

Aviation Human Factors Industry News

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From the sands of Kitty Hawk, the tradition lives on.

Hello all,

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In this weeks edition of *Aviation Human Factors Industry News* you will read the following stories:

★FAA Urges Small Drone Pilots To Wear Vests

★Evolution of the Airman Safety App

★NM firm helps airline maintenance industry go paperless

★Air Force Thunderbirds commander removed over loss of confidence

★Probe believes procedural slip led to ground-power shock

★Miscommunication cited in Super Hornet crash

★AIN's Human Factor, Episode 08: Fly-by-wire Failure, Part 2

★Slow rotation rates cited in abnormal take-off roll incidents

★And Much More

FAA Urges Small Drone Pilots To Wear Vests

Seeking to boost “public awareness” of legal small unmanned aircraft system (sUAS) operations, the U.S. FAA is urging sUAS pilots to wear reflective safety vests when flying their aircraft. “By taking this simple action, sUAS [pilots] can demonstrate that they are accepting responsibility for the activity and that they are intending to operate in a safe and compliant manner,” the FAA said in a newly released safety information for operators bulletin.



The move comes as the FAA attempts to cut down on the number of nuisance reports and general concerns tied to sUAS flying. “With the rapid increase in sUAS activity, combined with the technology and regulations being relatively new, the general public and law enforcement can be uninformed of what, when, how and where sUAS are legally permitted to be flown,” the FAA said. “Additionally, the public perceives some sUAS operations as threatening to their safety or privacy, in part because remote pilots are not easily identifiable.”

It recommends that vests contain wording such as “Drone Pilot, Stand Clear” to easily designate operators and encourages people not to disturb them. “The vest may reduce the likelihood that someone will approach or query an sUAS crew member engaged in safety-sensitive duties and will also help preserve a ‘sterile cockpit’ for these operations,” the agency said.

<http://ea.ecn5.com/Clicks/>

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Evolution of the Airman Safety App

The evolution of the [Air Force Safety Center's Airman Safety App](#) reached an important milestone with recent software updates Dec. 1, 2017.

This simple, web-based tool provides a streamlined process for all Airmen, their families and anyone accessing the base [to report safety issues](#) as they encounter them.



“The Air Force wants to utilize every Airman [as a sensor](#) to identify hazards in their workplace and throughout the installation,” said Col. William Culver, Air Force chief of Aviation Safety. “The aviation community, both commercial and military, has been doing this for many years and now we can take those [best practices](#) across all safety disciplines”.

With this update, the Air Force will use the Airman Safety App to leverage the expanding [Aviation Safety Action Program](#) voluntary reporting capability. This includes aircrew operations and logistics/[maintenance safety issues](#) and events. The transformation – “Aviation” is expanding to “Airman”.

Airmen will also have access to the latest hazard reports through active messaging and an ASAP Scoreboard located in the Air Force Safety Automated System database.

Another improvement links the Airman Safety App with a new hazard management module in AFSAS enabling safety professionals [to track and mitigate](#) reported hazards.

“Supporting features were upgraded in AFSAS to increase the application’s capability,” said Douglas MacCurdy, acting chief information officer and chief of Information Technology and Cyberspace Operations. “Air Force safety professionals now have a hazard management tool capable of [cradle-to-grave identification and risk mitigation of safety issues](#)”.

The Airman Safety App opened the door to a new way of limiting and eliminating safety hazards, like exposed electrical wires in the workplace, and road hazards around each and every installation while providing a substantial amount of data essential to [proactive mishap prevention and effective risk management](#).

The application is accessible anytime, anywhere and with almost any device – desktop, laptop, tablet or smart phone – and focuses on minimizing the most common obstacles, making reporting quicker and easier to accomplish.

NM firm helps airline maintenance industry go paperless

Hong Kong Aircraft Engineering achieved an industry milestone in November when it rolled out a made-in-New-Mexico electronic software system that allows the aviation engineering firm to [digitally manage its aircraft maintenance and repair operations on mobile apps](#).



“It’s the first third-party aircraft maintenance and repair operator [to go paperless](#),” said Mark McCausland, president and CEO of Albuquerque-based Ultramain Systems Inc., which built and installed the software.

HAECO will begin using the system immediately to service all Boeing 777-300 aircraft run by Cathay Pacific Airlines, one of HAECO’s key customers at Hong Kong International Airport. HAECO and Cathay will also roll it out for use on Cathay’s fleet of Airbus A330 planes early next year.

