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Mind the Gap? Identifying, Managing and Preventing Some Aircraft Crew Occupational Health and Safety/Flight Safety Problems

Andrew Watterson, Susan Michaelis

University of Stirling, Stirling, UK

Corresponding author:
Andrew Watterson
a.e.watterson@stir.ac.uk

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crew health, organophosphate, regulations, cabin air, memorandum of understanding

ABBREVIATIONS

CAA	Civil Aviation Authority
OP	Organophosphate
MOU	Memorandum of understanding

ABSTRACT
The paper explores a number of obstacles to and key approaches on the recognition and management of occupational health problems, relevant inter-actions and possible multi-causality in the context of aircraft crew health and safety. The dominant approach has all too often been – 'don't look, don't find, where is the problem?' Control and removal of these problems has failed even where there is a regulatory system that theoretically applies the standard occupational health and safety management hierarchy. Some solutions to address this failure and examples of good practice both within Europe and internationally are then identified and analyzed.

INTRODUCTION

The identification of occupationally-caused and occupationally-related diseases is all too often a very lengthy process. This impacts on official recognition, prescription and scheduling of the disease by governments, compensation for victims and most importantly preventative actions. The result is that those with occupational diseases from a process or product are often left behind decades after an industry/occupation and its materials and technology change or cease. The dominant approach to many occupational diseases has all too often been – don't look (or don't have the means to look), don't find (or don't have the means or knowledge to make sense of findings or omit crucial findings), where is the problem – and in the process important information from crew can be discounted or simply dismissed as 'hysteria? Sometimes the techniques to identify potential problems or make sense of a variety of data relating to them have been lacking. National health and safety regulations are usually underpinned by basic principles of removing hazards at source and, if that is not possible, adopting a hierarchy of approaches linked to substitution of less hazardous materials, isolation, engineering controls and personal protective equipment. Yet these principles have sadly all too often been subverted by industry, governments and complicit or captured regulators as the former head of the United States Occupational Safety and Health Administration, David Michaels, has carefully and recently documented.[1]

Table 1 illustrates how such approaches have either crudely or at times in a more subtle manner been adopted to air quality threats to crew linked to their possible organophosphate exposures (OPs).[2,3]

This is against a backdrop of a range of aviation regulations, standards and guidance material dealing with cabin air quality affecting crew and passengers in various ways. Examples of these include CS/FAR 1309 Equipment and Systems Design – Airframe: CS E510…. FAR 33.7 – Safety analysis engine/APU – Bleed air- Incapacitation /Impairment; CS E 690…. – Bleed air purity engines & APU; CS & FAR 25.831 a/b - Airworthiness - Ventilation and Heating (CO, CO2, O3); AMC 21.A.3B(b) – Unsafe condition – Impairment/discomfort – Increased frequency; (EU) 2015/1018 - Reporting: for example on contaminated air- could endanger aircraft/occupants. In addition, a range of occupational or occupationally-related regulation on health and safety within the EU either apply or would

Cut information	Stretch information
• Ignore studies on chemical exposures 1950s-2000 and lessons from long history of OP research linked to application of caution and vulnerable groups • Downplay complex mixture interactions • Ignore or downplay science on very low level exposures • Ignore or downplay incident reports • Fail to explore alternative engineering and materials approaches to problems • Underestimate exposure times of crew • Ignore 'false negatives' trap linked to limited epidemiology	• Exaggerate extent to which existing limited research has addressed problems • Over-estimate general responses to OPs and miss vulnerable groups in non-acute exposures • Argue occupational diseases are psychological/psychiatric in origin • Indicate no problems and have no adequate means to check if there are any • Set up reporting schemes for incidents but fail to fully investigate reports

Table 1 — The Procrustean Regulatory and Policy Approach to Assessing Air Cabin Quality Threats Relevant to OHSM?

