



# **Cellular Phone Use and Driving: A Dangerous Combination**

Ontario Medical Association  
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### **Summary of OMA Recommendations**

1. The OMA recommends that the Ontario government take action to curb the use of cellphones while driving.
2. The OMA recommends that activities such as dialing, texting and e-mailing be included in any government safety program or policy.
3. The OMA recommends that in addition to any legislative action, government and other interested parties sponsor a comprehensive public awareness campaign to inform the public about the risks of using cellphones and other hand-held devices while driving.
4. The OMA recommends that the government ensure that driving schools and driver education manuals include detailed sections about how cellphones and other hand-held devices decrease driving safety, in order to build awareness of this issue among the next generation of drivers.
5. The OMA recommends that informational and precautionary notices about the use of these devices while driving be provided by mobile communications companies with the purchase of any cellphone, headset or other hand-held device.
6. The OMA recommends that automobile manufacturers invest in promoting the safe use of cellphones and other hand held devices, in accordance with our findings, and include the cognitive dangers of talking on a hands-free device.
7. The OMA recommends that drivers make every effort to reduce all visual, manual and cognitive distractions.

## 1.0 Introduction:

Physicians are all too familiar with the health impacts of motor vehicle collisions. They treat the debilitating chronic injuries of patients who have been in accidents, perform critical surgeries on trauma patients, and may even witness tragic fatalities on emergency department operating tables. Consequently, physicians know first hand the devastation that motor vehicle collisions have on the lives and families of Ontarians. The *Ontario Road Safety Annual Report* notes that in 2005 there were 766 fatalities due to motor vehicle collisions in this province.<sup>1</sup> It also reports that there were 71,850 injuries due to collisions resulting in close to 50,000 hospital days. According to the Ministry of Transportation's 2007 report, *Analysis and Estimation of the Social Cost of Motor Vehicle Collisions in Ontario*, collisions generated a staggering \$18 billion in social costs to Ontarians in 2004.<sup>2</sup> In spite of these chilling figures, Ontario has made considerable progress in improving overall road safety particularly in reducing fatality rates. For example, death-rates have declined by 49 % in Ontario since 1980. Furthermore, the province's average rate of 6 deaths per population of 100,000 is well below the national average of 9 per 100,000, ranking it second in the country. Ontario's rate of 0.87 deaths per 10,000 licensed drivers places it as the safest jurisdiction in all of North America besides the Northwest Territories.<sup>1</sup>

Despite the improvements, physicians believe that more can and must be done to improve road safety and to continue to reduce unnecessary injuries and fatalities on Ontario's roads. Because of the obvious implications for public health, physicians believe that we have a role to play in efforts to promote initiatives which reduce motor vehicle collisions and improve overall road safety. It is in keeping with this interest in public health and safety that the Ontario Medical Association (OMA) is examining the issue of cellphone use and driving. While in many circumstances cellular phones can serve as safety mechanisms, physicians' are concerned over the danger that cellphone use is having on safe driving. In fact, the link between traffic accidents and cellphone use has led to bans on the use of hand-held devices while driving in over thirty countries, the Canadian provinces of Newfoundland and Labrador, Quebec, and Nova Scotia and the American states of California, Connecticut, New Jersey, New York, Washington state and Washington D.C.

This report will offer a summary of findings from the literature which studies the risks associated with cellphone use and driving. It will highlight the relevant findings in the context of

the OMA's commitment to improving public safety. Based on the evidence from both behavioural and epidemiological studies it will demonstrate that the danger posed by cellphone use while driving warrants urgent action on the part of the Ontario government. After a discussion of action being taken to address the issue in Canada and the United States, the report will conclude with several recommendations.

