Sandra Kinkade Hutton, RN, MSN, MBA

A Multi-Discipline
Safety Research Project

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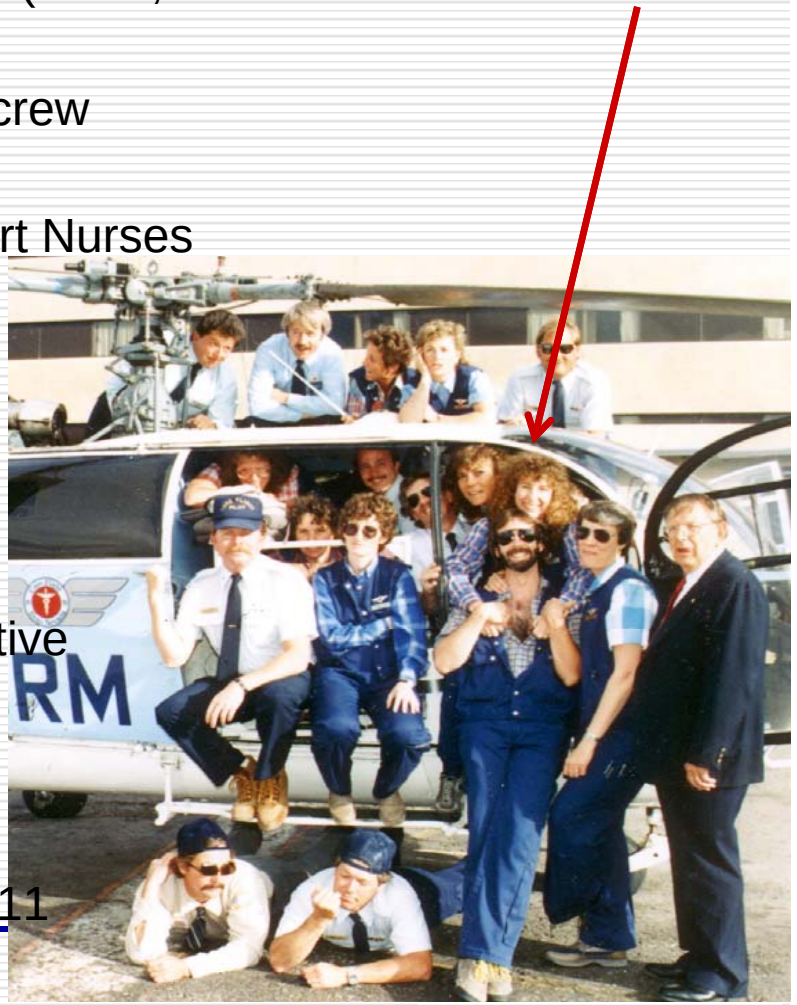
League of Extraordinary Wine Drinkers…"LEWD"

Speaker Background

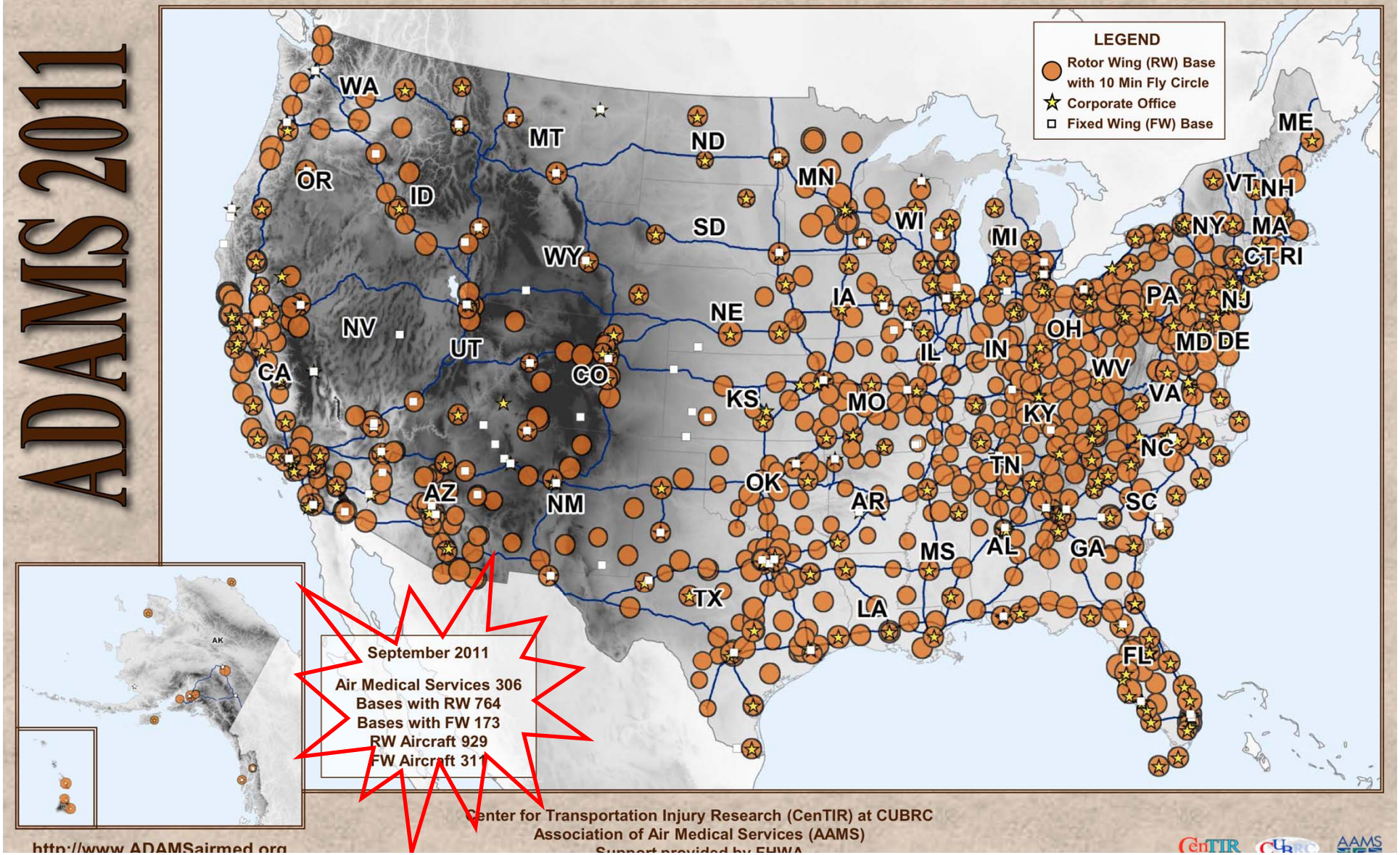
- Flight Nurse 13 years
  - Care Flight: single nurse/pilot crew (Reno, Nevada)
  - Vanderbilt LifeFlight: nurse/nurse crew (Nashville, TN)
  - President – Air & Surface Transport Nurses Association 1999
- Bell Helicopter 8 years
  - EMS Marketing Manager
  - Bell 429 design team
- Association of Air Medical Services
  - Certified Medical Transport Executive (CMTE)
  - Board member 2002 – 2011
  - President 2007 – 2009
  - Marriott-Carlson Award Winner 2011



