AIR ACCIDENT INVESTIGATION AND MEDICAL INCAPACITATION: A RETROSPECTIVE STUDY

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13 NOVEMBER 2023

CIVIL AVIATION AUTHORITY OF MALAYSIA

SCOPE

1. AVIATION MEDICINE INVESTIGATION AND FINDINGS OF 9M-BAA ACCIDENT.
2. POST AIR ACCIDENT MEDICAL MANAGEMENT AND PROCESS.
3. COMMON PSYCHIATRIC CONDITION OBSERVED IN AIR ACCIDENT SUVIVOR.
4. ANALYSIS OF COCKPIT INCAPACITATION.
5. MITIGATING MEDICAL INCAPACITATION RISK.

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Aviation Medicine Investigation and Findings of 9M-BAA

Details

- 1ST August 2022
- Piper Warrior II PA 28-161
- Beside Sungai Pinji, Ipoh
- 1 Pilot on Check – DFE, total 18,767 hrs on all type. 182 hrs on PA 28
- 1 Pilot in Command – FI, total 3,646 hrs on all type. 371 hrs on PA 28.

Finding

- Last minute change of plan for the night flight currency check for Pilot On Check.
- It was done in a hurry manner.
- Crashed into the side of a water diversion.
- Primary cause: Skill-based error - pilot inadvertently selected incorrect magneto setting for take-off.
- Contributing factor: Lack of monitoring and complacency.

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Medical Pathology Findings

Pilot On Check •(POC)	Pilot In Command (PIC)
•- Dissociative Amnesia – could not recall events from loss of power till regaining consciousness. •- Startle effect. •- Polytrauma injuries, mainly on the right side of the body.	- Deceased at the crash site due to fatal injury on the neck and chest.

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Medical Certificate

Pilot On Check •(POC)	Pilot In Command (PIC)
•- Valid and effective during the accident.	- Valid and effective during the accident.
•- Limitation: Valid Only With Corrective For Defective Near Vision.	•- Limitation: Shall Wear Corrective Lenses And Carry A Spare Set Of Spectacles.

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STARTLE EFFECT

-Physical and mental response to a sudden, intense unexpected stimulus.

-Increased heart rate and muscles tension.

-Stops doing what he was doing

-Disrupt the pilot's cognitive capability.

- Lose of the situational awareness

Recovery from Startle Effect.

-100ms to 3 seconds for simple tasks.

-Up to 10 seconds for more complex motor tasks

(Rivera, et al, 2014)

Aviation Medicine (Psychology) Analysis

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ANALYSIS OF AIRCRAFT CRASHWORTHINESS MNEMONIC “CREEP”

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1. Crash survivability and the human tolerance to impact is analyzed using the tool, “CREEP”
    - Container,
    - Restrain,
    - Environment,
    - Energy,
    - Absorption,
    - Post crash Factors.
2. These factors determined causes of injury and survivability of the occupants.

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ANALYSIS OF AIRCRAFT CRASHWORTHINESS MNEMONIC “CREEP”

1. CONTAINER “C”

- Space occupied by occupants.
- Ideal container should prevent intrusion of outside objects while maintaining its occupiable space.

The structure on the right side of the “container” has been damaged. This indicated the occupant at the starboard received mighty impact.

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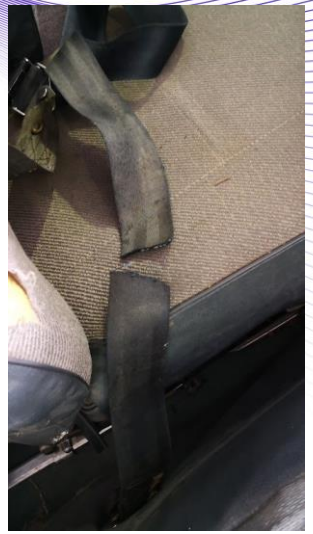
ANALYSIS OF AIRCRAFT CRASHWORTHINESS MNEMONIC “CREEP”

2. RESTRAINT “R”

- Keeps individual in the seat, attenuate the crash dynamic, restrict the occupant to avoid colliding with the aircraft structure.
- Three point harness.
- The strap was cut during the extrication by the BOMBA, suggesting both occupants fastened the seatbelt.

