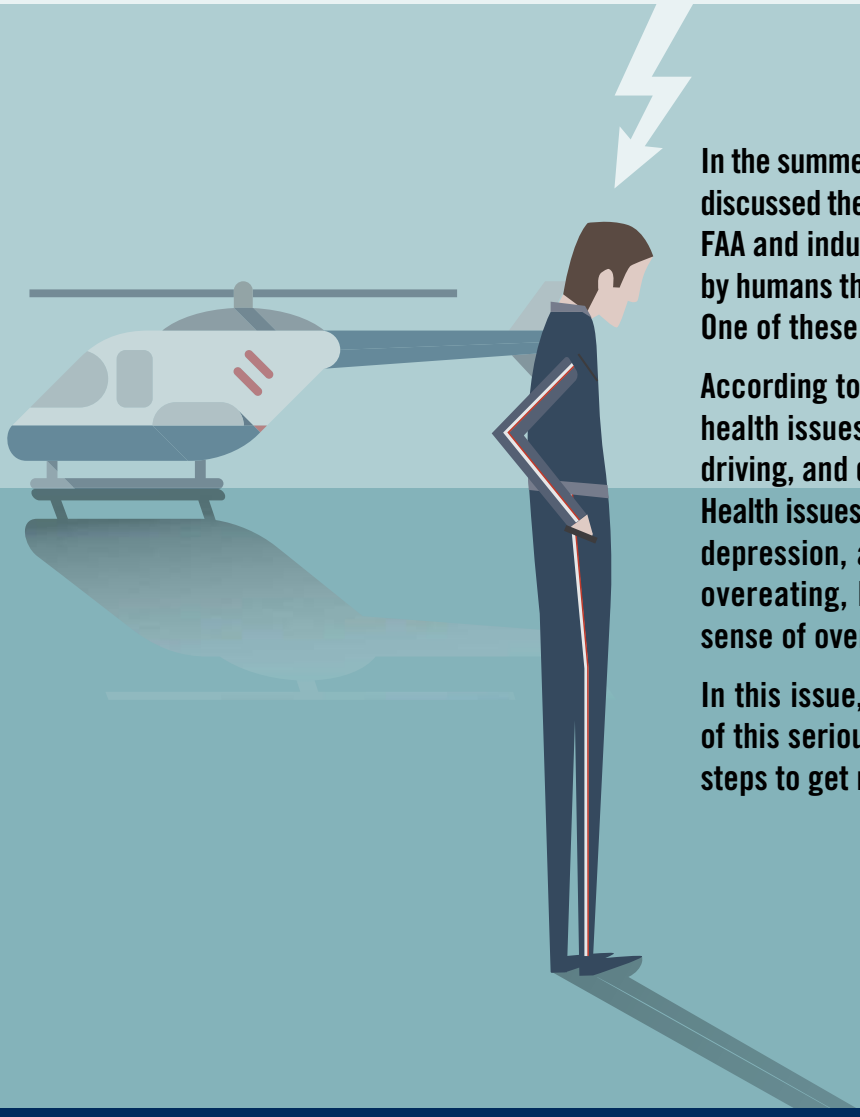
DRAINED

EXAMINING THE CAUSES & REMEDIES OF FATIGUE

On the evening of Feb. 2, 2009, Colgan Air flight 3407 crashed into a house in Clarence Center, New York, at 10:17 p.m., killing all 49 souls on board. The story of the disaster was featured on the tenth season of Canadian National Geographic Channel show "Mayday" in the episode entitled "Dead Tired," wherein the Bombardier Q400 is depicted in dark, foggy, icing conditions just outside Buffalo. The episode describes a first officer who had just commuted on a red-eye flight from Seattle to Newark prior to taking the right seat, as well as a captain who appeared to have been sitting and waiting at the Newark International Airport overnight, prior to the day of their 9:18 p.m. departure. The National Transportation Safety Board (NTSB) cited the probable cause to be the captain's inappropriate response to the activation of the stick shaker (leading to an aerodynamic stall), but it also found that the pilot's performance was likely impaired due to fatigue.

On the morning of July 6, 2013, Asiana Airlines Flight 214 was on final approach into San Francisco International Airport when the Boeing 777 came in short of the runway, struck its tail against the seawall and careened down the runway, coming apart as it slid. Although the crew flying the plane had a relief crew during the flight, the flight crew was nevertheless on board the aircraft from Incheon International Airport near Seoul to San Francisco—a flight of 10 hours and 20 minutes. The NTSB cited the flight crew's mismanagement of the airplane's descent and approach as the probable cause of the accident, with one of five contributing causes being flight crew fatigue.



