

A survey of health symptoms in BAe 146 aircrew

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The concerns that were brought to the Australian Federation of Air Pilots regarding air quality problems revealed a number of operational and OHS issues. This prompted the design and conduct of a survey of symptoms in members who fly BAe 146 aircraft in Australia. A total of 19 pilots and two flight attendants responded. Survey respondents showed high rates of symptoms which included headaches, eye, skin and upper airway irritation, neuropsychological impairment, respiratory problems, food/alcohol intolerances, muscle/joint pain, diarrhoea, and so on. While the results of this survey cannot be considered representative, they do provide self-reported data from a small number of pilots about health problems on the BAe 146, and suggest that the denials by the airlines should be re-examined.

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- AIRBORNE CONTAMINANTS
- BAe 146
- AEROTOXIC SYNDROME

Introduction

The Australian Federation of Air Pilots (AFAP) is the trade union which covers pilots within Australia (with the exception of the major airlines). During the early 1990s, the union was aware of concerns that were being expressed by some members, but the matter seemed to disappear for a significant period. This may have been due to the significant disruptions to the industry which occurred at this time.

The issue regained some momentum in the mid- to late-1990s, as the number of complaints began to rise from members who crewed BAe 146 aircraft and who had experienced smells inside the cabin and cockpit. In some cases, these experiences led to nausea and headaches, while in others they led to loss of balance. Further, the number of cabin crew who were medically released from duty on the BAe 146 was increasing, and in 1997 there was a serious incident on a freighter aircraft.

The major airlines had started an investigation into the complaints and Ansett Australia had established an "odour committee" to address the concerns that were being raised by employees. This committee included members of the Ansett Pilots' Association and Flight Attendants' Association of Australia, as well as a number of "experts". While material was being gathered and many of the affected crew were transferred to other models of aircraft, no real solutions emerged. Because the committee was developed from within Ansett Australia only and there were no equivalents at other operators, it took some time for a wider debate to develop — although the industry as a whole was aware of the problem.

As a result of the 1997 air freighter incident, the then Bureau of Air Safety Investigation took a direct interest in the issue and looked into the causes of fumes, design of the aircraft, and so on. It was at this time that AFAP took a more active interest in the issue because it considered a pilot becoming incapacitated during a flight to be a serious safety concern.

In responding to this issue, the union did not claim to be a medical or engineering expert; however, a significant amount of material related to the problem

was readily acquired from a number of organisations, individuals, researchers, medical professionals, the airlines and the Internet.

On the other hand, it seemed from the outset that the Ansett Australia committee was relying totally on the accepted wisdom of the medical experts involved, rather than investigating other possible alternatives. This point should be emphasised because, during the later public submissions to the Senate Inquiry, accusations were still being made by the airlines that the complaints were simply related to stress, hyperventilation or hormone imbalance. However, this apparent process of denial and marginalisation was clearly questionable, for example, the pilot involved in the 1997 incident was a 50-year-old male who believed himself to be a relaxed person.

Again, it needs to be stressed that the AFAP officers were not medical experts; they were simply looking for an explanation as to what was affecting crew members.

As a result of some basic research by an AFAP member, several descriptions of the oil used in the aircraft were tracked down and subsequently identified as the source of the fumes (after bearing seal failure). Also, while seeking out what effect the burnt oil fume could have, the material safety data sheet was found. This document stated that the oil was safe during tests under laboratory conditions but the inhalation of mist or fume may cause nervous system disorders through long-term exposure.

Many of the reports received from crew members were comparable with nervous system disorders, with symptoms appearing after an exposure of several years flying on the BAe 146.

When this material came to light, the commercial pressures began, for example:

- the aircraft manufacturer denied that there was a problem;
- the airlines believed that modifications had fixed the problem;
- the regulator did not believe that the matter was an air safety problem; and

— the oil manufacturer said that there was only a small risk and that it was working on a substitute oil in any case.

