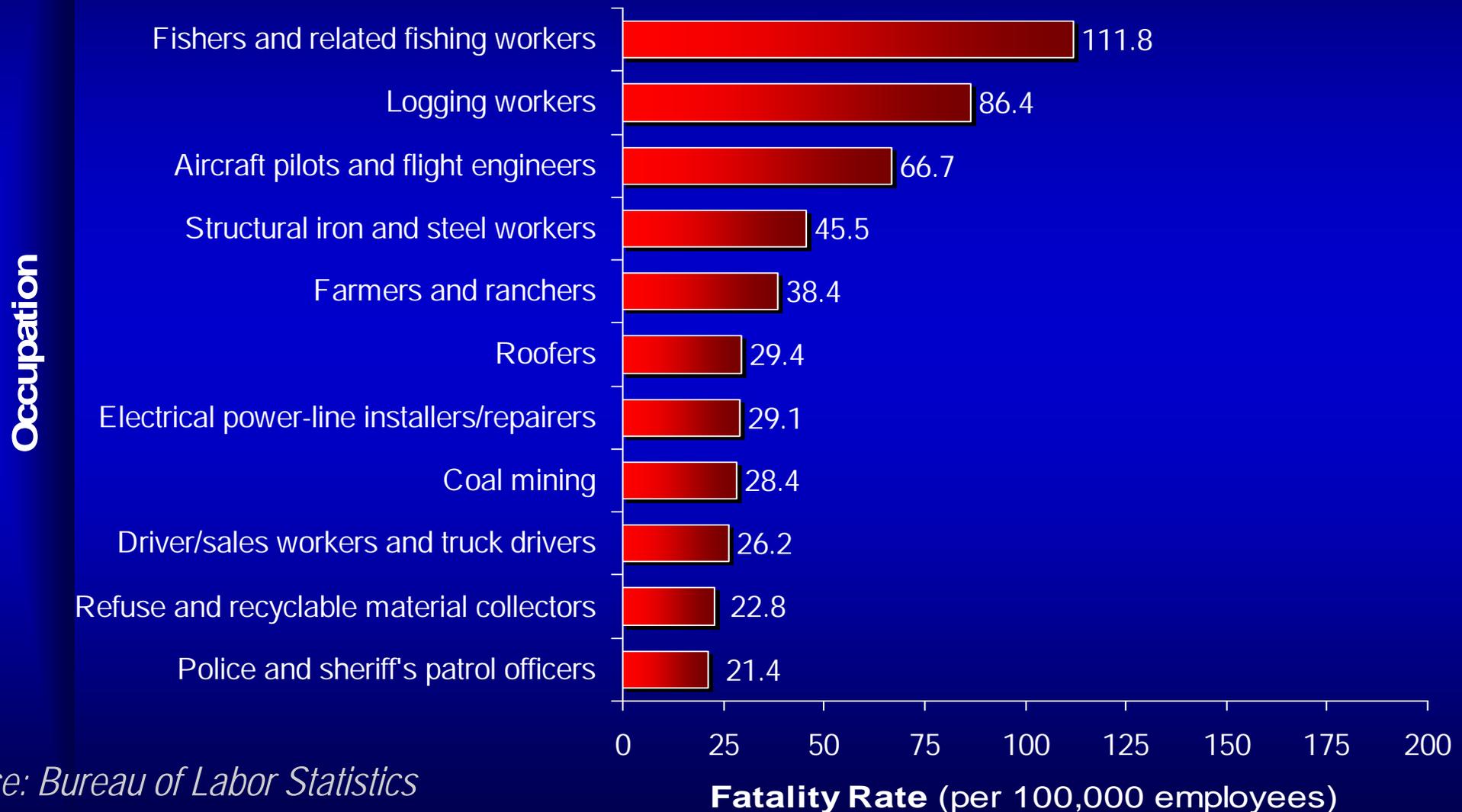


Normalized Data



**Number of crew members engaged in HEMS transport*

High-Risk Occupations, 2007



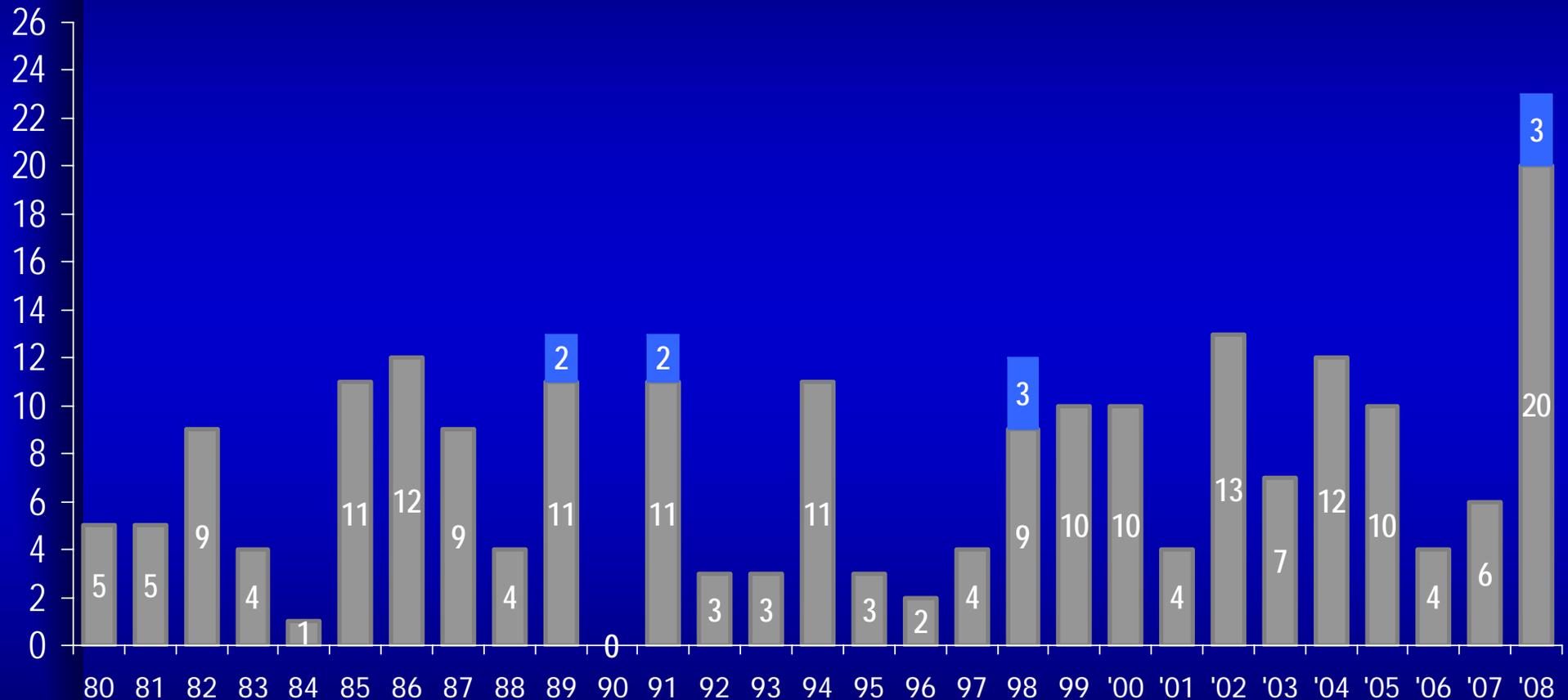
Source: Bureau of Labor Statistics
Census of Fatal Occupational Injuries, 2007

Population at Risk



- ◆ Average number of crew members / RW (18)
- ◆ For 2008: ~12,000
- ◆ Average crew members
 - Full-time vs. Part-time
 - Assumes equal exposure for all
- ◆ Average flight program