In the summer and fall 2016 issues of *Safety Connect*, we discussed the dirty dozen—the twelve human factors the FAA and industry have identified as typical errors made by humans that lead to accidents and significant events. One of these factors is fatigue.

According to the FAA, fatigue is related to increases in health issues, doctor visits, use of sick leave, impaired driving, and difficulty dealing with home and social life. Health issues include heart disease, high blood pressure, depression, anxiety, stress, gastrointestinal disorders, overeating, higher alcohol and drug use and a lower sense of overall well-being.

In this issue, we focus on the causes and implications of this serious problem, as well as useful and practical steps to get more rest and reduce your fatigue.

LIGHTING THE NIGHT

Could your street's LED lighting be making you tired?

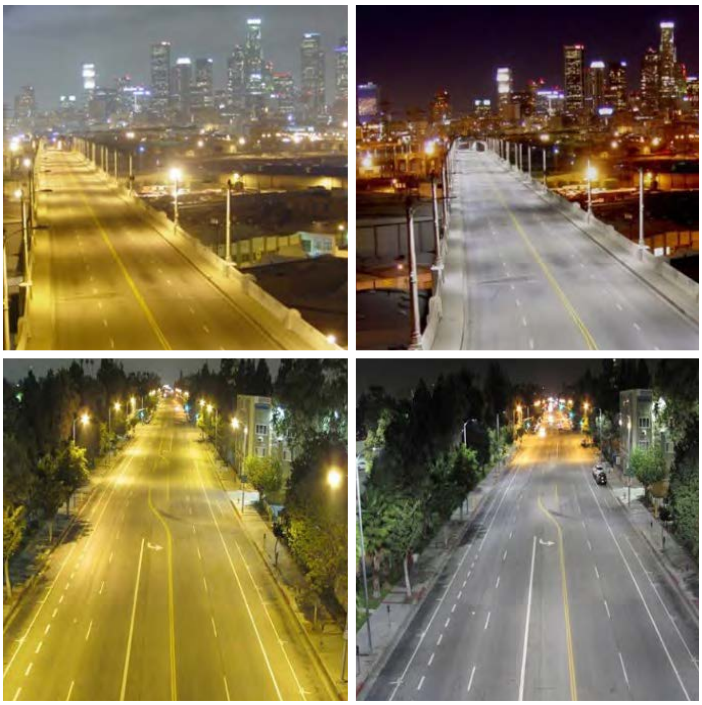
If you had taken the two sets of images shown, which photos would you say turned out better—the ones on the left or the ones on the right?

Most of us would probably choose the photos on the right, which are clearer and not as yellow-toned. However, according to a new policy statement by the American Medical Association (AMA), the photos on the left are better for our health.

The statement, adopted unanimously at the AMA's annual meeting in Chicago on June 14, 2016, comes in response to the rise of new LED street lighting sweeping the country. An AMA committee issued guidelines on how communities can choose LED streetlights to "minimize potential harmful human health and environmental effects."

A problem has arisen with municipalities replacing existing streetlights with efficient and long-lasting LEDs in order to save money on energy and maintenance. Although these new LED streetlights are delivering the desired results, the AMA's stance reflects the important connection between light and human health.

The new "white" LED street lighting has two problems, according to the AMA. The first is that blue light scatters more in the human eye than the longer wavelengths of yellow and red, and sufficient levels can damage the retina. The other issue addressed by the AMA statement is the impact on human circadian rhythmicity. According to the AMA statement, one of the considerations of lighting the night is its impact on human health and its effect on human sleep.



Which image looks better to you?

The images on the right show streetlights using LED lighting, which the AMA says have potential harmful health and environmental effects.

MAINTAINER FATIGUE & FATIGUE RISK MANAGEMENT

BY CORY CUMMINS, DIRECTOR OF FLIGHT SAFETY

In December 2016, the FAA issued Advisory Circular 120-115 to highlight the hazards of human fatigue as they relate to the safety of aviation maintenance and the individuals who perform maintenance tasks. It provides information on the increasingly studied and publicized practices of fatigue risk management (FRM). It also explains how we, as an aviation organization, can integrate FRM into our Safety Management System (SMS). Here are some excerpts from the circular:

According to the FAA's circular, we are a nation of sleep-deprived workers. It estimates that adults attempt to function on one to 1.5 hours less sleep than the generally-recommended eight hours per night. Human fatigue costs U.S. businesses over $136 billion in lost productivity each year. The losses do not include cost estimates associated with workplace injury, insurance claims or rework. Of concern to aviation safety (AVS) is the finding that maintenance personnel tend to get three hours less sleep per night than is recommended. That is a sleep debt twice the national average. Sleepiness and fatigue associated with sleep debt are cumulative. This means that losing even an hour of sleep every other night over the course of a week will produce conditions that negatively affect performance. Some of the most critical performance errors associated with worker fatigue include:

- impaired judgment and decision making;
- impaired communication skills;
- decreased attention span and ability to recall information;
- irritability;
- slower reaction times; and
- increased risk-taking.

