

الهيئة العامة للطيران المدني
GENERAL CIVIL AVIATION AUTHORITY



Air Accident Investigation Sector

Serious Incident

- Final Report -

AAIS Case N°: AIFN/0006/2015

Pilot Incapacitation

Operator: Etihad Airways
Make and Model: Airbus A330-243
Nationality and Registration: The United Arab Emirates, A6-EYN
State of the Operator: The United Arab Emirates
Place of Occurrence: Iranian Airspace
Date of Occurrence: 29 June 2015



Air Accident Investigation Sector
General Civil Aviation Authority
The United Arab Emirates

Occurrence Brief

Name of the Operator	:	Etihad Airways
Manufacturer	:	Airbus Industrie
Aircraft model	:	A330-243
Nationality	:	The United Arab Emirates
Registration	:	A6-EYN
MSN	:	832
State of Occurrence	:	Iranian Airspace
Date and time	:	29 June 2015, at 0336 LT
Injuries	:	None

Investigation Objective

This Investigation is performed pursuant to the United Arab Emirates (UAE) Federal Act No. 20 of 1991, promulgating the *Civil Aviation Law, Chapter VII- Aircraft Accidents, Article 48*. It is in compliance with *CAR Part VI Chapter 3*, in conformity with *Annex 13* to the Convention on International Civil Aviation.

The sole objective of this Investigation is to prevent aircraft accidents and incidents. It is not the purpose of this activity to apportion blame or liability.

The information contained in this Final Report is derived from the factual information gathered during the investigation of the Occurrence.

Investigation Process

The Air Accident Investigation Sector (AAIS) of the UAE was informed about the Copilot incapacitation that occurred on Etihad Airways Airbus A330 Aircraft 58 minutes after departure from Abu Dhabi International Airport. The Occurrence was notified by the Operator's Flight Safety to the AAIS Duty Investigator (DI) hotline, +971506414667.

The occurrence was classified as Serious Incident and the AAIS opened an Aircraft Accident Investigation File (AIFN/0006/2015).

The AAIS appointed an investigator-in-charge (IIC) and assigned an Investigation Team. France being the State of the Aircraft Manufacturer and Design, was notified and assigned an Accredited Representative to the Investigation. In addition, the Operator assigned an Adviser to the IIC. The AAIS led the Investigation and issued the Final Report.

The AAIS Reports are publicly available at:

<http://www.gcaa.gov.ae/en/epublication/pages/investigationReport.aspx>



Notes:

1. Whenever the following words are mentioned in this Report with first Capital letter, they shall mean the following:
 - (Aircraft)- the aircraft involved in this serious incident;
 - (Investigation)- the investigation into the circumstances of this serious incident;
 - (Incident)- this investigated serious incident;
 - (Commander)- the Commander of the incident flight;
 - (Copilot)- the Copilot of the incident flight;
 - (Cabin Manager)- the senior cabin crewmember of the incident flight;
 - (Report)- this serious incident Report.
2. Unless otherwise mentioned, all times in this Report are local time (LT). UTC time was local time minus 4 hours;
3. Photos and figures used in this Report are taken from different sources and are adjusted from the original for the sole purpose to improve the clarity of the Report. Modifications to images used in this Report are limited to cropping, magnification, file compression, or enhancement of color, brightness, contrast, or addition of text boxes, arrows or lines.
4. This Investigation also reviewed information from the following:
 - The UAE Mandatory Reporting of Safety Incidents (ROSI) flight crew Incapacitations from 2010 to December 2015.



Abbreviations

AAIS	The Air Accident Investigation Sector of the United Arab Emirates
AME	Aeromedical examiner
AMS	Aeromedical section (GCAA)
ATC	Air traffic control
ATSB	Australian Transportation Safety Board
AUG	Augmenting flight crewmember
CAR	<i>Civil Aviation Regulations</i> of the United Arab Emirates
FAA	Federal Aviation Administration
FC	Flight cycles
FCOM	<i>Flight crew operations manual</i>
FCTM	<i>Flight crew training manual</i>
FH	Flight hours
FL	Flight level
GCAA	The General Civil Aviation Authority of the United Arab Emirates
ICAO	International Civil Aviation Organization
IIC	Investigator-in-Charge
ILS	Instrument landing system
kg	kilograms
LT	Local time
MSN	Manufacturer serial number
NTSB	National Transportation Safety Board of the United States
OM-A	<i>Operations Manual Part A</i>
OMAA	Abu Dhabi International Airport
OTC	Over-the-counter
ROSI	Reporting of a Safety Incident (the UAE mandatory reporting program)
SOP	Standard operating procedures
UAE	The United Arab Emirates
USA	The United States of America
UTC	Coordinated universal time



Synopsis

A scheduled passenger flight, ETD045, operated by an Etihad Airways Airbus A330-243 Aircraft, departed Abu Dhabi International Airport, the United Arab Emirates, to Dublin Airport, Ireland, on 29 June 2015 with a total of 212 passengers and crew onboard.

Approximately 58 minutes after takeoff, and during cruise in the Iranian airspace, the Copilot, who was the pilot monitoring (PM), requested some tissue paper from the Commander in order to clear his congested nostrils. He blew into the tissue paper and noticed traces of blood mixed with mucus. Soon after, he told the Commander that he was not feeling well and partially reclined his seat, then entered into unconsciousness state for about one minute. The Copilot stated that just before fainting, he started to feel strange with a tingling sensation all over his body.

On realizing that the Copilot was incapacitated, the Commander called the Cabin Manager to the cockpit who administered oxygen to the Copilot. After regaining consciousness, the Copilot was assisted to the cabin and was attended to by a medical doctor who was on the flight as a passenger. Thereafter, the Copilot occupied a business class seat for the remainder of the flight.

The Commander declared an PAN-PAN and advised ATC that he was returning to Abu Dhabi. An off-duty Boeing 777 captain employed by the Operator, who was travelling as a passenger, assisted the Commander.

The landing at Abu Dhabi Airport was uneventful and the Commander taxied the Aircraft to the parking stand. By this time, the Copilot was in a stable condition. Paramedics attended to the Copilot onboard the Aircraft and he was then transferred to the Airport clinic. The on-duty doctor released the Copilot as his condition was considered satisfactory.

Prior to the Incident flight, the Copilot had 4-days off and had used over-the-counter medication nasal spray up to 24-hours before the flight in order to alleviate nasal congestion.

The Investigation was informed that all post-incident medical tests performed on the Copilot did not reveal any condition that may have influenced his incapacitation. The Copilot returned to active duty approximately one month after the Incident.

The Copilot had no known medical condition whilst flying for the Operator.

The Air Accident Investigation Sector could not determine the cause of the Copilot fainting after he saw blood upon blowing his nose as the Investigation was informed that all post-incident medical test results had not identified any medical condition.

Possible contributory factors that may have affected the Copilot's medical fitness included performing flying duties whilst he suffered from nasal congestion, the possible side-effects of the use of the over-the-counter nasal spray, medical fitness being affected by his biological clock, the effect of flying in a pressurized aircraft, and the psychological effect of seeing blood after he blew his nose, a condition that is known as vasovagal syncope.

The Final Report contains seven safety recommendations, with three addressed to the Operator and four addressed to the GCAA.



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1. Factual Information

1.1 History of the Flight

Etihad Airways ETD045, a scheduled passenger flight, departed at 0238 LT on 29 June 2015 from Abu Dhabi International Airport bound for Dublin, Ireland. On board the Airbus A330 Aircraft were a total of 212 persons comprising two flight crew, nine cabin crewmembers and 201 passengers.

The Commander of the flight was the pilot flying and was seated on the left hand seat.

Approximately 58 minutes into the flight, with the Aircraft in cruise at FL380 in Iranian airspace, the Copilot asked for a box of tissues from the Commander as he wanted to clear his nasal congestion. He blew his nose hard into the tissue and then saw a mixture of blood and mucus. The same occurred several more times. The Copilot informed the Commander that he was not feeling well. Soon after, he started to feel strange, suffering a tingling sensation in his fingers and body. He then partially reclined his seat. At this point the Copilot fainted and collapsed backwards into his seat with his eyes open. The Commander tried to revive the Copilot by calling his name and physically shaking him. Receiving no response, the Commander reclined the Copilot's seat further and pushed it backward thus preventing the Copilot from obstructing the flight controls while incapacitated.

An emergency alert passenger announcement was made in order to have the Cabin Manager go to the cockpit. The Cabin Manager attended to the Copilot by administering wet towels and oxygen with the help of another crew member. The Copilot revived after approximately one minute, but he was not fully conscious.