Unfortunately for the vested interests of those involved and for AFAP members, reports of fume incidents occurring are still being made today. However, as a result of consistent lobbying — particularly from AFAP members — a Senate Committee for Rural and Regional Affairs and Transport has added a specific reference to air safety and cabin air quality in BAe 146 aircraft to an existing aviation inquiry on airspace.

The material put to the inquiry and the conclusions of the Committee in the Senate Report are a matter of public record, so they will not be repeated here.¹ However, the Senate Inquiry clearly demonstrated the narrow definition of air safety which is so cherished by the regulators and airlines, and quite correctly identified that their responsibility was to a much wider concept of health and safety.

BAe 146 flight crew survey

In 1999, a survey of the health symptoms of BAe 146 pilots was conducted. Anonymity was guaranteed so

as to gain a more frank response to the survey questionnaire by participants.

The response rate was low — only 21 questionnaires were returned. Subsequently, it was discovered that in one company the letter and questionnaire had been removed from individual flight crew mailboxes. The reason for this was to ensure that fewer questionnaires would be completed and returned — and none from that particular company.

While the questionnaire was primarily sent to pilots, some flight attendants also replied.

Due to the removal of questionnaires from personal mailboxes by one airline, the responses received cannot be considered to be representative. Nevertheless, analysis of the questionnaires that were received showed a number of interesting trends, which are explored below.

Respondent demographics

Most pilots in commercial aviation are male. This was reflected in the results of the survey, in that the majority of crew who responded were male (Figure 1). Similarly, most respondents were in the 30–50 years age group (Figure 2).

FIGURE 1

Gender

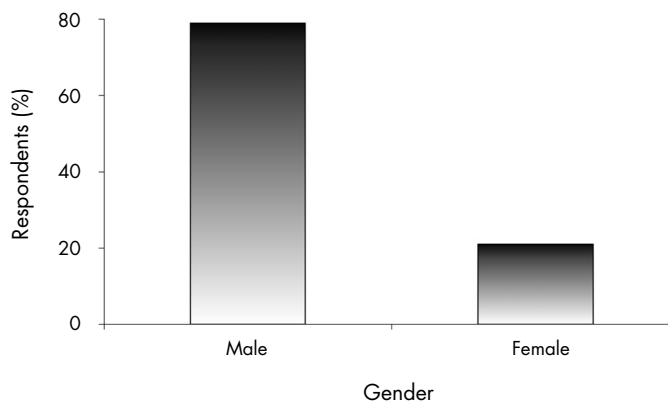
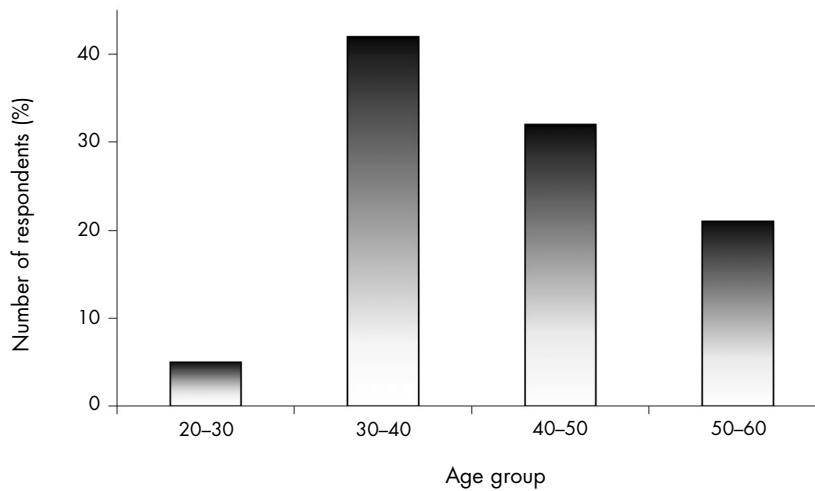


FIGURE 2
Age of respondents



Flying history

While the survey was targeted at flight crew, 90% of the respondents were pilots, and 10% were flight attendants. Of the respondents whose primary role was flying, the number of years spent flying is shown in Figure 3. All pilots were currently flying the BAe 146 full time (that is, they did not fly other models).