Atlas & Database of Air Medical Services

9th Edition National Air Medical Services GIS Database

ADAMS 2011

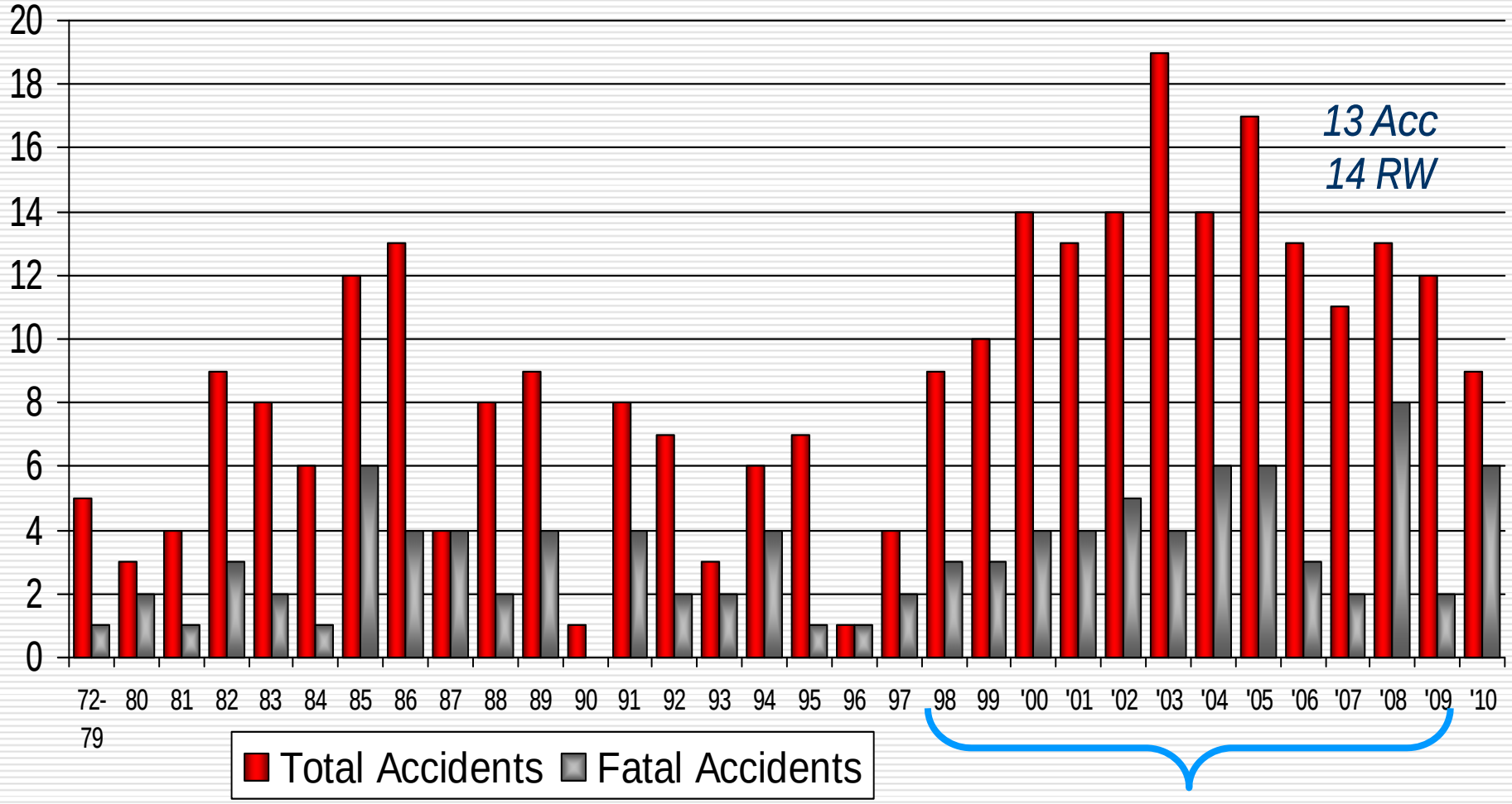


Center for Transportation Injury Research (CenTIR) at CUBRC
Association of Air Medical Services (AAMS)
Support provided by FHWA

http://www.ADAMSairmed.org

AIR EVAC
LIFETEAM

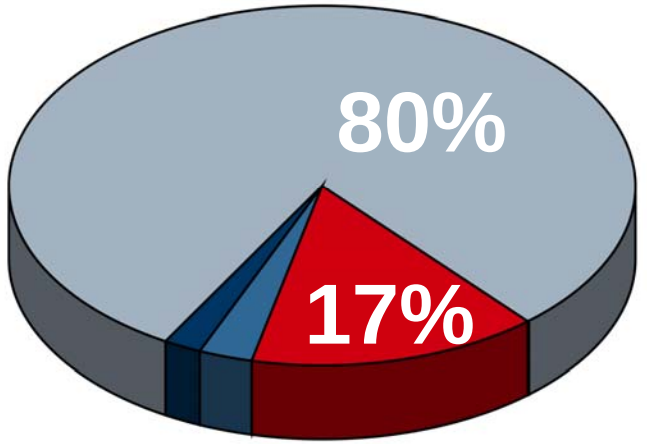
U.S. HEMS Accidents and Fatal Accidents



**Dedicated and dual-purpose through October 1, 2010*

Probable Cause…

- "Human error" – 80%
  - Weather-related
  - Collision with objects
- Mechanical – 17%
- Other – 3%
- Undetermined – 3%



Background

- U.S. HEMS safety research project
- Comprehensive review of HEMS accidents
- Root cause analysis
- Goal: Concrete recommendations that can
  - Prevent HEMS accidents
  - Reduce the impact of accidents that do occur

