



# FLIGHT SAFETY FOUNDATION HUMAN FACTORS & AVIATION MEDICINE

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## Pilots Must Be As Airworthy As Their Aircraft

*Medical airworthiness is more than maintaining good health, says the author, and it is only one link in the human factors chain. No chain is stronger than its weakest link; medical airworthiness derives its strength from education and training.*

by

Richard O. Reinhart, M.D.

There is an old saying that states that there are two things in life we don't want to know about: how the government is run and how sausage is made. There is one more thing many pilots and their managers do not want to know: the health of the pilot. There may be apathy and complacency, especially if the pilot says he feels ok and can pass an FAA exam.

Perhaps, this attitude is from not knowing that there is more to being a safe pilot than simply maintaining health. The armed services have realized this and require aircrew members to have a high altitude chamber ride and physiological training on a regular basis, in addition to other training.

### Human Factors: Broad Definition

Yet, is the pilot fit to fly during the entire flight? This issue becomes a part of a bigger picture called human factors. For the purpose of this discussion, human factors simply means the role that a person has in safe flight. Put another way, is there human related activity that will incapacitate a crew member?

Most of us accept that human factors play some part in the majority of all accidents, incidents and "close calls". I define close calls as those events we have all experienced in our activities that could have resulted in an embarrassing incident, injury or death — a near miss at a busy downtown intersection for instance. Each of us has experienced a close call; we all have been a human factor, although we may not publicly admit to these lapses in being safe.

Human factors are broad in definition. It can be the man-machine interface, which includes the design of crew seats, the

position of various instruments and controls, the size and placement of windshields, and etc. Lack of flight training or experience is not usually considered a human factor.

When discussing human factors, however, one usually doesn't think of the medical status of the crew or the physiology of flight. If the topic is brought up, it is usually related to the health and fitness of that pilot - "Is he eating correctly?" "Is he exercising?" "Is he overweight?".

When talking about physiological human factors then, I use the term "medical airworthiness". This means that, just as we look at an aircraft to be airworthy - to be safe for flight - the pilot should also be airworthy - medically airworthy - and requires similar scrutiny and standards as one would demand in inspecting an aircraft. Is a pilot medically airworthy? What happens to even a healthy body, in a flight environment, which could lead to a degree of incapacitation even for a few seconds? Human factors have become very visible in the press and it is important to recognize and include this specific element, medical airworthiness.

Why is medical airworthiness important? It is one link in the chain that makes the whole picture of human factors. The pilot is no stronger or safer than the weakest link of the human factors chain. For example, consider the role that vision plays in spatial orientation and how, even for a few seconds, that a pilot can become subtly incapacitated. Given the right scenario, this brief moment of incapacitation could be disastrous. Other examples include hypoxia, the long-term effects of hangover, over the counter medication and self-treatment, fatigue, impaired hearing, etc.

## Legal Pilot, But Not Safe

One of the challenges that we face is defining the significance of being medically airworthy. Consider that a pilot can be legal, but not safe. For example, the 8 hour to 12 hour “bottle to throttle” rule means nothing for a pilot who is suffering the effects of a hangover, that can be a contributing factor in an accident. Yet, if the pilot was legal, the regulation is no longer a major factor. If it is not a factor, it cannot become a statistic and if it is not a statistic it no longer becomes a specific reported cause of accidents. Therefore, it is often difficult to quantify the significance of a physiological element such as a hangover.

The importance of medical airworthiness in safe flight may be trivialized. Since these factors often can't be identified after the fact, the response in an accident investigation without an identifiable cause may be: “pilot failed to maintain control” or “pilot failed to maintain adequate airspeed”, etc. This, often, is casually looked upon as “pilot error”. I submit that he can be incapacitated or distracted in a series of events, which can ultimately end in an accident.

I am not suggesting that the lack of being medically airworthy is a single or a major safety issue and that education can make human factors go away. Human factors will always be present.