RHS



LHS

ANALYSIS OF AIRCRAFT CRASHWORTHINESS MNEMONIC “CREEP”

3. ENVIRONMENT “E”

- Interaction between space, structure with occupants .
- Injured by collision with cabin structures. E.g control column, levers and etc.
- Brace position reduce the strike envelop of the body
- Injuries in both pilot consistent with the collision with the cockpit structure.
- The injuries pattern suggested the POC was not in brace position in the course of collision.

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The control column on the RHS has been cut during the extrication. While the LHS control column remained intact. Both flight crews had a contact collision with the control column causing direct impact on chest.

ANALYSIS OF AIRCRAFT CRASHWORTHINESS MNEMONIC “CREEP”

4. ENERGY ABSORPTION “E”

- Crumple zones (collapsible landing gear) help energy absorption by increasing stopping distance.

The nose landing gear collapsed helping to absorb the impact.

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ANALYSIS OF AIRCRAFT CRASHWORTHINESS MNEMONIC “CREEP”

5. POST-CRASH FACTORS “P”

- Both occupants did not escape from the wreckage as they were unconscious and severely injured.
- No life-threatening factors, such as
  - post crash fire,
  - water level of the culvert did not cover the wreckage.
  - The time of rescue by the BOMBA - 1 hour after the crash.

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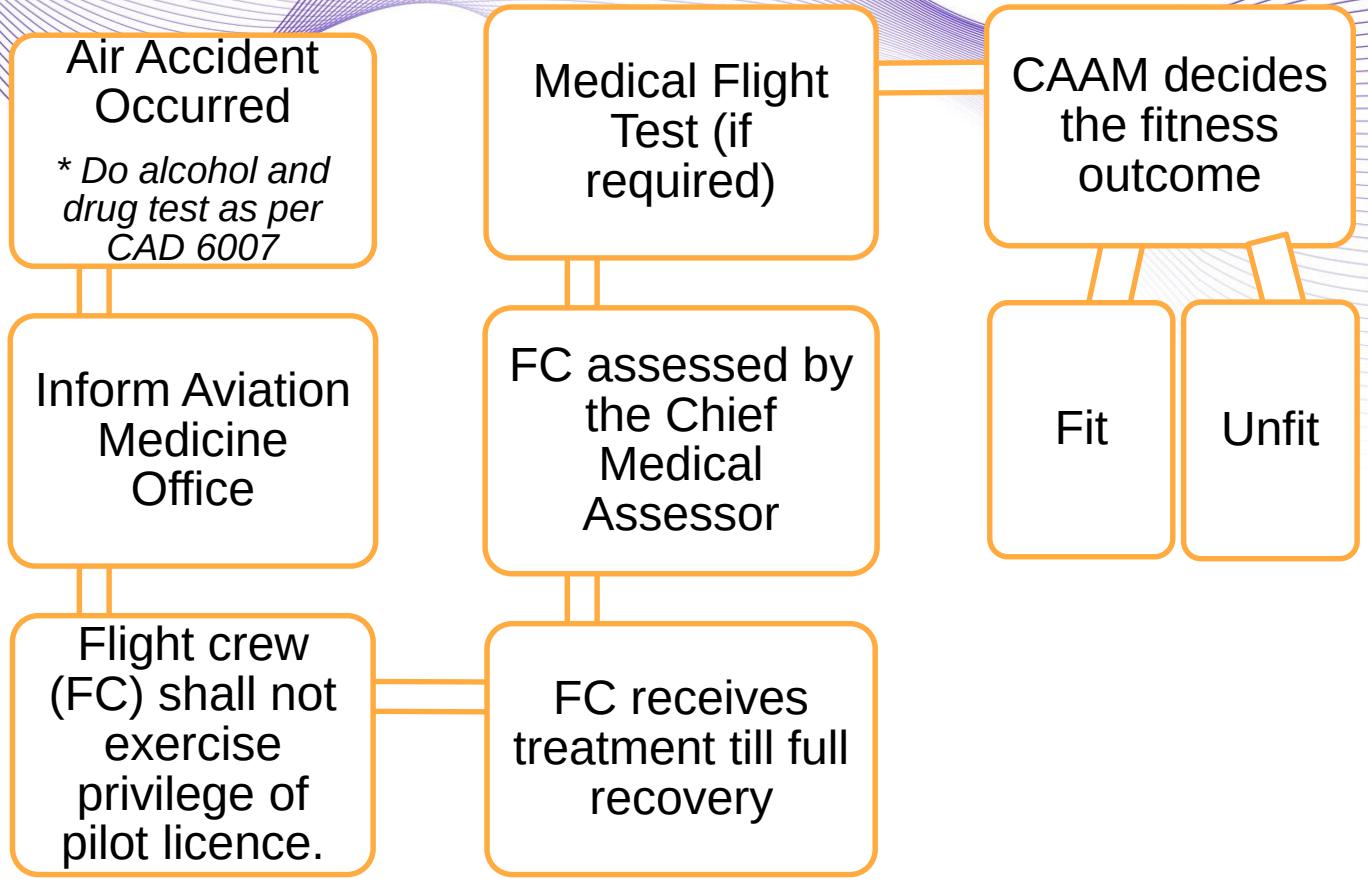
POST ACCIDENT MEDICAL MANAGEMENT AND PROCESS.



