

DRIVING: A MODIFIABLE RISK FACTOR THAT ACCELERATES THE JOURNEY TOWARDS POOR HEALTH

Introduction:

The COVID-19 pandemic and the stall it has placed on modern society has truly highlighted how reliant we have become on motorised transportation. Large amounts of time spent driving has become the daily norm for the majority of Irish people however the potential effects of this culture on our health is not well documented or understood ^[1]. We don't typically think about driving as the single most dangerous thing we do every day. For many of us, hopping into the car and travelling to work is second nature. However, the sobering statistics cannot be ignored when it comes to road traffic collisions and subsequent fatalities in Ireland ^[2,3]. According to the Irish Road Safety Authority (RSA), there were 130 fatal collisions on Irish roads in 2019 which resulted in a total of 141 deaths ^[2]. Of course, driving poses the obvious risks – things like getting distracted and running a red light, speeding or colliding with another driver however it's time for us to adopt Mary Ward's passion for the microscope and delve beyond the obvious to see the hidden burden that driving is placing on our health. There is a myriad of nuanced health issues arising from more drivers taking to the roads - an entire under-layer of unrecognised risks that can have a serious impact on health outcomes ^[3]. Increased levels of anxiety and stress, chronic pain, hearing loss, high blood pressure and obesity are among some of the serious health risks posed by road traffic ^[3]. All in all, perhaps we should be considering driving as one of the most pertinent determinants of health in modern day Ireland.

I am sure that everyone here is familiar with the term 'modifiable risk factors'. Many of us have heard these words being echoed through lecture halls and classrooms at some point throughout our healthcare education. The 2009 World Health Organization report identified the top six modifiable risk factors for mortality ^[4]. In terms of importance, they are ranked in the following order:

1. Hypertension (13% of deaths globally)
2. Smoking (9%)
3. Raised blood glucose (6%)
4. Physical inactivity (6%)
5. Obesity (5%)
6. Dyslipidaemia (5%)

Using these six factors as the framework of my essay, I am going to highlight how driving is contributing to a higher mortality risk. With over 2.5 million vehicles registered on Irish roads, the argument needs to be made that driving, as a lifestyle risk factor for public health may be contributing towards a significant proportion of our population flocking to A&E departments around the country.

Driving and Hypertension:

Hypertension is one of the most prevalent chronic diseases worldwide that has been identified as the leading risk factor for mortality according to the WHO ^[5, 6]. The International Society of Hypertension (ISH) have defined it as a systolic blood pressure (SBP) ≥ 140 mm Hg or a diastolic blood pressure (DBP) ≥ 90 mm Hg ^[7]. It is associated with a variety of cardiovascular, cerebral and renal conditions and also accounts for a huge economic cost to society ^[8 - 11]. Therefore, hypertension can be said to constitute a great public health and economic burden.

One million people in Ireland have high blood pressure however only 50% are aware of it ^[12]. Several studies have been carried out to suggest that a strong link exists between traffic exposure, stress and subsequent elevation in blood pressure. Exposure to peak traffic conditions causes an elevation in urinary catecholamines ^[13]. This is an indication of stress, thereby suggesting a link between traffic exposure, stress and blood pressure elevation. Stress is a negative state which involves various degrees of anxiety, fear and agitation and can induce changes in hormonal and cardiovascular activity which effects physical wellbeing. Chronic, stressful situations that cause repeated elevations in BP present a major risk factor for the development of hypertension ^[14]. Furthermore, in a heightened state of stress, one's usual range of abilities are diminished and the tendency for risk taking behaviour is also increased.

Clinically significant results were yielded from a study carried out in Lebanon on the relationship between traffic congestion and blood pressure elevation. They showed that exposure to traffic caused an increase of both systolic and diastolic BPs from an average of 123 mm Hg and 78 mm Hg to 142 mm Hg and 87 mm Hg, respectively ^[15]. The increase of SBP by 19 mm Hg and DBP by 9 mm Hg is clinically significant. Repetitive exposure to such a clinically significant stressor may eventually result in the development of hypertension ^[15]. In the same study, occupational drivers (mainly public transport drivers) had higher BP measurements compared with their counterparts regardless of their exposure to traffic congestion ^[15]. This finding supports the view that occupational driving, as a lifestyle/social factor may be contributing to the development of hypertension and subsequent poorer health in our population.

