Summary of the survey

**Additional Job**

Approximately 15% of those who responded indicated that they work at another job in addition to their EMS flying job, averaging approximately 36 hours per month (or about eight hours per week) at that additional job. As the majority of schedules allow for 6 to 7 days off it is assumed that most pilots who work additional jobs would do so during that interim period.

**Feeling Fatigued?**

More than 84% of the pilots surveyed believed that fatigue had affected their performance, with 68% believing that their alertness was degraded and 46% believing their performance was degraded. When asked which phase of flight was most affected by fatigue, approximately 31% responded with preflight planning through takeoff, with nearly 50% indicating that it was the en route through engine shutdown phase. Not surprisingly, the en route phase gathered the highest count, with about one in three pilots believing that phase was where they were most likely to be fatigued.

While the majority of pilots realize they fly in a fatigued condition, less than 28% ever reach the point where they are “nodding” off during flight. Of those, the vast majority indicated that they “rarely” nod off, compared to approximately one in twenty who “occasionally” to “frequently” nod off in flight. A full 50% indicated that they had either turned down a flight due to fatigue, or “in retrospect” believed that they should have turned down a flight due to fatigue.

**Sleep Inertia**

Prior to asking two questions related to sleep inertia, an explanatory statement was provided that stated in part that “sleep inertia is defined as the grogginess that you feel immediately after waking up. Sleep inertia can significantly affect your performance for anywhere from 10 minutes to 2 hours after waking up, although it appears that the majority of those effects subside within about 20 minutes.” When asked how often sleep inertia affected performance to the point where flight safety was compromised, nearly half responded with “Never” with another one third stating “Rarely” and one in ten “Occasionally.” Five hundred eighty three of the 637 pilots who responded stated that they were better off sleeping during the night and countering sleep inertia rather than attempting to stay awake through the night.

**The survey questions**

(The first two questions were demographic and were included to enable NEMSPA to correspond directly with the respondents in the future.)

3. Do you currently hold another job in addition to your EMS flying job? (If “No”, skip the next question)
4. How many hours do you spend at your additional job(s) during a typical month?

<table>
<thead>
<tr>
<th>Respondents</th>
<th>Response Total (hours)</th>
<th>Average hours/month</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>4202</td>
<td>42.02</td>
</tr>
</tbody>
</table>

Question 5.

In what ways has fatigue affected your flight performance? (check all that apply)

- Can't concentrate
- Performance degraded
- Alertness degraded
- Other

[Bar chart showing the number of responses for each category]
Question 6.

When your flight performance is affected by fatigue, which phase of flight performance is most affected?

<table>
<thead>
<tr>
<th>Phase of Flight Performance</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preflight planning</td>
<td>116</td>
</tr>
<tr>
<td>Preflight/walk-around</td>
<td>62</td>
</tr>
<tr>
<td>Engine start/taxi</td>
<td>89</td>
</tr>
<tr>
<td>Takeoff</td>
<td>233</td>
</tr>
<tr>
<td>Enroute</td>
<td>3</td>
</tr>
<tr>
<td>Descent</td>
<td>19</td>
</tr>
<tr>
<td>Approach/landing</td>
<td>15</td>
</tr>
<tr>
<td>Engine shutdown</td>
<td>3</td>
</tr>
</tbody>
</table>

NOTE: 133 of the respondents skipped question 6. Comments suggested that many pilots did not feel that fatigue had any significant affect on their performance!

Question 7.

How often do you catch yourself “nodding off” during a flight?

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Never</td>
<td>432</td>
</tr>
<tr>
<td>Rarely</td>
<td>169</td>
</tr>
<tr>
<td>Occasionally</td>
<td>32</td>
</tr>
<tr>
<td>Somewhat frequently</td>
<td>2</td>
</tr>
<tr>
<td>Frequently</td>
<td>0</td>
</tr>
</tbody>
</table>

Question 8.

Have you ever turned down an EMS flight request due to fatigue?

<table>
<thead>
<tr>
<th>Response</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>475</td>
</tr>
<tr>
<td>Yes</td>
<td>157</td>
</tr>
</tbody>
</table>
Question 9.

Are there flights you should have turned down due to fatigue?

- No: 414
- Yes: 222

Question 10.

How often does sleep inertia affect your performance to the point where safety is compromised?

- Never: 340
- Rarely: 225
- Occasionally: 68
- Somewhat frequently: 3
- Frequently: 3

*A brief definition of sleep inertia was provided with this question*
Question 11.