The respondents had substantial flying experience, although flying experience on the BAe 146 was less than the total years flying. Further, all pilots noted that they flew more than 500 flight hours per year in their current positions.

Health survey

The questionnaire contained a number of questions about health problems, including a list of symptoms, duration of symptoms, and so on.

Respondents were very positive about the quality of their health before flying (particularly before flying on the BAe 146 (Table 1)).

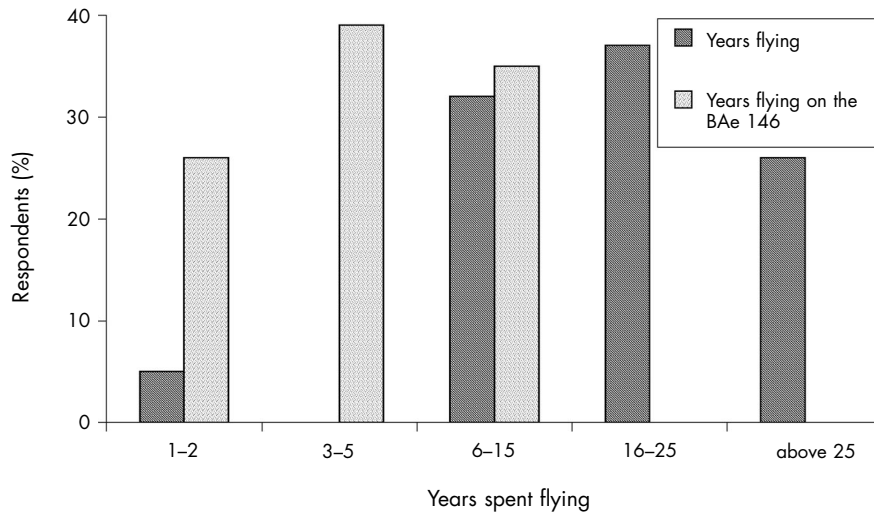
Respondents were less positive about whether their health had suffered while flying on the BAe 146. Most

considered that the number of symptoms had increased, that they were specific to flying on the BAe 146, and that the symptoms improved away from the plane (Table 2).

Just under half of the respondents considered that the symptoms were associated with specific exposure situations, such as an engine oil leak. However, 37% did not — suggesting that they considered that symptoms were part of the normal processes of working on the plane. This finding is quite revealing as it indicates a fairly widespread belief in the industry that, in addition to the BAe 146 being a plane which is prone to engine oil leaks, there is a persisting residual problem which is not directly associated with the leaks but which has the potential to continue to cause symptoms or affect health.

Data on symptoms were collected by asking the question: Do you experience any of the following symptoms during your work pattern? Respondents were asked to rate such symptoms as “occasional”, “sometimes”, “often” and “long term”. While the subjective nature of the ratings is acknowledged, it does allow the respondent to answer the question

FIGURE 3
Flying experience of respondents



without raising the problems that quantitative answers may produce. Data on symptom severity are shown in Table 3.

Of all the data collected in this survey, the symptom severity data reveal the most about health problems from flying on the BAe 146, namely:

- a wide range of symptoms was reported, in many body systems;
- some symptoms were reported at fairly high rates (for example, headaches, irritation and respiratory problems);
- some symptoms occurred quite frequently (for example, skin irritations and disorientation);

- some symptoms, such as coordination or memory effects, presented significant safety problems; and
- some symptoms only occurred as long-term effects (for example, immune system disorders).

These data show that the range of symptoms is extensive, and frequency of symptoms cannot be dismissed as being part of the normal health symptom background. Other symptoms, such as coordination or memory problems, are alarming — given that the respondent was flying a plane at the time.

