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LETTER TO THE EDITOR

The importance of sleep for governmental sectors, general population and industry – Asia–Pacific Economic Cooperation (APEC) Sleep Technology Agenda



Sleep is a field of study that encompasses several areas relevant to many of every country's governmental sectors, as well as industry and general population. The focus of this Letter will be to address how researching sleep can reduce health expenses, increase national productivity, bring awareness to public safety and facilitate health and medical related industry development based on the Sleep Technology Agenda (STA) [1] presented at the Asia–Pacific Economic Cooperation (APEC) meeting in Ho-Chi-Ming City, Vietnam, August 2017. APEC is an inter-governmental forum for 21 Pacific Rim member nations that promotes free trade throughout the Asia–Pacific region. The STA was officially endorsed by the APEC Secretariat in late 2017.

When it comes to cost-benefit evaluation, there are numerous ways to show how sleep technology development is beneficial to improve productivity and reduce medical expenses. The first case we addressed in the APEC STA was the issue of shift work. Working a night shift can result in a disruption of circadian rhythms and cause alternations of sleep physiology and biological function that can negatively affect physical and psychological well-being and work performance [2]. Similarly, U.S.-based surveys have demonstrated that individuals who worked an anti-clockwise shift had a 50% increase in the chance of causing a traffic accident when commuting for work [3]. Shift workers not only need to overcome sleep induced performance impairment and social problems, but they also have to deal with long-term adverse health consequences. Several studies showed that shift workers are more susceptible to strokes [4] and cardiovascular diseases possibly due to the elevation of blood pressure [5–7]. According to research from U.S., where one-fifth of its workforce is employed as shift workers, such individuals are four times more likely to develop duodenal ulcers in comparison with non-shift-workers in pylori infected groups [8]. Female shift workers are at 36%–60% greater risk of getting breast cancer [9]. In a 20-plus-year survey, females had a significantly increased risk of endometrial cancer associated with working a rotating night shift. It also showed that obese women working rotating night shifts doubled the risk of such cancer compared with obese women who did no night work [10]. As for males, rotating-shift workers were significantly at risk for prostate cancer (relative risk = 3.0) compared with day workers among 14,052 working men in Japan [11]. In a Finnish cohort composed of 1,669,272 persons between 1971 and 1995, men working the night-shift had significantly increased the risk of non-Hodgkin's lymphomas [12]. These health consequences need the attention of governmental authorities, and effective countermeasures need

to be developed and put in place. However, such countermeasures will not be straightforward, inexpensive or easily deployed.

Another important issue addressed at this APEC meeting and the resultant white paper [13] under “Global Sleep Technology Industrial Standards”, was for public safety and how sleep research can be instrumental to measure the societal impact of sleepy drivers. There are high annual percentages of drowsy driving related traffic accidents reported in E.U. [14] and U.S. [15]. According to the U.S. National Highway Traffic Safety Administration, many of these traffic accidents were related to fatigue, with 71,000 people injured, 1550 people killed, resulting in a total financial loss of \$1.25 billion U.S. dollars annually [15].

Nevertheless, this adverse societal impact may be just the tip of an iceberg because the complex factors of traffic accidents associated with drowsy driving remain illusive. Many studies have shown the strong link between OSAS and traffic accidents. However, very few people know that drowsy driving can be as deadly as drunken driving [16]. Furthermore, a critical evaluation index, the “near-miss”, was investigated in a more proactive way to prevent the danger of sleepy driving in 2007. This research concluded that near-miss sleepy accidents occur in 14 times more people than actual sleepy accidents (18.3% vs 1.3%) and that near-misses predict who is at risk for any type of auto accident in a dose-response fashion [17]. As a co-author of this paper, we emphasized during APEC presentation that based on the current sleep medicine/science knowledge, there are many opportunities to develop new technologies to prevent sleep-related transportation and industrial tragedies, and that it is always too late to make any difference after the accidents have happened. Hence, the STA recommends for the governmental action on the prevention of sleepy driving to include: 1) early diagnosis of symptomatic drivers, 2) nationwide report of drivers at risk with specific sleep disorders, and 3) in-time detection of “near-miss” events of drivers through effective new technologies.

In recent years, people have paid more attention to their health due to the global trend of personalized healthcare along with the advancements in sleep science and technology. In this APEC STA, we noted that cardiovascular diseases, cerebrovascular events, and neurological degeneration could be exacerbated by sleep disorders. Therefore, health and public safety promotion policies and programs should be initiated among the 21 APEC economies through the collaboration of clinicians, researchers, governmental agencies and industry.

Accompanying high economic achievement, shift worker, drowsy driving, sleep deprivation and many sleep-related chronic

diseases, have arisen in fast-paced societies with stressful lifestyle. Meanwhile, the above-mentioned sleep-related conditions in turn, have noticeably hindered further development of the economy because poor sleep can negatively affect public health, safety and national productivity. Given this universal problem, the role of sleep medicine and technology to offer potential solutions are of crucial importance. Events like the APEC STA proposal in 2017 can act as catalysts for cross-cultural understanding and problem-solving in regards to the important issue of sleep health. When efforts are consolidated, cooperation is facilitated and synergy is created, and we shall find more effective ways to reduce medical expenditure, increase national productivity, promote public safety and facilitate the industry development across the 21 APEC economies and provide a model for other nations to emulate.

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