

TOWARDS SAFER E.M.S. HELICOPTER OPERATIONS

OR . . .

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

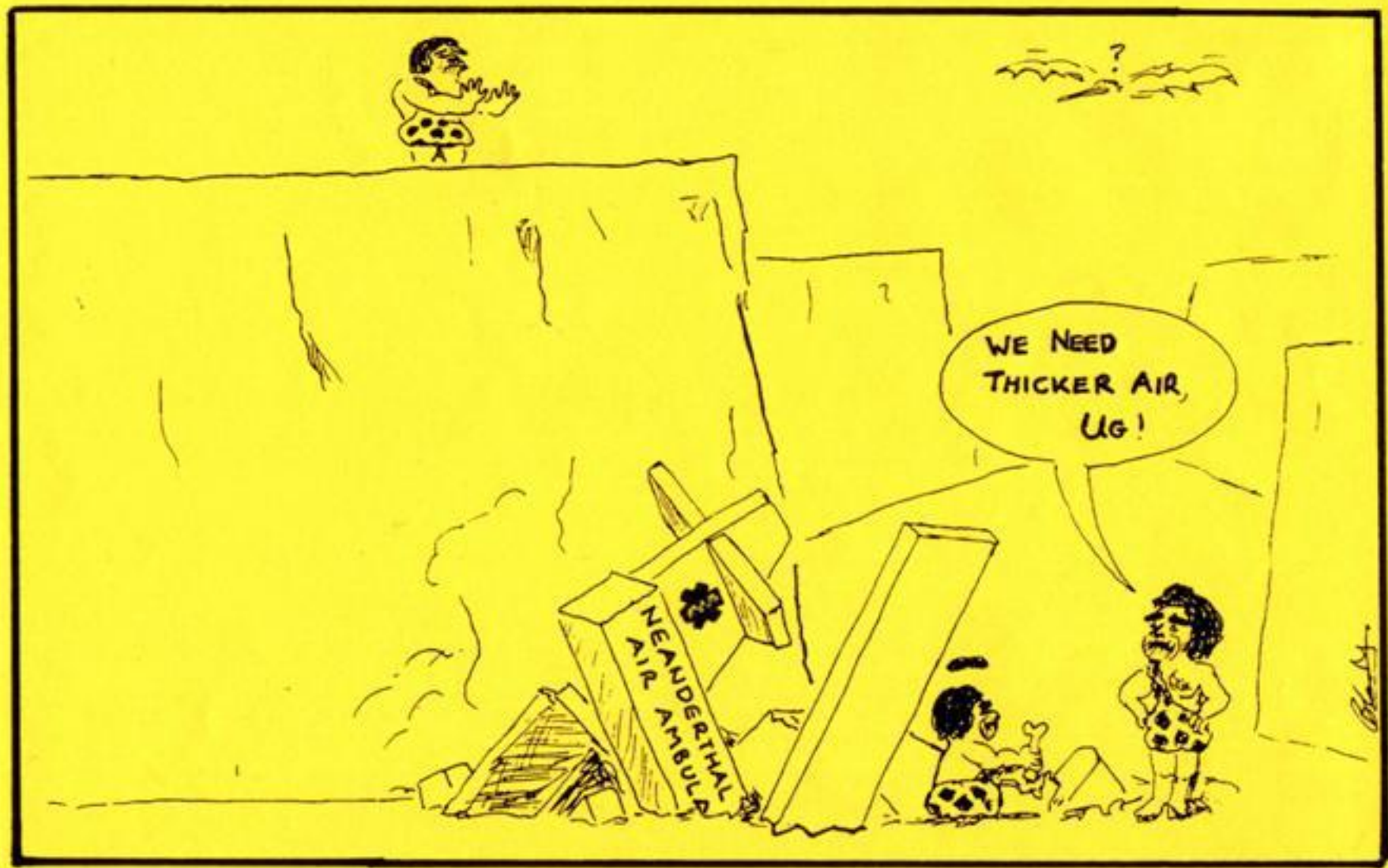
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Air medical accidents are a longstanding phenomenon:



Scope of the Problem

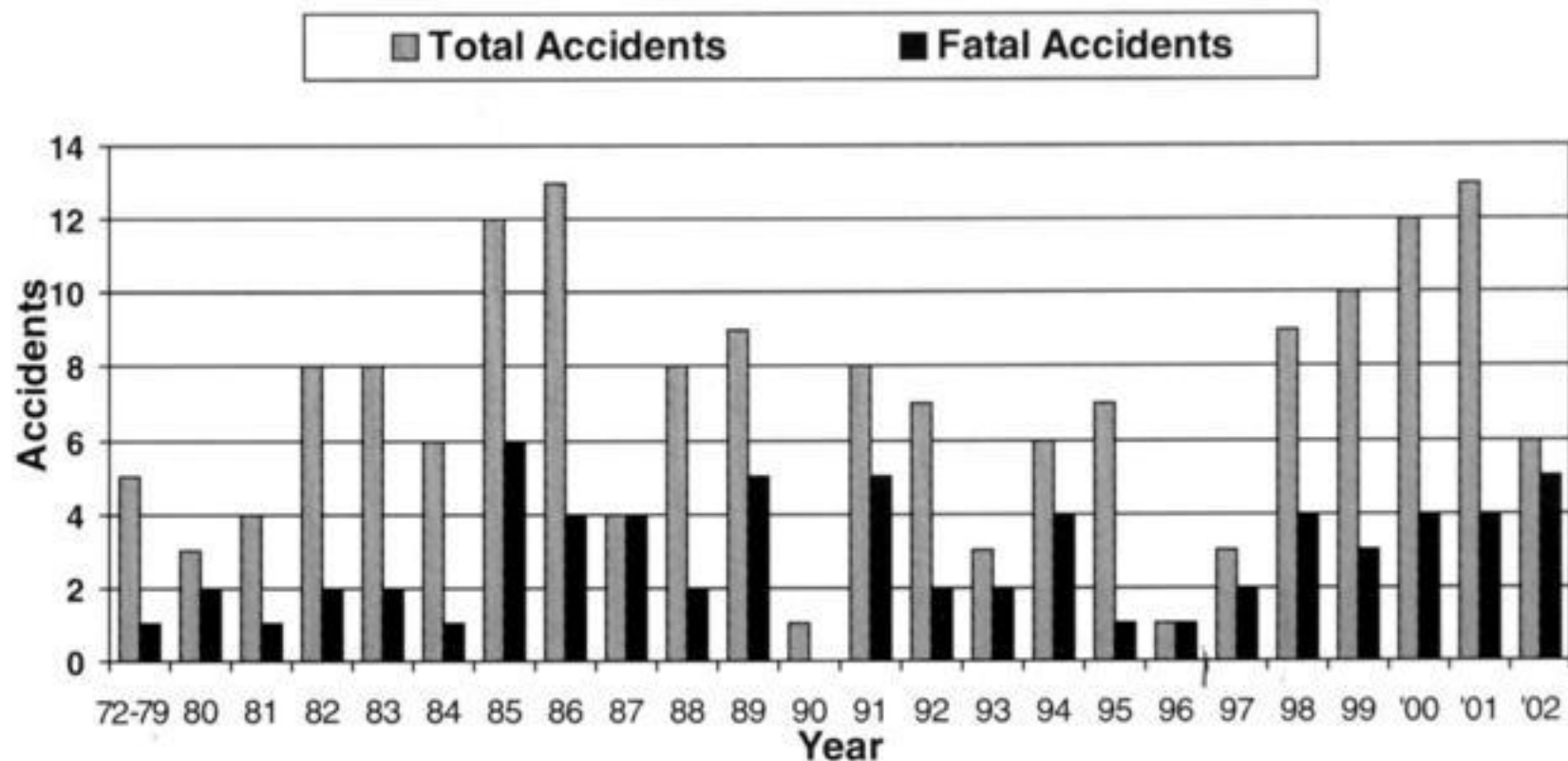
λ NZ & Australian HEMS:

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

λ 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:

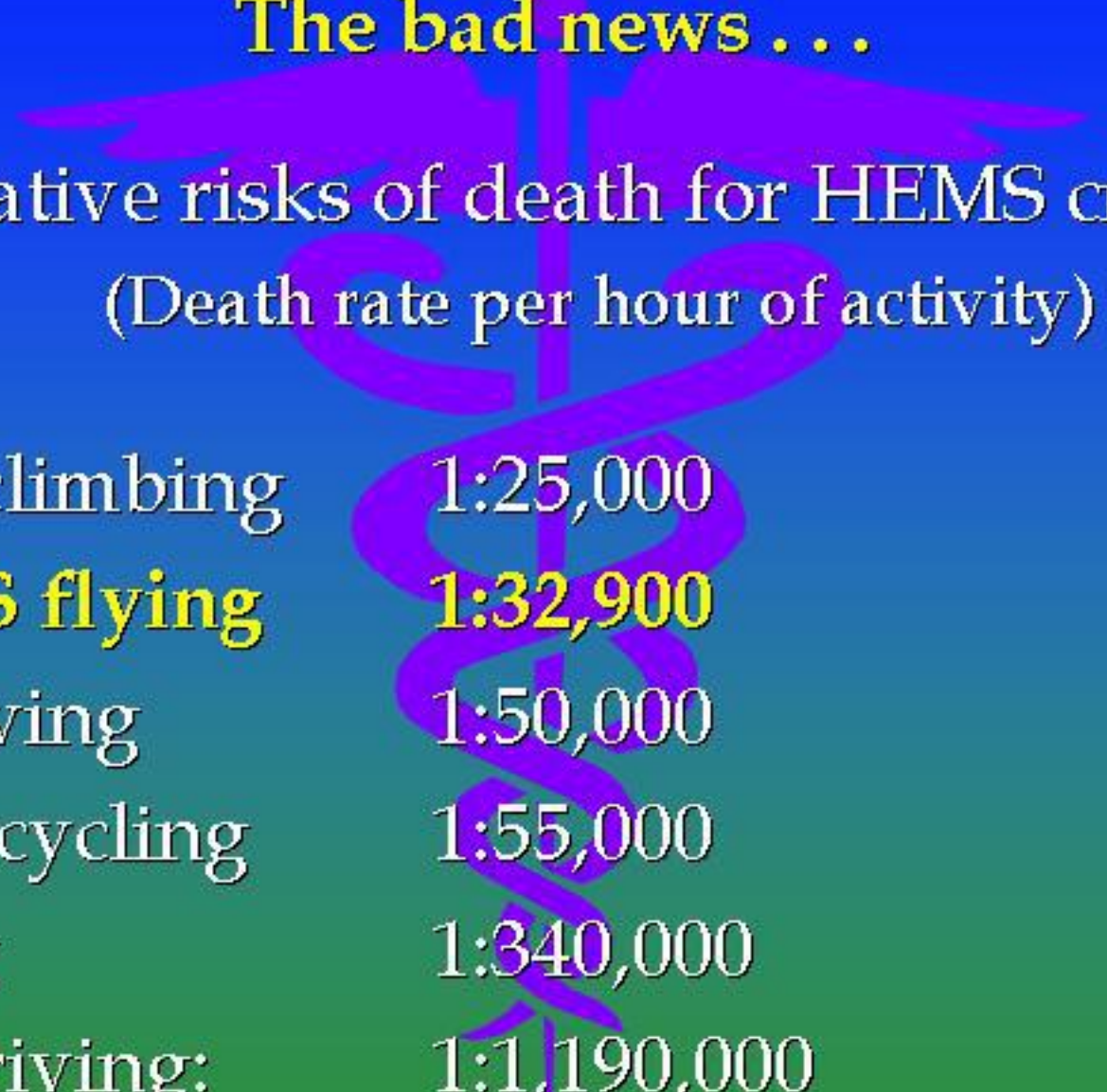
- λ Patient death rate in HEMS accidents(US)
= 0.76/100,000 patients flown