Uncontrolled hypertension can add a whirlwind of complications to one's health. Coronary artery disease, stroke/ TIA, dementia, cognitive impairment, glomerulosclerosis and retinopathy are just some examples of the undesirable effects of chronic high blood pressure. It is estimated that two thirds of strokes and almost half of all cases of ischemic heart disease are correlated with SBPs >115 mm Hg, a value considered to be within the normal range ^[16]. This points to the importance of maintaining pressures within a tight, controlled range and limiting one's exposure to stressful, highly emotive situations.

From the evidence, it is reasonable to propose that prolonged time spent in traffic can be associated with transient fluctuations in BP, thus manifesting itself as a major risk factor for the development of hypertension. In turn, this may directly increase the risk of mortality and so, I would not hesitate to conclude that mass-scale traffic congestion is a serious long term public health hazard.

What is the way forward? Technology to the rescue? Driverless cars are expected to be introduced into society within the next 20-30 years. Experts estimate that up to 90 percent of all traffic accidents can be avoided by removing humans from the driver seat ^[3]. Accidents caused by human error, drunk driving, speeding and disobeying traffic laws will be eliminated. Notwithstanding this, the potential benefits for improved driver satisfaction and health cannot be dismissed as the stress and anxiety associated with taking to the wheel will be eradicated by this advancement. These vehicles can be optimized to reduce stress-inducing traffic congestion and could be the key to wiping out traffic-related hypertension among Irish road users.

Driving and Smoking:

Tobacco use while driving is a major public health problem. Not only does it pose a substantial economic burden on the individuals who consume it but also on the healthcare system ^[17]. With worldwide tobacco-attributable deaths projected to be 8.3 million by 2030 ^[18], it is not surprising that smoking while driving is one of the factors that causes a large number of injuries and deaths worldwide.

The silent culture of tobacco-use whilst driving in Ireland has been made clear to me ever since commencing my clinical years of placement in our healthcare service. One quote that resonated with me came from a 60-year old gentleman with a 40 pack year history on the background of chronic COPD. When asked about the reasons behind his lengthy tobacco use, he admitted:

"The loneliness while driving on long journeys is what made me want to smoke".

The realization that such a routine part of everyday life for so many people (aka driving) is opening up the opportunity for a life of recurrent chest infections, dyspnoea and lung cancer struck me. It is an attitude and culture that needs to change, particularly among long distance drivers.

In order to tackle the problem, it is important to establish the factors that influence the behaviour of tobacco-use among the population of drivers in the first place. It is only then, that an effective tobacco control program can be implemented. In Lagos, Nigeria a cross sectional study was carried out to establish the reasons behind such behaviour among long distance drivers. Findings suggested that longer driving time was associated with higher odds for smoking, insufficient physical activity, short

sleep, obesity, and worse physical and mental health ^[19]. The associations consistently showed a dose-response pattern and more than 120 minutes of driving per day had the strongest and most consistent associations with the majority of outcomes ^[19]. Therefore, they could conclude that the overall prevalence of smoking among long distance drivers was high when compared to the general population. In Ireland, the volume of heavy goods vehicles (HGVs) on our roads is now greater than it was before the COVID-19 pandemic, according to the CSO. Therefore, more and more of our population are becoming vulnerable to the sedentary lifestyle encouraged by a life on the road. We need to recognize long distance drivers as an important target group for tobacco control interventions.

The health of the driver is not the only concern when it comes to tobacco use when behind the wheel. Various studies in Australia, Italy, Canada and the United States all consistently report evidence that smokers are at least 1.5 times more likely than non-smokers to have a motor vehicle crash ^[20]. Some researchers even report that smoking may be a greater distraction than the use of electronic devices and is therefore a considerable road risk. Frighteningly, this risk is also under-recognised by drivers themselves, according to a cross sectional study published in the 5th volume of the World Journal of Preventive Medicine, 2017. People were asked about their views, reports and perceptions on the behaviour of smoking while driving. From the figure below, we can see that the perceived risk of having an accident related to smoking while driving was quite low when compared to driving under the influence of alcohol/ speeding ^[21]. This mentality naturally lends itself towards more drivers taking up the habit of smoking and subsequently leading to increased road fatalities.