The system will allow HAECO's Hong Kong [technicians to access all task orders electronically](#). They'll receive job assignments in real time from Cathay and manage the entire work process from start to finish through mobile devices. Cathay, in turn, can conduct real-time monitoring of all maintenance and repair jobs underway.

HAECO handles about 1,000 light maintenance checks annually for Cathay Pacific. With the new software system, the company expects to save about [640,000 sheets of paper](#) it usually prints each year to document those tasks, said Clement Lam, HAECO Hong Kong director and general manager.

"We are confident that this application will help [increase productivity and minimize the impact on the environment](#) in which we operate," Lam said in a prepared statement.

Perhaps most important, it will help reduce aircraft downtime through much greater efficiency in planning and carrying out scheduled and unscheduled aircraft maintenance and repairs, McCausland said.

Ultramain, a homegrown New Mexico firm that launched in 1980, has developed different software systems for airlines and aviation maintenance and repair operators to transition to electronic management. It offers wireless systems for ground-based maintenance and logistics, and for onboard monitoring of flights to allow pilots to do real-time electronic reporting on technical issues.

Cathay Pacific already uses some Ultramain software, as do a number of industry giants, such as Virgin Atlantic Airways, Emirates, and KLM Royal Dutch.

For HAECO, Ultramain created some new capabilities to automate the digitization of paper task orders.

"We added capability for the system to ingest PDFs automatically," McCausland said. "It reads them, extracts the information, and organizes it in a database for technicians and managers [to then plan and follow all maintenance](#) with the least amount of downtime."

Ultramain is headquartered in Albuquerque, with regional offices in Ireland, Hong Kong and India. It employs 160 people worldwide, about 40 percent of them in New Mexico.

Air Force Thunderbirds commander removed over loss of confidence

The Air Force has removed the commander of the high-profile Thunderbirds demonstration team due to a loss of confidence in his abilities to lead the touring squadron of F-16 fighter jets, the service announced recently in a statement.



Lt. Col. Jason Heard was dismissed Nov. 20 as commander of the Thunderbirds – officially known as the U.S. Air Force Air Demonstration Squadron – and pilot of the team's No. 1 jet. Brig. Gen. Jeannie Leavitt, commander of the service's 57th Wing, dismissed Heard, citing a loss of confidence in his "leadership and risk management style."

"This was an incredibly difficult decision to make, but one that is ultimately in the best interests of the Thunderbird team," she said in the statement. "I am personally grateful for Jason's dedication to the 2017 season."

On Nov. 4, the Thunderbirds, based at Nellis Air Force Base in Nevada, completed their 2017 season, which included more than 70 air shows. The team pulled out of a scheduled air show in June following the crash of one of the unit's jets during training prior to a two-day performance at the Dayton Air Show in Ohio.

An Air Force investigation determined the June 23 [crash was avoidable](#). The F-16 was traveling too fast and had insufficient stopping distance as it landed on a rain-soaked runway before it overturned, destroying the \$29 million aircraft, according to the Air Force Accident Investigation Board's report released earlier this month.

The board found the pilot [failed to follow proper braking procedures](#) and his vision was impaired by rainwater on the cockpit's canopy. The pilot suffered minor injuries.

However, Tech. Sgt. Christopher Boitz, a spokesman for the Thunderbirds, said the crash was not the reason Leavitt dismissed Heard.

He said Leavitt had concerns that Heard's [leadership style](#) was resulting in unnecessary risk within the Thunderbirds' demonstrations, "which eroded the team dynamic."

"We are on the road together more than 200 days per year, executing flying operations with [absolutely no margin for error](#)," Boitz said. "As a result, absolute trust and teamwork in both our professional and personal dynamics are foundational to our mission."

Leavitt determined the team was better off with new leadership as it begins preparing for its 2018 schedule, according to the Air Force.

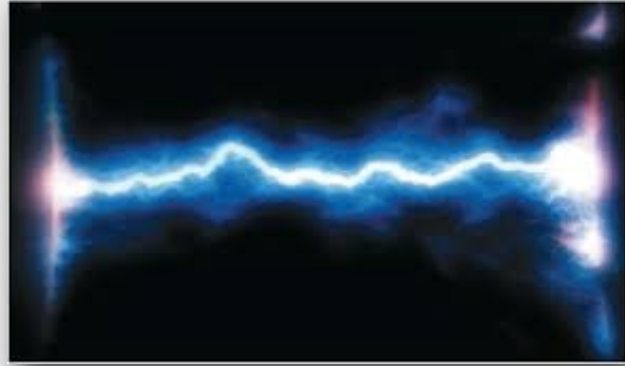
Lt. Col. Kevin Walsh, who has served as the Thunderbird's operations officer since 2016, was temporarily named commander of the unit until the Air Force selects a new permanent leader.

