TOWARDS SAFER E.M.S. HELICOPTER OPERATIONS

OR . . .

HOW TO STOP YOUR AIR MEDICAL HELICOPTER BECOMING A TRAUMA STATISTIC!

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Air medical accidents are a longstanding phenomenon:
Scope of the Problem

NZ & Australian HEMS:
- 7-10 (NZ) & 20-28 (Aust) EMS helicopters
- 7+ HEMS accidents in past 10 years involving hull loss & death or injury (crew +/- patients)

USA 1993-2002:
- Approx 230 programs with 400 helicopters
- 68 major accidents (hull loss)
- Including 30 fatal accidents (av 2.5 fatalities)
US HEMS Accidents 1972 - 2002

(Total 162 accidents, including 67 fatal accidents with 183 fatalities)
The good news:

- Patient death rate in HEMS accidents (US) = 0.76/100,000 patients flown

Compared to:

- Patient death rate from adverse event or medical error in hospital: = 131 to 292/100,000 patients
  (Range of studies)
The bad news...

Relative risks of death for HEMS crew
(Death rate per hour of activity)

- Rock climbing: 1:25,000
- HEMS flying: 1:32,900
- Skydiving: 1:50,000
- Motorcycling: 1:55,000
- Skiing: 1:340,000
- Car driving: 1:1,190,000
The tragic story of a HEMS accident:

- 24th July 2000, Rockhampton, Qld.
- Bell 206L Longranger, community supported EMS helicopter
- 2326 callout for 2 yr old child with croup, 90NM away.
- Departure 2340. Crew pilot, AO/crewman, paramedic AO (3)
- Departed scene w/crew plus patient & mother (=5 PoB)
- Enroute diversion (due insufficient fuel) to halfway location
- Fog (as per forecast) at attempted LZ location
- Three landing attempts aborted due visibility
- Further attempt enforced by low fuel state
- Aircraft struck ground in steep banking dive
- No survivors
Contributing factors
It's easy to be wise after the event, but:

- Insufficient fuel
- Probable failure to check/heed weather
- Excessive haste
- Possible pressure from perceived urgency
- Fatigue/sleep inertia
- Poor flight planning
- Inadequate medical crewing
- Poor cockpit resource management
Some more sorry tales:

- Helicopter on approach to (previously used) scene LZ
- Struck wire - known to be there but not taken into account
- Helicopter on night over-water flight to accident on island
- Lost horizon reference & hit sea - no survivors.
- Fully loaded helicopter lifting off from mountain HLS
- Overloaded for temp/altitude - insufficient power when lifting out of ground effect - lost rotor speed & crashed.
- Helicopter on night low level VFR flight
- Navigational error - flew into trees on rising ground
Factors in HEMS Accidents

- Weather
  - Including darkness
- Wires
  - & other obstacles/terrain
- We the people
  - The human factor
Turning the Corner

"Aviation, even EMS aviation is \underline{not} inherently dangerous . . .

. . . it \underline{is} however, inherently unforgiving of mistakes"
“There are old pilots and there are bold pilots – but there are not any old & bold pilots”
99.9% Safe?

- If each HEMS flies 1 mission per day: Then can expect to have 1 major crash/3 HEMS programs/year

- If airlines worked on 99.9% safety: Would have 18 international flights crash each day!
Human Risk Factors in HEMS Accidents

- Complacency - “the silent killer”
- Risk taking behaviour
- Lack of “safety culture”
- Pressure to complete task
- Excessive haste/poor planning
- Inadequate training
- Fatigue/inertia
- Poor crew resource management
So, just what exactly is this Crew Resource Management (CRM) business?
Crew Resource Management

- Defined as: “Effective management of all available resources to maintain a common frame of reference and safety goal.”

- 2000 Air Medical Safety Summit (USA) identified CRM and related training as the number one priority.
CRM – the prerequisites

- To have crew resource management you first need to have a crew
  - Remember, crew resources are not necessarily only in the aircraft
- Safety is everyone’s business
- CRM is not “cockpit communism”
  - One captaincy but universal airmanship
  - Leadership complemented by followership

Remember: Safety begins with “I”.
RPT versus HEMS

**AIRLINE SERVICES**
- Scheduled flights
- Planned in advance
- Designated & well equipped airports
- Wide array of navaids
- Close air traffic control

**H.E.M.S. OPERATIONS**
- Unscheduled flights
- Rapid decision making & planning required
- Small helipads & unimproved LZs
- Limited navaids
- Predominantly “OCTA”

*So whose need for crew resource management is greater?*
“Seven Pillars of CRM”

- Teamwork
- Effective communication
- Workload management
- Systematic decision making
- Situational awareness
- Stress avoidance/management
- Practice & simulation
“Crew Resource management is the human component of active safety”
"The Safety Triangle"

ACTIVE

PASSIVE

PRO-ACTIVE
PRO-ACTIVE SAFETY INITIATIVES

- Safety aware management
- Training for all crew in CRM
- Designated Safety Pilot
- Safety incident reporting & evaluation
- Check & Training Program
- Simulator training (flight crew)
- HUET training if applicable (all crew)

Promulgation of “safety culture”
Active (operational) Safety

- Crew resource management
- Multi-crewing (co-pilot or aircrewmans)
- Non-fatigued crew
- IFR capability & currency
- Advanced medical capabilities
- Proper mission planning
  - including abort drill/backup plan
Remember: Declining a flight on safety grounds is a valid risk management.

"Nobody ever crashed an aircraft by not flying it".
Are Two Engines Better Than One?

Two engines will not:
- Stop you from hitting wires
- Save you from spatial disorientation
- Stop you running out of fuel
- Save you from tail or main rotor failure

Two engines may:
- Offer IFR capability
- Allow carriage of an aircrewman or copilot
- Allow fitting of extra navaids & safety gear
- Allow flyaway in some circumstances in the event of failure of one engine.
What’s so great about IFR?

- IFR stands for Instrument Flight Rules
- Refers to capability to fly “blind” on instruments
- Requires an autopilot, navigational aids, and a rated pilot (second pilot or ACM desirable)
- Will allow completion of some additional flights
- Is not a panacea - flights still require VFR (visual) conditions for takeoff/landing.
What IFR capability can do is allow transition to instruments in the event of spatial disorientation; or inadvertent or forced entry into IMC (cloud)
The IFR option:
Passive Safety Initiatives
(surviving when all else fails!)

- Helmets/full harnesses
- Fore/aft facing seats
  - energy absorbing type if possible
- Crashworthy cabin layout
  - No loose objects!!!
- HUET & egress/survival training
- ELT beacons
  - aircraft & personal
- Survival pack/gear
New Developments in Safety

- More & better GPS utilisation
- Wire detection systems
- Night vision goggles
- Better crashworthiness
- JAR Ops 3 & beyond

But who is going to design us a better human being to use them?
“But isn’t this all going to be too expensive?”

If you think safety is too expensive, have you checked out the cost of the alternatives recently:

- Human lives?
- Aircraft replacement?
- Legal liability?
Cost Saving Safety

Currently HEMS in NZ are:

- Too numerous
- Over-utilised
- Inappropriately funded
- In need of a systemic overhaul

With fewer HEMS we can afford better (clinical & safety) standards
My Vision for HEMS:

- Fewer HEMS services
  - Analogous to trauma centres
- Multi-crew IFR capable 3-5 tonne class twin engined helicopters
- Proper staffing roster 24/7.
- Mandatory safety program & audit
- Critical care clinical team (with)
- Non-helicopter (i.e. road) backup transport
“Those who do not learn from history are doomed to repeat it.”
THE END

QUESTIONs?