

# Insomnia ROUNDS

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## Insomnia and Performance – Helping Your Patients Remain Alert and Effective

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The personal cost to someone with insomnia – often a chronic condition – is considerable in terms of financial cost as well as with significant impediments to their sense of vitality, mood, perception of health, and the ability to carry out everyday activities. Impaired cognitive performance has been positively correlated with the severity of the insomnia complaint. People with insomnia who sleep for fewer than 6 hours show impairments on executive functioning tasks, significant increases in absenteeism and non-vehicle accidents, reduced productivity and even dubious ethical behaviour on the job. Challenges with performance and mood at work and socially as a consequence of insomnia are some of the many reasons why effective treatment of insomnia is imperative. This issue of *Insomnia Rounds* examines adverse consequences of insomnia on performance including subjective fatigue, which is a prominent feature that negatively impacts perceived functional capacity, mood problems, and cognitive decrements, and provides a brief overview of treatment strategies.

Occasional sleepless nights are common; roughly 40% of Canadians experience insomnia as a symptom at any given time. However, approximately 10%, or about 3.5 million Canadians, suffer from diagnostic levels of chronic insomnia.<sup>1</sup> One reason for the high prevalence may be that the most common presentation of insomnia is as a comorbid disorder to another condition such as depression or pain.<sup>2</sup> Unfortunately, this fact has led to the erroneous belief that insomnia is merely a byproduct of the comorbid disorder, and as a result, insomnia has been historically underdiagnosed and undertreated.<sup>3-5</sup> The *Diagnostic and Statistical Manual of Mental Disorders*, 5<sup>th</sup> edition (DSM-V),<sup>6</sup> has eliminated the distinction between insomnia as the sole disorder and insomnia with another condition; it will be interesting to see if this nosologic change will result in improved access to needed treatment.

### What is the Cost of Insomnia?

In Canada, costs related to insomnia are estimated to be over \$5000 annually per insomnia sufferer.<sup>7</sup> Personal cost is considerably more than merely financial, however, as those with insomnia report significant impediments to their sense of vitality, perception of their health, and the perceived ability to carry out everyday physical activities.<sup>2</sup> Devastating effects on the quality of life of those with insomnia have been reported in both qualitative<sup>8</sup> and quantitative studies.<sup>9,10</sup> Many insomnia sufferers worry that they will die or become ill as a result of their condition, and anxiety about sleep loss and the perceived inability to cope with sleep loss are prominent cognitive features of the disorder.<sup>11</sup> As such, performance-related concerns are important and underline the necessity of effective management.

While the primary insomnia complaints typically consist of difficulties initiating or maintaining sleep or waking too early, daytime performance-related factors of insomnia are also common complaints (Table 1) that lead to seeking therapy.<sup>12</sup> Additionally, although insomnia can be transient, most of what we know about the performance problems in insomnia is based on research on chronic insomnia. Definitions of chronic insomnia vary in defining duration as a minimum of 1–6 months. This article will focus on issues specific to chronic insomnia.

### What Aspects of Performance are of Concern in Insomnia?

#### Fatigue versus sleepiness

Fatigue is probably the most commonly reported insomnia complaint,<sup>13</sup> and the complaint most often cited as the culprit in performance problems.<sup>14</sup> As such, fatigue is the complaint that brings people with insomnia to treatment. Studies confirm the link between insomnia and fatigue.<sup>15</sup>



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**Table 1: Performance-related complaints due to insomnia<sup>12</sup>**

- Fatigue/malaise
- Attention, concentration, or memory impairment
- Social/vocational dysfunction or poor school performance
- Mood disturbance/irritability
- Daytime sleepiness
- Motivation/energy/initiative reduction
- Proneness for errors/accidents at work or while driving
- Tension headaches, and/or gastrointestinal symptoms in response to sleep loss
- Concerns or worries about sleep

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Despite reports of fatigue, there is little objective evidence for an increased propensity to sleep; ie, widespread sleepiness.<sup>16</sup> This may be due to a hyperarousal mechanism that compensates for sleep loss.<sup>17</sup> Thus, it is important to distinguish between fatigue (ie; a subjective state of exhaustion) and the propensity to sleep (ie; sleepiness) when understanding insomnia.

