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## MANAGEMENT OF PHYSICIAN FATIGUE

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### *Background*

Health systems around the world are struggling with how to best meet the health needs of their populations. Health leaders speak with urgency about the need to improve the individual experience of care, improve the health of populations, and maximize return on investments. Physicians concur - they are continually focused on providing better care to their patients.

Concurrently, concerns over patient safety have arisen over the last two decades, rooted in studies of adverse events. The incidence of adverse events (AEs) in acute care hospitals has been reported in the United States (US),<sup>1,2,3</sup> Australia,<sup>4</sup> United Kingdom,<sup>5</sup> and Canada.<sup>6</sup> Between 5% and 20% of patients admitted to hospital experience one or more AEs; between 36.9% - 51% of these AEs are preventable; and AEs contribute billions of dollars through additional hospital stays as well as other costs to the system, patients and the broader society.<sup>7</sup> Leape et al. maintain that more than two-thirds of AEs are preventable.<sup>8</sup> These outcomes have prompted decision makers, policy makers and healthcare providers to examine contributing factors, including the increasingly complex health system and its impact on the well-being of providers.

Patient safety and physician well-being are the key drivers leading to restrictions on resident and/or physician duty hours aimed at reducing their

fatigue. The European Working Time Directive (EWTD) was first established in 1993 to place limits on all workers' hours throughout Europe under the umbrella of health and safety legislation. That directive included physicians but excluded doctors in training. In 2000, a new directive passed to include the "junior doctor" constituency accompanied by a requirement that by 2009 all health systems in the European Union limit resident work to a maximum of 48 hours averaged per week. The intention was to improve the working lives of doctors in training and to increase patient safety. A systematic review on the impact of the EWTD on postgraduate medical training, patient safety, or clinical outcomes found studies to be of poor quality with conflicting results.<sup>9</sup>

In 2003, the Accreditation Council for Graduate Medical Education (ACGME) in the US adopted a set of duty hour regulations for physicians in training. The ACGME issued revised regulations that went into effect in July 2011, reflecting the recommendations of a 2008 Institute of Medicine report *Resident Duty Hours: Enhancing Sleep, Supervision, and Safety*, calling for elimination of extended duty shifts (more than 16 hours) for first year residents, increasing days off, improving sleep hygiene by reducing night duty and providing more scheduled sleep breaks, and increasing oversight by more senior physicians.<sup>10</sup> The Institute of Medicine's report bases its recommendations on the growing body of research linking clinician fatigue and error.

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In 2013, the National Steering Committee on Resident Duty Hours released Canada's first comprehensive, collaborative and evidence-based report on fatigue and duty hours for Canada's approximately 12,000 residents. The Committee stresses that a comprehensive approach is necessary in order to enhance safety and wellness outcomes. Fatigue risk management is a predominant theme in the recommendations.

Fatigue management systems are in place in other sectors/industries that have a low threshold for adverse outcomes including aviation, transportation, and the Department of National Defence. In 2010, the Canadian Nurses Association released a position statement *Taking Action on Nurse Fatigue* that speaks to system, organizational and individual level responsibilities of registered nurses.

There are currently no specific policies in Canada for physicians in practice with respect to fatigue management. Given the heterogeneity of medical practice (i.e. various specialties) and of the practice settings (i.e. rural and remote versus urban, clinic versus hospital, etc.), the solutions emanating from a fatigue management policy may be different - one size will not fit all.

### ***Impact of Physician Fatigue***

#### ***Patient Safety***

Sleep deprivation is the condition of not having enough sleep and can be either chronic or acute. It impairs cognitive and behavioural performance. "Sleep is required for the consolidation of learning and for the optimal performance of cognitive tasks. Studies of sleep deprivation have shown that one night without sleep negatively affects the performance of specific higher cognitive functions of the prefrontal cortex and can cause impairment in attention, memory, judgment, and problem solving." (p. 1841)<sup>11</sup> A seminal study by Williamson and Feyer found that after 17-19 hours without sleep, performance on some cognitive and motor performance tests was equivalent or worse than that at a blood alcohol concentration (BAC) of 0.05%.<sup>12</sup> Wakefulness for 24 hours is equivalent to a blood alcohol level of 0.10%.<sup>13</sup>

A chronic sleep-restricted state can cause fatigue, which is a subjective feeling of tiredness, lack of energy and motivation. A large body of research exists linking sleep deprivation/fatigue, performance and adverse patient outcomes, particularly for medical residents.<sup>14,15,16,17,18,19, 20, 21,22, 23,24</sup>

However, literature on the impact on performance varies based on a number of factors. There are significant inter-individual differences in the global response to sleep loss, as well as significant intra-individual variations in the degree to which different domains of neurobehavioral function (e.g., vigilance, subjective sleepiness, and cognitive performance) are affected. Inter-individual differences are not merely a consequence of variations in sleep history. Rather, they involve trait-like differential vulnerability to impairment from sleep loss.<sup>25</sup>

Evidence suggests an inconclusive relationship between duty hour reductions (primarily those implemented in the US) and patient safety, suggesting that restrictions on consecutive duty hours have not had the anticipated impact on this crucial outcome as anticipated.<sup>26</sup> Several large studies have revealed only neutral or slightly improved patient mortality and other clinical parameters since implementation of the ACGME work hour limits in the US.<sup>27,28, 29,30</sup> In complex and ever changing health systems, it is difficult to isolate the impact of restricted duty hours alone.