## **2.0 Literature Analysis: Compelling Evidence of Harm**

The rise in cellphone use has ignited concerns internationally both in the medical community and in the broader public that their concurrent use with driving increases the risk of traffic accidents. Since the mid-1990s a broad range of studies has been commissioned to investigate the validity of what appears to be an intuitive fact: using a cellphone is a distraction to drivers and therefore increases their risk of accident, injury and perhaps even death. The literature on the subject investigates various aspects of the link between cellphone use and accident risk. There are epidemiological studies which examine accident data and cellphone records as well as controlled experimental and behavioural studies which measure the effect of cellphone use on cognitive functions associated with driving such as visual attention, as well as signal recognition, brake reaction time and other driving tasks. Before discussing them in detail it is helpful to summarize three key findings from the literature:

- 1) The epidemiological studies of those who have been in accidents show that the use of cellphones while driving significantly increases the risk of collision.
- 2) Experimental and behavioural studies demonstrate that having a conversation on a cellular phone is cognitively distracting and disrupts elements of driving performance such as reaction time for braking, recognition of traffic signals and other driving performance indicators. By negatively affecting driving performance, cellphone use increases the risk of collision.
- 3) The experimental and behavioural studies present clear evidence that cognitive distraction causes deterioration in driving performance. This confirms what the epidemiological studies also point to: that hands-free cellphone use while driving also poses a risk to safety.

### *2.1 Epidemiological Studies: Cellphone use and risk of accident*

In 1997, a seminal study undertook to evaluate the cellphone records of 699 individuals from the Toronto area who had been involved in non-injury traffic accidents. The study found that over 24 % of drivers had been using their cellphones within a 10 minute period preceding their accident.<sup>3</sup> Furthermore, even a brief period of cellphone use in the ten minute window resulted in a *quadrupling* (4.3-fold increase) of the risk of collision for drivers. This often cited study also noted that there was no decrease in the risk of accident for hands-free over hand-held cellphone use while operating a vehicle. In a more recent study conducted in 2005, the use of a cellphone was again found to pose high risk. In this study researchers analyzed data of drivers who owned or used cellphones and who had been involved in road crashes which necessitated hospital admission.<sup>4</sup> Based on the cellphone records of these injured drivers it concluded that the use of a cellphone up to ten minutes before a crash is associated with a *fourfold* increase in the likelihood of crashing. Again, the risk for accident increased irrespective of whether the cellphone used was a hand-held or a hands-free device. While some studies have found a more conservative link between collision risk and cellphone use while driving (see,<sup>5,6</sup>), it is important to note that the majority demonstrate at least a moderate increase in collision risk.

### *2.2 Cognitive Distraction: Experimental and Behavioural Studies*

The majority of the literature reports on controlled experimental and behavioural studies which examine the impact of cellphone use on the cognitive functions necessary for driving. These studies have confirmed the detrimental impact that cellphone use has on driving performance, whether it is in driving simulation experiments or in controlled driving task experiments. This section will discuss a representative sample from the literature as there are a myriad of studies, not all of which can be dealt with here. In 2007, brain researchers conducted a study using Functional Magnetic Resonance Imaging (*fMRI*) to investigate the impact of concurrent auditory language comprehension on the brain activity associated with a simulated driving task.<sup>7</sup> The auditory language comprehension component was designed to mimic listening to someone speaking on a cellphone. Changes in the subject's brain activity were monitored while they performed the driving task concurrent with the auditory component; this activity was then compared to *fMRI* imaging of the brain when driving without listening to the auditory component. The authors found that when language comprehension - through the sentence

listening task - is performed concurrent with driving it draws mental resources away from the areas of the brain which deal with driving tasks. Cortical activities in the regions of the brain associated with driving were reduced considerably by the listening task. This occurred despite the fact that the two tasks (driving and auditory comprehension) draw on different and non-overlapping cortical areas.

This finding is of particular interest because it demonstrates that mental resources are diverted due to mere auditory language comprehension tasks regardless of other tasks such as holding, dialing or even speaking on the phone. The sentence listening task is clearly less disruptive to driving than a real conversation on a cellphone would be as it does not involve talking or dialing; yet the cognitive distraction remains significant. What this study also shows is that the deterioration in driving performance occurs due to competition for mental resources at a central cognitive level rather than at the motor output or some other level. Holding the phone or dialing the phone is not necessary for the cognitive distraction to occur. This finding has implications for bans that only prohibit the use of hand-held cellphones. It suggests that the manual element of phone use is not the only, and likely not the most important factor contributing to driver distraction. The findings in this study also raise questions about the impact that a number of other common activities, such as listening to the radio or having an in-car conversation, might have on driving performance. Clearly it is safest to avoid any activity which draws our attention away from the road.