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COMMON MENTAL ISSUE AFTER ACCIDENT

1. POST TRAUMA STRESS DISORDER

2. DEPRESSION

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POST-TRAUMA STRESS DISORDER (PTSD)

What is PTSD?

Mental and behavioral disorder that develops from experiencing a traumatic event, such as air accident.

Prevalence of PTSD

After an air accident in commercial traveler.

- 46% (2 months after accident)
- 47% (9 months after accident.)

(Gouweloos et al, 2015)

Symptoms

- Intrusive memories.
- Flashbacks.
- Nightmares.
- Depressed.
- Detach from people and surrounding.
- Insomnia.
- Irritability.
- Enhanced startle response.

Flight implication

- Impaired attention and concentration.
- Avoidance of flying.
- Behavioral issue.
- Social and communication difficulties.

Fit to fly? when?

- Full recovery.
- Motivated to fly.
- Monitor residual phobic anxiety.

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DEPRESSION

What is Depression?

Persistent sadness and a lack of interest or pleasure in previously rewarding activities

Prevalence of Depression

after an air accident in commercial traveler.

- 32% (2 months after accident)
- 35% (9 months after accident)

Symptoms

- Depressed.
- Loss of interest.
- Guilt/Worthlessness.
- Suicidal thought.
- Retardation/Agitation.
- Fatigue.
- Sleep disturbances.
- Executive dysfunction.
- Change of sleep pattern.

Flight implication

- Impaired attention and concentration in safety-critical tasks.
- Risk of suicide and self-harm.
- Shift and demanding work aggravate the condition.

Fit to fly? when?

- Case by case basis.
- Stable with medication.
- Side effects.
- Cognitive function.
- Compliance and follow up.

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ANALYSIS OF COCKPIT INCAPACITATION.

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ANALYSIS OF COCKPIT INCAPACITATION.

Medical incapacitation is defined by the ICAO as:

“Any reduction in medical fitness to a degree or of a nature that is likely to jeopardize flight safety”.

(ICAO DOC 8984, 2012).

