IATA Guidance for airline health and safety staff on the medical response to Cabin Air Quality Events

(Smoke, Fumes/odours)

1. Introduction

Much controversy exists in relation to the potential health ramifications of cabin air quality events (CAQEs), particularly for the so-called fume events, and international research continues in an effort to provide answers. Engineering efforts are also underway to try to reduce the incidence of these uncommon but concerning events. Regardless of these efforts it is important from a duty of care perspective, that airlines have a methodology of managing these events and providing appropriate care to the crew and passengers involved. This document provides a high level approach for airline health and safety personnel for documenting and assessing CAQEs including conducting basic health risk assessments and determining the need for further medical assessment and/or treatment.

2. Definitions

a. Fumes

Odorous, gaseous compounds, which are not visible

b. Smoke

The product of burning materials made visible by the presence of small particles

3. Presentations

Depending on the local context, Air Quality Events may present to the safety department, airline medical department or aviation medical officer at differing times including:

a. In-flight event requiring advice,

b. Acute – immediate post-flight consultation or

c. Late presentation of a previously documented exposure

Figure 1 (below) documents a potential airline 'triage' process for an in-flight or acute post-flight assessment.

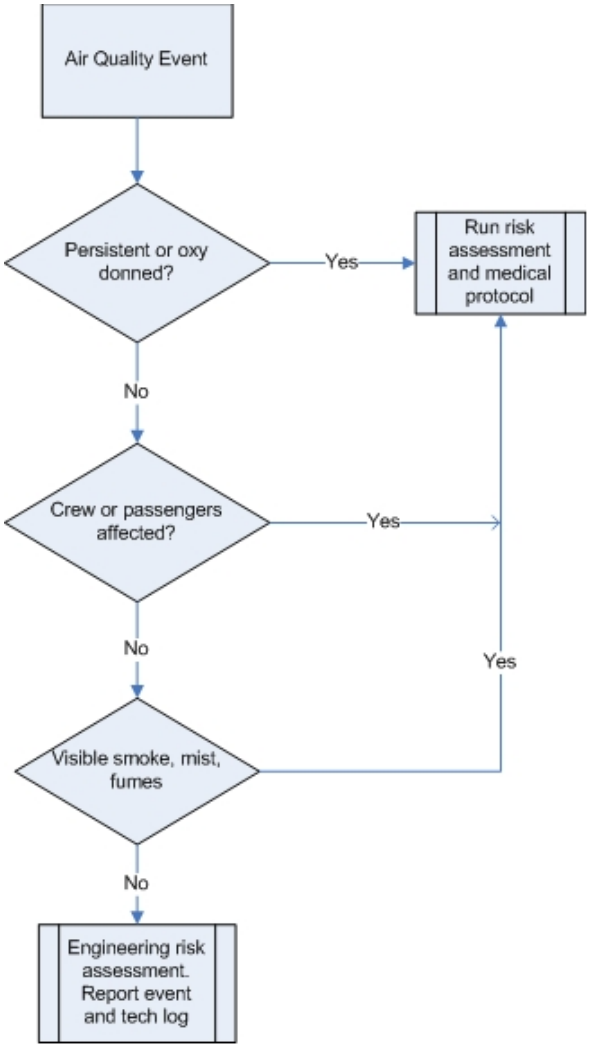

Figure 1. Flow Chart for In-flight or acute presentations of CAQE

4. Exposure assessment

In all events it is important to conduct an exposure assessment to help determine the potential for health effects and to assess fitness to operate. This may be conducted by safety or health personnel knowledgeable in such assessments. The following components are examples of the types of details that may be included in such an assessment:

a. Operational information

i. Location of aircraft (air, stand, taxi)

ii. Aircraft type

iii. Phase of flight

iv. Oxygen masks donned?

v. Section of aircraft affected (cockpit, cabin, fore, aft, galley, doors)

vi. Aircraft on APU?

b. Nature of exposure

i. Smoke (or flames), Fumes/odour

ii. Description of the smoke, fumes / odour (Open first then probe as necessary e.g. was an acrid, electrical, “dirty socks”, “wet woollen”, etc. type smell):

iii. Known or suspected source?

-Mechanical (e.g. APU, Engine Oil, Hydraulics)

-Non-mechanical (e.g. galley, toilet, open door, other aircraft, environmental (eg bushfire, volcano))

iv. Engineering information?

v. Material Safety Data Sheet (MSDS) sheets as appropriate

c. Duration of exposure for each crew/passenger

d. Symptoms experienced and duration

The following questions should preferably be asked by personnel with health training (e.g. by telemedicine patch-in) but may be asked by trained safety personnel. Open questions should be asked initially and then other symptoms excluded by closed questioning.