The questionnaire also provided respondents with extra space to add other comments. These are noted below. In general, they support the results of the

TABLE 1
Health status

<i>Health status</i>	<i>Good</i>	<i>Moderate</i>	<i>No answer</i>
How was your health prior to your flying career?	95%	0%	5%
How was your health prior to flying the BAe 146?	100%	0%	0%

TABLE 2
Symptom development

<i>Symptoms</i>	<i>Yes</i>	<i>No</i>	<i>No answer</i>
Have your symptoms increased since flying the BAe 146?	95%	0%	5%
Do symptoms increase by the same amount on other models of planes?	0%	63%	37%
Do symptoms increase more while on duty?	84%	5%	10%
Do symptoms increase more on the BAe 146 than elsewhere?	68%	0%	32%
Do symptoms decrease a few hours after sign off?	63%	16%	21%
Do symptoms improve on holidays or days off?	90%	5%	5%
Did you have symptoms prior to flying the BAe 146?	0%	95%	5%
Do symptoms only occur after exposure incidents?	47%	37%	16%

TABLE 3
Symptom severity

<i>Symptom severity</i>	<i>No answer</i>	<i>Occasional</i>	<i>Sometimes</i>	<i>Often</i>	<i>Long term</i>
Headaches, light-headedness, dizziness	32%	21%	21%	10%	16%
Irritation of eyes, nose and throat	16%	16%	32%	16%	21%
Disorientation	74%	5%	5%	0%	16%
Memory impairment (short-term)	53%	10%	5%	5%	26%
Concentration difficulties, confusion	53%	16%	10%	0%	21%
Blurred vision, tunnel vision	90%	5%	0%	5%	0%
Nausea, vomiting, gastrointestinal problems	90%	0%	0%	5%	5%
Fatigue, weakness, decreased performance	32%	21%	26%	0%	21%
Respiratory distress/difficulties	63%	0%	26%	0%	10%
Numbness (head, limbs, lips, fingers)	74%	5%	0%	10%	10%
Balance/coordination difficulties	74%	0%	16%	0%	10%
Joint pain, muscle weakness	84%	5%	5%	0%	5%
Intolerance to chemicals/odours	53%	5%	16%	0%	26%
Intolerance to foods/alcohol	84%	0%	0%	5%	10%
Skin irritations	79%	5%	16%	0%	0%
Immune system disorders	79%	0%	0%	0%	21%
General increase in feeling unwell	53%	5%	16%	5%	21%
Diarrhoea	90%	0%	5%	0%	5%
Cancer	100%				

survey data shown above, and are quite revealing in terms of the additional problems that they uncover:

- increased colds, running nose, watery eyes;
- increased skin irritation to eyes and neck;
- on flights of four hours plus, extreme headaches usually occur next day and last for 24 hours;
- eyes become bloodshot and painful;
- skin rash to hands;
- violent protracted headaches;
- initial experience during duty or period immediately following has now increased to approach to airport or similar environment;
- fatigue and lack of attention to detail has been evident for quite some time;
- when PAC filters changed, odour decreases;
- nausea felt whenever odour present; and
- affect on liver, fatigue, chemical sensitivity and sore eyes.

Conclusion

Overall, the survey provides limited results about the health issues for pilots flying on the BAe 146. It could be argued that the results of the survey should be dismissed as they are not representative, cover only a small sample size and — because of the action taken by one company to stop its staff from filling out the questionnaire — do not even represent one part of the union's constituency of interest.

However, the survey does provide self-reported data from a number of pilots about the health problems as a result of flying on the BAe 146. Therefore, the results of this survey are not airline or union rhetoric about what is or might be the real situation and, as such, they should be heeded.

Further, the findings of such a small survey are interesting because they provide data that support what is already known. The BAe 146 is a plane which

is prone to engine oil leaks, the contaminants in the oil are known to cause health problems when present in the plane's cabin, and the range of health problems reported in previous studies is entirely consistent with the findings of this study.