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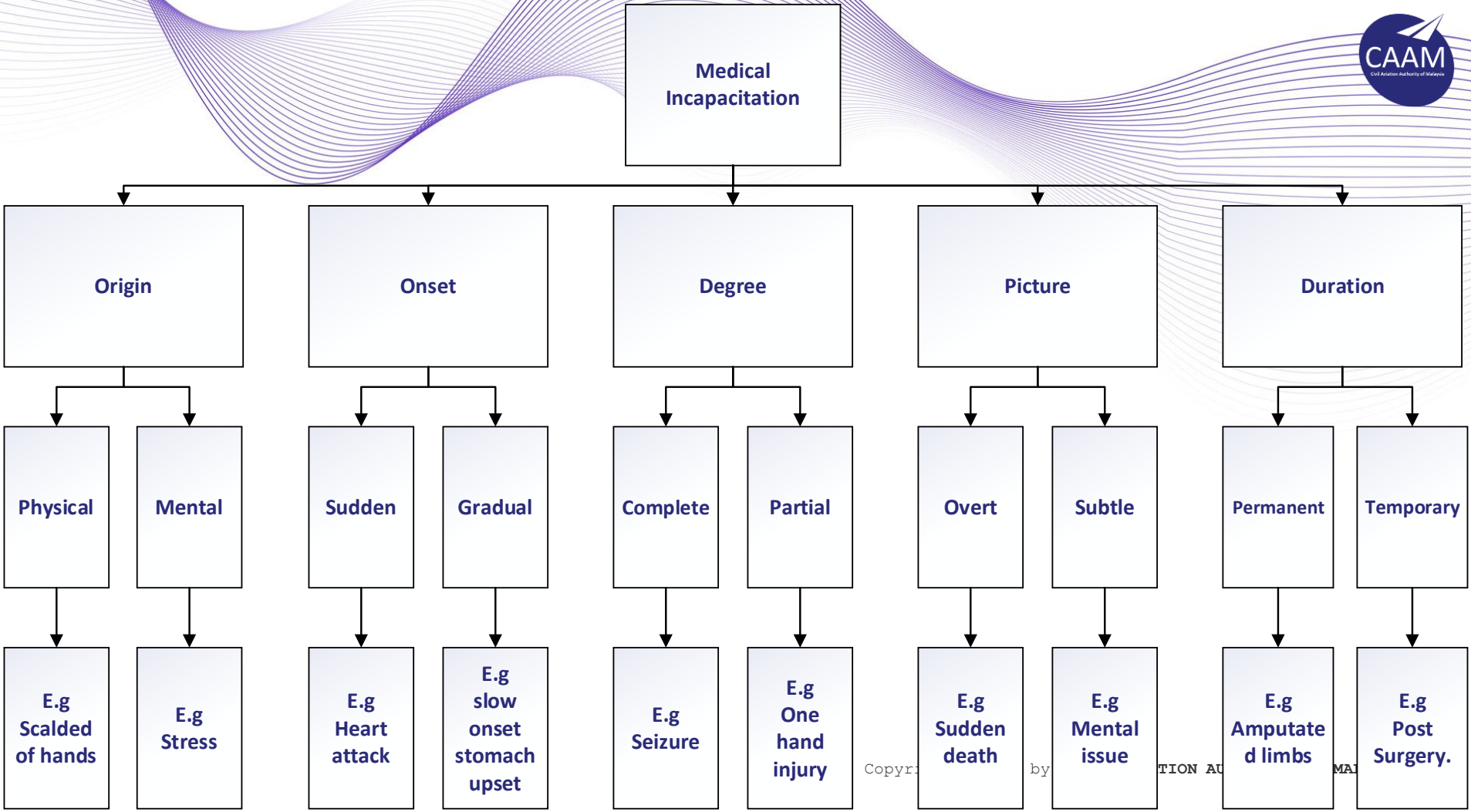

