Eventos de Calidad de Aire de Cabina

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MedAire
An International SOS Company

Potenciales Conflictos de Interés

- Empleado de MedAire en tiempo integral
- Sin conflicto de interés
- Opinión emitida no necesariamente es la de la compañía

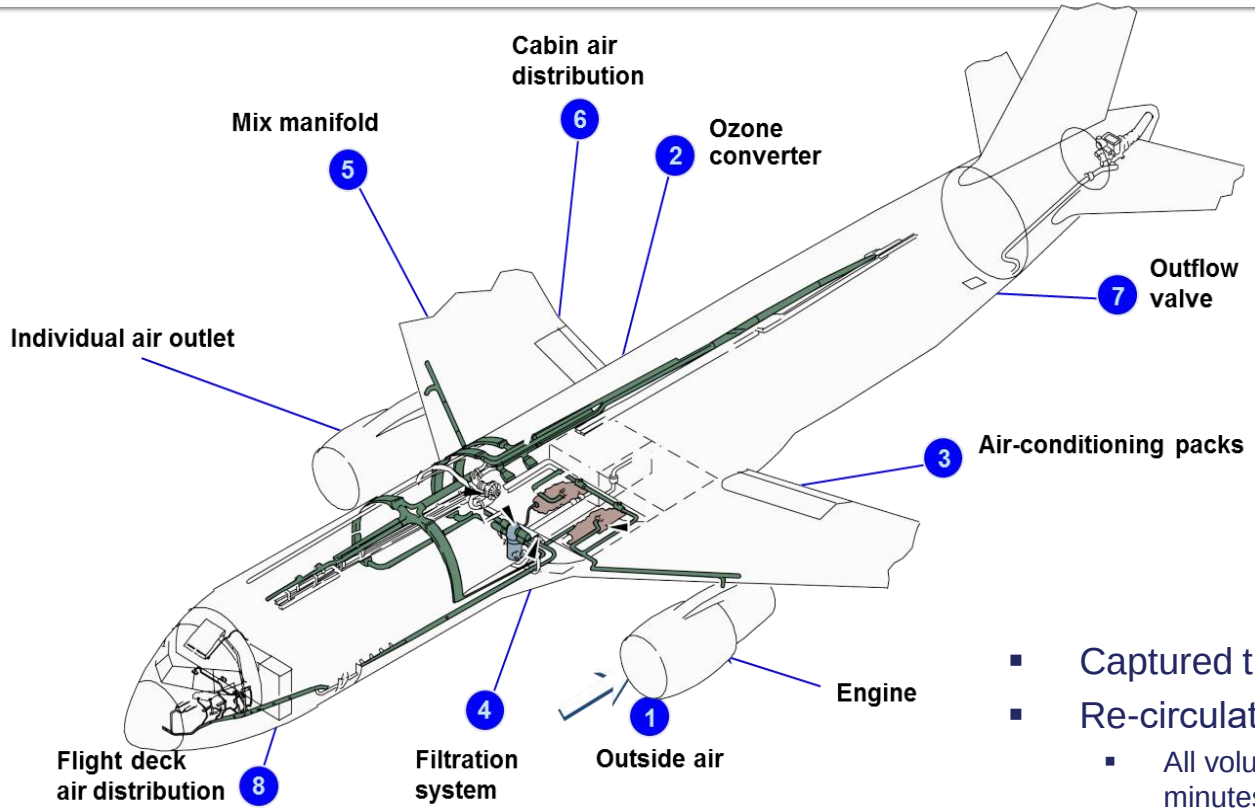
El Problema

- Reportes frecuentes de eventos de olor a bordo
- Descritos como: 'olor de calcetines sucios'
- Preocupación con posible exposición a substancias toxicas en corto y largo plazo

Eso no es nuevo…

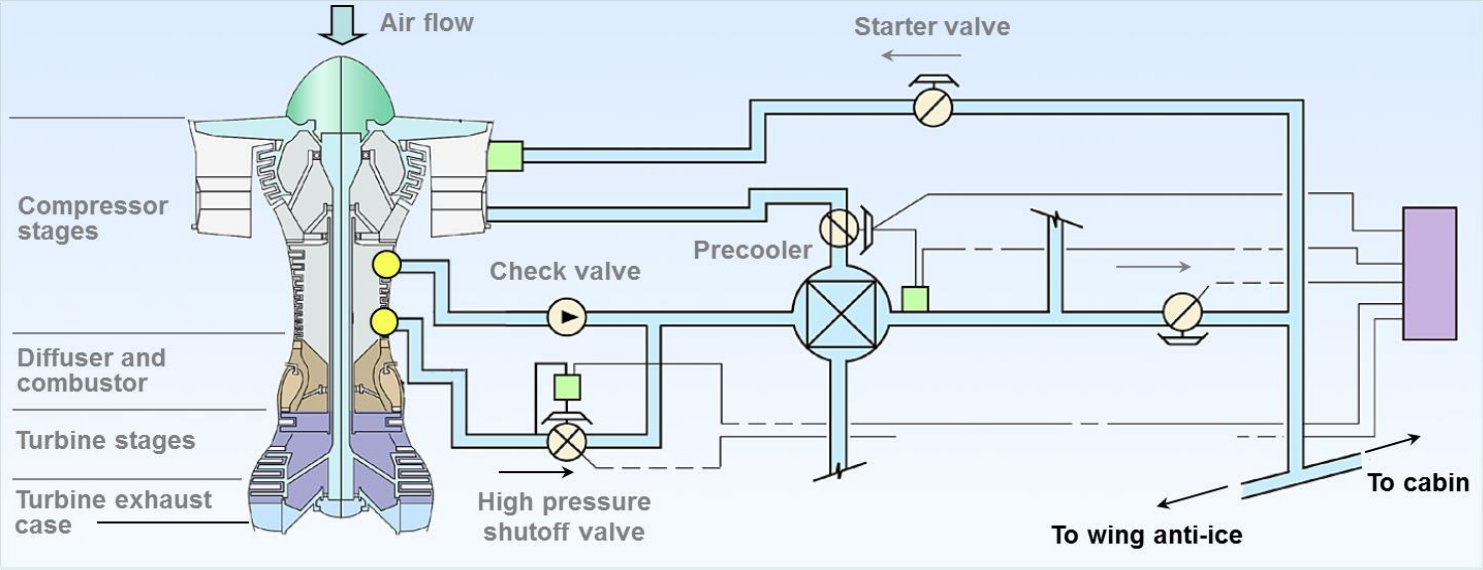
- 1999 – Tripulantes de Ansett Australia volando BAe146 reportan eventos of olores a óleo
  - BAe cambia el sistema de circulación de aire en el BAe 146
- Problemas similares reportados en versiones tempranas del Boeing 757 equipado con RB211-535C
- Nivel de atención intensificado desde 2007