Research Team

- 40 aviation and air medical professionals
- Representing
  - Associations
  - Air medical operators
  - Manufacturers
  - FAA
  - Aviation training
  - Aviation insurance
- Breakdown
  - 2/3 pilot/aviation background
  - 1/3 medical (and communications)

Grant Support and Funding

- MedEvac Foundation International (*formerly Foundation for Air-Medical Research and Education*)
- Flight Safety Foundation
- Air Medical Operators Association (AMOA)
- American Eurocopter Vision Zero Safety Award
- Air Methods Corporation
- Air Medical Physician Association
- PHI Air Medical
- Bell Helicopter
- AgustaWestland
- Metro Aviation
- Omniflight Helicopter Corporation
- Turbomeca USA
- Flight Safety International
- Air Medical Memorial Wings
- Sikorsky Aircraft Corporation

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Magnitude of the Mission

- 143 accidents
  - Complete NTSB dockets (our “evidence’)
  - 2.9 GB
  - > 2,900 electronic files
  - > 12,500 pages/pictures
- >40 aviation and air medical professionals
  - ~ 12,000 cumulative hours (so far)
  - Equivalent of 6 FTEs
    - Full-time (2,080 hrs) for a year

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Accident Analysis

The Process

The Process

- *“This is a Peer Review Document created exclusively for quality improvement purposes.”*
- Objective
- Non-biased
- Data/evidence driven

Focus: 1998-2010

- 168 HEMS accidents
  - 161 dedicated HEMS
  - 7 dual purpose
  - 54 (of 168) fatal
    - 51 HEMS
    - 3 dual purpose

through October 1, 2010

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Timeline of the Accident

- Events
- Actions
- Conditions
- What happened
- Contributing factors

Definitions

- Standard Problem Statement – issues that may have contributed to accident
  - May be used multiple times within a given accident chain of events
- Intervention Strategy – possible strategies and/or equipment that may have prevented accident
  - May have multiple interventions
  - An intervention is counted only once per accident
- Key Words – Developed by team to use for specific search criteria (night, scene, maintenance, etc)

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Contributing Factor (what or why)	SPS Level 1	SPS Level 2	Standard Problem Statement	SPS Code	SPS Code (no dupes)	V	I	V+I	P	Intervention Level 1	Interven
critical information not transferred	Communications	Communication - Inadequate Procedures	Inadequate coordination/communication with ground LZ personnel	603021	603021	3	4	7	3	Infrastructure	Communica
Ground crew did not recognize the unsafe conditions	Safety Management	Ground Personnel Training	Inadequate ground crew training	210010	210010	3	3	6	3	Infrastructure	Ground Su
winds did not support a vertical t/o	Pilot Judgment & Actions	Procedure Implementation	~~Pilot improper action due to misdiagnosis~~	~~506098~~	~~506098~~	~~2~~	~~2~~	4	2	Training/Instructional	Mission Sp
	Pilot Judgment & Actions	Human Factors - Pilot's Decision	Disregard for rules and SOPs - Pilot	501010	501010	4	4	8	4	Safety Management	SOP - Com
lack of information	Data Issues	Lack of real-time data	Lack of real-time data available	1102010	1102010	4	2	6	4	Data/Information	Investigatic
	Data Issues	Lack of real-time data	Lack of real-time data available	1102010		4	2	6	4	Data/Information	Recorder
Ground crew did not wet down the LZ	Safety Management	Ground Personnel Training	Inadequate ground crew training	210010	210010	4	4	8	3	Infrastructure	Ground Su
restricted response to crash	Post-crash Survival	Delayed Rescue	~~Delayed rescue - Other~~	~~1003099~~	~~1003099~~	~~2~~	~~2~~	4	4	Infrastructure	Ground Su
	Pilot Judgment & Actions	Flight Profile	Pilot's flight profile unsafe for conditions	503080	503080	4	4	8	4	Safety Management	SOP - Ops
	Pilot Judgment & Actions	Flight Profile	Pilot's flight profile unsafe for conditions	503080		4	4	8	4	Training/Instructional	Safety Tra
	Pilot Judgment & Actions	Flight Profile	Pilot's flight profile unsafe for conditions	503080		4	4	8	4	Training/Instructional	Safety Tra
	Pilot Judgment & Actions	Flight Profile	Pilot's flight profile unsafe for conditions	503080		4	4	8	4	Training/Instructional	Mission Sp
	Pilot Judgment & Actions	Flight Profile	Pilot's flight profile unsafe for conditions	503080		4	4	8	3	Safety Management	Capital Inve Personnel Equipment

Accident Analysis

Initial Results: Standard Problem Statements (SPS)

Top Ten Problem Statements

- Pilot Judgment and Action
- Safety Management
- Pilot Situation Awareness
- Data Issues (related to NTSB report)
- Ground Duties
- Maintenance
- Medical Crew
- Mission Risk
- Post-crash Survival
- Communications

Pilot Judgment and Action

SPS Level 2s *(Filtered, Collapsed Score)*

- Human Factors - Pilot's Decision
- Procedure Implementation
- Flight Profile
- Human Factors - Pilot/Aircraft Interface
- Landing Procedures
- Air Medical Resource Management