The causes of fatigue in aviation maintenance are shared by the employer and by the individual maintainer. Factors primarily under the control of the individual maintainer may include:

- amount of sleep in previous 72 hours;
- quality of sleep;
- continuous hours awake;
- emotional, physical, or medical issues that interfere with restorative sleep (i.e., sleep quality); and
- underutilizing and overlooking the importance of sleep opportunities.

Factors primarily under the control of the employer may include:

- the start time and duration of the shift;
- work and work/life schedule changes;
- sub-optimal rotation of shift schedules;
- not having a routine work schedule;
- work schedules that overlap with time periods when the body is biologically programmed to sleep (circadian rhythm);
- working too long at the same task; and
- working under suboptimal conditions, such as low staffing levels, insufficient breaks, poor lighting, loud noise, extreme temperatures, etc.

Fatigue is repeatedly linked to errors that lead to incidents and accidents. The risk of work-related injuries increases approximately 15 percent on afternoon shifts and 28 percent on night shifts, as compared to morning shifts. Workers on a 12-hour shift had more than double the risk of suffering an injury than workers on an eight-hour shift. Workers on a 16-hour shift had more than four times the risk of suffering an injury than workers on an eight-hour shift. The National Transportation Safety Board (NTSB) estimates that fatigue causes at least 100,000 crashes, 40,000 injuries and 1,550 deaths on U.S. roadways each year.

LOSING EVEN AN HOUR OF SLEEP EVERY OTHER NIGHT OVER THE COURSE OF A WEEK WILL PRODUCE CONDITIONS THAT NEGATIVELY AFFECT PERFORMANCE.

Historically, the FAA has managed fatigue with duty-time limitations. Eventually, an enhanced application of fatigue modelling, with use of wearable technologies such as Fitbit devices, will help workers and employers assess fatigue risk and adjust schedules accordingly. SMS and FRM will help ensure that schedules need not be based on "one-size-fits-all" duty-time limitations.

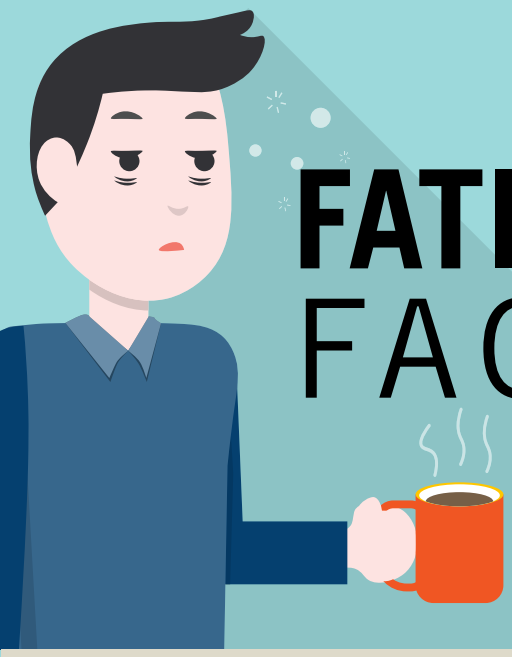
FRM minimizes fatigue-related performance errors, and applying its strategies has significant documented worker and organizational benefits related to safety and health, including:

- fewer on-the-job accidents and injuries;
- fewer physical illnesses;
- reduced absenteeism;
- reduced turnover;
- reduced morale problems;
- reduced insurance claims and premiums;
- reduced damage to equipment and aircraft;
- increased average sleep time and sleep quality; and
- an improved quality of life.

Air Methods is committed to incorporating FRM into all of our daily operations, particularly our maintenance operations; look for more information to come. Last year, a working group conducted a formal risk assessment to identify the risks associated with maintenance start times. Several of the principles noted above were identified as methods to mitigate the risks of early, late and after-normal working hours maintenance.