There are numerous other studies which seek to measure how cellphone use impacts elements of driving performance. One experiment found that the addition of a conversational task to a driving situation led to a large reduction in the subject's functional field of view.<sup>8</sup> When the functional field of view is diminished, drivers are at an increased risk of collision. Another visual field attention study conducted in Israel in 2004 reported that subjects in a driving simulation reacted slower to stimuli and performed tasks with considerably reduced precision on the road when using a cellphone.<sup>9</sup> A study published in the *Perceptual and Motor Skills* journal in 2006 found that the verbal and cognitive distraction caused by cellphone use impaired driving performance and skill in a host of categories including average driving speed, headway (maintenance of a safe distance between vehicles), collision rates and brake reaction time.<sup>10</sup> The higher the cognitive load involved in the dialogue, the more driving performance was negatively impacted (insufficient headway, higher collision rates, slower brake reaction time, etc.) Finally,

in simulated driving experiments published in the *Accident and Analysis Prevention* journal, researchers documented deterioration in four driving categories due to cellphone use: both traffic violations of various types and lapses in attention increased due to cellphone use while driving maintenance skills and response time suffered.<sup>11</sup>

### 2.3 Distraction with hands-free cell use

The evidence shows that both hands-free and hand-held cellphones pose a risk and the case is no different when it comes to cognitive distraction. One study from 2003 found considerable distraction effects from hands-free cell-phone use. It documented slower response times to light changes, more intense braking and a 15% increase in non-response to stoplights.<sup>12</sup> In its driving simulation tests, a 2004 study found that hands-free cellphone use caused drivers to be 18% slower to brake and take 17% longer to recover their speed. It also documented a twofold increase in rear-end collisions due to cellphone use.<sup>13</sup> A 2007 study from the *Accident Analysis and Prevention* journal showed that engaging in difficult cognitive tasks on hands-free cellphones caused a definite reduction in visual monitoring of mirrors and instruments with some drivers even resorting to abandoning them entirely.<sup>14</sup> The researchers also found evidence of increased prevalence of other unsafe tendencies during cellphone use, including fewer inspection glances at traffic lights and an increased tendency toward hard braking. Finally, another recent braking response study, this one of young drivers, found that both hand-held and hands-free cellphone use significantly slowed reaction times, movement times and total response times as compared to no use of cellphones.<sup>15</sup> Talking on a cellphone, regardless of whether it is hands-free or hand-held, was shown to reduce the speed at which the driver could process information.

Some studies have gone as far as suggesting that using a cellphone is as hazardous on a relative risk basis as driving with a blood alcohol level at the legal limit. A renowned study released in the *Human Factors* journal found that when driving conditions and time on driving tasks are controlled for, the impairments associated with cellphone use while driving can be as profound, albeit in different ways, than those associated with driving under the influence of alcohol.<sup>16</sup> The authors demonstrate that cellphone users are more likely than non cellphone users to miss critical traffic signals (traffic lights, brake lights etc.), are slower to respond to the signals that they do detect and are more likely to be involved in rear-end collisions. While driving at the legal limit deteriorates different driving functions, the authors argue that the cellphone

distraction is by no means less harmful. As has already been discussed, engaging conversations can negatively impact various cognitive functions needed to drive safely. A study published in the *Journal of Experimental Psychology* argues that even when cellphone users direct their gaze at objects such as traffic or brake lights they often fail to process what they are seeing because their attention is directed away from their external environment to an internal, cognitive context.<sup>17</sup> This phenomenon is described by the authors as ‘seeing without seeing.’ The eyes are open but the brain does not process what the eyes are seeing. This distraction impacts many elements of driving from recognizing signals, to critical reaction times and it is certainly arguable that the impairments are comparable to those caused by driving with the legal blood alcohol limit.