SPS = Standard Problem Statements

Pilot Judgment and Action

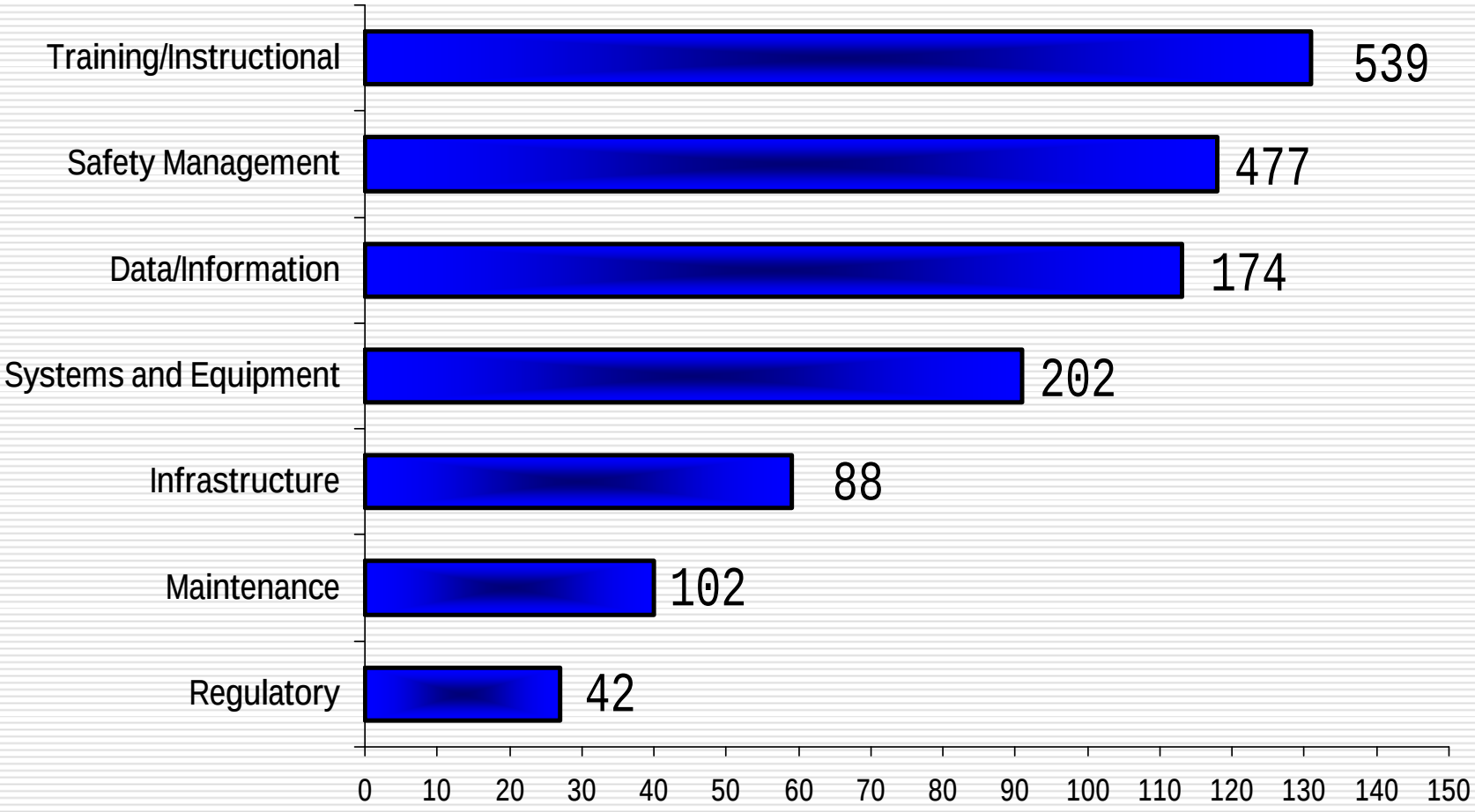
Top 3 Problem Statements

- Disregarded cues that should have led to termination of current course of action or maneuver
- Pilot misjudged own limitations/capabilities
- Pilot decision making

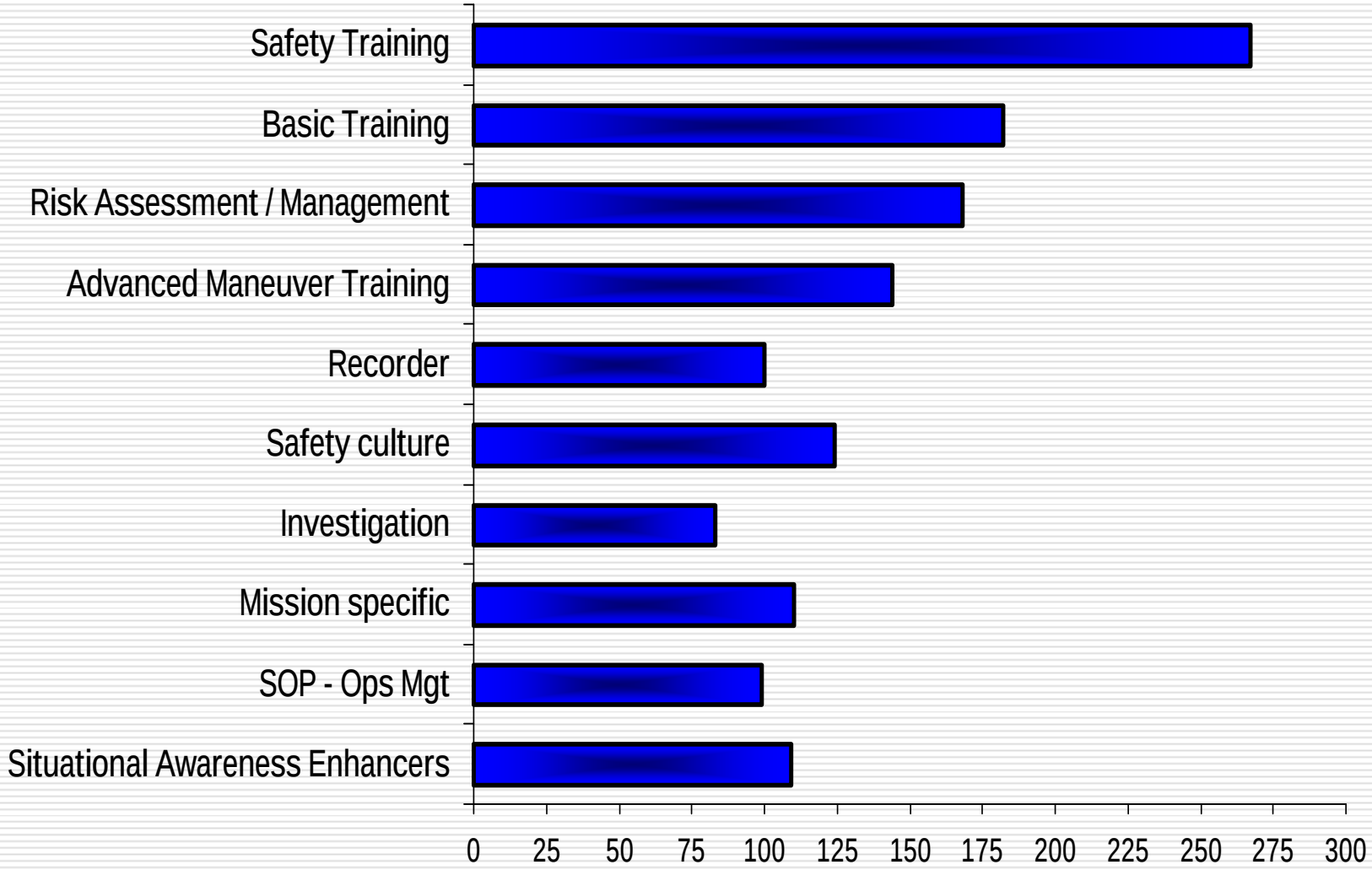
Accident Analysis

Initial Results: Intervention / Mitigation Strategies (IMS)