Also important to understanding insomnia is that fatigue is not a unidimensional construct. In addition to mental, emotional, and physical components of fatigue, it may also be useful to distinguish between fatigue that relates to an obvious quantifiable physical pathology and fatigue that may have more cognitively mediated origins.<sup>18</sup> For example, neurobiological models of fatigue distinguish between central and peripheral fatigue.<sup>19</sup> Peripheral fatigue is linked to physiological factors. Central fatigue occurs when the estimation of the resources needed to complete a task exceeds the estimation of the resources available. When a person with insomnia detects a resource deficit, the experience of fatigue is increased or perhaps attention to the sensations of fatigue are brought more into attentional focus.<sup>20</sup> Whatever explains the often reported mismatch between, and the lack of evidence for, sleepiness in those with insomnia, it is clear that subjective fatigue is a prominent feature in insomnia and it negatively impacts perceived functional capacity.

### **Mood disturbances**

Mood problems are a consistent complaint in insomnia sufferers and likely a factor that exerts influence in performance. Common mood disturbances include irritability, anxiety, or dysphoria after a poor night's sleep.<sup>12</sup> Mood problems can occur both at the symptom level (ie, feeling increased anxiety on a given day) as well as at a full syndrome level (ie, experiencing chronic levels of anxiety that cause distress or functional impairments of sufficient severity to meet diagnostic criteria). Several studies have found that insomnia patients report experiencing more negative mood and less positive mood throughout the day relative to good sleepers, and these mood changes are related to the previous night's sleep.<sup>21</sup> People with insomnia frequently attribute their negative mood to a poor night's sleep.<sup>11</sup>

Studies have also concluded that insomnia is associated with depression and mood and anxiety disorders.<sup>22-24</sup> The

first issue of this volume of *Insomnia Rounds*<sup>25</sup> focuses on the common psychiatric disorders (mood disorders, anxiety disorders and schizophrenia) that are associated with prominent sleep complaints. Whereas it may be tempting to associate quality of life impairments solely to the accompanying comorbid disorder, Katz and McHorney<sup>2</sup> found that the reported impairment in the ability to carry out normal physical activities and reduced sense of vitality were greater in chronic insomnia than in chronic medical and psychiatric disorders such as major depressive disorder (MDD) and coronary heart failure. Furthermore, successful insomnia treatment can contribute to remission and treatment potentiation of comorbid disorders.<sup>26-28</sup> Similarly, the failure to treat insomnia in the presence of a comorbid mental disorder may lead to poor pharmacotherapy and psychotherapy treatment response in the other disorder.<sup>29-31</sup> In considering treatment options for someone with insomnia, it is important to assess for and manage co-occurring mood problems; however, it is fallacious to assume that mood problems necessarily mean that there is a mood disorder. Haponik et al<sup>3</sup> found that only 28% of individuals diagnosed with MDD actually had an identifiable mood disorder; the rest were suffering from (untreated) insomnia.

### **Cognitive complaints and proneness to errors**

Cognitive impairment is another frequent complaint in insomnia.<sup>32</sup> The American Academy of Sleep Medicine Work Group research diagnostic criteria<sup>12</sup> for insomnia include cognitive complaints such as "attention, memory and concentration problems as well as proneness to errors". The severity of such cognitive complaints positively correlate with the degree of insomnia.<sup>21,33</sup> A qualitative study by Kyle et al<sup>8</sup> found that subjects with insomnia complained that they felt impaired on daily tasks requiring attention, concentration and memory. A consistent theme emerged of having to reread or redo tasks, or making mistakes that ranged from minor (eg, one patient wrote their child's birthdate on the study forms rather than their own birthdate) to major (eg, narrowly avoiding a vehicular accident).