Como Funciona el Sistema?



- Captured through the engine fans
- Re-circulate ≈50% of air
  - All volume is exchanged in 3-5 minutes

Engine bleed air system



Fuentes de Olor en la Cabina

- Externos
  - Ozona
  - Operación en tierra (vapores de combustible / humos)
- Internos
  - Ocupantes
  - Servicios de bordo
- Contaminación del aire
  - Ingreso de oleos lubrificantes o otras productos
    - Fallo del sello del motor o ingestión de fluido en la APU

Síntomas son inespecíficos y pueden ser asociados con otras condiciones

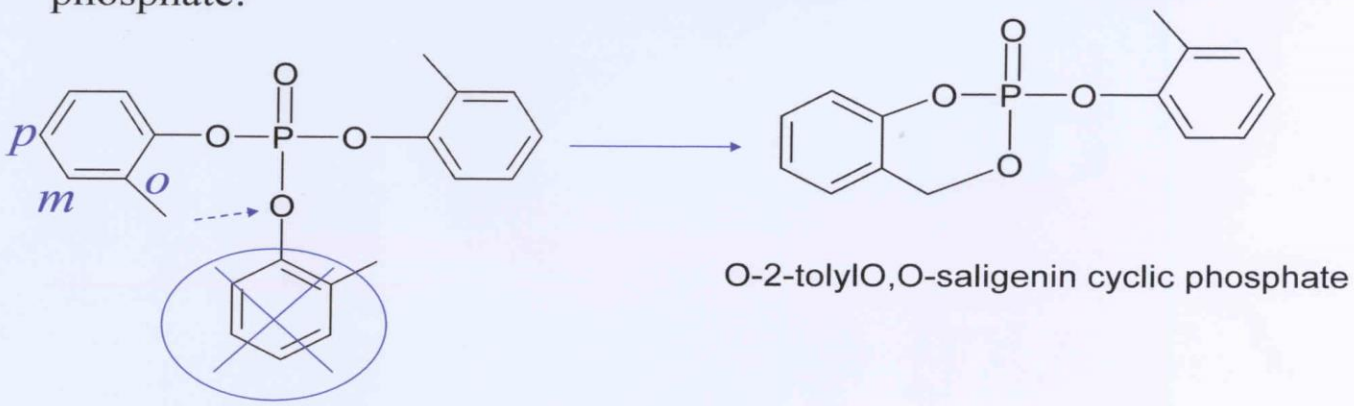
- Nausea
- Cefalea
- Dificultad cognitiva
- Mareo
- Mal-estar abdominal
- Confusión
- Pérdida de equilíbrio

- Fiebre
- Flaqueza muscular
- Disturbios del movimiento
- Hormigueo
- Depresión
- Ansiedad
- Disturbios del sueño

Efecto ***nocebo***?

Substancia sospechosa 1: ToCP

Tricresylphosphate (TCP) has previously been detected at very low levels in cabin air. The focus of some toxicologists on the *ortho* isomer (T*O*CP) is because only this form (<0.1% of TCP lubricant) produces delayed polyneuropathy after conversion in the body to a toxic cyclic phosphate:



tri-*o*-cresyl phosphate

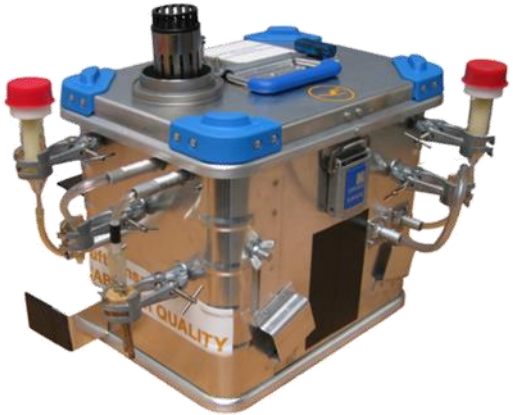
O-2-tolylO,O-saligenin cyclic phosphate

Substancia sospechosa 2: Monóxido de carbono (CO)

- CO es un subproducto de combustión
- Contaminación por gases de vehículos transitando por la terminal mientras la aeronave tiene puertas abiertas
- CO es inodoro y incoloro
  - Otras gases en la mistura no necesariamente

Comentarios

- Varios estudios
  - Aerolíneas (KLM, Lufthansa)
  - Academia: Cranfield
  - Reguladores:
    - EASA – FACTS
    - FAA



Comentarios

- No hay testes rápidamente disponibles para TCP
- Testes para CO disponibles en muchos hospitales
  - Niveles para no-fumadores cerca de 3%
  - Niveles en fumadores cerca de 10-15%
  - Mensuraciones por arriba de esos niveles consistentes con envenenamiento por CO

Información

GEN: Apr.2016

Bad smell in the air?
What to know and what to do.