The Commander declared PAN-PAN, to Tehran air traffic control (ATC) and he informed ATC of the Copilot's incapacitation and of his decision to return to Abu Dhabi. He instructed the Cabin Manager to assist the Copilot out of the cockpit.

A medical doctor, travelling on the flight as a passenger, attended to the Copilot and checked his vital signs. The Copilot's blood pressure was reported to be low and the doctor indicated to him that his blood pressure was low possibly as a result of the action of blowing his nose forcefully. The Copilot stated that after about 20 minutes he was feeling normal again. He then occupied a business class seat next to the doctor, and remained there for the rest of the flight.

The Cabin Manager informed the Commander that an off-duty company Boeing 777 captain was travelling as a passenger on the flight. The Commander requested the captain's assistance to help with ATC communications and checklist completion. The Commander then briefed the Cabin Manager and an announcement was made advising the passengers that the Aircraft would return to the departure airport.

Abu Dhabi ATC provided priority clearance and an uneventful overweight landing was performed at 0454 LT, one hour and 18 minutes after the Copilot's incapacitation. The total flight time was two hours and 16 minutes.

Airport paramedics met the Copilot at the Aircraft parking stand and medical checks were performed, including an electrocardiogram. The results of the medical tests were considered normal. The Copilot was then transferred to the airport on-duty doctor and no additional tests were performed. Blood tests for drugs and alcohol were not carried out. The doctor released the Copilot as the medical results were satisfactory.

1.1.1 Flight time line

All timings are local time (LT).

- 0238 The Aircraft was airborne.
- 0310 Top of climb, FL380.
- 0336 Approximate time of Copilot incapacitation
- 0343 Right turn initiated to return to Abu Dhabi.
- 0451 Established on runway 13L ILS.
- 0454 Overweight landing on OMAA runway 13L at 193624kgs.



Figure 1. EY045 flight path



1.2 Injuries to Persons

Except for the Copilot's incapacitation, there were no reported injuries.

Table 1. Injuries to persons

Injuries	Flight Crew	Cabin Crew	Other Crew Onboard	Passengers	Total Onboard	Others
Fatal	0	0	0	0	0	0
Serious	0	0	0	0	0	0
Minor	0	0	0	0	0	0
None	2	9	0	201	212	0
TOTAL	2	9	0	201	212	0

1.3 Damage to Aircraft

The Aircraft was undamaged.

1.4 Other Damage

There was no other damage to property or the environment.

1.5 Personnel Information

1.5.1 Flight crew information

Table 2. Flight crew information

	Commander	Copilot
Age	45	31
Type of licence	ATPL	ATPL
Valid to	02-10-2021	17-10-2020
Rating	A320 & A330	A330
Total flying time (hours)	11211.4	4562.39
Total on this type (hours)	748.96 (A320) & 544.47 (A330)	1986.39
Total last 90 days (hours)	246.43	186.25
Total on type last 90 days (hours)	44.01 (A320) & 202.42 (A330)	186.25
Total last 7 days (hours)	18:04	0
Total on type last 7 days (hours)	08:06 (A320) & 09:58 (A330)	0
Total last 24 hours (hours)	07:20	0
Total on type last 24 hours (hours)	07:20 (A330)	0
Medical class	Valid Class 1 certificate	Valid Class 1 certificate

The fatigue analysis provided by the Operator indicated that both the Commander and the Copilot had SAFE¹ values of 4.8 and 4.15 respectively. The crew are normally rostered up to a value of 5.2.

Prior to departure, the Commander had a cappuccino and no food was consumed by him up to the time of the incident. The Copilot consumed a can of cola and also did not eat anything up to the time of the Incident.

¹ System for Aircrew Fatigue Evaluation (SAFE) is used by the Operator and is a computer program that includes algorithms that allow a range of factors influencing crew to be evaluated in order to determine their alertness.



The off-duty Boeing 777 captain who assisted the Commander with radio communications after the Copilot became incapacitated was travelling as a passenger on the flight.

1.5.2 Copilot Information

The Copilot's most recent flight prior to the incident was on 17 June 2015. He was off-duty on 19 June and was rostered for duty on 20 and 21 June 2015. However, he reported sick for these two days. His next duty was on 29 June 2015 for the Incident flight which was 12 days after his most recent flight.

During the Investigation interview, the Copilot stated that he was suffering from the flu and nasal congestion. He had used over-the-counter nasal spray medication to help clear the congestion and he stopped administration of the spray 24 hours prior to the Incident flight. The Copilot stated that he was well rested and believed that he was medically fit for the flight.

1.6 Aircraft Information

1.6.1 Aircraft general data

Table 3. Aircraft data

Manufacturer:	Airbus Industrie
Model:	A330-243
MSN:	832
Date of delivery:	18 June 2007
Nationality and registration mark:	United Arab Emirates, A6-EYN
Name of the owner:	Etihad Airways
Name of the operator:	Etihad Airways
Certificate of Registration (CoR)	
Number:	35/07
Issuing Authority:	General Civil Aviation Authority, UAE
Issuance date:	18 June 2007
Valid to:	Open
Certificate of Airworthiness (CoA)	
Number:	EAS/27
Issuing Authority:	General Civil Aviation Authority, UAE
Issuance date:	18 June 2007
Valid to:	ARC Expiry on 16 June 2016
Total hours since new:	38745:38 as of 29 June 2015
Total cycles since new:	7083 as of 29 June 2015
Last inspection type, date:	Daily Check, 28 June 2015
Engines:	Rolls-Royce Trent 700
Maximum Takeoff Weight:	233000 kgs
Maximum Landing Weight:	187000 kgs
Zero Fuel Weight:	158150 kgs
Takeoff Weight for EY045	209800 kgs
Landing Weight for EY045	193600 kgs



1.7 Meteorological Information

Not a factor in this Incident.

1.8 Aids to Navigation

Ground-based navigation aids/onboard navigation aids, aerodrome visual ground aids, and their serviceability were not a factor in this incident.

1.9 Communications

The quality of the aircraft's recorded transmissions was good.

1.10 Aerodrome Information

The Incident occurred in-flight.

1.11 Flight Recorders

Information used in this Report was retrieved using the Operator's flight data monitoring for the Incident flight.

1.12 Wreckage and Impact Information

The aircraft was intact.

1.13 Medical and Pathological Information

After the Aircraft returned to Abu Dhabi International Airport, the Copilot was attended by the airport paramedics, and medical tests were performed which did not include drug and alcohol blood testing. The Copilot was later released by the airport doctor to return to his residence.

On the day of the Incident flight, the Copilot returned to the Operator's aeromedical department and met the company doctor. The Copilot was requested by the Operator's medical doctor to perform additional tests including a blood test, electrocardiogram, and to consult a cardiologist. The test results, as informed by the Copilot, did not reveal any findings related to his medical condition. The Copilot was able to return to flying one month after the Incident.

In his interview with the Investigation, the Copilot stated that he had a similar experience of fainting which occurred when a blood test was performed during a medical check. He experienced the same tingling feeling prior to fainting. He could not remember when this happened but it occurred sometime before joining the Operator. He sought medical consultation and his condition was diagnosed as Vasovagal, but he was not advised to receive any treatment.

1.14 Fire

There was no fire.

1.15 Survival Aspects

The Aircraft landed uneventfully and the crew and passengers disembarked normally.

1.16 Tests and Researches

No tests or research were required to be conducted as a result of this Incident.



1.17 Organizational and Management Information

1.17.1 Operators' flight crew manuals

During the Investigation, it was noted that the flight crew incapacitation related guidance was inconsistent in the reference manuals as stated:

1. With reference to an "Emergency Declaration":
 - The *OM-A* (8.3.15.1.3) states "Declare an Emergency if required."
 - The *FCTM* (AO-090 P 14/16) states "Declare an Emergency to ATC".
 - The *FCOM* (PRO-ABN-80 P 13/74) does not mention anything about declaring an emergency.

The Commander had referred to the *FCOM* procedures in executing his actions.

2. With reference to "Land as soon as Possible" it is stated in the following Manuals as mentioned:
 - *OM-A* (8.3.15.1.3) states "Arrange a landing as soon as possible".
 - *FCTM* (AO-090 P 15/16) states "Land as soon as practicable after considering all pertinent factors".
 - *FCOM* (PRO-ABN-80 P 13/74) does not mention anything about landing.