Although the subjective literature clearly supports the link between cognitive impairment and sleep, it is mixed with respect to the objective verification of such complaints. Most studies do not corroborate cognitive deficits.<sup>17,34-36</sup> Indeed, some studies find cognitive advantages to insomnia, including improved vigilance.<sup>34</sup> It is difficult to account for such discrepancies. External validity may be a factor; that is, in-lab tests may not provide an accurate picture of actual everyday cognitive functioning. Another possible element in preservation of cognitive functioning is total sleep times (ie, sleep duration). Despite difficulty initiating or maintaining sleep or poor quality sleep, those with insomnia often do not have below normative values for adults. Compared to control subjects with similar total sleep times (>6 hours), those with insomnia exhibit no differences on cognitive tasks, but those who sleep for fewer than 6 hours show relative impairments on executive functioning tasks.<sup>15</sup> Short sleep duration has also been shown to cause difficulties shifting attention when the demands of the task switches, as well as slowing in the speed at which information is processed. Another plausible explanation is that those with insomnia become adept at

managing the cognitive deficits owing to the increased cortical arousal associated with insomnia;<sup>35-38</sup> however, these individuals are aware of the increased effort needed to maintain normal cognitive functioning.<sup>39-41</sup> The awareness of extra effort may tax cognitive resources;<sup>42</sup> thus, this too may be cognitively mediated.<sup>43</sup>

### Other deficits in functioning

Insomnia is also related to increased absenteeism and mistakes at work. In the large (N=948) Canadian study conducted by Daley et al,<sup>7</sup> absenteeism from work for subjects with insomnia syndrome (ie, more than just symptoms) was 3.4-fold higher (19.9 versus 5.9 hours;  $P<0.05$ ) in comparison to good sleepers. Likewise, mean hours lost to reduced productivity in the insomnia syndrome group was 4.9-fold (97.7 versus 20.0 hours;  $P<0.05$ ) those of good sleepers. Similar results have been reported in several other large epidemiological studies.<sup>10,44</sup> Loss of sleep has also been implicated in dubious ethical behaviour on the job.<sup>45</sup> It is possible that some of the cognitive problems reported in insomnia could account for industrial issues such as nonvehicular accidents, workplace errors and poor decision-making in ethical situations. Workplace activities frequently require executive control for often complex tasks, such as decision making, anticipating the impact of decisions, problem solving, sustaining attention on a task, shifting attention to another task, and holding information in working memory while simultaneously manipulating another piece of information (eg, remembering a number while calculating a second number). These are all cognitive tasks that can be impaired in those with insomnia. All of these processes necessary for optimal work performance are associated with some degree of impairment in insomnia.<sup>46</sup> Moreover, as age increases, we may expect poorer performance on complex tasks: older adults with insomnia have been shown to have greater impairment in complex tasks such as detecting hard-to-distinguish target stimuli on a computer screen and responding using a keyboard (eg, responding to a “d” on the screen but inhibiting response to a “b”) than simple tasks (eg, detecting when an “x” appears on the screen).<sup>47</sup> Interestingly, after the insomnia is treated with cognitive behavioural therapy (CBT), these deficits are no longer present.

These work difficulties in patients who suffer from insomnia are typically compounded by the aforementioned other insomnia-related problems: fatigue and mood difficulties.

### Addressing the Problem

The obvious but too-often overlooked answer to addressing the performance issues associated with insomnia is to effectively treat the insomnia. The recommended first-line treatment for chronic insomnia is CBT,<sup>48</sup> as described in more detail in a previous issue of *Insomnia Rounds*.<sup>49</sup> Short-term evidence-based treatments also include pharmacotherapy, namely the benzodiazepines and the so-called Z-drugs; ie, non-benzodiazepine sedative-hypnotics.<sup>50,51</sup> There is evidence for very brief CBT treatment delivery in medical settings, including one session of brief behavioural insomnia therapy (BBIT),<sup>52</sup> and two 25-minute CBT sessions for primary care.<sup>53</sup>

The following are key components of BBIT and CBT treatments for insomnia.