Compared to:

- λ 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)



λ Rock climbing	1:25,000
λ HEMS flying	1:32,900
λ Skydiving	1:50,000
λ Motorcycling	1:55,000
λ Skiing	1:340,000
λ Car driving:	1:1,190,000

The tragic story of a HEMS accident:

- λ 24th July 2000, Rockhamptom, Qld.
- λ Bell 206L Longranger, community supported EMS helicopter
- λ 2326 callout for 2 yr old child with croup, 90NM away.
- λ Departure 2340. Crew pilot, AO/crewman, paramedic AO (3)
- λ Departed scene w/crew plus patient & mother (=5 PoB)
- λ Enroute diversion (due insufficient fuel) to halfway location
- λ Fog (as per forecast) at attempted LZ location
- λ Three landing attempts aborted due visibility
- λ Further attempt enforced by low fuel state
- λ **Aircraft struck ground in steep banking dive**
- λ **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:

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

Factors in HEMS Accidents




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

Turning the Corner



“Aviation, even EMS aviation is not inherently dangerous . . .

. . . it 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?

λ If each HEMS flies 1 mission per day:

**Then can expect to have 1 major crash/3
HEMS programs/year**

λ If airlines worked on 99.9% safety:

**Would have 18 international flights crash
each day!**

Human Risk Factors in HEMS Accidents

- λ Complacency – “the silent killer”
- λ Risk taking behaviour
- λ Lack of “safety culture”
- λ Pressure to complete task
- λ Excessive haste/poor planning
- λ Inadequate training
- λ Fatigue/inertia
- λ Poor crew resource management



*So, just what exactly is this
Crew Resource Management
(CRM) business?*

Crew Resource Management



- λ Defined as: “Effective management of all available resources to maintain a common frame of reference and safety goal.”
- λ 2000 Air Medical Safety Summit (USA) identified CRM and related training as the number one priority.

CRM – the prerequisites

- λ To have crew resource management you first need to have a crew
 - Remember, crew resources are not necessarily only in the aircraft
- λ Safety is everyone's business
- λ 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"

- λ Teamwork
- λ Effective communication
- λ Workload management
- λ Systematic decision making
- λ Situational awareness
- λ Stress avoidance/management
- λ Practice & simulation



“Crew Resource management is the human component of active safety”

"The Safety Triangle"



PRO-ACTIVE SAFETY INITIATIVES

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

Promulgation of “safety culture”

Active (operational) Safety

- λ Crew resource management
- λ Multi-crewing (co-pilot or aircrewman)
- λ Non fatigued crew
- λ IFR capability & currency
- λ Advanced medical capabilities
- λ 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 nav aids & 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