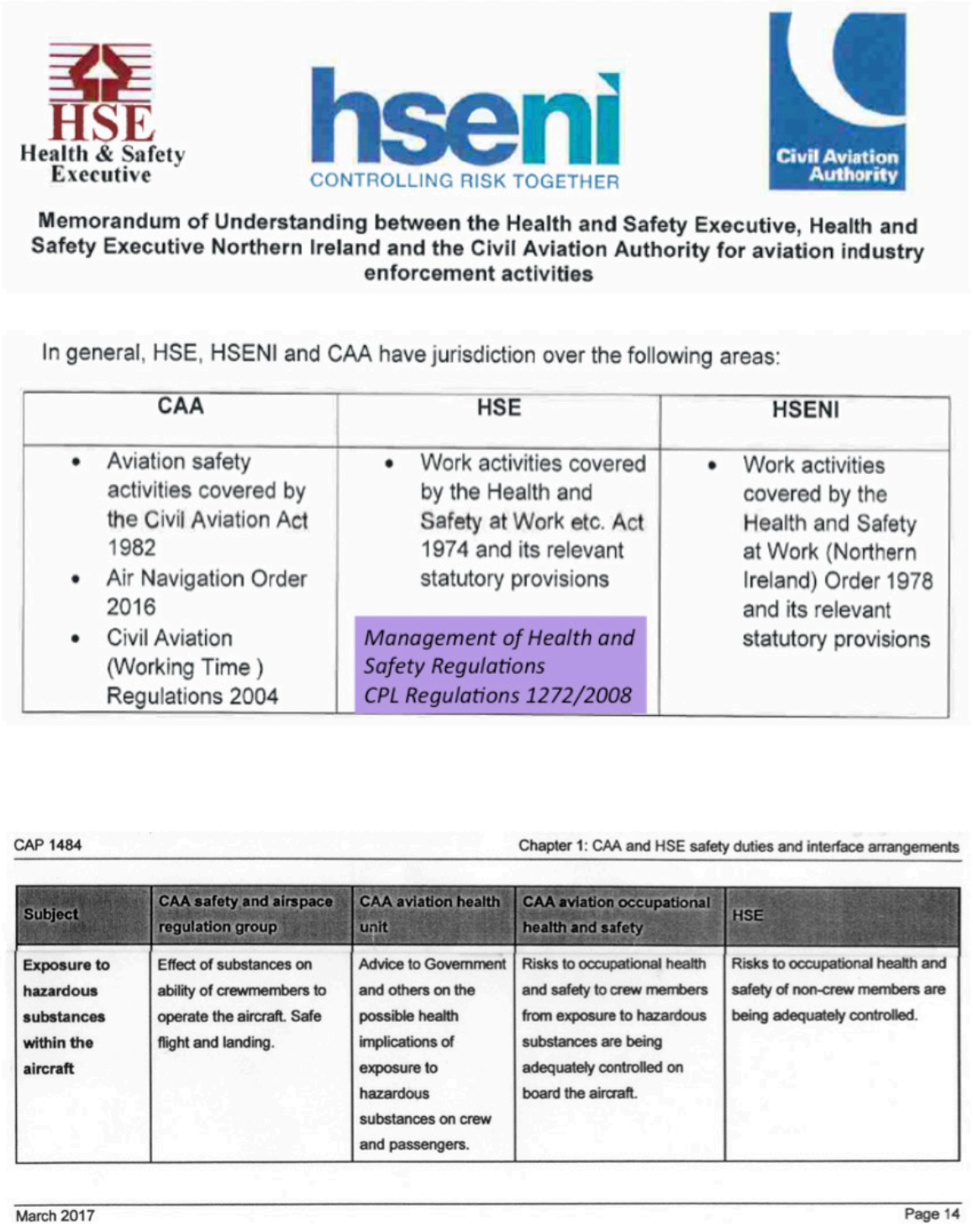
be relevant to aircrew and passengers on the ground and perhaps in the air in some circumstances. These include the following directives: the OSH Framework Directive EU 89/391; Directive – EU 98/24/EC – chemical agents; Directive – 2004/37 EC – Carcinogens; Directive – 2000/79/EC – Working time- mobile workers – mobile staff in civil aviation will have safety and health protection appropriate to the nature of their work.

DISCUSSION

To what extent can such regulations, directives and guidance be applied to cabin air, at what stages in a plane's travel form one airport to another? Can they be enforced? Are they enforced? How does inter-agency collaboration work when covering different stages of 'flight'? Do agencies have the knowledge, skills, staff, resources and time to enforce? The answers to these questions are not fully available and can vary depending upon who provides the information. Mechanisms exist to do this depending on interpretation and application of guidance as for example Figure 1 which illustrates the UK and Northern Ireland memorandum of understanding (MOU) with the CAA and related guidance.[4,5]

The MOU is only as effective as its scope and application. The Civil Aviation Authority (CAA), the aviation regulator, takes the aviation health and safety lead and provides advice to Government/media/passengers on health issues which must present staff at times with potential conflicts of interest because government and passenger interest can conflict. The CAA would be expected to assess dermal and inhalation exposures and altitude and exposure issues. It may be offered technical expertise by others working and researching in the field as for example happened with free blood testing, but such offers have been turned down. Effectively there appears to some to be an opaque if not closed loop between for example CAA, HSE Public Health England, EASA, the UK Committee on Toxicity (COT) and the Industrial Injuries Advisory Council on air quality advice and information used and any recognition of occupational ill-health due to cabin air. The HSE will cover non-air crew workers who are on the ground and have no intention of flight but can raise concerns with CAA when aircraft are in GB airspace. To outside observers, it seems they are given lesser priority where other regulators are better placed.