### Sleep restriction

Sleep restriction increases the drive for deep sleep,<sup>54</sup> and trains the body to be more efficient in sleep production. Restrict sleep to 30 minutes greater than the average total sleep time. For example, ask your patient to keep track of his/her sleep each morning on a sleep diary<sup>55</sup> (Appendix) and calculate the average amount of sleep obtained for the monitoring period. If the daily sleep diaries reveal that the patient sleeps for an average of 6.5 hours over the course of 2 weeks, the time in bed prescription is set to 7 hours, irrespective of how much sleep one gets on a given night.<sup>56</sup> Once sleep efficiency (ie, the time spent asleep divided by the time spent in bed) becomes high ( $\geq 90\%$ ), the patient can begin increasing his/her time in bed by 15 minutes per week, until the sleep efficiency is around 85%. It is important that this scheduled time spent in bed occur approximately the same time every night. To determine when the sleep opportunity should occur, follow the steps for stimulus control (below).

### Stimulus control

Increase the association between the bed/sleep situation and sleep with stimulus control.<sup>57</sup> To increase this association, there are 5 main rules:

- 1) only go to bed when sleepy, or very close to it
- 2) maintain the same rise time 7 days per week
- 3) refrain from sleeping outside the sleep schedule established above; ie, no napping, no sleeping in, and no going to bed early
- 4) do not go to bed or stay in bed unless sleeping; ie, get up if unable to sleep and do not return until sleepy
- 5) use the bed for sleep-related activities only; ie, refrain from doing activities while awake in bed

Preceding these rules is an explanation of conditioning (for a detailed description, see the paper by Edinger et al<sup>56</sup>). The rise time is set 7 days a week. The rise time can be used to anchor the prescribed time in bed from item 1. Using the example above, if the time in bed prescription is 7 hours, determine a time for which the patient will set their alarm 7 days per week (often this is the time at which they have to get up to go to work during the week). Counting backward 7 hours from this time provides the prescribed earliest bedtime. If the patient is not sleepy at this time, he/she is not to go to bed until sleepy.

### Caffeine avoidance

Lastly, it is important that the patient does not excessively use caffeine to cope with the insomnia during the day. Caffeine interferes with adenosine, which is involved in the generation of adequate drive for deep sleep. Moreover caffeine produces fatigue problems later because of the withdrawal symptoms. Caffeine, like alcohol, marijuana, or cigarettes, has sleep-interfering effects if consumed within a few hours of bedtime; thus, the recommendation is to eliminate these substances or refrain from use within 3–4 hours of bedtime.

For more detailed descriptions of these treatments see papers by Buysse<sup>52</sup> or Edinger.<sup>53</sup> There are also complete CBT for insomnia (CBT-I) manuals available,<sup>56</sup> and evidence that full 2–4-session CBT-I protocols can be administered without sleep or mental health backgrounds.<sup>58-61</sup> Additionally there are CBT-I self-help books available,<sup>56,62,63</sup> and evidence that CBT-I can be effective in self-help book formats<sup>64</sup> as well as on online forums such as <http://www.sleepio.com>.<sup>65</sup>

## Appendix: Sleep Diary Instructions<sup>a</sup>

### General Instructions

**What is a Sleep Diary?** A sleep diary is designed to gather information about your daily sleep pattern.

**How often and when do I fill out the sleep diary?** It is necessary for you to complete your sleep diary every day. If possible, the sleep diary should be completed within one hour of getting out of bed in the morning.

**What should I do if I miss a day?** If you forget to fill in the diary or are unable to finish it, leave the diary blank for that day.

**What if something unusual affects my sleep or how I feel in the daytime?** If your sleep or daytime functioning is affected by some unusual event (such as an illness, or an emergency) you may make brief notes on your diary.

**What do the words “bed” and “day” mean on the diary?** This diary can be used for people who are awake or asleep at unusual times. In the sleep diary, the word “day” is the time when you choose or are required to be awake. The term “bed” means the place where you usually sleep.

**Will answering these questions about my sleep keep me awake?** This is not usually a problem. You should not worry about giving exact times, and you should not watch the clock. Just give your best estimate.

### Item Instructions

Use the guide below to clarify what is being asked for each item of the Sleep Diary.