As the Commander had referred to the *FCOM*, his decision was to return to the departure airport of Abu Dhabi International which was a direct distance of 400 nm. The closest available airport at the time of the Incident was Kuwait International which was a direct distance of 105 nm.

3. Assisting Crew Member:
 - Following a flight crew incapacitation, *OM-A* 8.3.15.1.3 mentions that the cabin manager after liaising with the remaining flight crewmember, should discreetly check if a type qualified pilot is available onboard to replace the incapacitated pilot.
 - The cabin crew were aware that a company Boeing 777 captain was travelling as a passenger in business class. In liaison with the Commander, the 777 captain was approached and assistance was requested. Cockpit entry permission was granted after identification verification and the assisting crew member took the Copilot's seat to carry out operation of the radio and completion of checklists.

1.18 Additional Information

1.18.1 Operator's guidance for over-the-counter medication

The Operator has guidelines established for the use of over-the-counter medication which are reflected in chapter 6 of the *OM-A*. In addition, the following activities were carried out by the Operator's Medical Center:

"

1. Regarding the use of over-the-counter medication, communications were circulated by the Medical Center



proactively to pilots and cabin crew members during 2015, informing them of their responsibilities regarding over-the-counter medication, or any other medication. At the same time, this served as a safety alert regarding the use of medication and drug and alcohol testing.

2. The Medical Center provides service to all pilots and cabin crew where they can consult a medical practitioner following a recent illness to ascertain their fitness to fly. The Medical Centre has a continuous medical education (CME) program throughout the year for its medical practitioners to keep them up-to-date with latest developments and fitness to fly assessments. The program includes a number of sessions related to aviation health.
3. During 2015, the Medical Centre focused on awareness of medication use and drug and alcohol testing. During the course of the year, the campaign included circulation of information to all crew regarding medication use, poppy seed and alcohol use.
4. As part of induction training for crew, material is provided by the Medical Centre regarding the use of medication and flying.
5. An article has been published via a newsletter for pilots regarding medication and flying, which included self-assessment of fitness to fly. This was recirculated again during 2015.”

1.18.2 Investigated incapacitation occurrences at the Operator

Two other pilot incapacitations were reported to the GCAA ROSI by the Operator. The AAIS investigated one of the incident that occurred in 2012 where the commander was the incapacitated flight crewmember.

In that incident, during approach to Abu Dhabi International Airport, the commander, who was pilot flying (PF), became unconscious and leaned to his left. The copilot, upon noticing that the commander was incapacitated, took control of the aircraft and declared an emergency to AUH ATC. He called the cabin manager to the flight deck, who secured the commander in his seat and provided him with oxygen. The aircraft landed safely on runway 31L. The copilot stopped the aircraft on the active runway, where paramedics boarded the aircraft. The commander regained consciousness after landing and was taken to the airport clinic and later to the local hospital.

After being notified, the GCAA Duty Investigator requested that the Operator to conduct a drug and alcohol blood test on the commander as soon as possible. Due to the protocol between the local hospital where the commander was hospitalized and the Abu Dhabi Police, the drug and alcohol test could not be conducted as the case was not registered with the Police.

The investigation concluded that the cause of the commander’s incapacitation was an embolic event (stroke) that resulted in loss of consciousness.

A number of safety recommendations were issued to the Operator and to the GCAA. The relevant safety recommendations included the following:

The Operator to:

- SR60/2015- Ensure that its safety culture encourages voluntary disclosure of medical issues by the license holders.



The GCAA to:

SR61/2015- Consider enhancing medical data collection for medical events and pilot incapacitation, in order to identify any required risk mitigations.

SR62/2015- Conduct continuous testing of the medical assessment requirements, considering any newly arising medical risk.

SR63/2015- Include a cautionary statement in the license application form, which highlights the importance of disclosing an applicant's medical history to the medical examiner.

SR64/2015- Promote an appropriate just culture across the aviation industry to widen the sources of medical data collection, including voluntary disclosures by applicants for the position of pilot.²

1.18.3 The United States NTSB safety study³ – Drug use trends

In 2014, the National Transportation Safety Board (NTSB), conducted a safety study into the use and effects of medication. It was noted by this study, that the use of over-the-counter (OTC), prescriptions, and illicit drugs had increased in the United States. The NTSB addressed their concerns about the possible safety implications of increased drug use in all modes of transportation.

Data from aviation post aircraft accident toxicology testing on fatally injured pilots conducted by the Federal Aviation Administration (FAA) was used by the NTSB to assess drug use in aviation. By assessing evidence of fatally injured pilots' drug use prior to flying and the associated potential for impairment, this study addressed a serious aviation safety issue and a growing transportation safety concern.

Many safety recommendations were proposed in the NTSB safety study. These recommendations could benefit the aviation sector within the UAE, although only one, which was addressed to the FAA, is stated in this Report:

“Conduct a study to assess the prevalence of over-the-counter, prescription, and illicit drug use among flying pilots not involved in accidents, and compare those results with findings from pilots who have died from aviation accidents to assess the safety risks of using those drugs while flying.”

1.18.4 GCAA ROSI data on pilot incapacitation

This Investigation is the third⁴ such investigation performed by the UAE AAIS. The Investigation requested additional data held by the GCAA and UAE airlines in order to achieve a better understanding of the subject.

At the end of 2015, the total number of pilots holding a GCAA license was 8253, of which 186 were female pilots. 806 (or 9.77%) of the total pilot population were over the age of 55 years.

² The Final report of the AAIS case No. AIFN/0022/2012, issued on 20 September 2015

³ National Transportation Safety Board, *Drug Use Trends in Aviation: Assessing the Risk of Pilot Impairment*. Safety Study NTSB/SS-14/01, PB2014-108827

⁴ The other two UAE AAIS investigations include AIFN/0022/2012 (refer to section 1.18.2) and the on-going investigation AIFN/0017/2014.



The Investigation reviewed the 40 pilot incapacitations⁵, (figure 2), reported between 2010 and 2015 to the GCAA through the mandatory reporting system known as Reporting of a Safety Incidents (ROSI). All reported incidents involved commercial pilots and none involved pilots in general aviation, including rotary wing pilots. All reported incapacitations involved male pilots.

Out of the 40 reports, 28 of the incapacitations (70%) were reported by one UAE operator. Six of the pilots returned to flying duty, while 19 pilots remained active with the operator, and three resigned.

Of the 40 pilot incapacitations, 34 (85%) occurred with a dual cockpit crew.

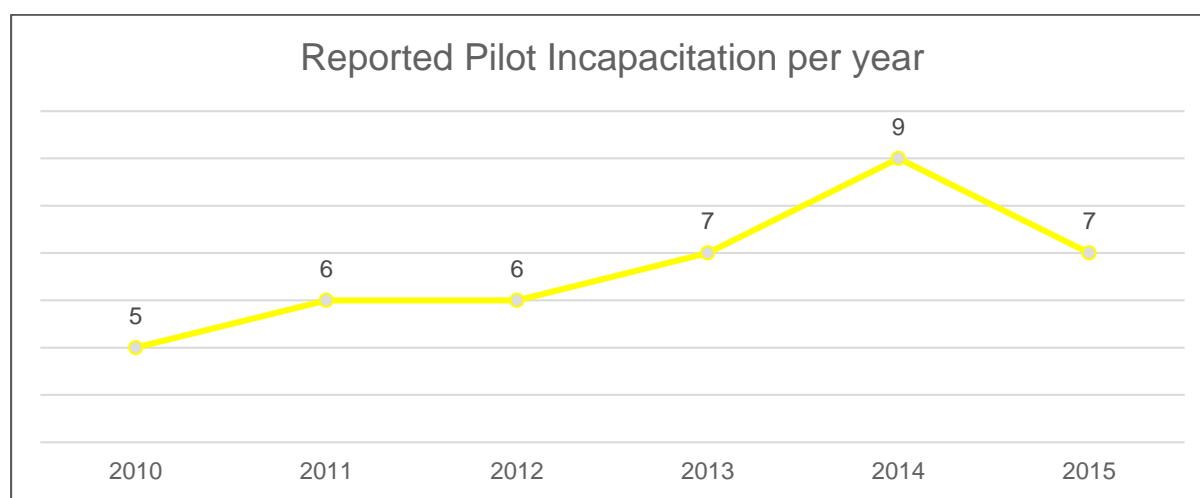


Figure 2. UAE pilot incapacitation per year – 2010 to 2015

Of the 40 cases⁶, two reported incapacitations were not included in the data shown hereafter in this section of the Report as valid information was missing. In addition, due to the GCAA policy of confidentiality of medical records, the Investigation could not determine the medical reasons for the incapacitations, except for the incident mentioned in section 1.18.1 of this report. From the data reviewed, the Investigation was unable to determine whether or not if any single pilot suffered a repeat incapacitation event.