Intervention Strategy: Level 1



Top 10 IMS (Intervention/Mitigation Strategies) Level 2



Top 5 "*Specific*" Interventions

- Improve quality and depth of NTSB investigation and reporting (E=4.08)
- Establish/Comply with risk management program (to include risk assessments pre-flight, in-flight and prior to departing each leg of flight, as appropriate) Install data recording devices (E=3.99)
- AMRM training and utilization (E=3.96)
- Install data recording devices (E=4.03)
- Develop or improve overall safety culture (E=4.01)

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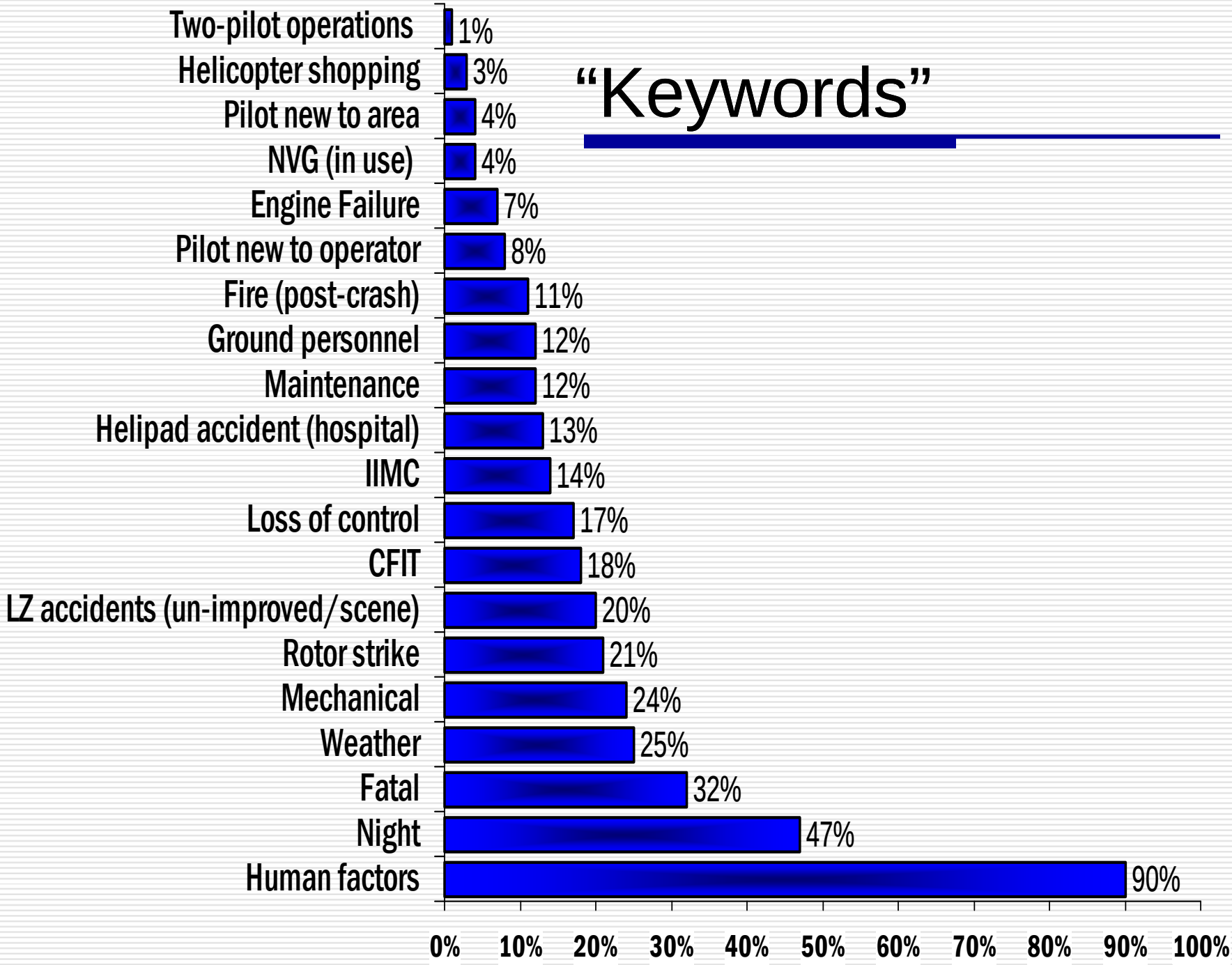
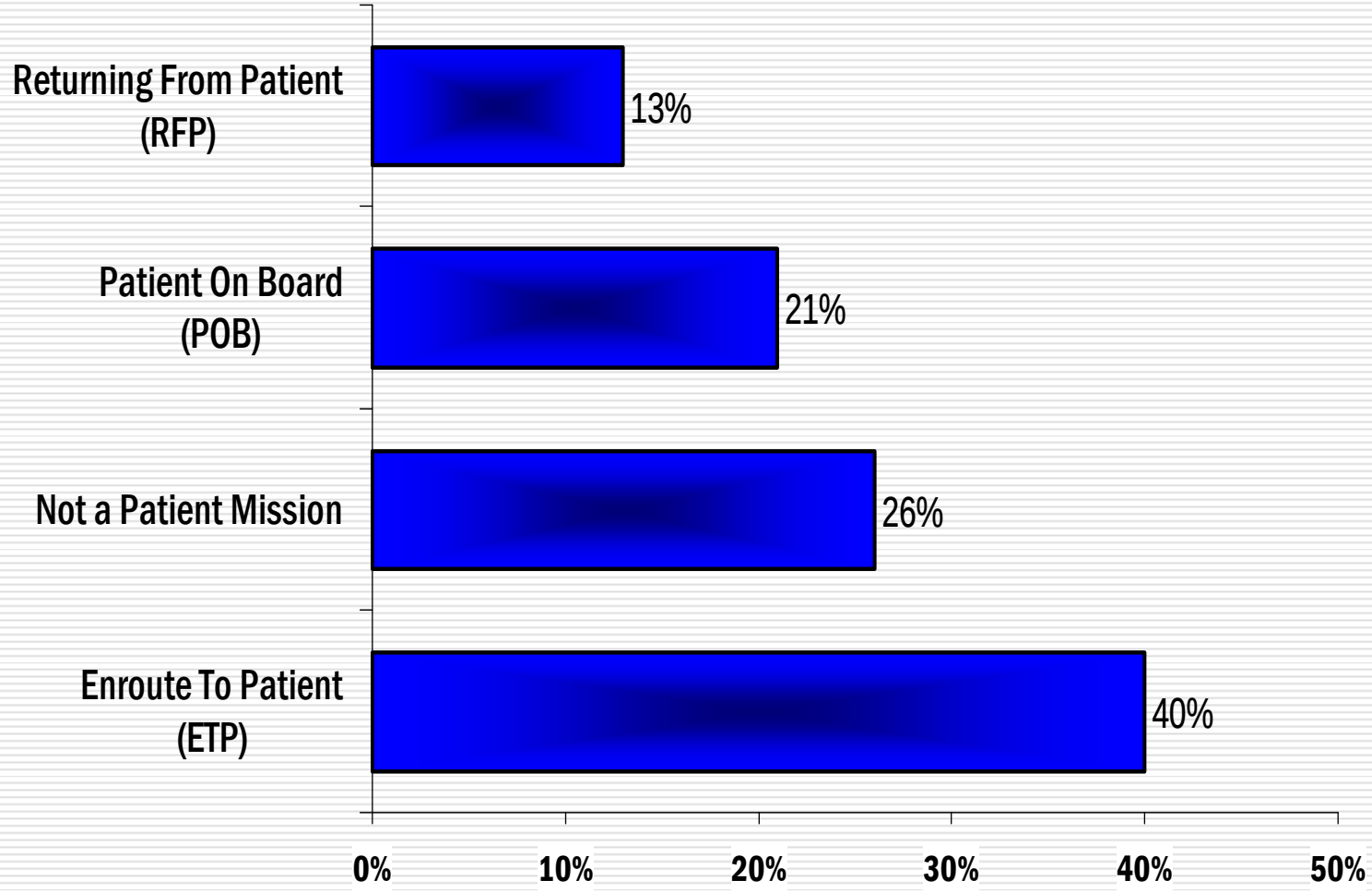
Accident Analysis