**Date:** Write the date of the morning you are filling out the diary.

1. *What time did you get into bed?* Write the time that you got into bed. This may not be the time that you began “trying” to fall asleep
2. *What time did you try to go to sleep?* Record the time that you began “trying” to fall asleep.
3. *How long did it take you to fall asleep?* Beginning at the time you wrote in question 2, how long did it take you to fall asleep.
4. *How many times did you wake up, not counting your final awakening?* How many times did you wake up between the time you first fell asleep and your final awakening?
5. *In total, how long did these awakenings last?* What was the total time you were awake between the time you first fell asleep and your final awakening. For example, if you woke 3 times for 20 minutes, 35 minutes, and 15 minutes, add them all up (20+35+15= 70 min or 1 hr and 10 min).
6. *What time was your final awakening?* Record the last time you woke up in the morning.
7. *What time did you get out of bed for the day?* What time did you get out of bed with no further attempt at sleeping? This may be different from your final awakening time (eg, you may have woken up at 6:35 a.m. but did not get out of bed to start your day until 7:20 a.m.)
8. *How would you rate the quality of your sleep?* “Sleep Quality” is your sense of whether your sleep was good or poor.
9. *Comments:* If you have anything that you would like to say that is relevant to your sleep feel free to write it here.

Sample

ID/Name: \_\_\_\_\_

Today's date	4/5/11							
1. What time did you get into bed?	10:15 p.m.							
2. What time did you try to go to sleep?	11:30 p.m.							
3. How long did it take you to fall asleep?	55 min.							
4. How many times did you wake up, not counting your final awakening?	3 times							
5. In total, how long did these awakenings last?	1 hour 10 min.							
6. What time was your final awakening?	6:35 a.m.							
7. What time did you get out of bed for the day?	7:20 a.m.							
8. How would you rate the quality of your sleep?	<input type="checkbox"/> Very poor <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input type="checkbox"/> Good <input type="checkbox"/> Very good	<input type="checkbox"/> Very poor <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input type="checkbox"/> Good <input type="checkbox"/> Very good	<input type="checkbox"/> Very poor <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input type="checkbox"/> Good <input type="checkbox"/> Very good	<input type="checkbox"/> Very poor <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input type="checkbox"/> Good <input type="checkbox"/> Very good	<input type="checkbox"/> Very poor <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input type="checkbox"/> Good <input type="checkbox"/> Very good	<input type="checkbox"/> Very poor <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input type="checkbox"/> Good <input type="checkbox"/> Very good	<input type="checkbox"/> Very poor <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input type="checkbox"/> Good <input type="checkbox"/> Very good	<input type="checkbox"/> Very poor <input type="checkbox"/> Poor <input type="checkbox"/> Fair <input type="checkbox"/> Good <input type="checkbox"/> Very good
9. Comments (if applicable)	I have a cold							

<sup>a</sup>Permission to use the Consensus Sleep Diary is restricted to clinical use only. Research use requires permission from first author.



## Conclusion

Insomnia is associated with a host of performance-related challenges and significant personal and economic costs. There are clear links with mood, fatigue, and quality of life. Performance on mental and physical tasks is less clear except when sleep duration is below adult norms (eg, <6 hours). Even in cases without clear neuropsychological impairment, there is consensus that people with insomnia have to exert more effort in completing tasks; as such, amassing the extra resources is particularly difficult given the amount of fatigue that is typically present.

Management of the patient with insomnia requires a delicate balance between challenging catastrophization about the insomnia that increases anxiety (eg, "I'm going to die if the insomnia doesn't resolve!") and worsens the sleep complaint, and acknowledging that insomnia places a large physical and emotional strain on the system. There is also a need to encourage healthy fatigue management that facilitates rather than diffuses the sleep drive, such as resting in ways that will not result in dozing or napping or too little activity in a 24-hour period. The clear take-home message when it comes to insomnia is to treat it using empirically supported treatments. In the case of chronic insomnia, CBT is the first-line treatment. In acute insomnias or when CBT is not readily available, patients should have access to effective pharmacological agents.

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## UPCOMING CONFERENCE

October 4 – 7, 2013

### 6<sup>th</sup> Conference of the Canadian Sleep Society

Halifax, Nova Scotia

CONTACT: Website: [www.canadiansleepsociety.com](http://www.canadiansleepsociety.com)

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