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
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
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
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
## 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)
<table>
<thead>
<tr>
<th>Contributing Factor (what or why)</th>
<th>SPS Level 1</th>
<th>SPS Level 2</th>
<th>Standard Problem Statement</th>
<th>SPS Code (no dupes)</th>
<th>V</th>
<th>I</th>
<th>M</th>
<th>P</th>
<th>Intervention Level 1</th>
<th>Intervention</th>
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</thead>
<tbody>
<tr>
<td>Critical Information not transferred</td>
<td>Communications</td>
<td>Communication - Inadequate Procedures</td>
<td>Inadequate coordination/communication with ground LZ personnel</td>
<td>603021</td>
<td>503021</td>
<td>3</td>
<td>4</td>
<td>7</td>
<td>3</td>
<td>Infrastructure</td>
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<td>Ground crew did not recognize the unsafe conditions</td>
<td>Safety Management</td>
<td>Ground Personnel Training</td>
<td>Inadequate ground crew training</td>
<td>20010</td>
<td>21010</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>3</td>
<td>Infrastructure</td>
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<tr>
<td>Winds did not support a vertical lift</td>
<td>Pilot Judgment &amp; Actions</td>
<td>Procedure Implementation</td>
<td>Pilot's flight profile unsafe for conditions</td>
<td>646200</td>
<td>506200</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>Training/instructional</td>
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<tr>
<td>Lack of information</td>
<td>Data Issues</td>
<td>Lack of real-time data</td>
<td>Lack of real-time data available</td>
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<td>1102020</td>
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<td>2</td>
<td>6</td>
<td>4</td>
<td>Data/Information</td>
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<td>Ground Personnel Training</td>
<td>Inadequate ground crew training</td>
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<td>4</td>
<td>8</td>
<td>3</td>
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<td>Restricted response to crash</td>
<td>Post-crash Survival</td>
<td>Delayed Rescue</td>
<td>Delayed rescue Other</td>
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<td>2</td>
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<td>4</td>
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<td>503000</td>
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<td>4</td>
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<td>4</td>
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<td>SOP - Operations</td>
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<td>4</td>
<td>8</td>
<td>3</td>
<td>Safety Management</td>
<td>Capital Investment Personnel Equipment</td>
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</tbody>
</table>
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

- Training/Instructional: 539
- Safety Management: 477
- Data/Information: 174
- Systems and Equipment: 202
- Infrastructure: 88
- Maintenance: 102
- Regulatory: 42
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)
Accident Analysis

Keywords and Summary Items
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%
Patient Mission

- **Returning From Patient (RFP)**: 13%
- **Patient On Board (POB)**: 21%
- **Not a Patient Mission**: 26%
- **Enroute To Patient (ETP)**: 40%
Phase of Flight

- Standing (Rotors in Motion): 3%
- Taxiing: 3%
- Maneuvering: 5%
- Descent: 5%
- Approach: 6%
- Hover: 9%
- Climb: 10%
- Landing: 21%
- Takeoff: 23%
- Cruise: 28%
Type of Mission

- Scene: 38%
- Interfacility: 26%
- Repositioning: 23%
- Training: 9%
- Maintenance: 3%
- Refueling: 1%
- PR: 1%
- Type of Flight - Other: 1%

0% 10% 20% 30% 40% 50%
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….

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*
Survivors....”The Awakening”

Jonathan Godfrey
Survivors Network
Thank You