



FAA
Air Traffic Organization

SAFETY MATTERS

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Insight and Resources for the ATO Safety Professional



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New Procedures to Improve Midnight Shift Alertness *Dave Buczek and Miya Wiseman*

When we work midnight shifts, we have to work against our circadian rhythms as we struggle to remain alert and vigilant while fighting our body's urge for sleep and restoration.

Fatigue can have a number of negative effects on the human body, including: slowed reaction times, lapses in attention, difficulty concentrating or maintaining situational awareness, and even nodding off. For air traffic control specialists and airway transportation systems specialists, these effects can reduce the ability to effectively perform safety-related duties. Recently, the FAA experienced situations involving denials of service during midnight hour operations due to unresponsive controllers. As a result, the ATO Fatigue Safety Steering Committee, a collaborative body that includes representatives from the ATO, the National Air Traffic Controllers Association, and Professional Aviation System Specialists, established a collaborative Fatigue Risk Management Workgroup to gather data, conduct analysis and make recommendations to reduce fatigue hazards associated with ATO midnight operations.

The FSSC FRM workgroup gathered data from the Air Traffic Safety Action Program, the NASA Controller Alertness and Fatigue Monitoring Study, and ATO operational event data and determined that ten hour midnight shifts, consecutive midnight shifts, and early day shifts that precede midnight shifts are associated with the highest fatigue hazards. Supported by fatigue scientists, the workgroup explored the factors that increase fatigue on these types of shifts. Two key factors were identified: the body's circadian rhythm and accumulated sleep debt.

Time of Day Impacts our Alertness

Humans are diurnal, meaning that we all tend to be awake during the day and sleepy at night. This is because our body's circadian rhythm, referred to as our "body-clock", programs us toward alertness during the day, and to be sleepy at night, especially between the hours of midnight and 5:00 AM. This is known as the daily Window of Circadian Low. Therefore, when we work midnight shifts, we have to work against our circadian rhythms as we struggle to remain alert and vigilant while fighting our body's urge for sleep and restoration. And, there's more—

Sleep Debt and Alertness

On average, we all need about eight hours of sleep each night. During sleep, our body and our mind rejuvenate so that we can start the next day fully charged and ready to go. If we get less than the amount of high quality sleep that our bodies need we



don't fully recuperate. This is referred to as carrying a sleep debt. When we work compressed, rotating or consecutive midnight shift work schedules, it is often difficult to get the full amount of quality sleep we need, and we can accumulate a sleep debt. The larger the sleep debt, the more fatigued we feel, and the more our performance of safety-related duties can deteriorate. So, what happens when we work midnight shifts and we are carrying a sleep debt?

Combined Circadian and Sleep Debt Impacts on Alertness

An example of how circadian and sleep debt factors can impact alertness in the operation can be seen when looking at consecutive midnight shift work schedules. These schedules can limit sleep quality and quantity during the work week because we are trying to sleep during the day while our circadian rhythms are programming us for alertness. This greatly reduces the quality and quantity of sleep we get each day and causes an accumulating sleep debt. And, that sleep debt combines with our circadian rhythms to make it increasingly more difficult to maintain alertness on each subsequent midnight shift. Fatigue science demonstrates that these factors are severely compounded on consecutive ten hour midnight shifts.

In recognition of these factors, the FSSC made a number of recommendations to the Vice President for Safety and Technical Training to help ensure that controllers remain alert on midnight shifts, especially

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**Embrace
correction to
reduce risk**

New Procedures to Improve Midnight Shift Alertness (cont'd)

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when they are working alone. The first of these to be implemented was new coordination procedures to replace "challenge check" telephone calls.

New and Improved Midnight Shift Coordination Procedures

In March, new coordination procedures went into effect for ATC operations that are single staffed on the midnight shift during the hours of 0000L to 0500L. The new procedures require that a controller positively accept receipt of an aircraft into their airspace before a transferring controller relinquishes control of that aircraft. The intent is to inform a controller that an aircraft is in his or her airspace so that he or she will remain alert and provide expected ATC services. These new procedures required updating local Letters of Agreement between facilities and establishing new Standard Operating Procedures for each facility to clearly define how these new positive hand-off procedures would work. Employees were briefed on the new hand-off procedures at the local level.

Additional Schedule Changes Coming Soon

While these new coordination procedures will help

reduce the likelihood of a denial of service situation, they don't address underlying fatigue issues associated with high hazard work schedules. These issues were addressed by the FSSC through additional recommendations to eliminate or restrict certain shift schedule patterns. Specifically, the FSSC made recommendations regarding ten hour consecutive midnight shifts, early day shifts that precede a midnight shift, and hold-over overtime. These additional schedule adjustments will soon be implemented to directly address how these schedules restrict nighttime sleep opportunity and increase sleep debt resulting in reduced alertness on midnight shifts.

The Bottom Line

Managing our fatigue and maintaining alertness on the job is a shared responsibility. FAA management is continuing to work collaboratively with NATCA and PASS to identify and mitigate fatigue hazards associated with work schedules and update procedures to enhance alertness in the operation. And employees need to take full advantage of sleep opportunities to get the restorative rest they need to be fully charged and remain alert when on duty. Working together, we can ensure the full availability of the ATC services we provide to the NAS.

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Read more on this topic at:

[Harvard University Healthy Sleep: What's In It for You?:](#)

[ATO Fatigue Safety Steering Committee webpage](#)

[FAA Fatigue Data Analysis webpage](#)

[FAA Advisory Circular: AC 120-100, Basics of Aviation Fatigue](#)

[Harvard University Benefits of Sleep](#)

[Harvard University: Sleep, Performance and Public Safety](#)

[Notice JO 7210.856 Single Person Midnight Shift Operations 6](#)

[Harvard University 12 Simple Tips to Improve Your Sleep](#)