There are plenty of unpleasant odors in the cabin. Most are harmless, but some are toxic, so it is important to be informed. Two types of fumes (unpleasant, odorous, and potentially toxic compounds) that can contaminate the air supply are engine oil and hydraulic fluid.. It's important to pay attention to the presence of unusual, unpleasant odors, especially if they are coming from the air supply vents, because those odors may be oil or hydraulic fumes, which are toxic and can make you sick. You need to report the fumes and minimize your exposure. This is true *even* if there's no visible smoke or haze. On some aircraft, because of the design, the air coming out of the *cabin* vents can be contaminated, while the *flight deck* air is just fine (or vice-versa). So, it's important to let the pilots know about any irregular conditions in the *cabin.* This is what you need to know:

AFA-wide; updated 8/14/06

SICK FROM POOR AIRCRAFT AIR QUALITY?
HERE'S WHAT YOU NEED TO DO

- ☐ **Call your LEC safety chair and report the date, flight #, aircraft #, your symptoms, and any details.** If you cannot reach your local safety chair or designated local official, you may also call AFA's Judith Murawski (206-932-6237 or cell 206-251-1203). AFA will provide you with information and support and will request the aircraft maintenance records on your behalf. These records may help to show whether engine oil or other chemical contaminants entered the cabin air supply.
- ☐ **File an incident report with the company immediately and keep a copy for your records.**
- ☐ **If you need medical attention, call your airline to get a workers' comp claim number so that your medical bills can be processed through workers' comp.** This is important because your regular medical insurance won't pay for work-related illness or injury and you don't want to get stuck with the bills.
- ☐ **Get medical attention (as needed) to document your symptoms ASAP.**

AFA-GEN: May 2018

SICK FROM SMOKE/FUMES ONBOARD? WHAT YOU NEED TO KNOW AND
WHAT YOUR DOCTOR NEEDS TO KNOW

The outside air that gets supplied to the cabin and flight deck is "bled" off either the aircraft engines or an auxiliary engine called the APU. Because of design and maintenance issues, engine oil/hydraulic fluid from the engines/APU sometimes contaminate the cabin supply air. The oil/fluid gets heated to high temperatures in the engines/APU (250-950°F), and the fumes are delivered (unfiltered) to the cabin/flight deck. You will likely notice an unpleasant odor, sometimes accompanied by visible smoke/fumes. The fumes contain a complex mixture of nasty chemicals, including carbon monoxide (if system temperature > 450°F) and organophosphates. Read the bulletin posted at http://ashsd.afacwa.org/docs/prevent.pdf for advice.

You can find the name of the oil or hydraulic fluid that your airline uses and print the Safety Data Sheet(s) (SDS) at this AFA website: http://ashsd.afacwa.org/practical.htm **Give the the relevant document to your doctor.** Make sure your doctor understands that the SDS do not explicitly describe health hazards associated with inhaling pyrolyzed (chemically degraded by heat) oil or hydraulic fluid, so the health hazard warnings on the SDS are incomplete. Also, give your doctor a copy of a FAA-funded and doctor-authored Health Care Providers' Guide (http://ashsd.afacwa.org/docs/HCPquick.pdf). **It is preferable to print and carry these documents with you. Alternatively, download them and store them on your phone.**

Nuevos testes

AVSA
Association des Victimes du Syndrome Aérotoxique

Síndrome Aerotóxico?

- Estudios de mortalidad no muestran diferencias significantes
- Tripulantes de edad avanzada en ciertos países

Original research

AEROTOXIC SYNDROME: A NEW OCCUPATIONAL DISEASE?

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ABSTRACT

Background: Concerns related to adverse health effects experienced by aircrew exposed to aircraft contaminated air have been ongoing for over 6 decades. Unfiltered breathing air is supplied to the cabin via the engine compressor. The likelihood that oil leaking over the engine oil seals may enter the cabin air supply has prompted continuing debate about the hazards associated with exposure to neurotoxic substances and to the thermally degraded or pyrolysed mixture. In this study, we undertook an in-depth investigation of aircrew involved in suspected aircraft contaminated air events.

Methods: Two studies were conducted to review the circumstances and symptoms of a cohort of aircrew working in the pressurized air environment of aircraft. A table of effects was then used for categorizing symptoms and reviewing other sources of data related to aircraft fluids and selected other conditions.

Results: Both acute and chronic exposures to neurotoxic and a wide range of thermally degraded substances were confirmed, along with a clear pattern of acute and chronic adverse effects. The latter were supported by medical findings and diagnoses, notably involving the neurological, neurobehavioural and respiratory systems.

Conclusion: A clear cause and effect relationship has been identified linking the symptoms, diagnoses and findings to the occupational environment. Recognition of this new occupational disorder and a clear medical investigation protocol are urgently needed.

Keywords: AEROTOXIC SYNDROME, AEROTOXICITY, CABIN AIR CONTAMINATION, CABIN AIR QUALITY, JET ENGINE OILS, OIL FUMES, TCP

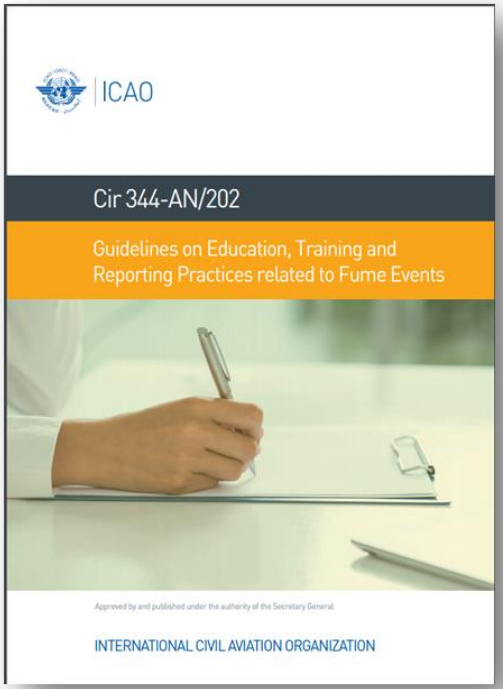
INTRODUCTION

In 1955, the first civilian aircraft adopted the military practice of bleeding unfiltered air (so-called bleed air) from engine compressors to supply the cabin ventilation system. Adverse effects on crew exposed to low levels of synthetic jet engine oil leaking over the oil seals were soon observed (1). It was promptly recognized that air bled from the engine compressors was contaminated via internal engine oil leakage into the compressor air (2). Hydraulic and de-icing fluids may also contaminate incoming engine air. Military studies found that the base stock of engine oils produce a wide variety of toxic substances as temperatures increase (i.e. when pyrolysed) (3).