The Australian Federation of Air Pilots considers that the presence of contaminants in flight decks and passenger cabins of commercial jet aircraft constitutes an air safety, occupational health and passenger health problem and the following observations have been made:

1. Incidents involving leaks of engine oil and other aircraft materials into the passenger cabin of aircraft occur and are recognised through service bulletins, defect statistics reports and other sources. The rates of incident occurrence are higher than the aviation industry admits, and for the BAe 146 are significant. The Australian Federation of Air Pilots supports full reporting and follow-up investigations in accordance with all regulatory requirements, as well as medical investigations for those exposed.

2. As indicated by manufacturer information and industry documentation, aviation materials such as jet oils and hydraulic fluids are hazardous and contain toxic ingredients. If such fluids leak into the air supply, cabin and flight deck, toxic exposures are possible. The Australian Federation of Air Pilots is concerned about such exposure events, and supports industry, government and inter-government initiatives to reduce such incidents.

3. Leaks of oil and other fluids into aircraft may be considered as a "nuisance" by some, but where such leaks affect the health and performance of crew, or the health of passengers, they should be considered as a flight safety and health issue which breaches airworthiness standards and other regulations.

4. Attempts by the industry to minimise this issue (such as acceptance of under-reporting of incidents, inadequate recognition of the extent of the problems, inadequate adherence/interpretation of the regulations, inadequate monitoring, inappropriate use of exposure standards and care provided to crew

reporting problems) have made it possible for the problem to continue.

5. The Australian Federation of Air Pilots is also concerned that the health implications — both short and long-term — following exposure to contaminants reported by crew and passengers must be properly addressed. A syndrome of symptoms is emerging, called “aerotoxic syndrome”, suggesting that these exposures are common and a sufficiently large group of affected individuals exists.

6. Where contaminants impair the performance or affect the ability of pilots to fly planes — as has been stated in a number of reports — this is a major safety problem. Where contaminants cause undue discomfort or even transient health effects in staff and passengers, this is a breach of Federal Aviation Regulation 25.831 and other regulations.

7. Until recently, the aviation industry’s approach in dealing with this problem has been to deny that it exists but some limited attempts have now been made to address this problem.

The most important message that AFAP would like to convey to its members is, in the event of a fume incident:

- no matter where a report of fumes or odours comes from, take it seriously;
- record all relevant details related to the event, including aircraft registration, flight crew, flight details, time, place, who is affected and any underlying issues;
- get the aircraft to the nearest alternate destination or return to departure point;
- clear the aircraft;
- have engineering look at the aircraft;
- where possible, affected crew should seek medical assistance as soon as possible;
- ensure that the company records the event; and
- report the event to the Australian Transport Safety Board.

All of the above recommendations are critical and, although they may seem obvious, there are a number of well-publicised incidents when such information was not recorded or details reported.

The issue of cabin air quality needs to be treated with an open mind, that is, we may not be able to rely on an existing medical solution to fix the problem. The approach of AFAP has been to take in all possible solutions and work for the best possible result for those directly affected. As such, it is critical that the answers to the following questions are fully understood:

- What effects do the fumes have on the body?
- What are the long-term health implications for an individual?

Ultimately, a regulatory authority is needed which will protect the interests of employees and the travelling public without being influenced by commercial interests. From the evidence that was presented to the Senate Inquiry, it is apparent that AFAP lacks confidence in the Civil Aviation Safety Authority (CASA) to perform such a role.

In AFAP’s view, CASA’s role in dealing with the problem of oil leaks on the BAe 146 has been inadequate, and in some cases, because of its reluctance to get involved, has made the problem worse.

In concluding this article, it should be stated that it has taken the last five years to get to this point. The first reports of fume problems began in the late 1980s and the effects of the fumes are now starting to take their toll on current employees. There is no doubt that many more problems will start to appear in the near future.

Reference

1. Senate Rural and Regional Affairs and Transport References Committee. *Air safety and cabin air quality in the BAe 146 aircraft*. Canberra: Parliament of Australia, October 2000. Website at www.aph.gov.au/senate/committee/rrat_ctte/bae/bae.pdf