Open question:

Did you experience any symptoms? If so, what is the main symptom you experienced/are still experiencing, and what were the other symptoms that were/are present?

Probes:

Did you experience any of the following?

- Cough, wheeze, shortness of breath, chest tightness, difficulty with speech;
- Sore throat, burning throat, difficulty swallowing, nasal irritation, runny nose, chest pain, palpitations;

- Dizziness, headache, sensation changes or weakness anywhere on the body, difficulty balancing, loss of hearing, difficulty concentrating; and/or
- Nausea and/or vomiting.

e. Number of people affected including tech crew, cabin crew, positioning crew and passengers and their locations. Note any disparities in symptoms vs. relative exposure.

5. Reporting of events by the crew

It is important for airlines to have a formalised process for reporting of CAQ events using either a dedicated form/template or an existing safety event database. Key data points should be captured that may assist with the exposure assessment but also assist in trending events over time. Data should be captured at the time of the event using a single form and may be captured by flight crew or by technical support persons e.g. in an operations or engineering support centre.

Examples of data that may be useful for analysis are:

a. Aircraft type

b. Engine type

c. APU

d. Nature and severity of event

e. Effect on occupants

f. Phase of flight

g. Nature of odour

One example form for the collection of these data is at Annex 1.

6. Medical Assessments

Not all events require a Medical Assessment to be conducted. For example in an event where there was a mild odour with no symptoms experienced there is a negligible risk of any health effects and an assessment will be fruitless. The exposure should be simply documented. Medical assessment should be proportional to the risk (hazard + exposure). In some instances a telemedicine assessment and advice will suffice whereas for other more serious events, a full assessment is required and may include a physical examination, investigation or referral. An example of 'triage' is below at figure 3. A triage should be conducted by personnel trained in such assessments.

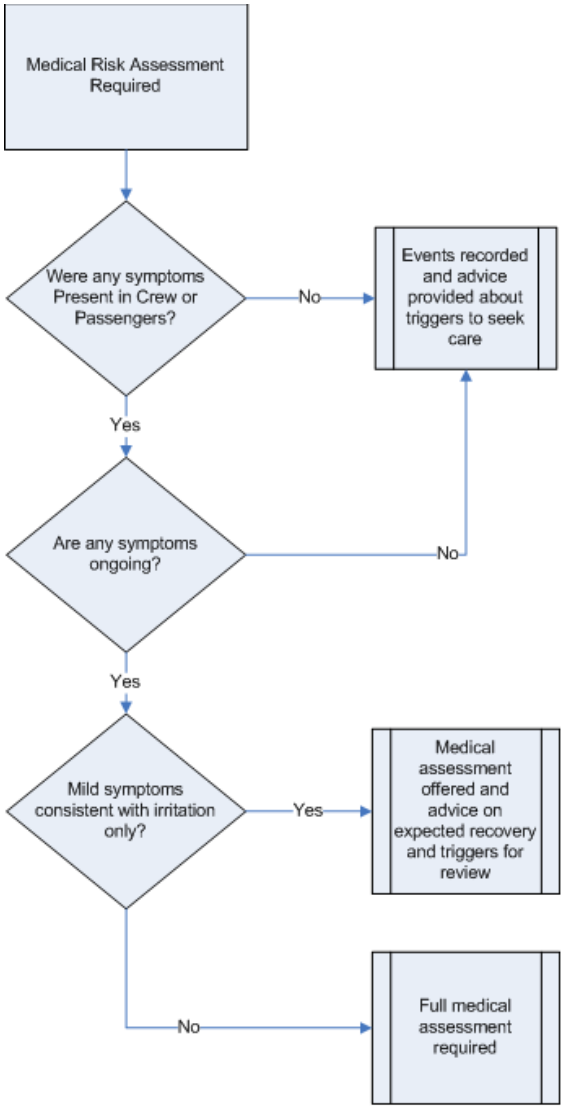

Figure 3: Example protocol for determination of need for Medical Assessment

Depending on the airline threshold for initiating medical involvement, most cases will be resolved with a simple clinical history and health advice.