Table 4 illustrates the number of the total flying hours and departures, from 2012 to 2015, for the major UAE⁷ commercial operators. With the calculated percentage of pilot incapacitation occurrences/yearly departures. Based on analysis of the data over the four-year period, the calculated average number of departures before a pilot incapacitation occurrence is approximately 61,000 departures. or one incapacitation every two months.

Year	Flight Hours	Departures	Number of Incapacitation	% of Incapacitation / Departures
2012	1,418,521	426,665	6	0.00141
2013	1,550,139	352,426	7	0.00199
2014	1,729,983	413,128	9	0.00218
2015	2,034,014	571,000	7	0.00123

⁵ The total number of UAE pilot incapacitations between 2010 and 2015 was provided by the GCAA.

⁶ Of the 40 cases reported, except for one UAE operator involving two pilot incapacitations, details of pilot status, age, flying hours and rank, was provided by the other UAE operators for the 38 incapacitations.

⁷ The UAE operators total flight hours and number of departures was provided by the GCAA.



Figure 3 illustrates the 38 (19 captains and 19 first officers) pilots rank and function during the incident flights and their status after the reported incapacitation.

Twenty-three (61%) of the pilots, did not return to flying duty. This comprised 11 captains and 12 copilots. Except for one pilot, the remaining 22 pilots were employed by one UAE operator. The Investigation was unable to determine the reasons why the 23 pilots did not return to active flying duties.

Of the 15 pilots who returned to active flying duties, two included the captain mentioned in section 1.18.1 of this Report and the Copilot of the Incident flight.

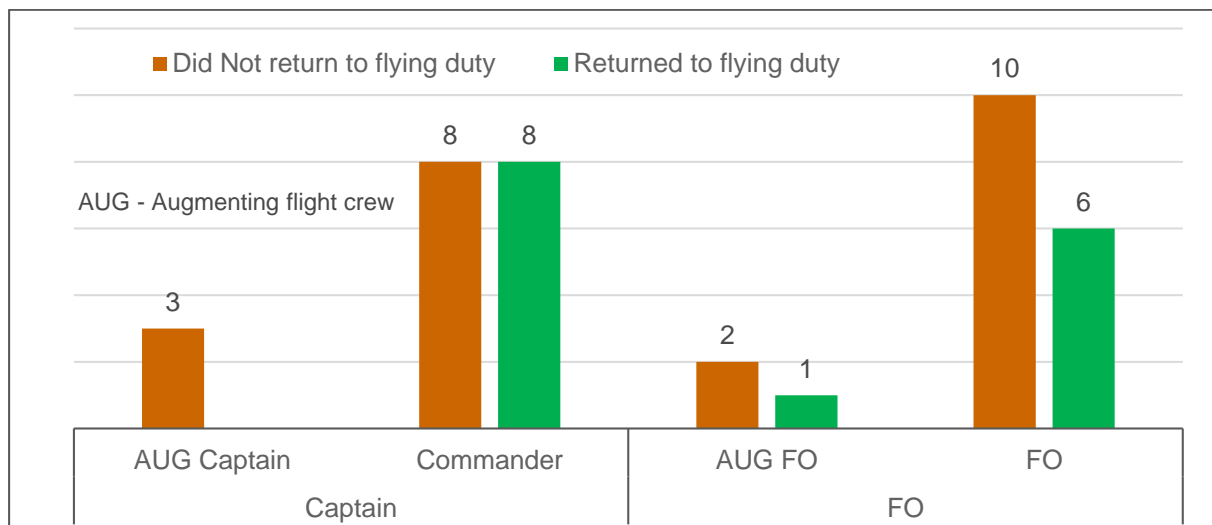


Figure 3. The 38 pilots' flight rank/function and flying status after incapacitation

Figure 4 illustrates the age groups of the 38 incapacitated pilot population. Ten incapacitation events involved pilots over the age of 50 years, and 28 incapacitations (74%) involved pilots under the age of 50 years. Pilots who returned to flying duty consisted of three pilots over the age of 50 years, and 12 pilots (43%) under the age of 50 years.

Four of the six pilots (67%) over the age of 55 who were incapacitated did not return to flying duty. Of the 806 UAE pilots over the age of 55, there was a rate of 0.74% pilot incapacitation in this age group. The pilot age group below 55 years had an incapacitation rate of 0.43%.

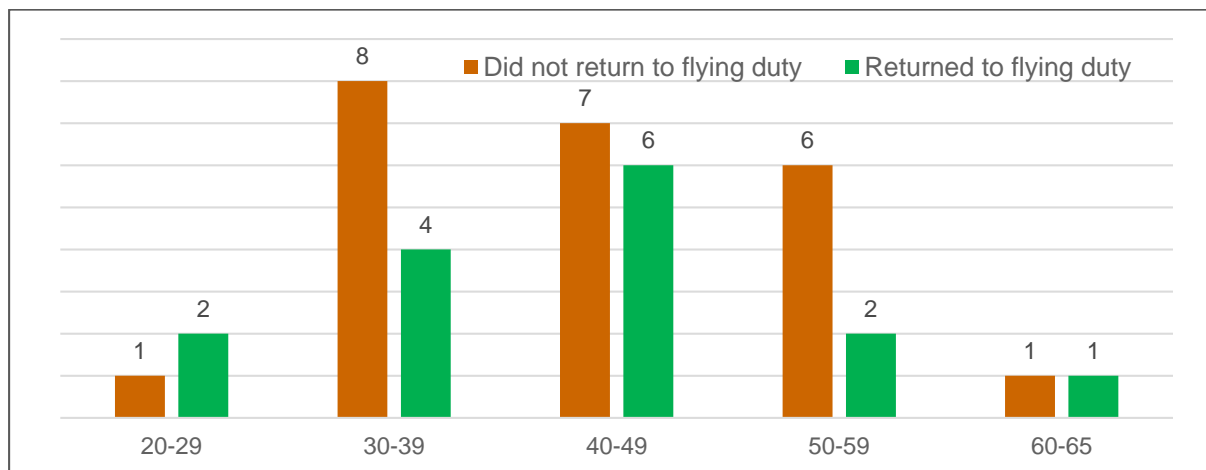


Figure 4. The 38 incapacitated pilots age group



Figure 5 illustrates the flight phase during which the pilot incapacitation occurred. Thirty-four of the 38 incapacitations took place whilst the aircraft was in flight with three (8.8%) occurring during the climb phase. Thirty-two of the 38 incident flights (84%) involved a dual cockpit crew.

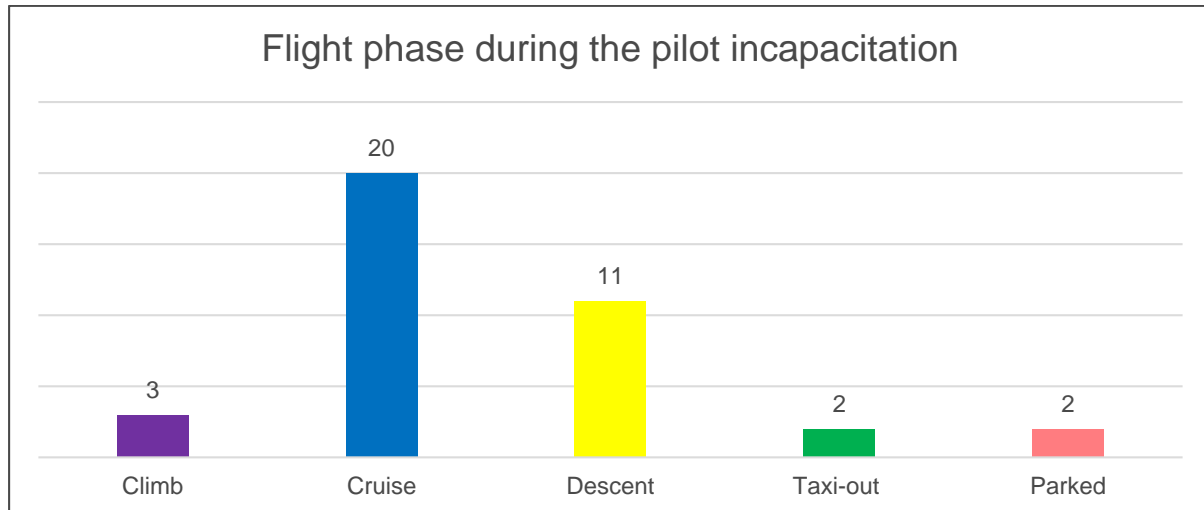


Figure 5. Flight phase during the pilot incapacitation

1.18.5 UAE Civil Aviation Regulations on Medical Confidentiality and OTC

The UAE *Civil Aviation Regulations* pertaining to medical provisions can be found under *CAR Part II, Chapter 5- Medical Provisions*.