Whether controlling flights, caring for patients, flying or maintaining aircraft, identifying and managing your own fatigue is critical to the safe completion of each and every flight in the non-stop business of air medical operations.

To access the entire Advisory Circular, find the link on Flightdeck at Flightdeck>Safety>Resources.



FATIGUE FACTS

- Increased vulnerability to illness
- Loss of appetite
- Sleepiness
- Depression
- Giddiness
- Digestive problems
- Irritability

Info courtesy Canadian Centre for Occupational Health and Safety

Fatigue is increased by

- Dim lighting
- Limited visual acuity
- High temperatures
- High noise
- High comfort
- Tasks over long periods of time
- Long, repetitive, monotonous tasks

Impacts of Fatigue

decreased

- decision-making ability
- ability to do complex planning
- communication skills
- productivity/performance
- ability to handle job stress
- reaction time
- memory/ability to recall details

increased

- tendency for risk-taking
- forgetfulness
- errors in judgment
- sick time and absenteeism
- medical costs
- accident rates

STAYING AWAKE FOR 24 HOURS STRAIGHT AFFECTS THE HUMAN BODY ALMOST EXACTLY LIKE A BLOOD ALCOHOL LEVEL OF .10%.

Did you know the Monday following the switch back to daylight saving time in the spring sees more road rage incidents and traffic accidents than any other day of the year? Please take extra precaution and set yourself up for success. Get out of bed an hour earlier Sunday morning to help you be tired enough to sleep that night. Getting the correct hours of sleep Sunday night may assist you in not becoming a victim to the Monday after daylight saving time.

Are you mission-ready?

HEALTHNET'S ASSESSMENT TOOL
DETERMINES FATIGUE-BASED RISK FOR EACH SHIFT

BY JEFF WHITE, DIRECTOR OF SAFETY
HEALTHNET AEROMEDICAL SERVICES, CHARLESTON, WEST VIRGINIA

HealthNet Aeromedical Services uses a fatigue assessment tool at the start of every shift for all air and ground crew members. In the assessment tool, the following questions are asked.

- What was your schedule the day before your current shift?
- How many total run hours did you have in the past 24 hours?
- How many hours of uninterrupted rest did you receive in the past 24 hours?
- How many consecutive days in a row have you worked (including other employers)?

There are three possible answers below each of the questions. The crew member selects an answer. Each answer comes with a risk rating. If risk falls into the medium or high range, the flight team leader or base operations director must be contacted. The clinician cannot accept a mission until a corrective action plan is put into place.

Take back your energy

WITH LIFESTYLE CHANGES

FIGHT FATIGUE BY INCORPORATING THESE STEPS INTO YOUR DAILY ROUTINE

CHANGE YOUR LIGHTS If you have a "white" LED streetlight or hospital light installed outside your window where you sleep, make the effort to get it replaced with a yellow one.

LET THE LIGHT IN The arrival of spring means more sunlight, which means you'll require less sleep and feel more energetic due to the relationship between darkness and melatonin, a hormone that makes you sleepy. Open those blinds and let in the sun. Get outdoors in natural daylight as much as possible—even if for only a short walk at lunchtime. Make your work and home environments as bright and airy as possible.

JUST MOVE Although it might sound like a contradiction, exercise is very effective for getting better rest. Get involved in some kind of physical activity every day if you can. Many sources say a walk is nearly as good as a run. A goal by our health insurance provider is for each of us to get in at least 150 minutes of exercise per week (or 30 minutes a day, five days a week).

EAT THE RIGHT FOODS When we're young, we don't notice a direct link between the way we eat and the way we sleep. But for most of us, that becomes more obvious the more we age. Studies show a direct link in school-aged children between diet and scholastic performance. There's always a temptation to ditch the salads and fill up on starchy foods such as pasta, potatoes and bread. You'll have more energy, however, if you include plenty of fruits and vegetables in your daily diet.

GET SUFFICIENT VITAMIN D Essential for the immune and nervous systems, a lack of vitamin D can make you feel more tired than you actually are. Food is your first, and probably best, choice for vitamin D. Great sources are oily fish, such as salmon, sardines and mackerel. Other sources of vitamin D are meat, eggs and dairy products.

AVOID CRASH-CAUSERS Both sugar and caffeine can interrupt our natural circadian rhythms and sleep. Sugar lifts up our energy quickly but then leaves us crashing shortly after. Many also try to fend off their energy crash with caffeine, which can prevent us from being tired for up to eight hours following ingestion. If you're not on shift, it's best to avoid caffeine six to eight hours prior to bedtime.