7. Purpose of medical assessments

The function and purpose of medical involvement is as follows:

a. To assess medical impact on health (triage)

I. Rarely – urgent medical care, ambulance (not the purpose of this guideline)

II. No immediate health threat but persistent symptoms

III. Transient symptoms now resolved

b. To provide immediate care as necessary

c. To document event

I. OH&S reporting and medical file

II. Airline Safety database

III. Engineering and tech log.

d. To investigate persistent symptoms

e. To assess fitness to operate

f. To provide information to those involved– risk communication, advice about delayed symptoms to report

g. To investigate causality in making injury-on-duty determinations.

h. To arrange any necessary follow up

I. Medical review or referrals

II. Close loop with Engineering e.g. if oil / hydraulic leak found to be cause.

8. Medical Assessment Checklist (to be completed by a competent physician)

It is important to have a consistent approach to the assessment and management of persons exposed to these events and the approach should be tailored by the individual airline to their risk and local context. The following are elements that may be considered in the development of a medical assessment protocol for utilisation by the airline medical department or an external provider e.g. occupational physician.

a. Exposure assessment as per 4. above

b. Clinical History

I. Presenting symptoms

II. Past Medical History including previous exposures

- History Asthma COPD
- Psychological / Psychiatric history / A&OD issues
- Neurological / endocrine / metabolic

III. Allergies Atopy / Allergies / sensitivities

IV. Medications, R-OH, Smoking history

V. Occupational History

c. Physical Examination as indicated by history

I. Respiratory

II. ENT (if irritant symptoms)

III. Eyes (if eye symptoms)

IV. Neurological (rarely)

V. Mini Mental State (rarely)

d. Investigations (for high risk exposures)

I. Peak flow / spirometry (incl post bronchodilator if indicated)

II. Pulse oximetry (if indicated)

III. Blood tests (FBC, LFTs)

IV. For high risk exposures to products of engine oil pyrolysis:

- Carboxyhaemoglobin – if significant CO exposure is considered (note that normal carboxyhaemaglobin levels are above zero, and higher in smokers)
- Plasma Cholinesterase levels – to be interpreted by an expert

Note that some aircrew may be participating in experimental trials such as tests looking for bio markers of organophosphate exposure. These tests are not currently clinically indicated but may be of research value.

Note – Any examination or investigations should be guided by history and risk assessment, not applied routinely. As per the triage protocol (fig 3), persons at low risk who are asymptomatic may not require medical assessment. Persons who have had significant contaminant exposures and have had ongoing or delayed symptoms should be assessed more thoroughly. Persons with significant contaminant exposures and acute symptoms may require assessment in the Emergency Department and may require ongoing health surveillance.

9. Treatment

This document does not intend to propose specific treatment protocols as each case must be managed as clinically indicated as for any other potential exposure. Treatment is generally supportive and symptomatic including addressing irritant symptoms and any respiratory or immunological complications. Treatment to significant contaminant exposure is a specialised area that may require referral to an emergency department or to a specialist such as a neurologist, immunologist, neurologist, occupational physician or psychiatrist.

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ANNEX 1

STANDARDIZED SMOKE/FUMES REPORTING FORM
SMOKE/FUMES REPORTING FORM

SECTION 1: FLIGHT AND REPORTER DETAILS

Note: For each question, check all that apply. If one answer is dominant for a given question, write a ☆ next to that item.

AC number: _____
AC type: _____
Tech log # (if known): _____
Departure stn.: _____
Arrival stn.: _____

Flight date (DD/MM/YYYY): _____
Reporter name: _____
Employee no.: _____
Email: _____
Phone: _____

Form completed by:
☐ Flight crew
☐ Cabin crew
☐ Maintenance
☐ Other

PIC signature: _____
(operator discretion)

Phase(s) of flight:
☐ Parked (pre-flight)
☐ Pushback
☐ Engine start
☐ Taxi-out
☐ Take-off
☐ Climb
☐ Cruise
☐ Descent
☐ Approach
☐ Landing
☐ Taxi-in
☐ Parked (post-flight)

Estimated duration of incident:
_____ (hrs.) _____ (min.)

Engine power level changes:
☐ Yes
☐ No
☐ Unknown

Known history of similar conditions on same aircraft?
☐ Yes
☐ No
☐ Unknown

Recent aircraft service history:
☐ None
☐ De-icing or anti-icing
☐ Engine/APU oil serviced
☐ Hydraulic fluid serviced
☐ Pesticide application
☐ Other: _____
☐ Unknown

SECTION 2: SMOKE OR FIRE INFORMATION

Note: For each question, check all that apply. If one answer is dominant for a given question, write a ☆ next to that item.