Is it better for you to remain awake during the night so that you will not feel the effects of sleep inertia, or is it better for you to sleep during the night and overcome the short term effects of sleep inertia?

[Bar chart showing responses: 583 for sleep during the night, 54 for stay awake during the night.]

It is better for me to sleep during the night and overcome sleep inertia if necessary.

It is better for me to stay awake during the night and not have to experience sleep inertia.

NOTE: The respondents expressed a clear concern regarding the effects of sleep debt rather than sleep inertia. It would be interesting to know the ages of the 54 minority respondents. Unfortunately, the survey did not collect that data.

Question 12.

Please list any suggestions or ideas you may have for combating fatigue. This could include ideas that have been successful for you personally, as well as known remedies. What works for you?

In the interest of space, the 434 responses to Question 12 are not included in this report. They will be made available to interested persons at www.nemspa.org in the near future.

13. Flight Assignment Category

<table>
<thead>
<tr>
<th>Category</th>
<th>% of respondents</th>
<th># of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotor Wing</td>
<td>91.7%</td>
<td>584</td>
</tr>
<tr>
<td>Fixed Wing</td>
<td>7.4%</td>
<td>47</td>
</tr>
<tr>
<td>RW and FW</td>
<td>0.9%</td>
<td>6</td>
</tr>
</tbody>
</table>
14. Which of the following best describes your level of responsibility?

| Response |
|----------------------------------|--------|--------|
| Line pilot with basic added responsibilities | 59.3%  | 375    |
| Line pilot with significant added responsibilities | 13.9%  | 88     |
| Lead pilot of base manager         | 24.1%  | 152    |
| Chief pilot or Director of Operations | 2.7%   | 17     |

15. Do you fly single or dual pilot?

<table>
<thead>
<tr>
<th>Response</th>
<th>Response %</th>
<th>Response count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single pilot</td>
<td>98.3%</td>
<td>626</td>
</tr>
<tr>
<td>Dual pilot</td>
<td>1.7%</td>
<td>11</td>
</tr>
</tbody>
</table>

16. Are you typically “on call” or “on duty”? Being “on call” implies that you generally work from home and start your duty time when paged or called for a flight request. An “on duty” shift implies that you have scheduled start of shift and end of shift times. You can be “on duty” from home or you may be assigned to a base. NOTE: Your personal information will NOT be associated with any specific survey answers. You identity WILL be kept anonymous.

<table>
<thead>
<tr>
<th>Response</th>
<th>Response %</th>
<th>Response count</th>
</tr>
</thead>
<tbody>
<tr>
<td>On duty</td>
<td>98.7%</td>
<td>627</td>
</tr>
<tr>
<td>On call</td>
<td>1.3%</td>
<td>8</td>
</tr>
</tbody>
</table>

17. Which statement best describes your physical work assignment?

<table>
<thead>
<tr>
<th>Response</th>
<th>Response %</th>
<th>Response count</th>
</tr>
</thead>
<tbody>
<tr>
<td>I work from home</td>
<td>1.7%</td>
<td>11</td>
</tr>
<tr>
<td>I am assigned to a base</td>
<td>91.1%</td>
<td>580</td>
</tr>
<tr>
<td>I am assigned to more than one base</td>
<td>7.2%</td>
<td>46</td>
</tr>
</tbody>
</table>
Question 18.

How long are you typically OFF when transitioning from DAY shifts to NIGHT shifts?
- 24 hours
- 2 to 3 days
- 4 to 5 days
- 6 to 7 days
- Greater than 7 days
- NA

How many consecutive DAY shifts do you typically work?
- 1 or 2
- 3 or 4
- 5 or 6
- 7
- Greater than 7
- I am on call or typically don't work day shifts

How many consecutive NIGHT shifts do you typically work?
- 1 or 2
- 3 or 4
- 5 or 6
- 7
- Greater than 7
- I am on call or typically don't work night shifts

How long are you typically OFF when transitioning from DAY shifts to NIGHT shifts?
- 24 hours
- 2 to 3 days
- 4 to 5 days
- 6 to 7 days
- Greater than 7 days
- NA

Question 21.
How long are you typically OFF when transitioning from NIGHT shifts to DAY shifts?

- 24 hours
- 2 to 3 days
- 4 to 5 days
- 6 to 7 days
- Greater than 7 days
- NA

Question 22.

Which of the following best describes your most secluded "rest" environment at the base where you typically work?