Turbine engines utilize synthetic lubricants that generally include an ester base stock (95%), a wide variety of triaryl phosphates (TAPs), organophosphate (OP) anti-wear additives (around 3%), amine antioxidants and proprietary ingredients (1–2%). The commercial formulation of the OP additive is generally cited as tricresyl phosphate (TCP). Exposure of such substances to extreme temperatures generates a large number of pyrolysed compounds and hydrocarbons. Hydraulic fluids are made up primarily of tributyl phosphates (TBPs) and triphenyl phosphates, while de-icing fluids consist of ethylene and propyl glycols.

Over the last 2 decades, many ad hoc air-monitoring studies have been performed during normal engine operations. These have focused on TCP, which is

ICAO / IATA


ICAO
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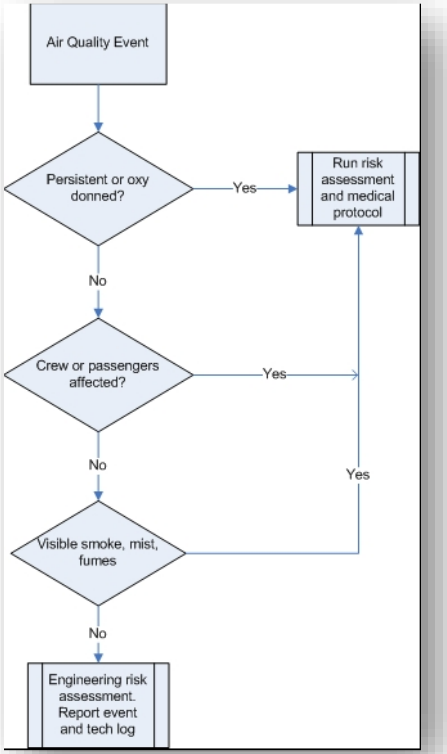
Guidelines on Education, Training and Reporting Practices related to Fume Events
Approved by and published under the authority of the Secretary General
INTERNATIONAL CIVIL AVIATION ORGANIZATION

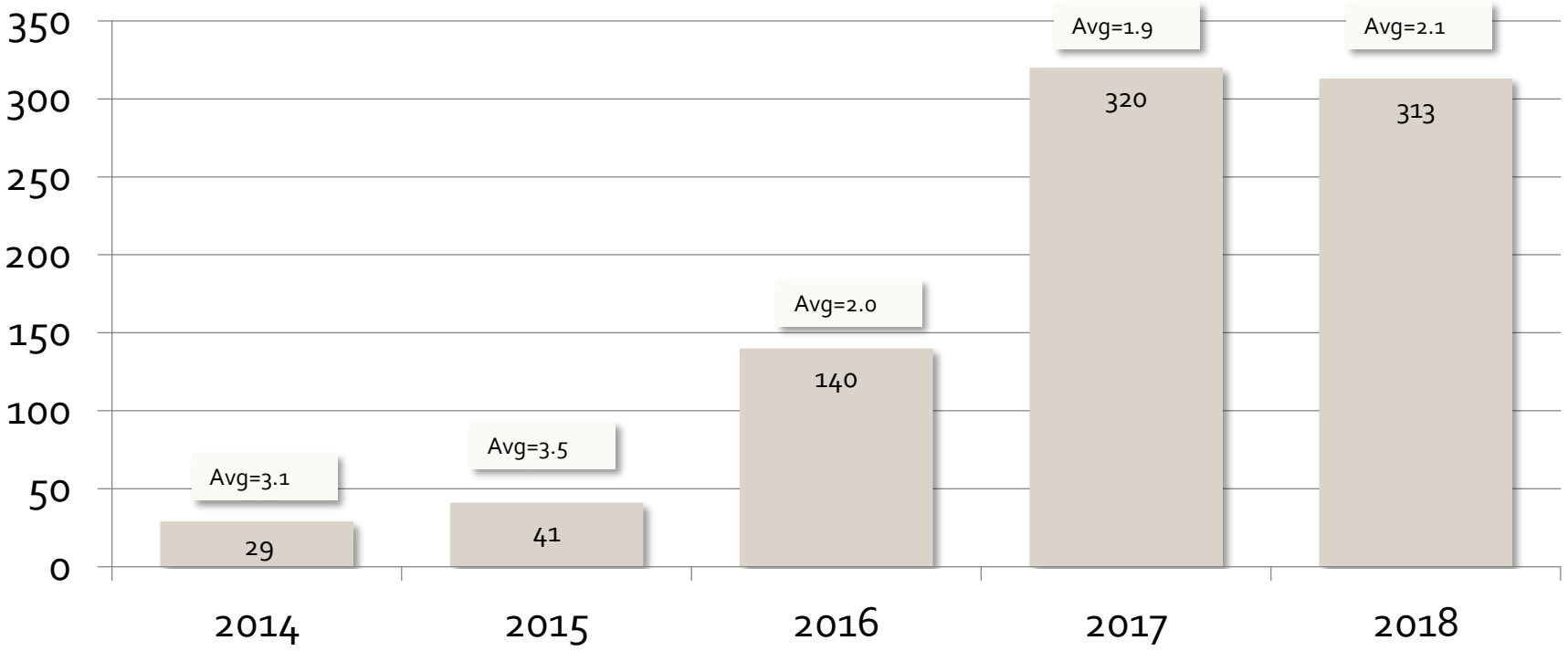

Air Quality Event
Persistent or oxy donned?
Yes
Run risk assessment and medical protocol
No
Crew or passengers affected?
Yes
No
Yes
Visible smoke, mist, fumes
No
Engineering risk assessment. Report event and tech log