## Stacks Against The Pilot

Consider this illustration. Take a 12-pack of sodas and label each can with a specific medical airworthiness element. One can, for example, represents the effects of a hang-over. Label the other cans to represent over-the-counter medications for a cold, fatigue from several days of long trips, the stress of a son in the hospital with tonsillitis, etc. Then slowly stack them and consider the impact of the elements represented on each can. As the pyramid of cans rises, it becomes less stable, and more likely to topple.

Ponder the pilot at the end of a long day, who has stacked all twelve cans so to speak, on an IFR approach at night and there are wind shear warnings. A chart suddenly slides off the glare shield. The pilot, scanning his instruments, reactively reaches for the chart and takes his attention from flying the aircraft. For a brief moment he is incapacitated. In most cases, he recovers utters an expletive, and presses on. No one else knows it happened. If it did end in an accident, it is unlikely that any of these “cans” would be considered as a contributing factor. Yet, that chain of events did contribute to an incapacitation. Subtle, short, yet incapacitating. We've all been there.

## Training And Education

The ultimate challenge, therefore, to us who are concerned with safety and charged with the training and education of our aircrews in safe procedures, is to provide the resources to

familiarize each aircrew member with the impact of medical airworthiness on safe flight.

The pilot who has had military training, was continually exposed to safety programs and is likely to be more medically airworthy than other pilots who don't have that background. The exceptions are the companies that have in-house training and/or send crews to outside training programs. No matter what the background, all air crew - pilots, flight attendants and mechanics - need this education. We can't assume all crew know about medical airworthiness.

A recent U.S. National Business Aircraft Association (NBAA) study of the medical issues in corporate flight departments asked a couple of questions regarding interest in physiological training. One question asked, “If such training were made available would you be interested in purchasing?” Yes, according to 82 percent of the response.

Another question asked, “What courses are required by your company?” The answers: first aid 33 percent, CPR 25 percent, flight physiology 27 percent altitude chamber 8 percent, and no training at all was 37 percent.

The response confirms what Dick Van Gemmert, of Xerox, recently shared with me. He feels that managers and educators have let our flight crews down by not providing them adequate education in this area, even though the topic is recognized as important. As he stated, “Our crews have matured without our input and assistance in their health and medical airworthiness”.

Tom Block wrote in *Flying* magazine several years ago:

“The latitude company handbooks afford allows the crew to walk the tightrope between anarchy and totalitarianism. It's unrealistic to consider “judgement” a simple matter of strict adherence to the book. Good judgement comes from a blend of factors - not the least of which is the license to learn from our experiences.

If we encourage blind adherence, we invariably discourage pilots from thinking for themselves. If we allow each pilot to do freely whatever he likes, we are courting chaos.

Company manuals, procedures, checklists and policies have grown dramatically in content and complexity over the last several years. The elaborate systems of bigger aircraft are partly responsible. Too much, however, is the result of government and company officials launching campaigns to print answers for every aerial contingency.

There's nothing we've found yet to replace a pilot's good judgement. Too much rigid control - or none at

all - are the twin goblins that chase away common sense.”

## **Educate Management Too**

To make safe decisions during flight by using good judgement requires adequate insight and awareness of many factors, not the least being medical airworthiness. If we expect our pilots to use good judgement we must give them training. Managers of flight departments and their supervisors need exposure to this training as well.

Each company, no matter how small, should have someone designated as a Flight Safety Officer, just as military squadrons do, to assemble and distribute safety material for crew and management.

It is crucial to emphasize the role and significance of medical airworthiness in flight safety. We must educate and train the entire aviation community in the medical airworthiness elements of human factors. This must be an on-going program so that safe flight is not compromised by complacency or lack of knowledge of what makes a safe pilot.

There is another old saying that states we learn nothing the second time we are kicked by a mule. Aviators and doctors, too often, do not have the luxury of even a first kick! ◇

(This article came from the author's presentation in October 1987 to the Flight Safety Foundation's Corporate Advisory Committee. Ed.)

### ***About the Author***

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