Probe believes procedural slip led to ground-power shock

French investigators believe an airport worker [suffered an electric shock](#) while connecting ground power to an Airbus A320 after the equipment was turned on by a second person.

The Air France aircraft had arrived at Bastia airport in Corsica on 11 September last year.

French investigation authority BEA says a [30cm electric arc](#) was seen as the worker connected the 115V ground-power unit to the jet. While the worker did not sustain burns, he was injured [after being thrown](#) by the electrical blast. The plug remained connected to the aircraft.



BEA found an [absence of insulation on the plug](#), damage it suspects was caused by repeated [improper removal](#) of the plug by its cables. It also says the damage might have arisen from an incident a few weeks earlier, on 22 June, a tow-tractor was started while the ground-power unit was still connected.

But the inquiry adds that it believes a switch on the ground-power unit, to open the electrical supply to the aircraft, was simultaneously activated as the plug was connected to the A320.

Normally the worker connecting the plug would return to the ground-power unit to activate the switch. An assistant worker who had helped unravel the connecting cable testified to the inquiry that he had not operated the switch.

The inquiry notes [a similar incident](#) on 15 April this year, in which a ground worker was thrown by electrical arcing while holding a connected cable, having asked another worker to activate the power unit.

BEA says it was unable to determine who activated the switch in the Bastia event but adds that the probability of its happening in the absence of voluntary action by another person is "very low".

Miscommunication cited in Super Hornet crash

A Super Hornet pilot who ejected from his jet April 21 in the West Pacific was less than 950 feet above the water when he got out and was nearly pulled underwater by his parachute cords after hitting the surface, according to the Navy's command investigation.

The pilot, a Carrier Air Wing 2 captain, was miraculously uninjured in the harrowing incident in the Celebes Sea, south of the Philippines. His name was redacted in a copy of the investigation.

No one was disciplined, but the investigation cites the pilot's [failure to maintain speed and subsequent loss of jet control](#) as a main cause of the.

[Other factors in the mishap include](#) an inexperienced junior officer in the carrier Carl Vinson's control tower and a breakdown in communication between the pilot and the tower during "crew resource management," a set of procedures to mitigate devastating [human error](#) in the air.

The report also found the pilot was dealing with compounding emergencies as he struggled to keep the jet under control, and that there was "a perceived rush to land the aircraft" back on the carrier.

"While certain aircrew errors and a lack of experience in the tower precipitated the ejection, none were intentional or due to culpable negligence," a letter endorsing the report's findings states.

The captain had about 4,100 total flight hours under his belt and was current in all qualifications, according to the report.



“(He) is well-known and respected in the Naval Aviation community, and is highly regarded by his fellow CVW-2 aviators,” the report states.

The captain took off in a F/A-18E that had [just come off a 98-day down status](#) after undergoing an assessment known as a Functional Check Flight Profile A, or FCF-A.

“All involved felt (the captain’s) experience was better suited for (the jet), since it is common for a long time down, post FCF-A aircraft to have minor issues following a successful FCF,” the investigation states.

Before takeoff, the captain was informed of discrepancies that remained on the jet that were not considered major, the report states.

They included a multi-functional information distribution system, or MIDS, that “worked on deck but fell out of the link airborne and would not get back in,” according to the report.

Other issues included a tactical air navigation system that didn’t work until it was overhead the ship.

Such issues appear to have [contributed to the captain’s challenges](#) in the cockpit, but are not cited in the report as causes of the crash.

After the end of the mission, which involved 10 jets and strike fighter weapons tactics, the captain reported smelling something burning “with great intensity” before it quickly dissipated, according to the report.

About an hour in, the captain was not receiving information via his MIDS communication system “and was focusing more than normal to visually see other aircraft” as they entered formation to land on the Carl Vinson, the report states.

The captain’s control panel indicated a [hydraulic fluid caution](#), and while circling overhead, his wingman noticed a steady stream of fluid coming from near the captain’s right main landing gear door, according to the report.

He exited the landing formation at that point.

Due to his MIDS system not working, the captain had to consciously look out for other aircraft in a [“see and avoid mindset,”](#) the report states.

“Looks like we are tracking to you wanting to get on deck pretty soon,” the air boss on the carrier told the captain.