Experiencia MedAire (2014-2018 Sep)

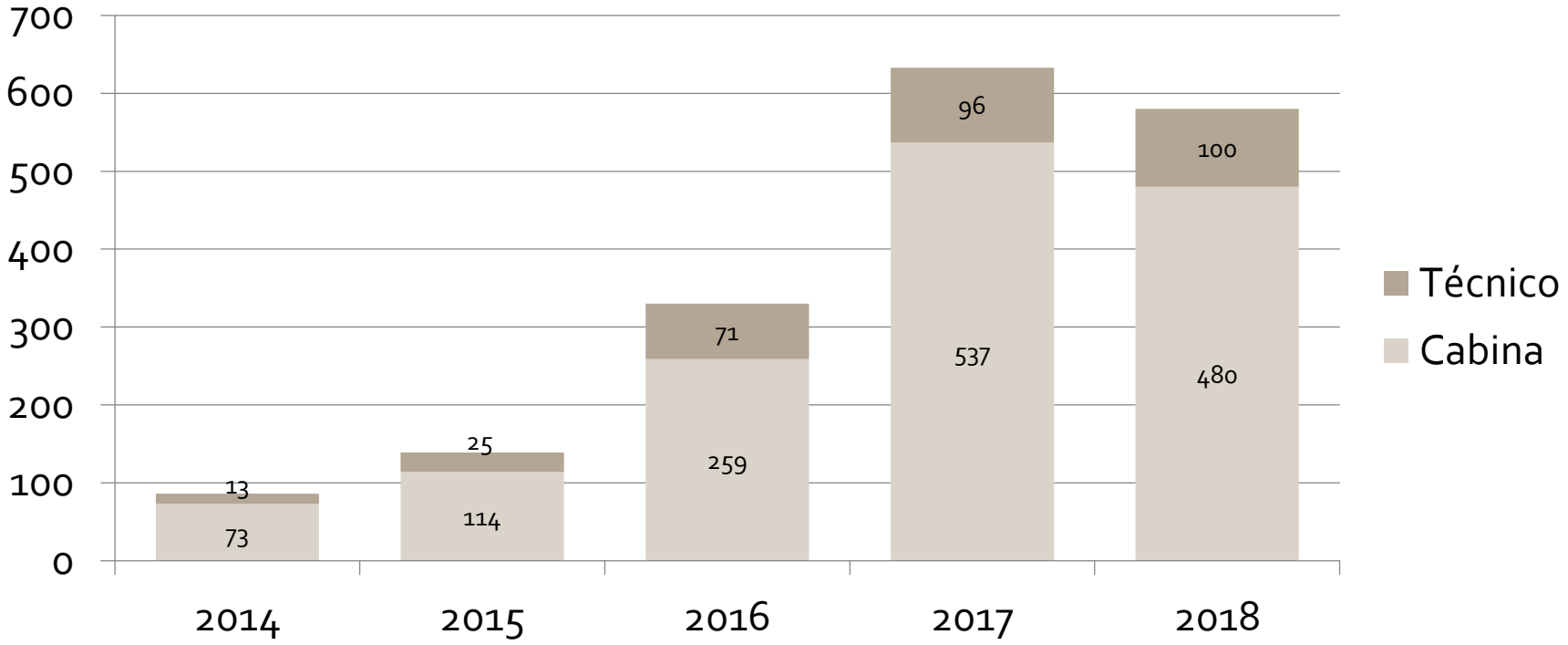
- 13 aerolíneas reportando Eventos CAC
- 843 eventos involucrando 1,768 tripulantes

Experiencia MedAire

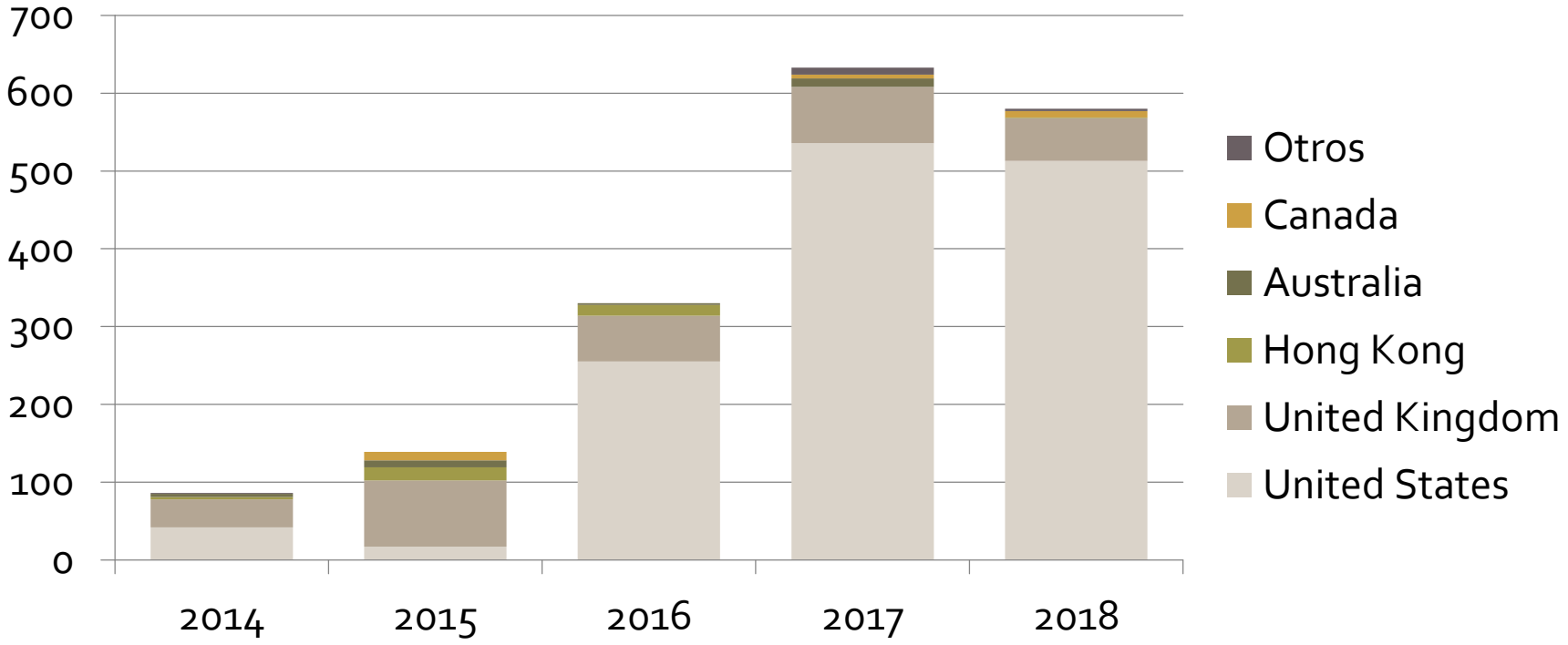
Eventos y promedio de tripulantes afectados por evento