Research on the effects of practicing physician sleep deprivation and extended work shifts on clinical outcomes is limited and inconclusive.<sup>31, 32</sup>

The issue of physician fatigue is complex, and is affected by much more than duty hours. Other contributing factors affect performance including work patterns, individual response to sleep loss, experience of the worker, the context of which sleep deprivation is necessary, hours of actual sleep, patient volume, patient turnover and patient acuity, environmental factors, personal stressors, workload, etc. Limiting work hours alone is not sufficient to address sleep deprivation among physicians. Reduced or disturbed periods of sleep, more consecutive days or nights of work, shift variability, and the volume of work all increase

fatigue and thus can contribute to errors.

One of the biggest concerns with a fatigue management strategy is continuity of care, linked to the number of transfers of care (handover) among providers. Transfers of care inevitably increase in an environment of work hour limitations.<sup>33,34</sup> Handovers are considered critical moments in the continuity of patient care and have been identified as a significant source of hospital errors, often related to poor communication. There is a growing body of literature on how to do these well and how to teach this well. This is an important skill for physicians in the context of a fatigue management strategy: “Standardization of the handover process has been linked to a reduction in the number of errors related to information transfers. In addition, effective mechanisms for the transfer of information at transition points have been recognized as patient safety enablers.”<sup>35</sup>

### ***Provider Well-being***

Provider well-being (physical, mental, occupational) is linked to system performance and patient outcomes. It is affected by fatigue and work patterns including night shift and extended hours. Comprehensive, systematic reviews of the health effects of on-call work in 2004 showed that nighttime work interrupted sleep patterns, aggravated underlying medical conditions, and increased the risk of cardiovascular, gastrointestinal, and reproductive dysfunction.<sup>36,37,38</sup> Other research suggests an elevated risk of breast cancer,<sup>39,40</sup> prostate cancer,<sup>41</sup> colorectal cancer,<sup>42</sup> asthma<sup>43</sup>, diabetes,<sup>44</sup> and epilepsy<sup>45</sup> for shift workers. Disruption of the body’s circadian rhythms is thought to be one of the main pathways for adverse health effects from shift work, particularly for work schedules that involve night work.

Given that 24-hour work is unavoidable in various industries, including healthcare, researchers have evaluated different shift schedules designed to reduce some of the negative health effects of working at night. Optimal shift schedules are aligned as much as possible with the circadian rhythm, promote adaptation of the circadian

rhythm with shift work, reflect workers’ needs and preferences, and meet organizational or productivity requirements. The following interventions appear to have the most beneficial effects on the health of shift workers:<sup>46</sup>

- Schedule changes including changing from backward (counterclockwise) to forward (clockwise) rotation, from eight hour to 12 hour shifts, and flexible working conditions, self-scheduling, and ergonomic shift scheduling principles
- Controlled exposure to light and day;
- Behavioural approaches such as physical activity, scheduled naps and education about sleep strategies; and
- Use of pharmacotherapy (i.e. caffeine and melatonin) to promote sleep, wakefulness, or adaptation

Sleep deprivation and on-call shifts consistently point to deterioration of mood resulting in depression, anger, anxiety, hostility, and decreased vigilance.<sup>47,48,49</sup> A Canadian study found that shift workers reported significantly higher burnout, emotional exhaustion, job stress and psychosomatic health problems (e.g. headaches, upset stomach, difficulty falling asleep) than workers on a regular day schedule.<sup>50</sup> Prolonged duty hours by residents has been found to contribute to marital problems, pregnancy complications, depression, suicide and substance abuse,<sup>51</sup> as well as serious conflicts with attending physicians, other residents, and nurses, in addition to increased alcohol use and instances of unethical behaviour.<sup>52</sup> Surprisingly however, the abolishment of 24-hour continuous medical call duty for general surgery residents at one facility in Quebec was associated with self-reported poorer quality of life.<sup>53</sup>

In contrast to other recommendations on the health benefits of 8 hr shifts, the risk of a work safety incident increases markedly after more than eight hours on duty. The risk in the twelfth hour is almost double than in the eighth hour (and more than double the average risk over the first eight hours on duty).<sup>54</sup> Extended work duration and nighttime work by interns is associated with an

increased risk of reported percutaneous injuries (PIs).<sup>55</sup> Fatigue was reported more often as a contributing factor for nighttime compared with daytime injuries. Fatigue was also more commonly reported as a contributing factor to PIs that occurred after extended work than those that occurred after non-extended work.<sup>56</sup> Other research found that residents were most exposed to blood-borne pathogens through needle punctures or cuts during overnight duty periods.<sup>57</sup>