Within the provisions, there are references (*MED.A.015 and MED.A.020*) relating to medical confidentiality, pilot medical fitness for flight, the use of non-prescribed medication and seeking advice from a GCAA approved medical doctor. The following are extracts from *CAR Part II, Chapter 5*:

“MED.A.015 Medical confidentiality

All persons involved in medical examination, assessment and certification shall ensure that medical confidentiality is respected at all times and accessibility restricted to personnel authorised by the GCAA.

MED.A.020 Decrease in medical fitness

(a) Licence holders shall not exercise the privileges of their licence and related ratings or certificates at any time when they:

- 1) are aware of any decrease in their medical fitness which might render them unable to safely exercise those privileges;
- 2) take or use any prescribed or non-prescribed medication which is likely to interfere with the safe exercise of the privileges of the applicable licence;
- 3) receive any medical, surgical or other treatment that is likely to interfere with flight safety.

(b) In addition, licence holders shall, without undue delay, seek aero-medical advice when they:

- 1) have undergone a surgical operation or invasive procedure;



- 2) have commenced the regular use of any medication;
- 3) have suffered any significant personal injury involving incapacity to function as a member of the flight crew;
- 4) have been suffering from any significant illness involving incapacity to function as a member of the flight crew;
- 5) are pregnant;
- 6) have been admitted to hospital or medical clinic;
- 7) first require correcting lenses.

(c) In these cases:

- 1) Licence holders of medical certificates shall seek the advice of an AeMC or AME. The AeMC or AME shall assess the medical fitness of the licence holder and decide whether they are fit to resume the exercise of their privileges in accordance with the process established by the GCAA.”

In section *MED.A.028* of the same regulations, guidance is given about the use of over-the-counter medication (OTC) or non-prescribed medicine which may affect a pilots' performance. It is stated in *CAR Part II Chapter 5 section MED.A.028*:

“ MED.A.028 Drug and alcohol testing program

- i) Licence holder shall not use an over-the-counter (OTC) or non-prescribed medicine which is incompatible with aviation duties.
- l) Licence holders shall not use any medication that could affect the safe performance of aviation duties unless the AME/GCAA has been informed of and has approved such use.”

Under section *CAR Part II, Chapter 5 section MED.A.035*, the applicant is required to disclose their medical history as stated:

“ MED.A.035 Application for a medical certificate

- (a) Applications for a medical certificate shall be made in an electronic format established by the GCAA.
- (b) Applicants for a medical certificate shall provide the AeMC or AME as applicable, with:
 - 1) proof of their identity;
 - 2) a signed declaration:
 - (i) of medical facts concerning their medical history;
 - (ii) as to whether they have previously undergone an examination for a medical certificate and, if so, by whom and with what result;
 - (iii) as to whether they have ever been assessed as unfit or had a medical certificate suspended or revoked.

(c) When applying for a revalidation or renewal of the medical certificate, applicants shall present the most recent medical certificate to the AeMC or AME prior to the relevant examinations.”

The GCAA mentions under *GM1 MED.A.040*, that aircrew medical certificates issued under alternative means of compliance are based on risk assessment taking into



consideration the industry standard of incapacitation not exceeding 1% annually and that flight safety is not affected by sudden incapacitation. The following is stated in *CAR Part II, Chapter 5 section GM1 MED.A.040*:

“GM1 MED.A.040 Issue, revalidation and renewal of medical certificates

Aircrew personnel and applicants who do not meet Medical standards prescribed in this Chapter may be granted a medical certificate under alternative means of compliance. And this Medical certification may be granted on the need of the service, consistent with training, experience, performance, and proven safety of the aircrew personnel.

1) Issue Pre-requisites of Medical Certification under this paragraph

Medical certificates are based upon risk management and how it is applied to the following criteria:

- (i) It cannot jeopardise the flight safety. I.e. risk of sudden incapacitation does not exceed 1 % annual incapacitation risk.
- (ii) The disqualifying defect does not pose a risk of sudden incapacitation.
- (iii) It does not pose any potential risk for subtle incapacitation that might not be detected by the individual but would affect alertness, special senses, or information processing.”

CAR Part II, Chapter 5, under section 6 - Use of medication, psychoactive drugs or other treatment reiterates the effects of using certain medications and the results of pilots flying while medically unfit. Mention is made of trivial ailments that include colds and sore throats and the compounding side effects of medication, including OTC, which can lead to accidents and incidents. The regulation goes on to advise pilots not to take any medicines before or during flight unless they are completely familiar with their effects on their own bodies and in case of any doubt, they should consult an approved medical doctor. Section 6 of the *UAE CAR Part II, Chapter 5* states:

“ 6. Use of medication, psychoactive drugs or other treatment

6.1 The use of Medication (prescribed or non-prescribed)

(a) Accidents and incidents have occurred as a result of pilots flying while medically unfit and the majority have been associated with what have been considered relatively trivial ailments. Although the symptoms of colds, sore throats, diarrhoea and other abdominal upsets may cause little or no problem whilst on the ground they become dangerous in the flying environment by distracting the pilot and degrading performance in the various flying tasks. The in-flight environment may also increase the severity of symptoms which may be minor while on the ground. The effects may be compounded by the side effects of the medication prescribed or bought over the counter for the treatment of such ailments. The following are some widely used medicines which are normally considered incompatible with flying.

(b) Antibiotics such as the various Penicillins, Tetracyclines and others may have short term or delayed side effects which can affect pilot performance. More significantly, however, their use usually



indicates that an infection is present and thus the effects of this infection will normally mean that a pilot is not fit to fly.

(c) Tranquillisers, anti-depressants and sedatives. Inability to react due to the use of this group of medicines has been a contributory cause to fatal aircraft accidents. Again, as with antibiotics, the underlying condition for which these medications have been prescribed will almost certainly mean that a pilot's mental state is not compatible with the flying task.

(d) Stimulants such as caffeine, amphetamines etc. (often known as "pep" pills) used to maintain wakefulness or suppress appetite are often habit forming. Susceptibility to different stimulants varies from one individual to another, and all may cause dangerous over confidence. Over dosage causes headaches, dizziness and mental disturbance. The use of "pep" pills while flying is not permitted.

(e) Anti-histamines can cause drowsiness. They are widely used in "cold cures" and in treatment of hay fever, asthma and allergic rashes. They may be in tablet form or a constituent of nose drops or sprays. In many cases the condition itself may preclude flying, so that, if treatment is necessary, advice from the AMS, or an AME should be sought so that modern drugs, which do not degrade human performance, can be prescribed.

(f) Certain drugs used to treat high blood pressure can cause a change in the normal cardiovascular reflexes and impair intellectual performance, both of which can seriously affect flight safety. If the level of blood pressure is such that drug therapy is required, the pilot should be temporarily grounded and monitored for any side effects. Any treatment instituted should be discussed with the AMS, or an AME and a simulator assessment or line check may be appropriate before return to flying.

(g) Following local, general, dental and other anaesthetics, a period of time should elapse before return to flying. The period will vary considerably from individual to individual, but a pilot should not fly for at least 12 hours after a local anaesthetic and for 48 hours after a general or spinal anaesthetic.

(h) The more potent analgesics may produce a significant decrement in human performance.

If such potent analgesics are required, the pain for which they are taken generally indicates a condition which precludes flying. (i) Many preparations are now marketed containing a combination of medicines. It is essential therefore that if there is any new medication or dosage, however slight, the effect should be observed by the pilot on the ground prior to flying. Although the above are the commonest medicines which adversely affect pilot performance, it should be noted that many other forms of medication, although not normally affecting pilot performance, may do so in individuals who are "oversensitive" to a particular preparation.

Individuals are therefore advised not to take any medicines before or during flight unless they are completely familiar with their effects



on their own bodies. In cases of doubt, pilots should consult an AME, or the AMS.”

1.18.6 Vasovagal syncope

The post-Incident test results from the medical examinations performed on the Copilot were not made available to the Investigation in order to determine any possible cause behind the temporary unconsciousness.

