DEFINE AND MEASURE FATIGUE PROBLEM

The majority of accidents are attributable to human error rather than system failures, mechanical malfunctions, or other factors. As many as 80 percent of aviation crashes are at least partly due to "pilot error", and nearly half of these are due to pilot inattentiveness or flawed decision making. Similarly, human error is a dominant factor in approximately 80 to 85% of maritime casualties. In these accidents, impaired situational awareness and incorrect situation assessment overwhelmingly predominate as causal factors. Such difficulties in marine, aviation, and highway operations often are due to operator fatigue. Fatigue is a known contributor to human errors in transportation because it reduces the availability of cognitive resources needed to assess the dynamic evolution of operational situations, aligning latent risk factors with problematic emerging conditions. The Department of Transportation (DOT) defines fatigue as "the degradation of human performance, the slowing down of reflexes, and/or the impairment of the ability to make rational judgments." Recent consensus indicates fatigue well may be responsible for as many as 15-20% of transportation mishaps, making it a bigger problem than drugs and/or alcohol. Fatigue associated with extended duty periods and circadian factors has received the most attention in transportation research, but the fatigue from high cognitive and/or physical workload is less well understood. A better understanding of the relative contributions of sleep, time on duty, time of day, jet lag or shift lag, cognitive load, and physical exertion on the alertness and performance of transportation workers is needed. Furthermore, a better understanding of individual differences in fatigue vulnerability would contribute substantially to the development of comprehensive fatigue management systems. A great deal of recent literature has shown wide divergence in individual tolerances to fatigue, and it appears that fatigue vulnerability is a more or less static trait, but to date there is no "litmus test" for an individual's susceptibility to this operational stressor. In addition, problems remain in terms of defining the true extent of fatigue-related problems in modern industrial and transport operations. How is the impact of fatigue best assessed? Laboratory studies have revealed the impact of sleep deprivation and sleep restriction on performance under controlled circumstances, but there is little consensus on the degree to which these impairments are responsible for compromised safety in the real world. The absence of reliable and valid measures of fatigue-related impairments in the field is another problem that must be addressed before the true extent of the fatigue difficulties can be assessed and the efficacy of new interventions can be established. For instance, there presently is no practical methodology to detect the degradation of situational awareness, the increased risk-taking propensity, or the real-time impact of cognitive slowing on safety-sensitive tasks in dynamic work environments. Finally, the health impact of non-standard work schedules, prolonged duty cycles, constant circadian disruptions, and chronically disrupted sleep requires further attention. Information is needed on the current state of knowledge regarding the long-term impact of current scheduling practices and the sorts of health monitoring systems which will be adequate to ensure employee health status in the future.