HEMS Crew* Fatalities



**With no information on population at risk, dual purpose fatalities are not included in calculations*

Thru December 31, 2008

Results, 1980-2008



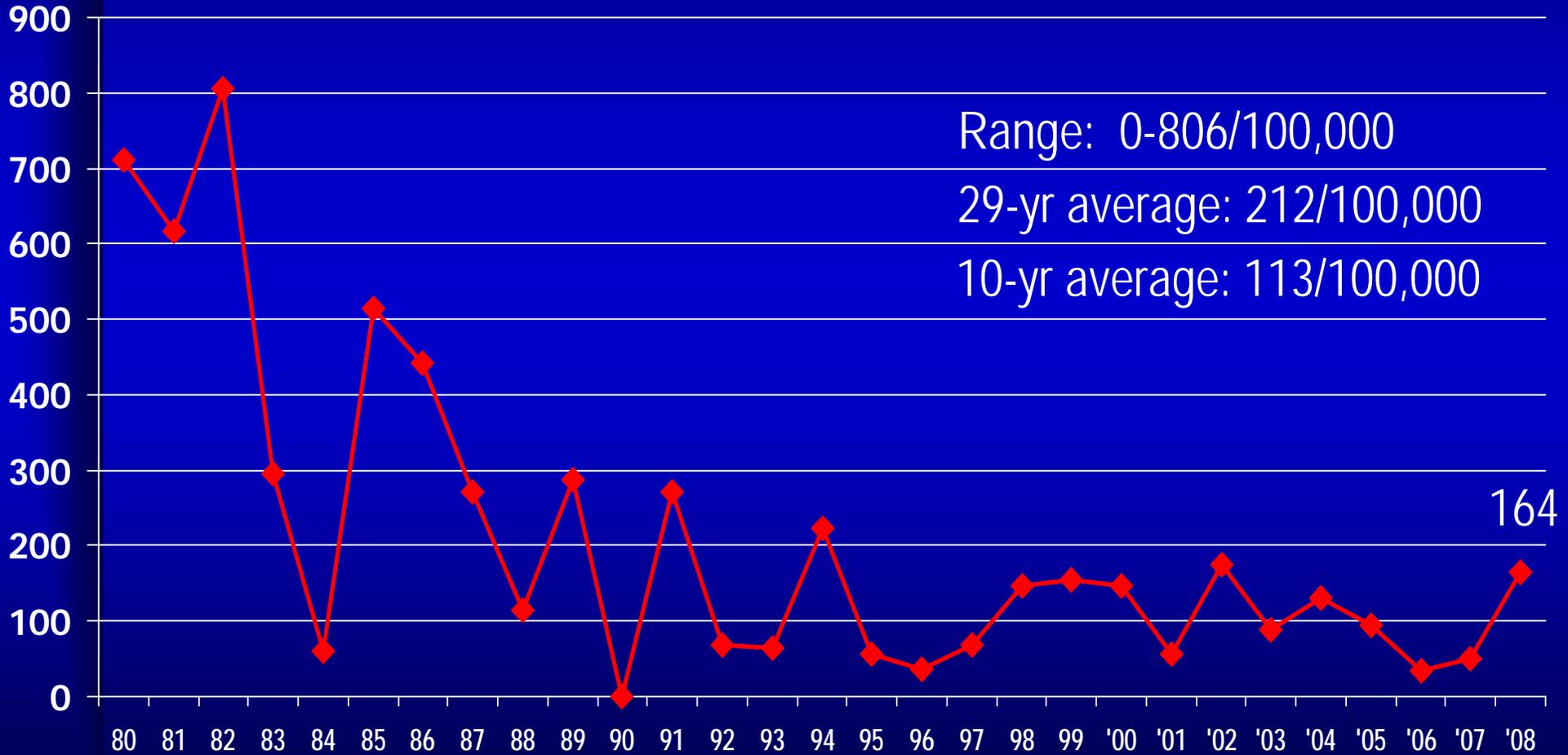
- ◆ 264 total fatalities
 - 34 patients
 - 10 dual-purpose crew members
 - 7 others

213 dedicated HEMS crewmember deaths

- ◆ Population at risk over 29 years
 - Range: estimated 700 – 12,000
 - A *very* small sampling