As a result, medical research of vasovagal syncope was performed by the Investigation based on the information provided by the Copilot. He had described the symptoms as tingling feeling prior to fainting together with low blood pressure after the Incident. In addition, he had a similar experience of fainting which had occurred before joining the Operator, when blood was drawn from him during a medical check. The Copilot was also aware about vasovagal when he did seek medical consultation prior to joining the Operator.

The medical information⁸ available to the Investigation mentions that vasovagal syncope when the part of the human nervous system that regulates heart rate and blood pressure malfunctions in response to a trigger, such as the sight of blood. This causes the heart rate to slow and blood vessels in the legs to dilate. As a result, blood pools in the legs which lowers the persons' blood pressure. The drop in blood pressure and the slowed heart rate would quickly reduce the blood flow to the brain resulting in the person fainting.

Medical studies indicate that vasovagal attack, known as syncope⁹, is the most common cause of fainting. This disorder is also referred to as neurocardiogenic syncope¹⁰.

Vasovagal attack may occur for a person of any age, but the attacks are more common in children, young adults, and the elderly. There is normally a pre-triggering indications before the onset of a vasovagal attack that may include psychological and physiological symptoms. Hyper emotions, such as panic or fright when seeing blood drawn during a medical check, fear for life, or pooling of blood on the leg muscles after running or other strenuous exercise. Recovery after a vasovagal episode generally begins in less than a minute and it is recommended not to stand for at least 15 minutes as there is a risk of fainting again.

Articles on vasovagal syncope indicate that this condition is usually harmless and requires no treatment. However, it is mentioned that treatment for vasovagal attacks depends on treating the underlying cause of the vasovagal attacks and includes identifying the triggers and discussing methods to prevent or avoid them.

It is recommended that medical examinations are performed on the person in order to rule out more serious causes of fainting, such as heart disorders and may include the following:

- **Electrocardiogram.** This test records the electrical signals your heart produces. It can detect irregular heart rhythms and other cardiac problems. You may need to wear a portable monitor for at least a day or as long as a month.

⁸ Medical extracts was taken from American Heart Association (<http://www.heart.org/HEARTORG/>) and the National Institute of Neurological Disorders and Stroke (<http://www.nhlbi.nih.gov>).

⁹ Syncope, commonly described as “fainting,” is a symptom, not a disease, and can be classified according to the cause, the most common of which is Neurocardiogenic syncope.

¹⁰ Neurocardiogenic syncope (also known as vasovagal syncope) is a benign condition characterized by a self-limited episode of systemic hypotension.



- **Echocardiogram.** This test uses ultrasound imaging to view the heart and look for conditions, such as valve problems, that can cause fainting.
- **Exercise stress test.** This test studies heart rhythms during exercise. It's usually conducted while you walk or jog on a treadmill.
- **Blood tests.** Your doctor may look for conditions, such as anemia, that can cause or contribute to fainting spells.
- **Tilt table test.** If no heart problems appear to cause your fainting, your doctor may suggest you undergo a tilt table test.

1.19 Useful or Effective Investigation Techniques

The Investigation was conducted in accordance with the Legislation and *Civil Aviation Regulations* of the United Arab Emirates, and with the AAIS approved policies and procedures, and in accordance with the Standards and Recommended practices of Annex 13 to the Convention on International Civil Aviation.



2. Analysis

2.1 General

The safe operation of an aircraft places many demands on a pilot. In order to meet these demands, flight crewmembers are required to maintain good mental and physical health, impairment of which may have serious implications for the safety of flight. Even though the requirements to obtain a medical fitness certificate for a pilot are very stringent, given certain conditions, it is possible that any pilot can become incapacitated during flight. Thus, it is essential that pilots know what incapacitation is, be aware of warning signs, know how best to avoid it, and know how to deal with it. Pilots should not fly if they are not well and should seek medical advice. With reference to the ICAO *Doc 8984- Manual of Civil Aviation Medicine*, Chapter 3, the acceptable medical risk for pilot in-flight incapacitation is based on the “1% rule” which relies on the presence of a second pilot to take over all the flight duties in the event of the incapacitation of the other pilot. However, this is possible only if the second pilot is physically present in the cockpit.

It is noted by the Investigation, that of the 40 pilot incapacitation occurrences involving UAE pilots that were reported to the GCAA, all of the flights continued safely without any further issues.

2.2 The Incident Flight

The departure of the Incident flight from Abu Dhabi International Airport was uneventful with the Commander as the pilot flying. While the flight was in Iranian airspace, at FL380 and 58 minutes into the flight, the Copilot, who had started the flight with symptoms of nasal congestion, informed the Commander that he was not feeling well after he had seen blood mixed with mucus upon blowing his nose. Shortly after, the Copilot fainted in his seat and was unconscious for approximately one minute.

The incapacitation of the Copilot was immediately apparent to the Commander who verified his physical status by calling out his name and trying to physically shake him. The Cabin Manager was summoned and after the Copilot was removed from the cockpit, assistance with radio communication and checklist completion was accomplished with the assistance of an off-duty Boeing 777 captain, who was an employee of the Operator travelling on the flight as a passenger.

Even though the Operators' reference states that as a result of a pilot incapacitation the aircraft should be landed as soon as possible, the Commander initiated a return to the departure airport of Abu Dhabi which was 400 NM away. The closest airport at the time of the Incident was Kuwait International Airport which was a distance of 105 NM away.

An uneventful overweight landing was performed at Abu Dhabi Airport 78 minutes after the incapacitation.

Upon arrival, the Copilot was allowed to leave the airport medical clinic without a drug and alcohol blood test being performed.

The Investigation believes that most of the actions taken by the Commander were in line with the Operator's standard operating procedures. However, due to inconsistencies with the flight crew operation manuals, the Commander should have landed the Aircraft as soon as possible and not allowed the Boeing 777 captain into the cockpit, as he was not type qualified, and instead, obtained the assistance of a cabin crewmember. Therefore, the Operator should standardize and align its procedures following a flight crew incapacitation so that flight crews are better guided.



The GCAA should also ensure that Industry best practices are maintained and that conformity of practices with standards exists across all UAE operators.

2.3 Medical Information with Regards to Pilot Incapacitation

Within the population of pilots in the UAE, the current available data does not provide accurate awareness of in-flight incapacitation risks, especially in relation to medical and mental health issues. This lack of information, confirmed by the difficulties experienced during this Investigation in collecting data on previous similar incidents, could be due to the reluctance to report this type of event, lack of information for each of the reported incapacitation occurrences with the GCAA, and restrictions linked to medical confidentiality.

In order to better understand the 40 reported incidents of pilot incapacitation, the GCAA should review the relevant medical reports and determine if there are medical concerns that could affect aviation safety within the UAE.

As an example, a research reference *AR-2015-096* published by the Australian Transport Safety Bureau (ATSB)- *Pilot incapacitation occurrences in Australia between 2010 to 2014*, there were 113 reports of pilot incapacitation. The top four reasons given for the pilot incapacitation included 45 due to gastrointestinal illnesses, 11 due to laser strikes, eight unknown reasons and five incidents of pilots losing consciousness.

In other safety studies on pilot incapacitation performed by the NTSB and the ATSB, it was mentioned that medical conditions and incapacitation events accounted for less than one percent of all accidents and incidents. For the UAE, the 40 reported incapacitation were all uneventful and this reflects well on the medical certification system employed by the UAE GCAA and airlines. However, it remains important that this system continues to evolve with, and be based on, the changes and developments in scientific research and medical practice. This will ensure that the aeromedical certification process is evidence-based, up to date, and reflects the current state of medical knowledge. In doing so, the risks to the travelling public of an in-flight medical event leading to incapacitation of the pilot can be minimized, and the overall safety of the air transport system can be enhanced.

From the data provided to the Investigation by the GCAA and the UAE airlines, the number of pilot incapacitation occurrences is well below the accepted medical risk of the *1% rule*. However, it is expected that every two months, or once in every 61,000 departures, there may be a pilot incapacitation due to a medical reason. Thus, for every million departures there will be approximately 16 pilot incapacitation occurrences, with the age range between 30 to 50 years being at the highest risk. These figures are only for UAE commercial airlines as there were no reports of pilot incapacitation involving general aviation.

With the ease of having access to any type of medication in the UAE, the GCAA should also engage with the responsible governmental ministries for the purpose of disseminating safety information to pharmacies and medical clinics on the use and effect of prescribed and non-prescribed medication by persons involved in the aviation industry, including pilots.