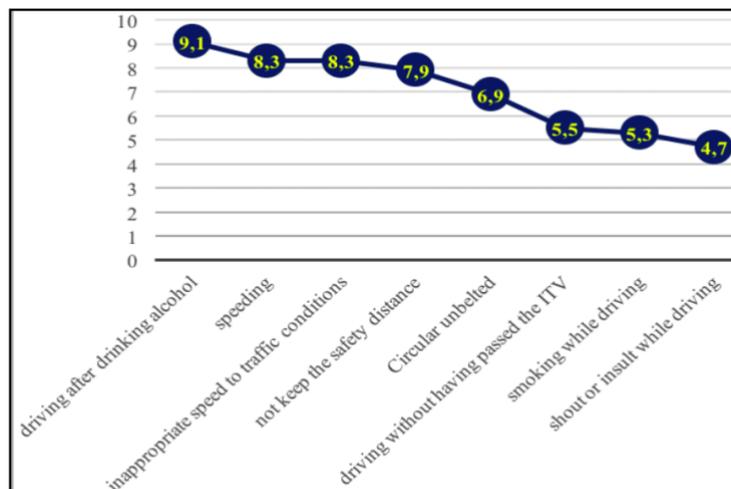


Figure 4. Perceived risk of accident related to smoking while driving and other specific misbehaviors [21]

Although measures have been put in place to try and tackle this problem, it still remains a concern. The introduction of the Children and Families Act, 2015 was a major step on the road to success. From January 1st 2016, it is now illegal to smoke in a car with a child (under age 18) in any kind of vehicle in Ireland however electronic cigarettes remain outside the scope of this ban. The reason behind this decision is not clearly understood, given the increasing health and safety concerns about such products. The aim of this movement was to protect the health of children by avoiding second hand smoke in small, enclosed spaces. However, I think it's time to protect the health of the entire nation and introduce a zero tolerance policy when it comes to smoking behind the wheel. According to the HSE's 2020 Smoking Prevalence Tracker half year infographic, 15.7% of our population are still smoking – 5.8% of which are e-cigarette users. Smoking while driving needs to be considered a public health problem by all levels in society to try and lower these numbers and promote a road safety culture that we all deserve.

Driving and hyperglycaemia:

Following on from the above, it is clear that road transport drivers are a key target group when it comes to promoting a healthier lifestyle amongst road users. Road transport drivers are among the professional groups whose activities have a strong impact on public safety. Passenger transport operations and truck

driving are closely associated with the responsibility for other people's lives and therefore optimal health in this group is needed to promote the highest standard of road safety across the country. In view of their professional activity, long distance drivers are at a higher risk of obesity and hypertension, thus indirectly, carbohydrate metabolism disorders such as diabetes [22]. According to the literature, having a greater number of risk factors for diabetes makes its development more probable [23-24]. These diseases not only increase the risk of traffic accidents but also account for higher rates of long-term sick leaves, partial or permanent disability for work and therefore contribute to a considerable economic burden [25].

According to Diabetes Ireland, the total number of people living here with diabetes is estimated to be 225,840 [26]. Unfortunately, there are no concrete studies in Ireland to evaluate whether the incidence of diabetes is higher among frequent road users. However, we can learn from other studies that have been carried out about the adverse health outcomes that can occur as a result of our over-dependence on driving as a means of transport.

One study in Poland investigated the selected risk factors for diabetes mellitus among road transport drivers and constructed a model management plan for drivers with hyperglycaemic status. In order to assess the prevalence of the risk factors for diabetes among this profession, they followed 570 drivers over the period 2001-2007 at an outpatient clinic of occupational medicine. According to their results, excessive body weight was recorded in 62.6% of the study population; 45.3% had overweight and 17.4% were diagnosed with obesity. Hypertension was noted in 36.7% of drivers and hyperglycaemia in 47.5% of cases [27]. Obesity is a factor predisposing to hypertension as supported by the four-fold higher incidence of elevated BP in subjects with excessive vs. normal body weight. This finding is consistent with the literature [28]. Furthermore, elevated BP values were significantly more common among hyperglycaemic subjects than those with normal blood glucose levels which is consistent with the results obtained by Ruprecht [29] who demonstrated a higher prevalence of hypertension in similar groups.

Spending so much time on the road can open up a vicious cycle of co-morbidities. It is easy to see that the sedentary lifestyle promoted by long distance driving correlates with a higher tendency to develop risk factors for diabetes. It is not uncommon to find these people in diabetes clinics around the country and so they must move to the top of our list when it comes to important target groups for better health promotion. These people are quite literally driving along the road to poor health and multiple co-morbidities.

Driving and Obesity/ Physical inactivity:

According to the WHO, Ireland is set to become the most obese country in Europe by 2030 [30]. With more drivers taking to the roads, this naturally lends itself to a sedentary lifestyle which in turn increases obesity rates. Not only does this pose a huge societal threat but also presents novel challenges for road safety.

