CONFEREN CES PROCEEDINGS

Sessions presented at the
2017 International Aircraft Cabin Air Conference

19-20 September 2017
Imperial College London
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KEYWORDS
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
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. 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...
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)
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).

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. 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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