Several [lapses in communication](#) took place between the captain and the lieutenant communicating with him from the carrier's tower, according to the report.

As hydraulic fluid cautions continued to sound, the captain shut down his right engine and was flying on just his left as he extended his landing gear.

While fighting to keep the jet balanced, and with his MIDS system and other navigational equipment not fully functional, the captain struggled to see the ship or other aircraft.

The captain readied to restart his right engine to balance out a side-to-side drift, known as a yaw, before he landed.

All this time, several audible cautions were going off around the captain, interrupting his communication with the tower, according to the report.

[“He was focusing all his attention on flying the jet,”](#) the report states. “Despite over 4,000 flight hours, he never had a situation where the jet was fighting him so much.”

Eventually, the captain brought both throttles to max, and inadvertently sent the left engine into afterburner.

He then reduced both throttles, but the aircraft pitched and went out of control.

The jet was doing about 161 mph at 932 feet above the sea, with the right wing down at a 39-degree angle, when he ejected.

“(The captain) stated the ejection sequence was immediate,” the report states. “He saw the canopy impact the water and began counting while he attempted to find his (quick disconnect) fittings to prepare for water entry. He was able to count to five before his feet hit the water.”

He inflated his life preserver on the second try, but [became tangled](#) in his parachute and thought he might be dragged under by the system.

A rescue helicopter was on the scene five minutes later and made visual contact with the captain. A swimmer arrived on scene 22 minutes after he ejected.

The captain reported soreness from the incident, and was shook up about crashing into the water and nearly drowning, the report states.

The lieutenant in the tower “[was not experienced enough to handle the emergency situation](#) and provide the necessary F/A-18E/F (flight instructions) to make key decisions,” according to the report.

In the air, the report chided the captain for not being more “[proactive and authoritative](#)” with the tower to ensure key information was communicated.

“Even though he was busy handling compound emergencies, he should have had the ability to guide the (lieutenant) to the necessary (instruction) items to read,” the report states.

The lieutenant also initiated a “[perceived rush](#)” to get the captain’s jet back on deck that was communicated through the air boss, but the captain should have slowed the situation down to properly handle the emergencies, according to the report.

Restarting the right engine and keeping it idle prevented the jet from balancing out, whereas matching the engines would have countered the asymmetry and allowed the jet to land, even with the other issues, the report states.

The captain was dealing with [compound emergencies that affected his ability](#) to maintain proper speed, which led to the buildup of side forces.

His inadvertent left engine afterburner activation led to the intensity of the control loss, according to the report.

“At this point in the emergency, I am confident any aviator in a similar position would have struggled to keep the jet from departing,” the report states.

The lead investigator writes in the report that they spent time in a simulator that reenacted the mishap’s hairiest seconds.

“(The captain) made a very timely and correct decision to eject,” the report states.

“The surprise and intensity of the departure, which I saw first-hand in the simulator, could have easily caused a less experienced pilot to delay ejection, resulting in a loss of life.”

AIN's Human Factor, Episode 08: Fly-by-wire Failure, Part 2

While flying an Airbus A330 at FL370 over the Indian Ocean from Singapore to Perth in 2008, pilot Kevin Sullivan found himself dealing with malfunctioning primary flight control computers.

The aircraft began to pitch down over the water, which injured some of the 303 passengers on board. Fortunately, Sullivan's [past experience as a Navy pilot](#) helped him navigate to safety. In this second part of this **AIN's *The Human Factor*** episode, Sullivan continues his tale of [Qantas Flight 72](#) and how he was able to land the aircraft at the military field at Learmonth Airport. He also speaks about how the experience affects him today.



[Listen](#)

Slow rotation rates cited in abnormal take-off roll incidents

Crews are being cautioned over the risk posed by slow rotation rates after a serious take-off incident involving long-haul aircraft operating at limiting conditions.

While the European Aviation Safety Agency has not specified the details of the incident, it states that it involved a four-engined widebody departing [a "limitative" runway while near its maximum weight](#).

The aircraft required a "very long" take-off run, says EASA, and was still below minimum required height when it passed the opposite-direction runway threshold.

Analysis of preliminary information shows that slow aircraft rotation was a ["main contributing factor"](#) in the incident, it adds.



Similar events had also occurred at the same airport involving another operator of four-engined widebody aircraft, says EASA, and slow rotation rates were present in a "significant" number of departures.

It has drawn attention to the [safety issue in a bulletin](#) to operators and training organizations, recommending that they identify – through flight-data monitoring – [whether rotation rates are a potential hazard](#), and take action to prevent unacceptable risks.