### **3.0 Jurisdictional responses**

As stated in the introduction, many countries, states and provinces have opted to address the risk of cellphone use when driving by instituting a ban. The OMA believes that it is helpful to understand what is being done in other jurisdictions in order to provide a measure of context for the recommendations which will follow in the concluding section.

#### *3.1 Canada*

Because this issue falls under provincial jurisdiction there has not been any federal legislative action in Canada. Physicians however have been very active in pushing for government action on this issue both at the provincial and national levels. The Canadian Medical Association (CMA) approved a policy motion in 2001 recommending “legislation prohibiting the use of phones when driving a motor vehicle.”<sup>18</sup> The motion was sent, by way of letter, to the federal, provincial, and territorial ministries of transportation. Newfoundland and Labrador banned the use of handheld cellphones while driving in 2003. The Newfoundland and Labrador Medical Association had been advocating a ban since 2001 and had passed a motion in 2002 in support of pressing the government to act to ban all forms, not just handheld, of cellphone use while driving.<sup>19</sup> Drivers caught on their cellphones in that province now face fines of up to \$180 per offence.

Doctors Nova Scotia called for its government to make the use of cellphones while driving illegal in the province. In December 2007, the government did just that. The law, which

went into effect April 1, makes it illegal for anyone to use hand-held cellphones or text messaging devices while driving. Hand-held cellphones can however be used to report an emergency situation. Doctors Nova Scotia publicly supports this law. During its 2007 annual general meeting the association voted to partner with like-minded organizations to lobby the government to ban the use of cellphones while driving. The association, in fact, suggested the legislation go a step farther and also ban the use of hands-free cellphones.<sup>20</sup> Drivers in Nova Scotia face a \$50 fine for talking into a hand-held phone or text messaging, \$100 for a second offence and \$200 for a third and subsequent offences. Quebec also recently instituted a cellphone ban which includes \$80 to \$100 tickets and the possibility of losing three demerit points.

### *3.2 Insight from recent bans in California and Washington*

Like in Canada, most bans outside of this country have targeted the use of hand-held cellphones and have not placed restrictions on the use of hands-free devices. In the United States, new bans came into effect on July 1<sup>st</sup>, 2008 in both Washington State and California. The Washington state ban is a so called secondary offence law. This means that police must first find that a driver is committing another offence like speeding or dangerous driving before they can be ticketed with the \$124 fine. This type of ban targets those drivers who are already engaging in collision-prone driving. In California the ban applies only to hand-held cellphones for drivers over eighteen but is a complete ban on any cellphone use for drivers under the age of eighteen. The ban is a relatively minor offence in California. Being caught with a cellphone behind the wheel brings a \$20 ticket for a first offence and no risk of losing points. The law does not ban dialing or texting on a phone but merely talking.

The ban in California however is being trumpeted by one study as having the potential to save 300 lives a year, an impressive 7% reduction from the 4000 or so killed every year in that state.<sup>21</sup> The Public Policy Institute of California conducted the study which looked at traffic fatalities, mobile phone ownership and hands-free laws across several states – New York, Connecticut, New Jersey, and Washington D.C. - to estimate how fatalities have changed since the institution of a ban in these states. While the study does not answer emphatically why laws permitting hands-free use reduce fatalities, its findings provide some interesting insight. The study found that mobile-phone ownership is associated with higher traffic fatality rates in bad

weather and on wet roads - the fatality rates were not statistically significant for other conditions, such as during normal or sunny weather. In general it found that a ten percentage point increase in mobile phone use raises the number of traffic accidents per mile driven by 2.1 %. The magnitude of this effect is equivalent to a 3.5-time increase in fatality risk when using the phone. In bad weather however, a ten percentage point increase in mobile phone use raises traffic fatalities by a considerable 11.5%. The study found that traffic fatalities in bad weather conditions have dropped between 30 and 60 percent since the laws banning hand-held use took effect.<sup>22</sup>

Data in this study pertaining to New York specifically showed that fatalities from collisions continued to fall nearly two years after the ban. Admittedly, this study's findings are limited by the fact that only New York had a hands-free law in effect for a significant period of time (since 2001) and therefore all of the data comes from a small number of states over a very short period of time. Importantly, this study did not find that the hands-free ban reduced overall fatality rates and the findings it did make, used to predict the 300 death reductions for the California ban, are not necessarily appropriate to be generalized.