Under the 2008 MOU, there has been to our knowledge



HSE Health & Safety Executive

hseni CONTROLLING RISK TOGETHER

Civil Aviation Authority

Memorandum of Understanding between the Health and Safety Executive, Health and Safety Executive Northern Ireland and the Civil Aviation Authority for aviation industry enforcement activities

In general, HSE, HSENI and CAA have jurisdiction over the following areas:

CAA	HSE	HSENI
• Aviation safety activities covered by the Civil Aviation Act 1982 • Air Navigation Order 2016 • Civil Aviation (Working Time) Regulations 2004	• Work activities covered by the Health and Safety at Work etc. Act 1974 and its relevant statutory provisions *Management of Health and Safety Regulations* *CPL Regulations 1272/2008*	• Work activities covered by the Health and Safety at Work (Northern Ireland) Order 1978 and its relevant statutory provisions

CAP 1484 Chapter 1: CAA and HSE safety duties and interface arrangements

Subject	CAA safety and airspace regulation group	CAA aviation health unit	CAA aviation occupational health and safety	HSE
Exposure to hazardous substances within the aircraft	Effect of substances on ability of crewmembers to operate the aircraft. Safe flight and landing.	Advice to Government and others on the possible health implications of exposure to hazardous substances on crew and passengers.	Risks to occupational health and safety to crew members from exposure to hazardous substances are being adequately controlled on board the aircraft.	Risks to occupational health and safety of non-crew members are being adequately controlled.

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Figure 1 — *UK and Northern Ireland Memorandum of Understanding between HSE, HSENI and CAA and Memorandum of Understanding Guidance.* *(Text in italics represents authors contribution)*

- *Basic education*
- *Training*
- *Standard reporting*
- *Trouble shooting*
- *Event Investigation*

SECTION 5: SYMPTOMS AND REACTIONS — ALL EVENTS

Note: For each question, check all that apply.

Symptoms reported?	Symptoms/reported by	Flight crew	Cabin crew	Maintenance	Passenger(s)
☐ Yes (if yes) →	Abnormal taste				
☐ No	Dizziness				
☐ Unknown	Fatigue or weakness				
	Headache				
If yes, symptoms reported by:	Irritated eyes, nose, throat				
☐ Flight crew	Slowed thinking				
☐ Cabin crew	Tingling				
☐ Maintenance	Trouble breathing				
☐ Passenger(s): Seat # ___ ___	Other				

Comments:

Figure 2 — The ICAO approach – Moving in the right direction with work to do? (Text in italics represents authors contribution)

no or no effective Control of Substances Hazardous to Health Regulations enforcement by HSE of or CAA enforcement of the Working time regulations relating to chemical exposure. Workplace exposure standards for chemicals used by HSE in the UK would not be applicable in flight which is a major concern especially with effects of complex mixtures at altitudes above 5000 feet.

What should be done to fix the many gaps in regulatory oversight, transparency, information, accessibility and flow, occupational disease recognition and monitoring, standard setting, application, effective occupational and environmental hygiene controls, design, inter-agency cooperation and effective coverage of air crew, passengers and ground crew with regard to chemicals and processes known to cause or suspected to cause cabin air pollution? Better application of existing laws and regulations and their logical extension to air as well as ground exposures could be done partly through well resourced, trained and staffed regulators being more active in monitoring and enforcement and also through tweaking existing regulations. Such an approach should be cost effective as well as raising health and safety standards for both workers in the industry and passengers as knowledge of exposures to toxic chemicals in the industry grows.

In addition, building on, properly evaluating and applying widely the good practice on occupational health and safety management systems that is developing for the industry under such initiatives as the ICAO's Guidelines on Education, Training and Reporting Practices related to Fume Events 2015 will be valuable (*Figure 2*).[6]

It must of course not be viewed as a tick box exercise but lead to action at all appropriate levels where problems are identified. It would underpin the proposed improved regulatory framework and mechanisms. The OHSAS 18001 that incorporated key aspects of ISO 45001 which now replaces it as the new international standard for occupational health and safety indicated

some necessary generic features for raising health and safety standards relevant to cabin air.[7] These include effective systems integration and greater attention to worker 'wellness' and collection of occupational health data linked to increasing crew participation, recording and perceptions. Evidence suggests that all too often the critical resource of air crew on fume incidents has been marginalized or dismissed rather than used in ways that OHSAS indicates. In addition, the approach requires a linkage to mechanisms to improving responses on technology and materials; increasing attention paid to suppliers, contractors and health and safety bodies relevant to issues identified; identifying substances with known/ potential risks to human health at various levels; ongoing and new hazard identification activity including non-routine as well as routine work and product design and emergency situations such as a 'fume' incidents.

What is clear, however, is that the issue has been seriously neglected all too often by industry and regulators at both national and international level. Only the actions of individual pilots and cabin crew and their trade union and professional bodies in the first place over many years have led to recognition of the problem that only now are beginning to increase recognition of the issue.[8–10]

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