The GCAA should conduct a study to assess the prevalence of over-the-counter and prescription medication use among flying pilots not involved in accidents/incidents, and compare those results with international aviation accident agencies on findings from pilots who have died in aviation accidents to assess the safety risks of using those drugs while flying.

The need for post-accident/incident drug and alcohol blood testing is an area that has been mentioned in several UAE AAIS investigation reports. However, as occurred in this Investigation, there was no testing performed on the Copilot immediately after arrival at Abu Dhabi. The GCAA should address this and establish clear instructions for all airlines to follow.



2.4 Medical Fitness of the Copilot

Even though it was not medically substantiated, the Investigation believes that the symptoms experienced by the Copilot prior to his fainting are similar to vasovagal attack. These included the triggering effect of seeing blood when he blew his nose, his description of feeling strange with a tingling sensation in his fingers and body, his actual fainting, confirmation of low blood pressure as measured during the flight, and subsequent nil-findings during the post-incident medical testing. In addition, he had suffered a similar experience of fainting when blood was drawn during a medical test before he joined the Operator.

The Investigation also believes that a single factor, or combination of the following factors, may have affected the medical fitness of the Copilot:

- The flu that he had suffered from during the 12 days when he did not fly prior to the Incident flight;
- The possible side effects of using over-the-counter medication;
- Even though he was not fatigued and was rested for the flight, the Incident flight was performed at a time, starting at 0230 LT, when his core body temperature, brain wave activity, hormone production, regulation of glucose and insulin levels, urine production, cell regeneration, and many other biological activities would have been affected due to his circadian cycle;
- The effects on his medical condition of flying with nasal congestion during the 58 minutes in a pressurized aircraft.

The Copilot was declared medically fit by the Operators' medical examiner and after obtaining consent from the GCAA, he was allowed to return to flying duty approximately one month after the Incident. As the reason for his fainting and what triggered this condition was not established, the Operator should continue to monitor and assist the pilot as to how to manage this medical condition.

2.5 Vasovagal Syncope

A vasovagal attack itself is not serious. However, injury is possible during a fainting episode as the person may fall if standing and the attack poses a potential danger if episodes occur during a critical activity such as driving, or operating machinery, including piloting an aircraft. Single pilot aircraft are at greater risk if a vasovagal attack occurs during flight.

Although frequent or recurrent episodes can negatively affect quality of life and employability, neurocardiogenic syncope is generally considered a benign condition as episodes are self-limiting. Understanding what triggers an attack or the pathophysiology of neurocardiogenic syncope is necessary to guide appropriate management and is recommended for any person who may have had a vasovagal attack.

Suspension of piloting privileges after a vasovagal syncopal episode is not covered under the UAE Civil Aviation Regulations. This is an area that requires further research and data analysis. To eliminate any potential risk to both the pilot as well as to the safety of the flight, the requirement for pilots to come forward openly to report that they have had any medical concern, including episodes involving fainting, should be enhanced and encouraged by the airlines as well as the Authority, without affecting the employability and job security of the pilot. A good example of this approach already exists in one UAE operator which suffered 28 of the reported 40 incapacitations (or 70%). This operator assisted six pilots to return to flying duty, 19 pilots were reassigned to non-flying jobs and three pilots voluntarily resigned. This approach should be encouraged across the UAE aviation industry.



3. Conclusions

3.1 General

From the evidence available, the following findings, causes and contributing factors were made with respect to this Serious Incident. These shall not be read as apportioning blame or liability to any particular organization, or individual.

To serve the objective of this Investigation, the following sections are included in the conclusions heading:

- **Findings-** are statements of all significant conditions, events or circumstances in this Incident. The findings are significant steps in this Incident sequence but they are not always causal or indicate deficiencies.
- **Causes-** are actions, omissions, events, conditions, or a combination thereof, which led to this Incident.
- **Contributing factors-** are actions, omissions, events, conditions, or a combination thereof, which, if eliminated, avoided or absent, would have reduced the probability of the accident or incident occurring, or mitigated the severity of the consequences of the accident or incident. The identification of contributing factors does not imply the assignment of fault or the determination of administrative, civil or criminal liability.

3.2 Findings

3.2.1 Findings relevant to the Aircraft

- (a) The Aircraft was certified, equipped, and maintained in accordance with the existing requirements of the *Civil Aviation Regulations* of United Arab Emirates.

3.2.2 Findings relevant to the flight crew

- (a) The flight crew were licensed and qualified for the flight in accordance with existing requirements of the *Civil Aviation Regulations* of United Arab Emirates.
- (b) The flight crew held valid class 1 medical certificates and were adequately rested to operate the flight.
- (c) The Copilot's last flight was 12 days before the Incident flight.

3.2.3 Findings relevant to flight operations

- (a) The flight was conducted in accordance with the procedures contained in the company Operations Manual.
- (b) The Commander was the pilot flying.
- (c) During cruise at FL380, 58 minutes into the flight, the Copilot became incapacitated. The Commander requested the assistance of the Cabin Manager who entered the cockpit.
- (d) PAN-PAN was declared to Tehran ATC.
- (e) The Copilot was assisted from the cockpit by the Cabin Manager.
- (f) The Commander had referred to the *FCOM* and decided to return to the departure airport of Abu Dhabi International which was a direct distance of 400 NM. The closest available airport at the time of the Incident was Kuwait International which was a direct distance of 105 NM.



- (g) An off-duty company Boeing 777 captain was allowed into the cockpit by the Commander and assisted with radio communications and checklist completion.
- (h) Priority air traffic clearance was given to the Commander and an uneventful overweight landing was performed 78 minutes after the incapacitation.

3.2.4 Findings relevant to the Operator

- (a) In the Operators' pilot references for "Emergency Declaration" it is stated in the following manuals:
 - *OM-A (8.3.15.1.3)* states "Declare an Emergency if required."
 - *FCTM (AO-090 P 14/16)* states "Declare an Emergency to ATC".
 - *FCOM (PRO-ABN-80 P 13/74)* does not mention anything about declaring an emergency.
- (b) In the Operators' pilot references to "Land as soon as Possible" it is stated in the following manuals:
 - *OM-A (8.3.15.1.3)* states "Arrange a landing as soon as possible".
 - *FCTM (AO-090 P 15/16)* states "Land as soon as practicable after considering all pertinent factors".
 - *FCOM (PRO-ABN-80 P 13/74)* does not mention anything about landing.
- (c) Following a flight crew incapacitation, *OM-A 8.3.15.1.3* states that the cabin manager, after liaising with the remaining flight crewmember, should discreetly check if a type qualified pilot is available onboard to replace the incapacitated pilot.
- (d) The assisting crew member, a Boeing 777 captain, was not type qualified on the A330, but his assistance was accepted as the Commander felt that it was a better option than utilizing the cabin crew.
- (e) The Operator has guidelines established for the use of over-the-counter medication which are reflected in chapter 6 of the *Operations Manual Part A (OM-A)*.
- (f) Between 2010 and 2015, the Operator had a total of three ROSI reports of pilot incapacitation.

3.2.5 Findings relevant to medical

- (a) The Copilot reported sick on 20 and 21 June 2015 as he was suffering from flu and nasal congestion.
- (b) The Copilot used over-the-counter nasal spray medication to help clear the congestion and stopped administration of the spray 24 hours prior to the Incident flight.
- (c) The Copilot had experienced an incident of fainting when blood was drawn from him during a medical test before he had joined the Operator.
- (d) During the Incident flight, 58 minutes after takeoff the Copilot fainted in his seat after blowing his nose. The Copilot saw blood mixed with mucus in the tissue paper.
- (e) Prior to fainting, the Copilot started to feel strange with a tingling sensation in his fingers and body. The Copilot revived after one minute and was taken to



the cabin where he was attended to. It was confirmed that he had low blood pressure. He remained in the cabin for the rest of the flight.

- (f) No drug and alcohol blood test was performed on the Copilot after the Incident.
- (g) The Investigation was informed that all post-incident medical test performed on the Copilot by the Operators' medical and recommended doctors had no findings.
- (h) The Copilot was declared medically fit and was allowed to return to flying duty approximately one month after the Incident.
- (i) The Copilot had no known medical condition whilst flying for the Operator.
- (j) The medical records of the Copilot were not made available to the Investigation.