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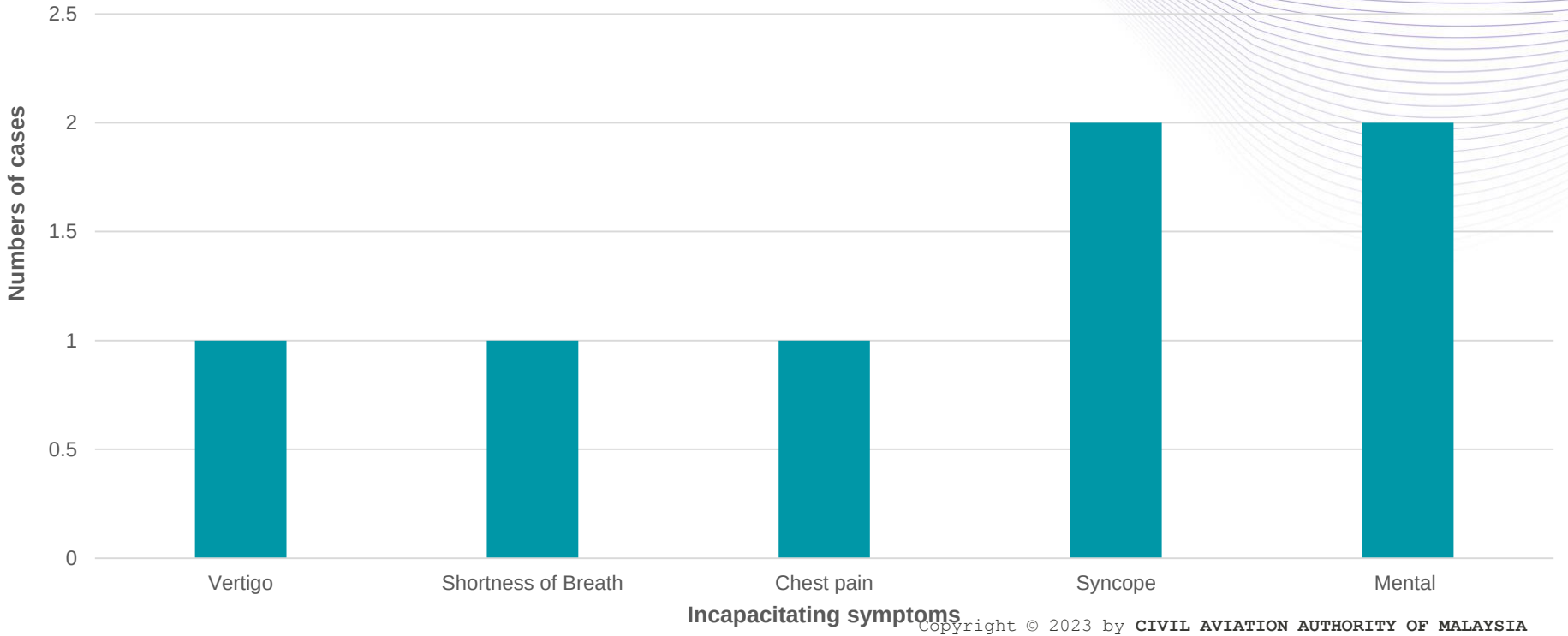
ANALYSIS OF COCKPIT INCAPACITATION.