Experiencia MedAire – Posición

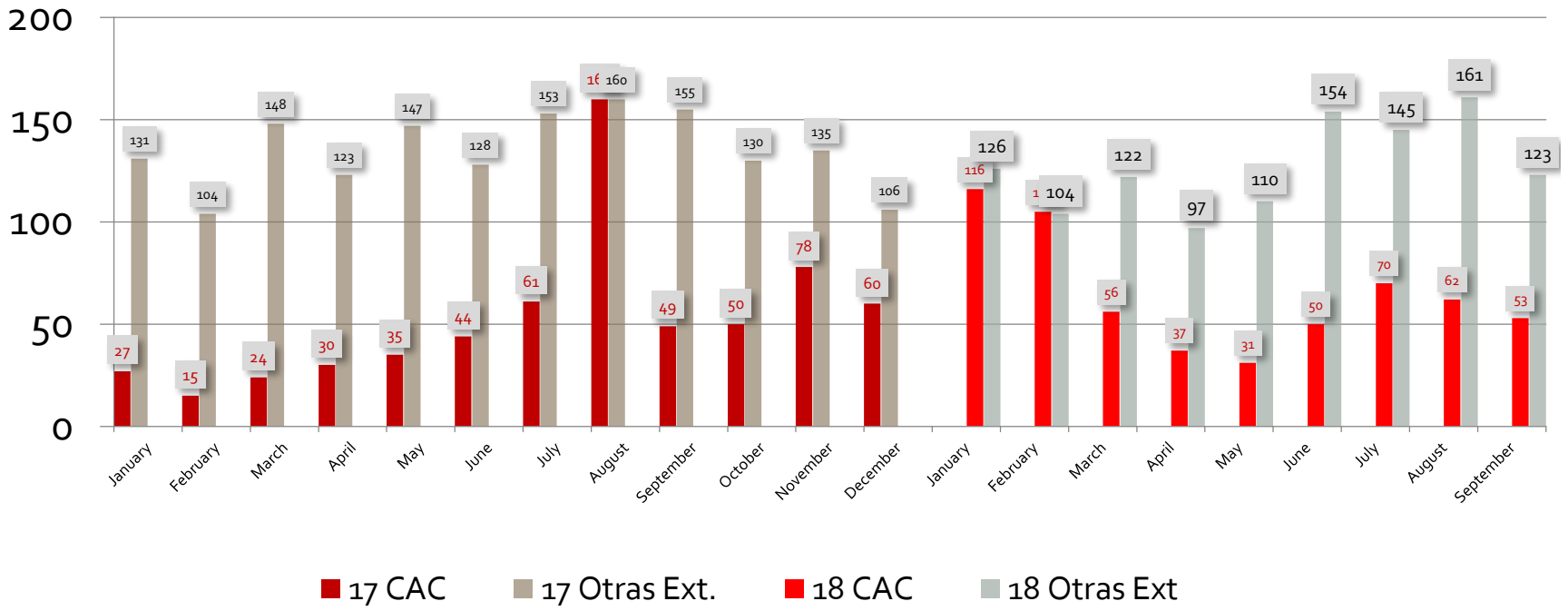


Experiencia MedAire – País

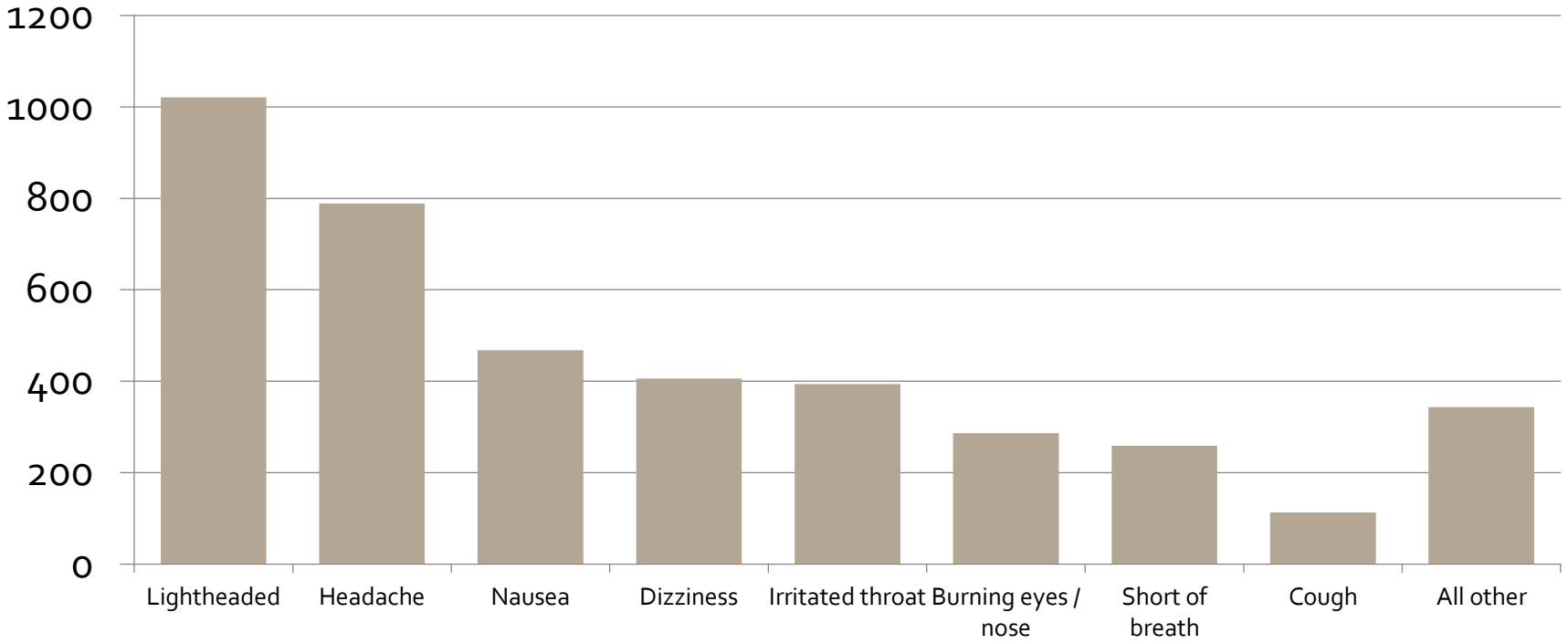


Actividad Mensual

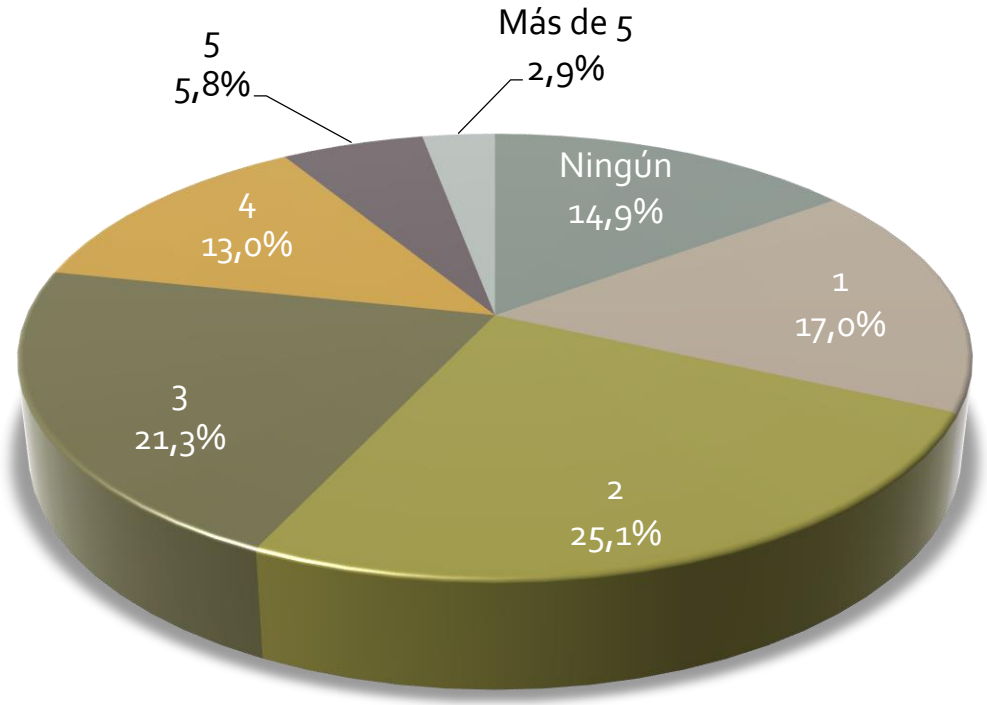
CAC versus Otras Causas Externas



Síntomas
Aislados o en combinación

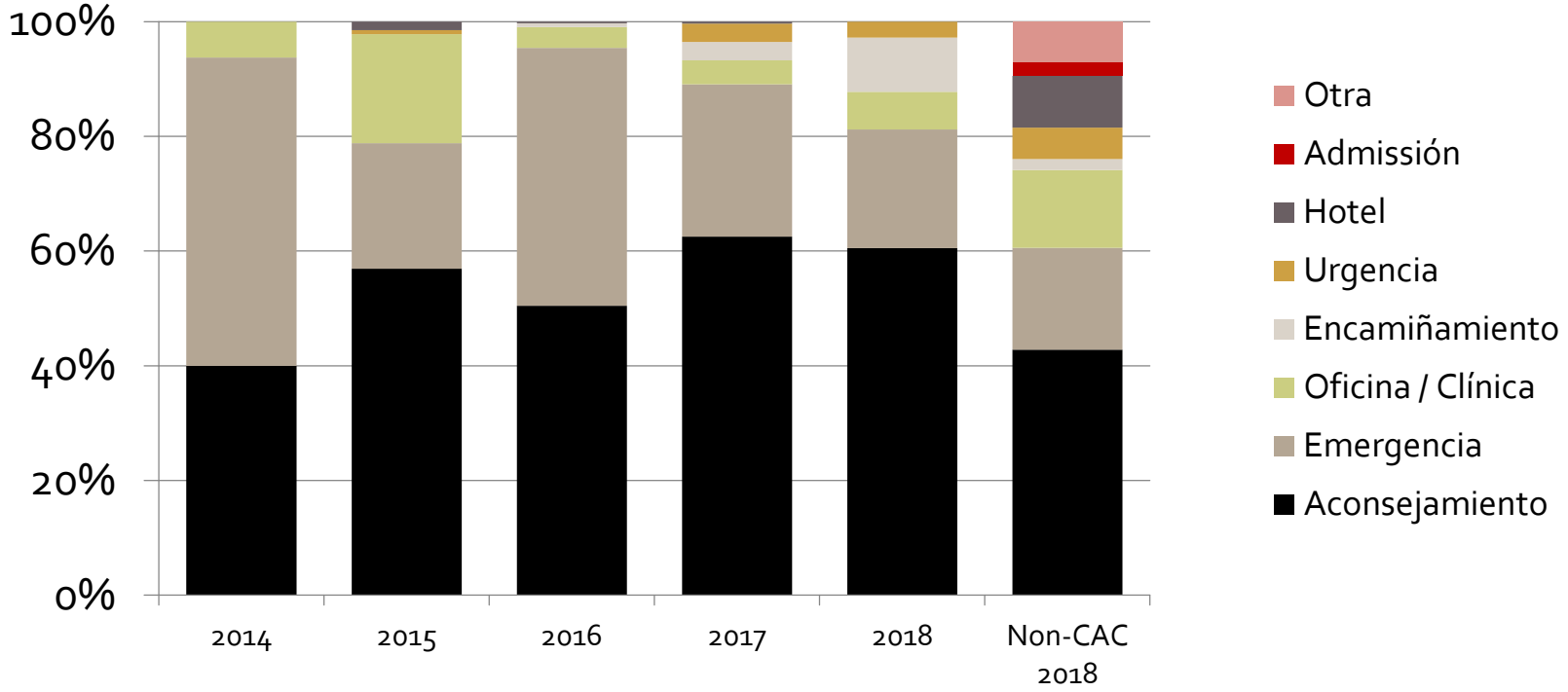