#### **4.0 Conclusion:**

The OMA's review of literature on both behavioural and experimental studies demonstrates a strong association between cellphone use while driving and cognitive distraction which leads to deterioration in various driving performance measures and an increase in unsafe, collision-prone driving. The link between increased risk for collision and cellphone use is also supported by the epidemiological studies.

#### **5.0 OMA Recommendations:**

Based on this evidence, and in the interest of reducing vehicle collisions which threaten the health of all Ontarians, **the OMA recommends that the Ontario government take action to curb the use of cellphones while driving.**

Although this paper has focused on the evidence of driving while talking on the phone, it is clear that any activity such as dialing, typing or reading a text message or e-mail, or other activities that require motor-reliance or visual distraction are unsafe. Clearly, any task which

averts the drivers eyes to a cellphone or e-mail device, or requires the driver to take their hands off the wheel can increase risk. **The OMA recommends that activities such as dialing, texting and e-mailing be included in any government safety program or policy.**

The OMA believes that raising awareness about the risks associated with cellphones and driving is an important tool in discouraging the practice. At this point, there is little evidence that the practice is seen as dangerous or viewed in a negative light. While cellphone driving bans themselves have garnered significant media and public attention, raising public awareness must be an essential part of any campaign to reduce this practice in Ontario. **The OMA recommends that in addition to any legislative action, government and other interested parties sponsor a comprehensive public awareness campaign to inform the public about the risks of using cellphones and other hand-held devices while driving.**

In keeping with the importance of raising awareness, we believe it is particularly important that new drivers be educated about the risks of using a cellphone while driving. Thus **the OMA recommends that the government ensure that driving schools and driver education manuals include detailed sections about how cellphones and other hand-held devices decrease driving safety, in order to build awareness of this issue among the next generation of drivers.**

The OMA also believes that relevant private stakeholders take responsibility for improving awareness about the use of cellphones while driving. **The OMA recommends that informational and precautionary notices about the use of these devices while driving be provided by mobile communications companies with the purchase of any cellphone, headset or other hand-held device.**

Furthermore, **the OMA recommends that automobile manufacturers invest in promoting the safe use of cellphones and other hand held devices, in accordance with our findings, and include the cognitive dangers of talking on a hands-free device.**

Although beyond the realm of our investigation, it is important to note that there are many driving distractions that have nothing to do with the use of cellphones or other hand-held communications devices. The OMA is not suggesting that other manual and visual distractions (such as tuning the radio, searching for a missing piece of paper, or eating while driving) are risk free. Similarly, we accept that there are many cognitive distractions that have nothing to do with these devices. So, in the interest of overall improvements of road safety and in addition to our recommendations related to the use of cellphones, the **OMA recommends that drivers make every effort to reduce all visual, manual and cognitive distractions.** This may require the curtailment of distracting in-car conversations and waiting until you pull over to find an item that you have misplaced or to engage the children in the back seat.

OMA recognizes that there is a need for investigation into the impact that bans in other jurisdictions have had on the use of cellphones and similar devices while driving. We are also cognizant that enforcement of certain types of legislation can be challenging, but neither of these issues are within the realm of a physician's expertise. We believe it is the role of physicians to investigate the health impacts of societal activities, such as driving while using your phone, and to report these publicly. Sometimes the evidence is conclusive enough to require physicians to challenge the status quo and champion the health and safety of their patients by calling for legislative action. In this case the evidence is clear; driving while using a cellphone is dangerous to the driver, their passengers and others on or near the roadway.

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