"These controls may include the provision of ad hoc training on rotation techniques based on [aircraft manufacturers'] operational documentation," says EASA.

"The unintended introduction of additional risks [such as tail-strikes] should also be considered when analyzing possible mitigating measures."

EASA has not identified the incidents under investigation.

But Colombian authorities have been probing incidents involving abnormally-long take-off rolls by Airbus A340s at Bogota, including one by an Air France A340-300 on 11 March this year. There is no immediate confirmation that the EASA bulletin relates to the Bogota incidents.

EASA says it has also identified another event which took place at a separate airport, also with a limitative runway, centered on a different four-engined widebody aircraft type.

This incident has lent further urgency to the need to address slow rotation rates, says the authority, although there are no current plans to issue an operational directive on the matter.

Engine Maintenance and Performance Monitoring

Don't let your engine contribute to a loss-of-control accident. [Proper engine maintenance](#), advanced pre-flight, and performance monitoring can go a long way to eliminating this type of mishap.

The GAJSC has determined that a significant number of general aviation fatalities could be avoided if aircraft were equipped with [FADEC](#). Decreased pilot workload and engine monitoring capability that can alert operators of engine problems are cited as advantages of FADEC. Full authority control also precludes operating engines beyond established limits.



Teaching Points:

- Discuss the advantages and disadvantages of FADEC, EEC (Electronic Engine Control) and electronic ignition systems
- Encourage aircraft owners and operators to consider electronic engine control options.

References:

- FADEC Power Point

Available on the National FAASite Share Point site under Approved Resources.

· Advisory Circular (AC) No: 33.28-1 Compliance Criteria for 14CFR§33.28 Aircraft Engines, Electrical and Electronic Engine Control Systems

· Wikipedia FADEC article <https://en.wikipedia.org/wiki/FADEC>

Get the facts at: <https://t.co/OivH7lAyZL>

Study finds drones more damaging than bird strikes to planes

Drones that collide with planes cause more damage than birds of the same size because of their [solid motors, batteries and other parts](#), a study released by the Federal Aviation Administration on Tuesday found.

The study's researchers say aircraft-manufacturing standards designed for bird strikes aren't appropriate for ensuring planes can withstand collisions with drones. The FAA said [it will depend on drone makers](#) to help develop technology to detect and avoid planes.

Reports of close calls between drones and airliners have surged. The FAA gets more than 250 sightings a month of drones posing potential risks to planes, such as operating too close to airports.

Canadian officials say a drone hit a small charter plane carrying eight people last month over Quebec City, the first such incident in Canada. The plane landed safely.



A team of researchers from four universities used computers to simulate collisions between drones weighing 2.7 to 8 pounds (1.2 to 3.6 kilograms) and common airliners and business jets. [In some cases](#), drones would have penetrated the plane's skin.

The researchers said the drone collisions inflict more damage than striking a bird of the same size and speed because drone components are much stiffer — birds are composed mostly of water.

The study was performed by researchers from Mississippi State University, Montana State University, Ohio State University, and Wichita State University. The FAA said studies over the next three years will look at the severity of collisions between drones and other types of planes and helicopters.

The FAA estimates that [2.3 million drones will be bought for recreational use this year](#), and the number is expected to rise in coming years. Many other drones are used for commercial purposes including news photography and inspecting pipelines, power lines and cell towers.

Drone operators need special permission to operate in some areas near airports. The FAA said last month that drone operators often call air traffic control towers to ask permission to operate, which creates a potential safety hazard by [distracting controllers](#) from managing the flow of airplanes.

Why Accidents Happen and How to Avoid Them

Accidents may seem like a word used only in safety briefings until one occurs. When it does happen, it comes along with [reeling effects](#): injuries, death, court prosecutions, loss of property, damage to company reputation and the environment.



The resultant slowdown in business and work activities further drives down income. However, the immediate and remote causes of workplace accidents can always be traced to **unsafe acts and unsafe conditions**. What's the Danger?

Unsafe acts are **human-related actions** that threaten the health and safety of workers; they pose an immediate danger because they are done by the employees involved. To enable a continuous understanding of unsafe acts, we shall group them into five broad categories.

- Taking shortcuts which involve by-passing safety instructions and procedures that are meant to protect workers from harm.
- Inadequate training.
- Faulty work tools and equipment are a big safety concern because once on site, workers focus on being productive.
- Engaging in horseplay during work activities reduces your concentration and makes it harder to observe safety rules.
- Abusing drugs or working under the influence of drugs and alcohol limits mental focus thus facilitating accidents and so does emotional disturbance.