Driving as a form of passive transportation by its nature does easily support a healthy lifestyle. It promotes higher rates of sedentary behaviour which in turn is associated with morbidity [31]. The adverse effects of car use on health outcomes has been well documented by the literature. One study showed that substantial car use (> 10 h per week) was associated with a 50% higher risk of cardiovascular disease mortality [33]. Other studies have found associations between car driving and higher rates of obesity [34-36]. Driving to work was associated with 13% higher odds of obesity [34] and driving > 120 min per day was associated with 78% higher odds of obesity [35]. Although these studies were not carried out in Ireland, the situation here barely differs. The prevalence of childhood obesity in Ireland is unacceptably high with approximately 1 in 5 primary school children overweight or obese. Obesity in childhood can lead to an increased risk of diabetes, hypertension, coronary heart disease and stroke in later life, medical consequences that are now presenting as early as adolescence as a result of chronic childhood obesity. In turn, this exponential trend will pose huge challenges for our healthcare system in the future if measures are not taken now to curb the ever growing problem.

According to the most recent census (2016), only 12.3% of the population travel to work by foot/bicycle. The remainder used motorized vehicles to reach their destination ^[32]. This trend in itself encourages an unhealthy lifestyle due to longer hours seated in one position, lack of opportunities for exercise and at times, poor eating options. Where have the days gone when our parents and grandparents cycled miles to get to work? Major interventions are required at government level to tackle this problem. More investment in safe road practices for pedestrians and cyclists, educational school visits and ramping up of our 'cycle to work' scheme are just some of the measures that we need to take to tackle the ever growing epidemic of overweight and obesity in our country. It is a chronic relapsing condition that requires imminent government action to protect the healthcare system from turmoil in the future and to do so, we need to recognise that excessive road use is a public health hazard that is adding to the problem.

Driving and Dyslipidaemia:

Atherosclerotic cardiovascular disease (CVD), typified by coronary heart disease (CHD) and stroke is a preeminent cause of preventable and premature mortality globally. It accounts for about 30% of global deaths ^[37]. This is expected to increase by almost 50% by 2030 ^[38]. It is also a major cause of mass disability and loss of productivity globally with over 150 million disability adjusted life years (DALYS) ^[39]. Driving is a behavioural risk factor that predisposes to metabolic abnormalities including dyslipidaemia and subsequently increases the risk of CVD.

Again, professional drivers are a group exposed to many cardiovascular risk factors secondary to non-systemic work hours, prolonged stress, low physical activity and irregular meals. In Nigeria, a study was carried out which proved that long distance, professional drivers are at a higher risk of CVD than the general population on account of the higher prevalence of risk factors they harbour; abnormal glucose profiles, overweight/ obesity, alcohol use, smoking and atherogenic dyslipidaemia. In this study, the prevalence of dyslipidaemia was 56.3%, predominantly elevated triglyceride levels in 27.8% of the subjects ^[40]. However, it was also noted that beyond these conventional risk factors for CVD, various driving related activities such as traffic congestion, ergonomic factors, long-distance driving, shift work and anxiety have also been implicated. These are known to cause various neuroendocrine and neurocardiological responses such as increased secretion of cortisol and catecholamines and decreased heart rate variability, which may also be possible mediators of CVD ^[41-42]. This finding nicely wraps up the argument that driving, as a behavioural risk factor contributes to each and every facet of premature mortality as outlined by the WHO.

There is therefore a need to increase CVD risk awareness in this vulnerable yet important segment of our population. A close collaboration with the patient's general practitioner (GP) is necessary. GPs should have some knowledge on the profession of their patients and should monitor the patients' health condition closely for the greater good of society. Good clinical practice at this level would be to establish systemic contacts with occupational medicine services to allow for the speedy exchange of patient data, especially in the light of any changes in the patient's health which may predispose them to an increased risk of a road traffic accident. Furthermore, through public awareness campaigns, banning of smoking, compulsory annual health screening, defined maximum driving hours per week and the provision of facilities to promote physical activity, the universal health of our occupational drivers may be improved.

Conclusion:

To make driving as safe as possible for all road users and thereby support the natural ethos of the National Office for Traffic Medicine, it is important to recognise the indirect strain that road traffic is placing on our health. In order to evaluate this properly, I would like to see more definite research conducted in Ireland on the driving population. For many people driving is as crucial as putting on a pair of shoes in the morning however, as a lifestyle factor it is actually contributing (indirectly) to mortality. The next time you are driving down the M50 think of it as a journey towards poorer health and perhaps, as a nation we can tackle and overcome the sedentary lifestyle and co-morbidities that have become synonymous with sitting in the driver's seat!

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