- Hospital waiting room
- Hospital lounge area for employees only
- Dedicated area shared by entire flight team
- Separate room designated for pilot
- I work from home
Question 23.

How would you best describe the environmental conditions (lighting, temperature and noise) for the secluded rest area you identified in the previous question?

- Conditions make it very difficult to sleep
- Conditions make it somewhat difficult to sleep
- Conditions don't affect my ability to sleep
- Conditions make it easier to sleep

Question 24.

Which best describes the sleep or rest surface provided to you in the secluded area described above?

- Bed
- Fully reclining chair
- Partially reclining chair
- Non reclining chair (padded)
- Non reclining chair (non padded)
- Sofa / Couch
Question 25.

Which best describes your company’s policy or attitude regarding sleeping while on duty?

- No limitations or restrictions
- Restricted to certain hours
- Other restrictions
- Tolerated, but frowned upon
- Against policy, but happens anyway
- Not tolerated

Question 26a.

How much do you typically sleep during an EMS night shift?

- Less than 1 hour
- 1 - 2 hours
- 2 - 3 hours
- 3 - 4 hours
- 4 - 5 hours
- 5 - 6 hours
- 6 - 7 hours
- Greater than 7 hours
Question 26b.

What is the maximum you are able to sleep if you don’t fly during a night shift?

- Less than 1 hour: 7
- 1 - 2 hours: 8
- 2 - 3 hours: 18
- 3 - 4 hours: 38
- 4 - 5 hours: 84
- 5 - 6 hours: 133
- 6 - 7 hours: 146
- Greater than 7 hours: 147

Question 27.

How much sleep do you typically require to feel completely rested and alert during the day?

- Less than 5 hours: 28
- 5 to 6 hours: 131
- 6 to 7 hours: 257
- 7 to 8 hours: 188
- Greater than 8 hours: 19
Question 28.

How much are you typically able to sleep during the day if you HAVE BEEN AWAKE for most, if not all of the night before?

Less than 3 hours
3 to 4 hours
4 to 5 hours
5 to 6 hours
6 to 7 hours
7 to 8 hours
Greater than 8 hours

Question 29.

How much are you typically able to sleep during the day if you HAVE BEEN ABLE TO SLEEP for most, if not all of the night before?

Less than 3 hours
3 to 4 hours
4 to 5 hours
5 to 6 hours
6 to 7 hours
7 to 8 hours
Greater than 8 hours

Question 30.

Describe your sleeping habits during the daytime, prior to reporting for a night shift (check all that apply).

I attempt to sleep as much as possible during the day.
It depends upon how much sleep I had the night before.
I generally take a 1-2 hour nap before coming to work.
I generally take a 2+ hour nap before coming to work.
Question 31.

How would you describe your ability to sleep during the day? (check all that apply)

- I can sleep well during the day if I was awake the night before.
- I have difficulty sleeping during the day even if I was awake the night before.
- I can sleep well during the day regardless of how much I slept the night before.
- I am able to take short naps (less than 2 hours) during the day.
- I am generally unable to even take short naps (less than 2 hours) during the day.

Question 32.

Which of the following significantly (at least 25% of the time) affects your ability to sleep during the day? (check all that apply)

- Children (playing, needing attention, school)
- Spouse / Roommate(s)
- Sleep Area
- Light
- Noise
- Temperature
- Work Interruptions
- Social Interruptions
- Personal Concerns (Worrying)
- Work Related Concerns
- Additional Job
- Other

Question 33.

How does knowing that the possibility exists for you to sleep during a night shift influence your daytime (prior to night shift) sleeping habits?

- That possibility does not influence my daytime habits.
- That possibility might influence my daytime habits if I have something important to do during the day.
- That possibility definitely influences my daytime habits if I have something important to do during the day.
- That possibility always influences my daytime habits.
Conclusion

The issue of sleep-related deficits and their impact on safety for shift workers has received much attention for many years. From November of 2007 and throughout much of 2008, the rash of helicopter accidents in air medical transport is raising alarms across the nation. The fact that many of these fatal accidents occurred at night prompts questions of whether pilot fatigue may have been a significant contributing factor.

The specific sleep-related deficits that are of concern for night air medical transport operations include the cumulative effects of sleep deprivation with the resultant fatigue (both acute and chronic), and sleep inertia. Although these topics are not new to the majority of highly experienced pilots flying HEMS operations, the full extent of their influence on performance may not be well understood by the majority.