Keywords and Summary Items

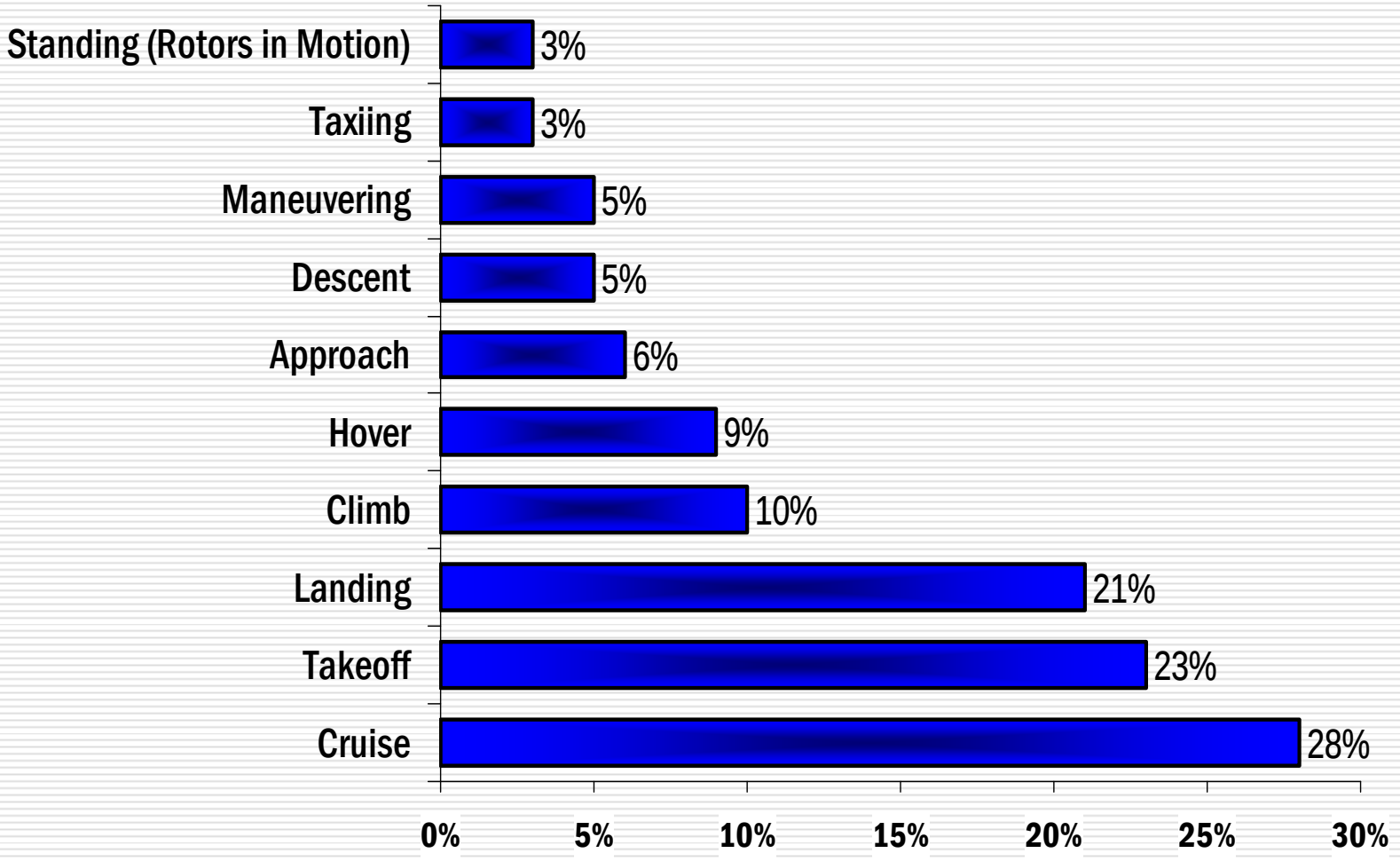
“Keywords”


Two-pilot operations 1%
Helicopter shopping 3%
Pilot new to area 4%
NVG (in use) 4%
Engine Failure 7%
Pilot new to operator 8%
Fire (post-crash) 11%
Ground personnel 12%
Maintenance 12%
Helipad accident (hospital) 13%
IIMC 14%
Loss of control 17%
CFIT 18%
LZ accidents (un-improved/scene) 20%
Rotor strike 21%
Mechanical 24%
Weather 25%
Fatal 32%
Night 47%
Human factors 90%
0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