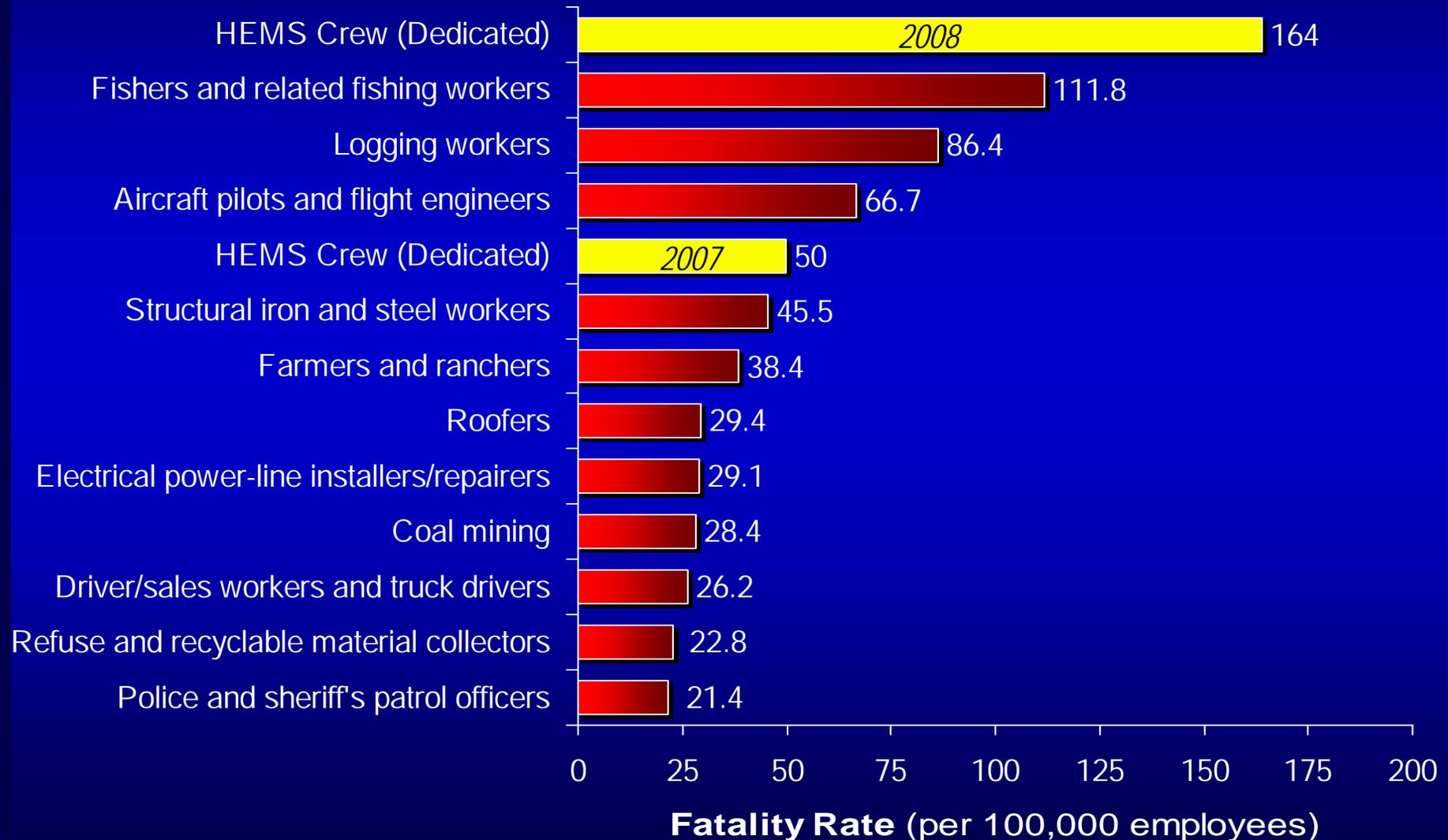
HEMS Crew Fatalities / 100,000 Personnel