Causes of Reported Flight Crew Incapacitation (Apr 2022 – Apr 2023)



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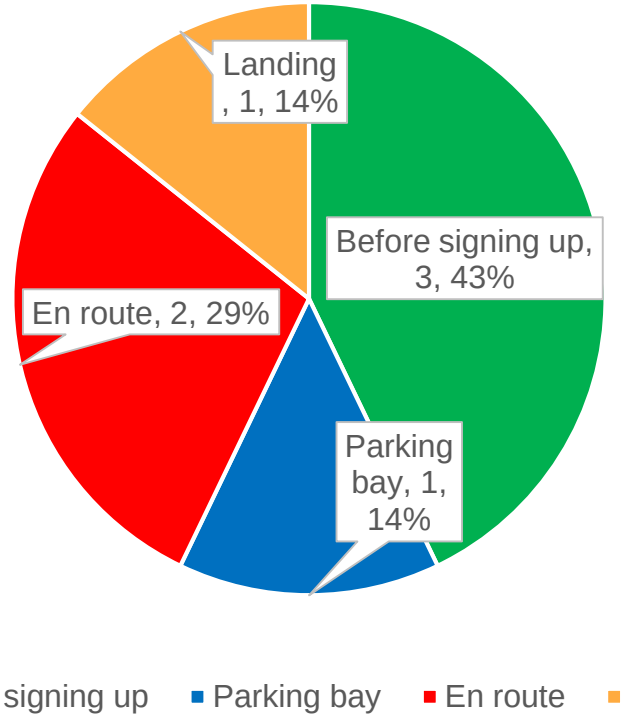
ANALYSIS OF COCKPIT INCAPACITATION.

When did the symptoms emerge?



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MITIGATING MEDICAL INCAPACITATION RISK.

The Law

Pursuant to the Regulation 62 (for flight crew) and Regulation 155 (for air traffic controller), Civil Aviation Regulations 2016 (MCAR 2016), a licence holder not to act as member of flight crew when unfit, if: –

(a) suffers injury involving incapacity to undertake the function to which the licence relates;

(b) incapacity period of more than twenty-one days;

(c) pregnant;

(d) requires continued treatment with any medical prescription; or

(e) hospitalization.

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MITIGATING MEDICAL INCAPACITATION RISK.

Cont'

shall –

(A) as soon as possible inform the CAAM in writing of the injury, illness, pregnancy or treatment or as soon as possible after the period of twenty-one days has elapsed in the case of the illness referred to in paragraph *(b);* and

(B) not exercise the privileges of the licence and ratings until he has satisfied the medical examiner that his medical fitness has been restored to the standard as may be determined by the CAAM .

Refer to MCAR 2016 for details

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MITIGATING MEDICAL INCAPACITATION RISK.

Responsibility of licence holders

1. Notify Decrease In Medical Fitness to CAAM.
2. Shall not exercise the privilege of pilot or ATCO licence.
3. Seek treatment from doctor and comply.
4. Attend to Designated Medical Examiners (DMEs) or Chief Medical Assessor(CMA) for reinstatement assessment upon full recovery.
5. Submit reports, investigation, X-ray, CT scan, MRI, blood result and etc to the attending DMEs or the CMA.

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MITIGATING MEDICAL INCAPACITATION RISK.

Responsibility of An Employer

1. Provide the licence holder leave from the flying duty.
2. Ensure the licence holder does not fly or assume air traffic control (ATCO).
3. Ensure notification to CAAM in a timely manner.
4. Support licence holder in terms of welfare, insurance, sick leave, psychological and moral support.

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MITIGATING MEDICAL INCAPACITATION RISK.

PRE-FLIGHT SELF-ASSESSMENT

I - Illness (Free of illness and symptoms)

M - Medication (Taking any unsafe medication, check with your DME)

S - Stress (Free of any distracting stress)

A - Alcohol or Drugs (When was the last drink? On any drug?)

F - Fatigue (Adequate sleep and rest?)

E - Eating (adequate meal?) Emotion (emotional stable)

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CONCLUSION

1. Medical Incapacitation is a real threat to the flight safety.
2. Medical Fitness is an important element in the flight safety.
3. Health awareness should be cultivated in an organization.
4. Mental incapacitation is usually subtle and insidious, which is difficult to detect.
5. Refrain from performing a flight duty if unwell.
6. Cockpit incapacitation is under-reported
7. Notify Decreased in Medical Fitness as soon as possible.

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