Número de Síntomas por Caso



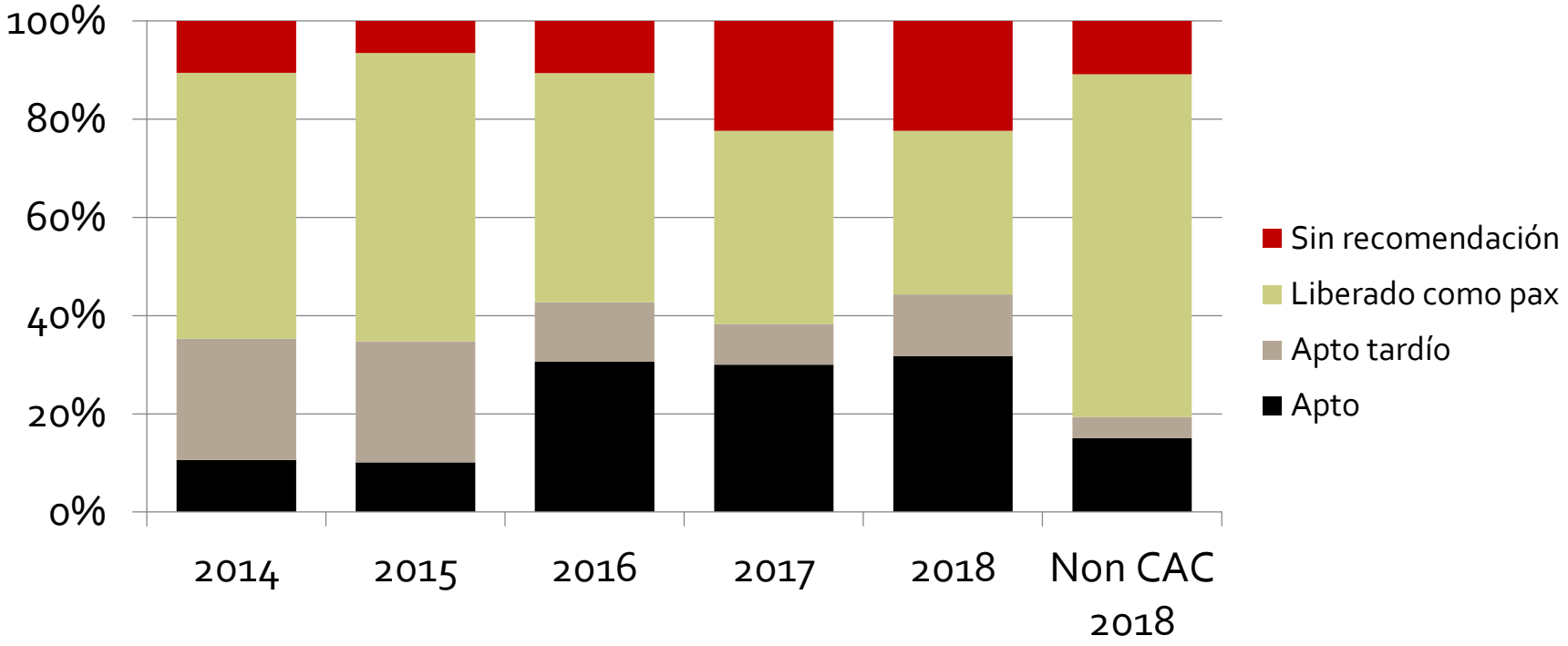
Experiencia MedAire

Manejo del caso



Experiencia MedAire

Aptitud para el vuelo



Conclusiones

- Eventos de Calidad de Aire de Cabina representan un tema relevante en la aviación comercial mundial
- Contaminación del aire de cabina aunque pueda ocurrir, parece ser un evento raro y sin atingir niveles de toxicidad
- No fue encontrada correlación entre eventos de olor y la presencia de contaminantes toxicos
- No hay evidencia clara de efecto de largo plazo en tripulantes
- Posibilidad de efecto Nocebo

Gracias!