Evidence of smoke or fire?
☐ Smoke
☐ Fire
☐ Neither smoke nor fire

Type of smoke or fire?
☐ Localized smoke
☐ Generalized smoke
☐ Open flame

Location of smoke or fire:
☐ Cabin; if cabin ⟹
☐ Flight deck
☐ Flight crew rest area
☐ Cabin crew rest area
☐ Lavatory _____
☐ Galley _____
☐ Cargo

☐ Forward cabin
☐ Mid cabin
☐ Aft cabin
☐ Upper deck cabin

Skip to SECTION 4.

SECTION 3: FUMES/ODOUR INFORMATION

Note: For each question, check all that apply. If one answer is dominant for a given question, write a ☆ next to that item.

If fumes/odour, describe type:
☐ Acrid
☐ Chemical
☐ De-icing
☐ Dirty socks
☐ Exhaust
☐ Electrical
☐ Fuel
☐ Musty/mouldy
☐ Oily/burning oil
☐ Vomit
☐ Other: _____

Intensity of fume/odour
☐ Mild
☐ Moderate
☐ Strong
☐ Nauseating

If fumes/odour in cabin:
☐ Forward cabin
☐ Mid cabin
☐ Aft cabin
☐ Upper deck
☐ Cabin crew rest area
☐ Galley
☐ Lavatory

Apparent location of fumes/odour in cabin/flight deck:
☐ Air supply system vents
☐ Cabin item
☐ Flight deck equipment
☐ Galley equipment
☐ Other: _____
☐ Unknown

If fumes/odour in flight deck:
☐ General flight deck area
☐ Flight crew rest area

If fumes/odour in cargo:
☐ Known source
☐ Unknown source

If known, identify:
_____

Potential source of fumes/odour coming from outside the aircraft:
☐ De-icing or anti-icing underway
☐ Fueling underway
☐ Proximity to ground service vehicle exhaust
☐ Proximity to other aircraft (exhaust)
☐ Other: _____

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SECTION 4: OTHER OBSERVATIONS – AL EVENTS

Note: For each question, check all that apply.

☐ Blocked drain ☐ Cabin item: _____ ☐ Galley equipment malfunction	☐ In-flight entertainment system malfunction ☐ Irregular equipment noise	☐ Leak/spill ☐ Lights flickering/malfunction ☐ Other: _____	**Air supply source:** ☐ APU ☐ Engines ☐ Ground conditioned air unit ☐ Ground air starter ☐ Other: _____

SECTION 5: SYMPTOM/REACTIONS – ALL EVENTS

Note: For each question, check all that apply.

Symptoms reported?

☐ Yes (if yes) →

☐ No

☐ Unknown

If yes, symptoms reported by:

☐ Flight crew

☐ Cabin crew

☐ Maintenance

☐ Passenger(s): Seat # ___ ___

Symptoms/used by	Flight crew	Cabin crew	Maintenance	Passenger(s)
Abnormal taste				
Dizziness				
Fatigue/weakness				
Headache				
Irritated eyes, nose, throat				
Slowed thinking				
Tingling				
Trouble breathing				
Other				

Comments:

Emergency equipment used?

☐ Yes; if yes, complete table

☐ No

Equipment/used by	Flight crew	Cabin crew	Maintenance	Passenger(s)
Oxygen mask				
Smoke goggles				
Portable breathing equipment				
Portable oxygen bottle				
Fire extinguisher				
Drop down masks				

Medical assistance required?	Type of medical assistance (if applicable)	Additional details: _____
☐ None ☐ Flight crew ☐ Cabin crew ☐ Passenger: Seat(s) ___ ___ ☐ Maintenance	☐ On-board only ☐ Medical advisory service ☐ Emergency medical services met aircraft ☐ Emergency room/clinic ☐ Other: _____	

SECTION 6: MAINTENANCE FOLLOW-UP AND INFORMATION – ALL EVENTS

Note: For each question, check all that apply.

Maintenance fault/source identified?	Impact on operation	Maintenance action(s), if known: _____
☐ Yes ☐ No	☐ None ☐ Diversion ☐ Return to base ☐ Aircraft change ☐ Flight cancelled ☐ Gate delay ☐ Other: _____	

IF NEEDED, PROVIDE ADDITIONAL COMMENTS IN SEPARATE PAPER

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