A Few Ways to Protect Yourself

- Accidents are caused by our actions and inactions; the most important step towards avoiding them is identifying and addressing their causes.
- Never mix work with play, it is harmful in more ways than one.
- Do not abuse drugs and never work under the influence of drugs or alcohol.
- Only carry out tasks you are trained for; especially tasks requiring special skills.

Final Word

Accidents are caused by our actions and inactions; the most important step towards avoiding them is identifying and addressing their causes.

Moderate Coffee Drinking “More Likely to Benefit Health Than to Harm It”

Drinking coffee is “more likely to benefit health than to harm it” for a range of health outcomes, say researchers. Their study is published in *The BMJ*.

They bring together evidence from over 200 studies and find that drinking **3 to 4 cups of coffee a day** is associated with a lower risk of death and getting heart disease compared with drinking no coffee. Coffee drinking is also associated with lower risk of some cancers, diabetes, liver disease, and dementia.

However, they say drinking coffee in pregnancy may be associated with harms, and may be linked to a very small increased risk of fracture in women.

The included studies used mainly observational data, providing lower quality evidence, so no firm conclusions can be drawn about cause and effect, but their findings back up other recent reviews and studies of coffee intake. As such, they say, excluding pregnancy and women at risk of fracture, “coffee drinking appears safe within usual patterns of consumption” and they suggest that coffee could be safely tested in randomized trials.



Coffee is one of the most commonly consumed beverages worldwide and could have positive health benefits. But existing evidence is of lower quality from observational research and randomized controlled trials are needed to strengthen the evidence of benefits.

To better understand the effects of coffee consumption on health, a team led by Robin Poole, PhD, specialist registrar in public health at the University of Southampton, with collaborators from the University of Edinburgh, carried out an umbrella review of 201 studies that had aggregated data from observational research and 17 studies that had aggregated data from clinical trials across all countries and all settings.

Umbrella reviews synthesize previous meta-analyses and provide a high-level summary of research on a particular topic.

Drinking coffee was consistently associated with a lower risk of death from all causes and from heart disease, with the largest reduction in relative risk of death at 3 cups a day, compared with non-coffee drinkers. Increasing consumption to above 3 cups a day was not associated with harm, but the beneficial effect was less pronounced.

Coffee was also associated with a lower risk of several cancers, including prostate, endometrial, skin and liver cancer, as well as type 2 diabetes, gallstones, and gout. The greatest benefit was seen for liver conditions, such as cirrhosis of the liver.

Finally, there seemed to be beneficial associations between coffee consumption and Parkinson's disease, depression, and Alzheimer's disease.

There was less evidence for the effects of drinking decaffeinated coffee but it had similar benefits for a number of outcomes.

Many of the included studies may have adjusted for factors that may be associated with both the health outcome and with coffee drinking, such as smoking. This was not comprehensive and varied from study to study. The authors can therefore not rule out the effect of such factors on the apparent harmful or beneficial associations.

The authors conclude that coffee drinking "seems safe within usual patterns of consumption, except during pregnancy and in women at increased risk of fracture."

And they call for robust randomized controlled trials “to understand whether the key observed associations are causal.”

In a linked editorial, Eliseo Guallar, MD, at the Johns Hopkins Bloomberg School of Public Health says, although we can be reassured that coffee intake is generally safe, doctors should not recommend drinking coffee to prevent disease—and people should not start drinking coffee for health reasons.

As this study shows, some people may be at higher risk of adverse effects, he writes, and there is “substantial uncertainty” about the effects of higher levels of intake. Finally, coffee is often consumed with products rich in [refined sugars and unhealthy fats](#), “and these may independently contribute to adverse health outcomes,” he adds.

However, even with these caveats, “moderate coffee consumption seems remarkably safe, and it can be incorporated as part of a [healthy diet](#) by most of the adult population,” he concludes.

Their study is published in [The BMJ](#).

<http://www.bmj.com/content/359/bmj.j5356>

When pilots go from rehab to the cockpit

A drinking problem is not necessarily the end of a pilot's career. In fact, for decades the FAA has been quietly sending pilots diagnosed as substance abusers back to work. It's called the Human Intervention Motivation Study (or HIMS). And, before you panic, consider this: it's one of the most successful rehab programs ever, and is drawing interest for dealing with substance abuse in other industries as well. Tony Dokoupil reports.

<https://www.cbsnews.com/videos/when-pilots-go-from-rehab-to-the-cockpit/>