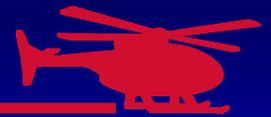
High-Risk Occupations, 2007



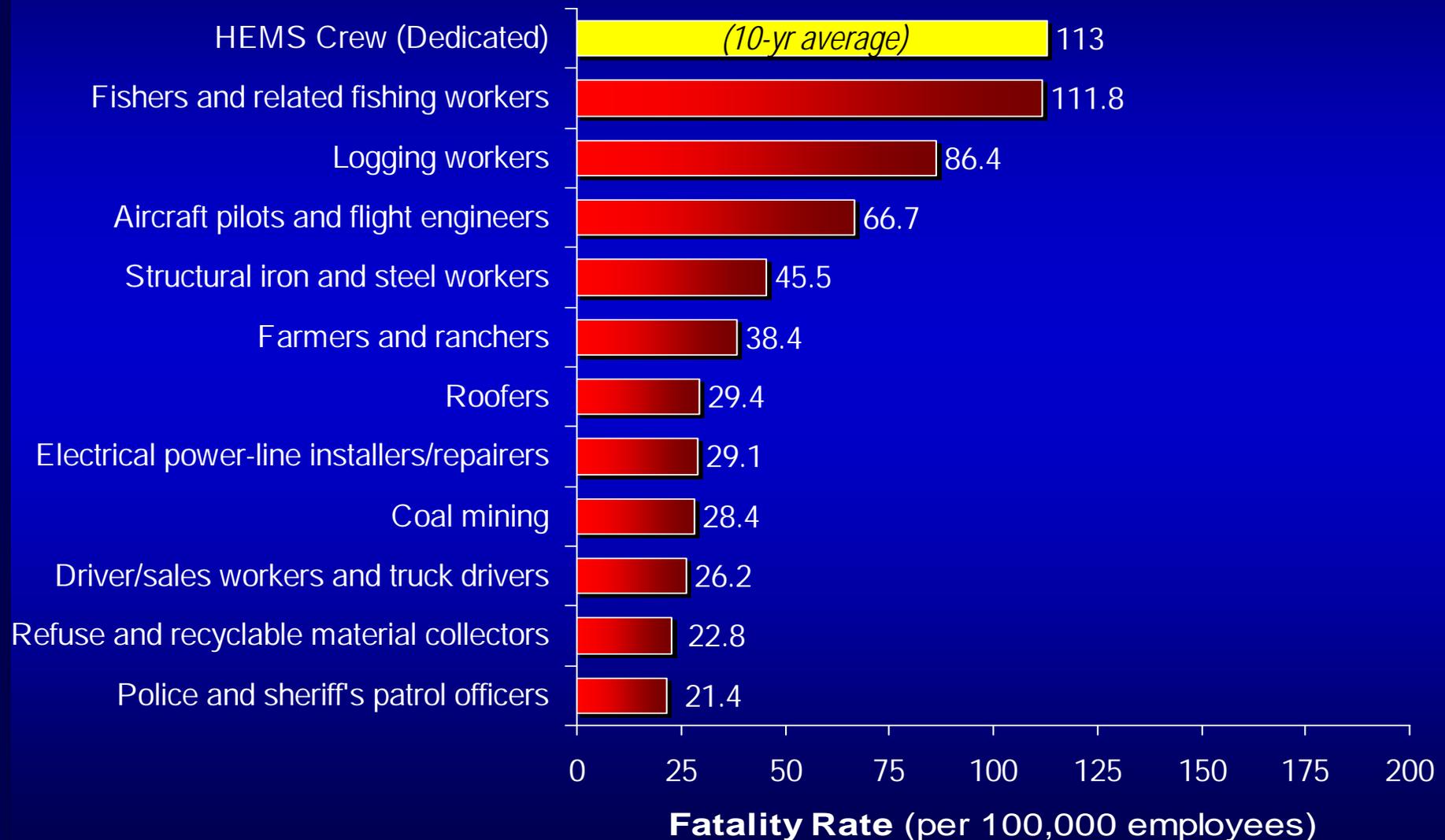
Occupation



High-Risk Occupations, 2007



Occupation



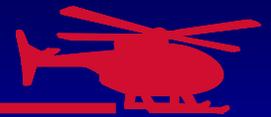
HEMS: The Risk to the Patient

- ◆ 29-year study
- ◆ ~ 4,500,000 patients flown by HEMS
- ◆ 34 patients have died in HEMS accidents
- ◆ Death rate: 0.76/100,000 patients flown

HEMS: The Risk to the Patient

- ◆ Institute of Medicine, 1999
 - Estimates of two major studies
 - 44,000-98,000 deaths each year due to adverse events
 - Death rate: 131-292/100,000 pts per year

In conclusion.



- ◆ Crunched the numbers
- ◆ Validated the magnitude of the risk
 - Aircraft
 - Personnel
 - Patient
 - Community
- ◆ We have the ability to save lives—and take them
- ◆ We have the ability to make a difference—each and everyone of us



Thank you