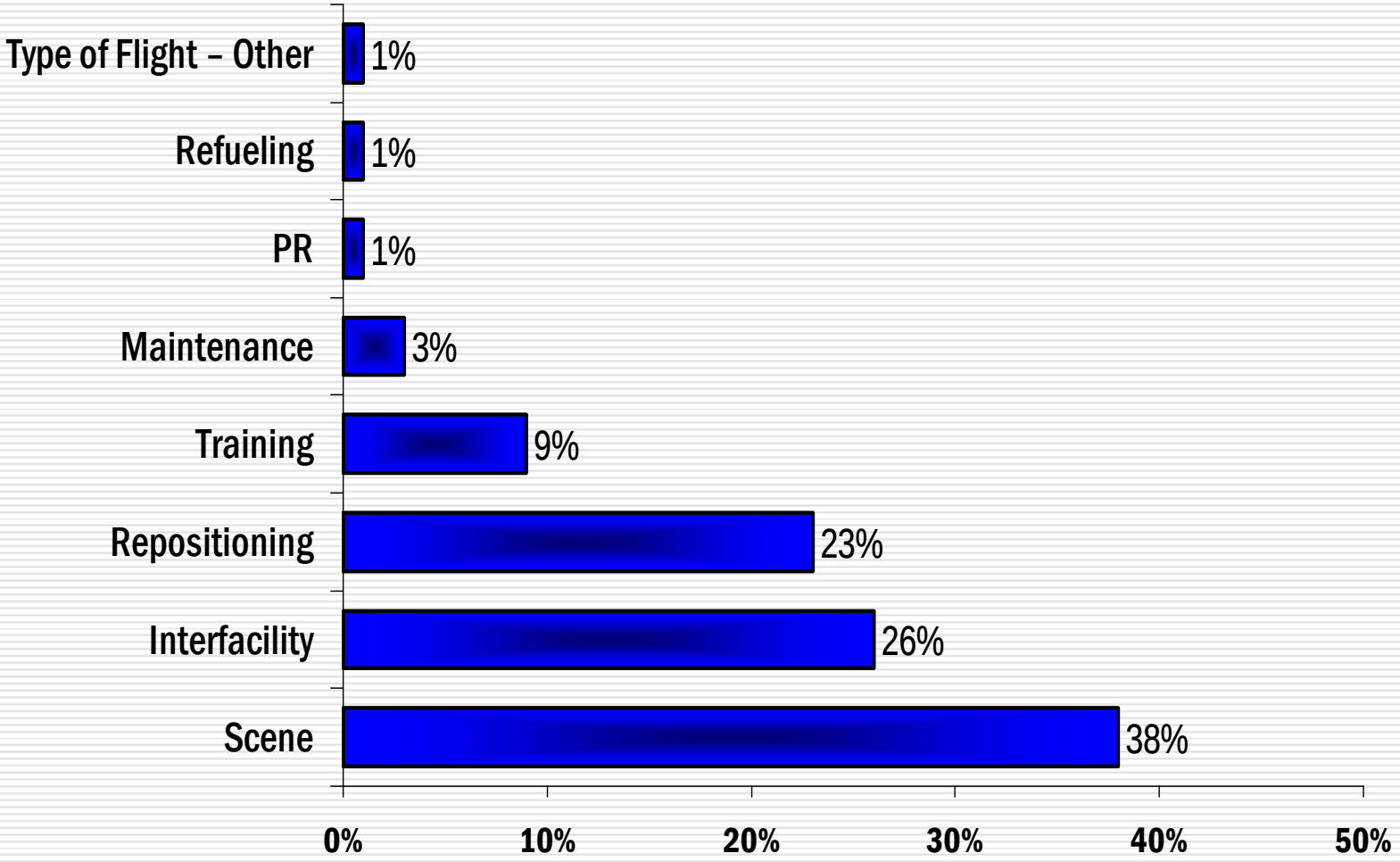
Patient Mission



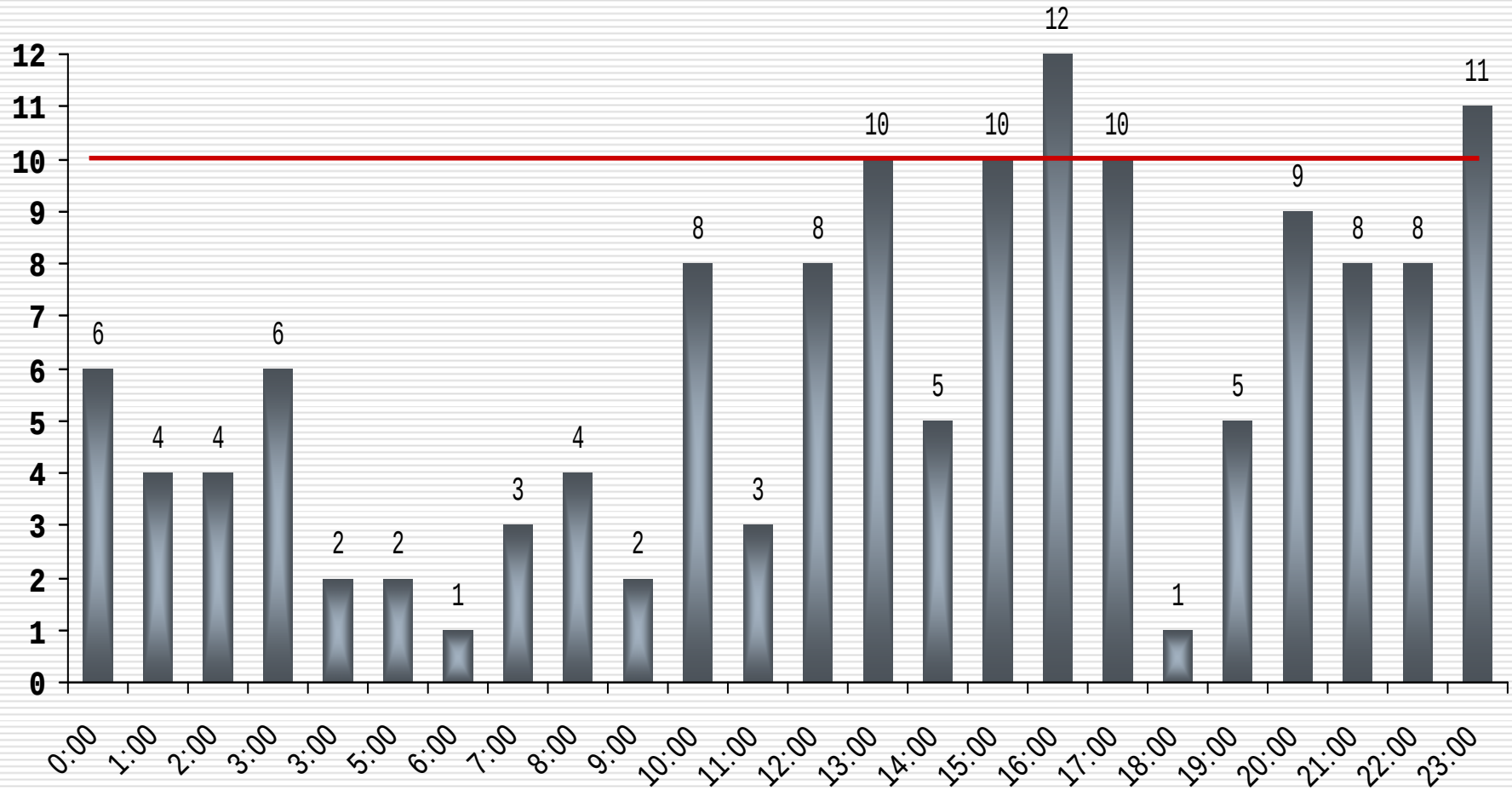
Phase of Flight



Type of Mission



Accidents by Time of Day



Pilot Information: Average (Min – Max)

- All aircraft: 6,708 (1,529 – 20,537)
- Pilot-in-command: 5,753 (697 – 19450)
- Rotor-wing: 5,514 (753 – 17,793)
- Make and model: 860 (12 – 8,000)
- Past 30 days: 17 (0 – 51)
- Age: 47 (26 – 69)

AAMS and Industry Safety Initiatives

Vision Zero
“Zero Accidents of Consequence”

- Initiative started by AAMS to address HEMS accidents
- Goal to decrease the accident rate through safety awareness, by addressing the essential components of building a community **culture** of safety
- Jonathan Godfrey selected as Chair 2008
  - Lone survivor of HEMS crash in the Potomac River in 2005
  - Channeled his experience into a crusade to educate the industry in prevention, survival and eventually higher awareness of Post Traumatic Stress Disorder (PTSD)

“Education, Awareness, Vigilance”

Awareness

- Medical Team
  - Considered to be an elite position among peers
    - More advanced skills, more autonomy, more visibility, and a “cool” flight suit
  - Over-confidence may cloud visual cues related to unsafe practices
- Prevent Complacency
  - Risk Assessment check lists
  - Shift briefings
  - Aircraft walk around