Health care facilities that have physicians working in them have a role in supporting and promoting provider well-being, including providing enablers of extending and continuing resiliency such as nutritious food, on call rooms, appropriate numbers of staff, locums, etc. They also have a role in working jointly and collaboratively with physicians to ensure that on-call schedules do not place work demands on individual physicians that prevent the physicians from providing safe patient care and service coverage. For example, research with emergency physicians suggests that a nap at 3 AM improves performance in physicians and nurses at 7:30 AM compared to a no-nap condition despite the fact that memory temporarily worsened immediately after the nap.<sup>58</sup>

Individual resilience, intergenerational differences, illness-related issues, as well as family commitments also need to be considered. Physicians should also be encouraged to take the necessary time to rest and recover on their time off. The obligation of physicians to provide after hour coverage and care is unavoidable and should be considered by an individual when they choose a career in medicine, and as a physician in managing their schedule/call.

A review of 100 studies from around the world indicates the culture of medicine contributes to doctors ignoring the warning signs of fatigue and stress and in many cases suffering from undiagnosed ailments such as stress and depression, or from burnout.<sup>59</sup> The authors suggest the culture of medicine is such that doctors feel they don't need help; they put their patients first. Of the 18% of Canadian doctors who were identified as depressed, only a quarter of them

considered getting help and only two per cent actually did. The report suggests that burnout from working long hours and sleep deprivation because of understaffing seems to be the biggest problem worldwide.<sup>60</sup> The Canadian Medical Protective Association (CMPA) states that physicians should consider their level of fatigue and if they are clinically fit to provide treatment or care.<sup>61</sup> Fatigue is not a sign of weakness. All members of the health care team should support their colleagues in recognizing and managing sleep deprivation and fatigue.

Physician fatigue has several ethical dimensions. The Canadian Medical Association Code of Ethics states that physicians have an ethical responsibility to self-manage their fatigue and well-being.<sup>62</sup> However, physicians must be trained and competent to know their own limits and evaluate their own fatigue level and well-being. The system must then support physicians in this recognition. The doctrine of informed consent is another dimension of physician fatigue. If physician fatigue is an added risk for any aspect of patient care, whether it is surgical or medical, elective or emergent, then some have argued that the doctrine of informed consent suggests that physicians have an obligation to inform patients of that risk.<sup>63,64</sup> "The medico-legal considerations for physicians centre on the ethical duty to act in the best interests of their patients. This may mean that if a physician feels that his or her on-call schedule endangers or negatively impacts patient care, reasonable steps are taken to ensure patients do not suffer as a result and that the physician is able to continue providing an adequate level of care for patients."<sup>65</sup>

### ***System Performance***

Addressing physician fatigue may have workforce implications.

Physician workload is multifaceted comprised of clinical, research, education and administrative activities. If physician workload or duty hours are reduced, any one of these activities may be impacted.

It has been suggested that implementing fatigue

management strategies such as a workload ceiling for physicians may result in a greater need for physicians and thus increase system costs. However, new models of team based care delivery that incorporate technology, reduce redundancy, utilize a team based approach, and optimize the role of physicians offer an opportunity to better manage physician fatigue without necessarily requiring more physicians. Other strategies also need to be explored to improve the on-the-ground efficiency of physicians.

Some of the strategies to address practicing physician sleep deprivation/fatigue such as scheduling changes and reduced workload may affect access to care, including wait times. Surgeons or others may have to cancel surgeries or other procedures because of fatigue and hours of work, forcing rescheduling of surgery/procedures and potentially increasing wait times. This is particularly relevant given Canada's large geography and varied distribution of physicians. Therefore, flexibility in strategies to address physician sleep deprivation/fatigue are needed to reflect the variety of practice types and settings in existence across the country, in particular solo practices; rural, remote and isolated sites; community locations; etc. The same holds true for smaller specialties, which has been the experience in the UK with the implementation of the EWTD.

Fatigue management is a competency that needs to be taught, modelled, mentored, and evaluated across the medical education continuum, from medical student to practicing physician.

#### Recommendations

1. Educate physicians about the effects of sleep deprivation and fatigue on the practice of medicine and physician health, and how to recognize and manage their effects.
2. Create a national tool-box of self-awareness tools and fatigue management strategies and techniques.

3. Advocate for the integration of fatigue management into the continuum of medical education.
4. Advocate for the creation of system enablers with the flexibility to:
  - Consider the full workload of physicians (clinical, teaching, administrative, research, etc.);
  - Optimize scheduling to coordinate on call and other patient care following call; and
  - Implement organizational/institutional level fatigue risk management plans.
5. Develop and advocate for implementation of standardized handover tools.
6. Enhance and reaffirm a culture within medicine that focuses on patient-centered care.
7. Reaffirm the culture shift within medicine that encompasses physician well-being.
8. Encourage physicians treating physicians to be aware of the aggravating effects of fatigue on their well-being and practice.

#### *Conclusion*

Physicians are interested in how to best meet the needs of the population, in continually improving the care provided to Canadians. To do so requires that they also care for themselves including managing the effects of sleep deprivation and fatigue. It is a complex issue that requires multifaceted solutions. Strategies must address physician fatigue at an individual, organizational/institutional and system level.

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