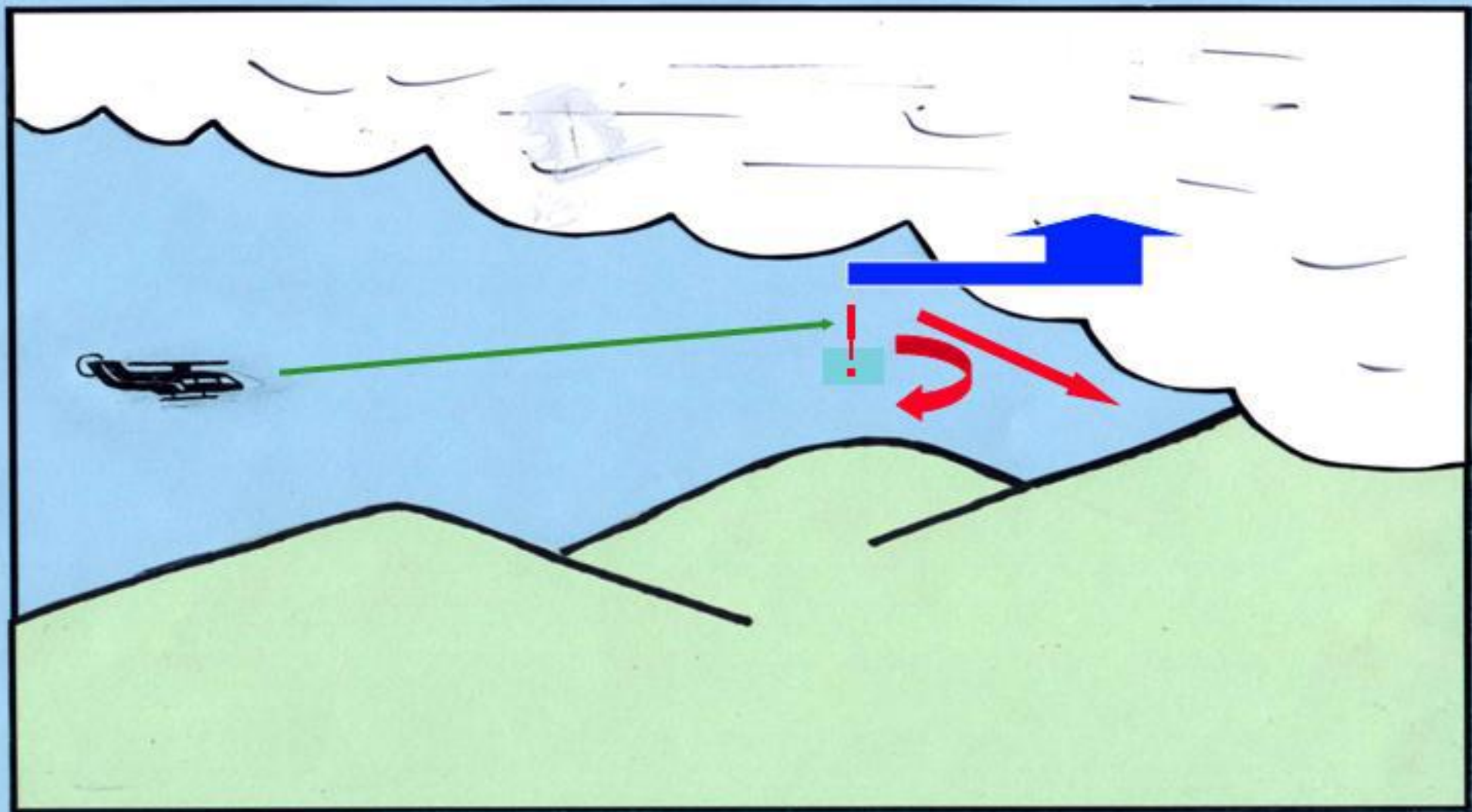
BUT

- ✦ Is not a panacea - flights still require VFR (visual) conditions for takeoff/landing.

... However:

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!)

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

New Developments in Safety

- λ More & better GPS utilisation
- λ Wire detection systems
- λ Night vision goggles
- λ Better crashworthiness
- λ 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:

- λ Human lives?
- λ Aircraft replacement?
- λ Legal liability?

Cost Saving Safety

Currently HEMS in NZ are:

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

With fewer HEMS we can afford better (clinical & safety) standards

My Vision for HEMS:

- λ Fewer HEMS services
 - Analogous to trauma centres
- λ Multi-crew IFR capable 3-5 tonne class twin engined helicopters
- λ Proper staffing roster 24/7.
- λ Mandatory safety program & audit
- λ Critical care clinical team (with)
- λ Non-helicopter (i.e. road) backup transport





*“Those who do not learn from history are
doomed to repeat it.”*



THE END

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QUESTIONS?