Awareness

- Digital Safety Stories
  - The Center for Medical Transport Research
    - Sponsored by the Air Medical Operators Association, MedEvac Foundation International & MedFlight of Ohio
  - Personal stories concerning safety issues of those working on the front lines of the transport industry
  - Peers who have survived or avoided a crash
  - It can happen to you….
- http://www.medevacfoundation.org/MedEvac/Outreach/Digital_Safety_Stories.aspx

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“Be Safe”

AMOA
AIR MEDICAL OPERATORS ASSOCIATION

MedEvac
FOUNDATION
INTERNATIONAL

The Center
for Medical Transport
Research

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Vigilance

- Elevated awareness of risk involved in HEMS missions

- Open communication
  - Ability to question decisions from leadership if it impacts safety
  - Ability to question pilot in command if medical team member is concerned about anything such as weather, aircraft capabilities, etc

Challenge coin to help bring focus individually and industry-wide to the human factors that impact crews getting home safely

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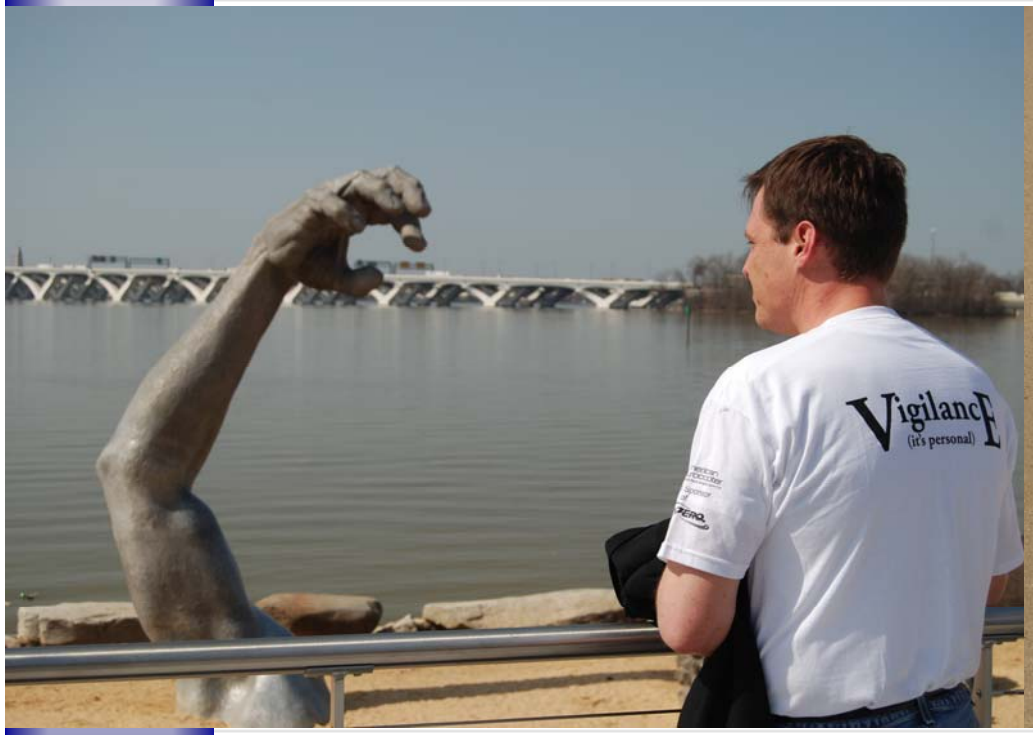
Survivors….”The Awakening”



Jonathan Godfrey

Survivors Network

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Thank You