3.2.6 Findings relevant to the GCAA

- (a) The UAE Civil Aviation Regulations pertaining to medical provisions can be found under *CAR Part II Chapter 5 Medical Provisions*.
- (b) The GCAA protects the medical confidentiality of pilots as stated in section MED.A.015 of *CAR Part II Chapter 5 Medical Provisions*.
- (c) The GCAA reminds pilots about medical fitness under section MED.A.020 *CAR Part II Chapter 5 Medical Provisions*.
- (d) The GCAA cautions pilots about the use of over-the-counter medication under section MED.A.028 *CAR Part II Chapter 5 Medical Provisions*.
- (e) The GCAA mentions declaration of medical history by pilots when applying for a medical certificate under section MED.A.035 *CAR Part II Chapter 5 Medical Provisions*.
- (f) The *UAE CAR Part II Chapter 5* under section 6 - *Use of medication, psychoactive drugs or other treatment* reiterates the effects of using certain medications and the results of pilots flying medically unfit.
- (g) There was no request by the GCAA to conduct a drug and alcohol blood test on the Copilot.

3.2.7 Findings relevant to UAE Pilot Incapacitation

- (a) Between 2010 to 2015, the GCAA reporting of a safety incident, ROSI, had received reports of 40 incidents of flight crew incapacitation.
- (b) At the end of 2015, there were 8253 pilots. 186 were female pilots and 806 pilots were over the age of 55 years.
- (c) All reported incidents of pilot incapacitation involved commercial pilots and none involved pilots in general aviation.
- (d) All reported pilot incapacitation occurrences involved male pilots.
- (e) Year 2014 had the highest number of pilot incapacitations with 9 reports.
- (f) Thirty-four of the 40 pilot incapacitations occurred with a dual flight crew. The six other incapacitations occurred with a crew composition of more than two.
- (g) Thirty-eight incapacitated pilots involved 19 captains and 19 first officers. The Investigation was unable to determine the rank of the pilots involved in the other two incidents.



- (h) Twenty-eight of the reported pilot incapacitations occurred at one UAE airline. Six of the pilots returned to flying duty, 19 pilots remained employed with the operator in capacities other than pilot, and three voluntarily resigned.
- (i) Of the 23 pilots, 11 captains and 12 first officers, who did not return to flying duty, 20 remained employed with their company and three resigned.
- (j) The pilot age group below 50 years had 28 reported incapacitations (or 74%).
- (k) Four of the six pilots (or 67%) over the age of 55 who were incapacitated did not return to flying duty.
- (l) Three flights had a pilot incapacitation during climb phase.
- (m) Based on the data over the four years (2012 – 2015), the calculated average departures before a pilot incapacitation is approximately 61,000 departures, or one incapacitation every two months.
- (n) As a result of maintaining medical confidentiality on the part of the GCAA, the Investigation could not determine the medical reason for 37 of the reported pilot incapacitations.
- (o) The Investigation was unable to determine if any individual pilot had a repeat occurrence of incapacitation.

3.3 Causes

The Air Accident Investigation Sector could not determine the cause of the Copilot fainting after he saw blood upon blowing his nose as the Investigation was informed that all post-incident medical test results had not identified any medical condition.

3.4 Contributing Factors

Possible contributory factors that may have affected the Copilot's medical fitness included performing flying duties whilst he suffered from nasal congestion, the possible effects of the use of the over-the-counter nasal spray, medical fitness being affected by his biological clock, the effect of flying in a pressurized aircraft, and the psychological effect of seeing blood after he blew his nose, a condition that is known as vasovagal syncope.



4. Safety Recommendations

4.1 General

The safety recommendations listed in this Report are proposed according to paragraph 6.8 of *Annex 13 to the Convention on International Civil Aviation*, and are based on the conclusions listed in Section 3 of this Report. The UAE AAIS expects that all safety issues identified by the Investigation are addressed by the receiving organizations.

4.2 Final Report Safety Recommendations

4.2.1 Etihad Airways

It is recommended that Etihad Airways:

SR64/2016

Review and update the reference manuals, including training manuals, available to the pilots and flight crewmembers to ensure that they all contain the same information when responding to any abnormal situation during flight including pilot incapacitation.

SR65/2016

Review the policy as to who can assist the operating cockpit flight crew in case of one pilot becoming incapacitated.

SR66/2016

Reiterate to pilots that they should always contact the medical center when they are using, or are in doubt about, the use of any over-the-counter medication or if they feel the need to discuss any medical issues. The Operator should continue to promote this amongst pilots without any retribution.

4.2.2 The General Civil Aviation Authority (GCAA) of the United Arab Emirates

It is recommended that the GCAA:

SR67/2016

Engage the responsible governmental ministries involved with non-aviation medical licensing with the purpose of disseminating safety information to pharmacies and medical clinics on the use and effect of prescribed and over-the-counter medication to persons involved in the aviation industry including pilots.

SR68/2016

Conduct and publish a study to assess the prevalence of over-the-counter and prescription medication use amongst UAE pilots not involved in accidents/incidents and assess the safety risks of using those drugs while flying and make pilots aware of less impairing alternative drugs if they are available.

SR69/2016

Establish clear regulations regarding post-accident/incident drug and alcohol blood testing for all airlines to follow. The need for a post-accident/incident drug and alcohol blood testing is an area that has been mentioned in several UAE AAIS investigations reports.



SR70/2016

Review the current statistics that indicate, on average, one pilot incapacitation every 61,000 departures in order to better understand if there are medical concerns that could affect aviation safety within the UAE. The GCAA should also review why the current trend shows that the most susceptible pilot age group to suffer an incapacitation is between 30 to 50 years.


This Report is issued by:

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Appendix A. OM- Part A Ch. 8.3.15.1.3 Action to be taken in case of Incapacitation

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- Routine monitoring and cross-checking of flight instruments, particularly during critical phases of flight, i.e. take-off and initial climb-out, approach and landing.
- Correct application of Crew Coordination, especially the principle of 2-way communication

8.3.15.1.3 Action to be Taken in Case of Incapacitation

Once a subtle or an obvious incapacitation is identified:

- Other pilot in control to immediately make Emergency Alert PA "Cabin Manager to the cockpit immediately"
- Take over control
- Engage the auto-pilot whenever practicable
- Check the position of essential controls and switches
- Concentrate on flying the aircraft especially during critical phases of flight
- Inform ATC
- Declare emergency if required
- Give NITS briefing to Cabin Manager or Deputy as per SEP manual
- Arrange a landing as soon as possible
- Summon help from cabin crew to take care of the incapacitated flight crew member
- Reorganize the flight deck work
- Distribute the workload among the remaining flight crew
- Do not press for a hasty approach
- Perform checklists earlier than normal
- Achieve landing configuration earlier than normal

Assisting cabin crew member(s) should:

- Pull the incapacitated pilot back to his seat and fit the shoulder harness
- Place hands across the chest through the shoulder harnesses
- Push the seat completely AFT and fully recline the seatback
- Pull the incapacitated pilot's legs back and cross them away from the control column (if fitted)
- Release the seatbelt and shoulder harnesses
- Carry the incapacitated pilot out, without touching any controls or switches, if not possible, remain in cockpit and provide first aid/oxygen, if required
- Assist the other pilot as directed

Note: The shoulder harnesses should be locked if the incapacitated pilot has to be left unattended in his seat (e.g. assisting cabin crew seeking support).

The CM shall make a PA for a medically qualified passenger and after liaising with the remaining flight crew member will discreetly check if type qualified pilot is on board to replace the incapacitated crew.



Appendix B. OM- Part A Ch. 8.3.13.2 Authorised Personnel

8.3.13.2 Authorised Personnel


The following personnel are authorized to access and remain on the flight deck:

- GCAA Inspectors on duty
- Etihad GCAA licensed pilots in uniform
- Operating Cabin Crew in uniform
- ETIHAD Synthetic Flight Instructors (SFIs) and ETIHAD Flight College Multi Pilot Licence Instructors (MPLIs) on duty and in uniform.

Note:

1. Only the above personnel are permitted access to the flight deck after the aircraft doors are closed and the engines are started through to engines shutdown. There are no exceptions to this rule.
2. In exceptional circumstances, access permissions shall be approved by SVPO or delegate in writing.

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3. The final decision to allow authorized personnel onto the flight deck remains with the Captain.

Visits to the flight deck for any other individual is strictly forbidden, there are no exceptions to this rule.

A person shall only be carried on the flight deck provided that a seat with safety belt / safety harness is available and that requirements concerning supplemental oxygen are met.

The person shall be instructed:

- Not to distract and / or interfere with the operation of the flight.
- No to touch any controls, switches, instruments, circuit breakers.
- Not to smoke.
- Not to talk unless invited to do so by the Commander.
- Keep the safety belt / safety harness fastened at all times.
- Use and location of emergency exits, life jacket and oxygen.