It is likely, in fact, that fatigue is present in some measure in most accidents that occur, both day and night. But, the extent to which fatigue may have been a significant factor contributing to a specific incident is generally unknown and difficult to evaluate. Dr. Mark Rosekind, an internationally recognized expert in sleep and fatigue, has led efforts to develop a structured approach to examine fatigue factors in accident investigations for use by NTSB investigators. But, the extent to which the HEMS specific accidents have been examined in this regard remains unclear. At the time of this report, Dr. Ira Blumen, Medical Director at the University of Chicago Air Medical Network (UCAN) and his research study group of professionals from all roles in air medical transport are carefully examining 10 years of HEMS accidents in search of root causes. We hope that the results of this study will provide additional indications of whether, and to what extent fatigue may have contributed to any of those accidents.

Since there is currently some controversy within the HEMS community regarding how to address the issues of fatigue and sleep management, NEMSPA determined to conduct a survey of HEMS pilots to gather direct input from those who are most affected by the challenges of shift work, and who will be directly affected, along with all others on board their aircraft, by any measures that may be instituted to attempt to mitigate these factors.

The survey questions and the numbers of pilots that chose each possible response to each question are presented on the following pages. After removing some obvious duplicate respondents, the survey garnered 699 responses, which we believe makes the data significantly representative of the nationwide HEMS pilot population.

In addition to the responses to the survey questions, 330 of the respondents opted to add a personal comment to the final survey item, which was: “Please add any additional comments or suggestions you may have. Note that these comments may eventually be shared throughout the EMS industry.” There has been no attempt in this report to edit any of those comments or to delete any except those that were duplicate responses from the same person.
After careful consideration of the results of this survey, the Board of Directors of NEMSPA believes that the following measures are prudent and necessary responses to the collective input provided by the EMS pilots that responded.

- It is important to facilitate as much effective rest as possible while a pilot is on shift, particularly during successive night shifts, since workload during the shift and conditions outside of a pilot’s control during off-duty hours may result in an accumulation of sleep debt. It is known that only sleep can resolve sleep debt. In addition, both the pilots and the organizations that employ them must acknowledge the necessity to decline a flight request if the pilot is too fatigued to fly safely. In a white paper written specifically for the air medical transport community, Dr. Mark Rosekind said the following “It is an absolute: sleep loss will reduce alertness and performance. Extensive research, over many decades, in laboratories and field operations all over the world has shown that sleep loss will degrade diverse aspects of performance, impair alertness and create the risk for errors, incidents, and accidents”.

- There is a need for a professionally developed curriculum of education for air medical crew members that addresses fatigue and its affect on performance. This education must include instruction on how to counter fatigue and sleep loss to insure maximal alertness during all flights.

- All air medical provider programs and operators should evaluate the policies and cultural realities of their organizations to identify and correct any practices or attitudes that could result in pressure on crew members to accept a flight when significantly fatigued. The importance of emphasis and support for safe practices at the managerial and executive levels of HEMS provider organizations is critical in creating a safe culture.

- There must be an ongoing and detailed analysis of the root causes of HEMS accidents, and particularly CFIT accidents. The results of this analysis must guide changes in HEMS operations as needed to mitigate the identified causal influences.

- The development of any policy or standard that would dictate how pilots perform their duties industry-wide must include the participation of expert representatives from the current HEMS pilot population. Since the process of identifying operational hazards and quantifying the associated risks, along with the establishment of mandatory controls to eliminate or minimize those risks, is essentially operational risk management applied on a national scale, it also seems logical that representatives from operator organizations should be involved.

Among the necessary qualities of any control selected by the risk management process are:

1. The control must be effective in a manner which can be measured by reasonable means.

2. The control cannot limit the performance of the associated activity (transporting patients) to an extent that makes it financially impractical to perform the activity at all (hence the need for operator involvement).
3. The control must not introduce secondary risk that is equal to or greater than the original target risks.

The responses of the pilots in this survey indicate considerable concern that some controls could violate this last requirement.

Finally, we believe that the careful analysis of accident root causes called for above may reveal that the basic lack of visual cues when flying at night and/or in bad weather is a major factor contributing to CFIT accidents. While fatigue may have been a factor in many HEMS accidents, the pilot’s degraded ability to see and avoid obstacles while flying at night must also be addressed. It is important to accelerate the fielding of night vision technology and HTAWS throughout the industry. Other technological options, such as TCAS, Flight Operations Quality Assurance systems, as well as traditional CVR and FDR systems, and perhaps other technologies, should also be considered as possible controls to reduce the risks associated with flying at night or in marginal weather.