Improving Motor Vehicle Safety for Pregnant Women: A Call for Greater Awareness

Motor vehicle injuries are the leading traumatic cause of morbidity and mortality in pregnant women as well as the leading cause of traumatic fetal demise worldwide. Traumatic injuries affects between 6-7% of all pregnancies though the scale of the problem is likely to be greater due to a lack in standardized reporting. In the US alone there are approximately 92000 road traffic accidents involving pregnant women every year. In an article from the Center for Injury Research and control, Frank Weiss states that “more pregnant women die from intentional & unintentional injury than all “maternal mortality” related conditions combined and motor vehicles are probably the leading cause of pregnancy-associated maternal injury death.” In recent years, there has also been a growing awareness about the possible immediate and long-term effects for fetuses involved in road traffic accidents as well as a changing understanding of how pregnancy may make women more likely to be involved in a road traffic accident. Despite this, a significant proportion of pregnant drivers do not always employ safe driving habits throughout their pregnancy and only a fraction of pregnant women receive prenatal counseling from healthcare professionals regarding safe driving habits. Pregnant women drivers remain an understudied population in Ireland and worldwide. Greater awareness must be created in Ireland about this commonplace but important risk factor for the safety of Irish pregnant mothers as well as their fetuses.

In “Commentary on Safe Motherhood”, James Marks astutely notes that “what gets measured gets done”. One of the problems faced when discussing maternal morbidity and mortality from car crashes in Ireland is the fact that these statistics are not regularly collected and reviewed. The WHO defines maternal deaths as “the death of a women while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes”. Unlike maternal mortality due to medical and obstetric causes, which must be recorded in all Irish maternity hospitals, there is not readily available data concerning injury-related maternal deaths. This is despite US based studies showing that “about one-half of all female reproductive age deaths are due to injury and half of those are due to MV crashes”.

while Schiff et al. found that motor-vehicle injuries accounted for 70% of all injury-related deaths amongst pregnant women in a 6-year period in New Mexico. The types of injuries sustained are varied, ranging from minor contusions, dislocations and sprains all the way up to life threatening splenic and uterine ruptures as well as maternal death. Maternal outcomes of car crashes are dependent on the severity of the crash, gestational age at the time of crash as well use of seat belts and airbags.

Pregnancy can be considered as a period of heightened vulnerability not only for the growing fetus but also for the mother. A controversial question when discussing motor vehicle safety for pregnant women is whether being pregnant in and of itself can have a deleterious effect on driving. Currently, the WHO states that accidents that occur during pregnancy are coincidental and are not affected by the state of pregnancy. However, recent research has challenged this assumption. In an award-winning Ontario based study of 6922 crashes involving pregnant drivers, Redelmeier et al. discovered that pregnant women are 42% more likely to be involved in a car crash when compared against themselves in the three years prior to becoming pregnant. The peak rate of crashes was found to be in the first month of the second trimester and “this increased risk extended to diverse populations, varied obstetrical cases, and different crash characteristics”. Normal physiological changes that occur during pregnancy such as fatigue and problems focusing were suggested as explanations for the increased crash rates. Traditional driving advice: “avoid excessive speeds, signaling your turns, yielding right of way” are all ways to reduce this risk. Based on these findings, the Society of Obstetricians and Gynecologists in Canada are now considering including road safety advice in their prenatal guidelines, which would constitute a worldwide first.

Risk to the fetus is of evident importance when discussing RTA's involving pregnant women yet little is known about the long term effects of crashes on fetal outcomes. Motor vehicle injuries are the worldwide leading cause of fetal injury resulting from trauma, causing adverse events such as abruptio placenta, uterine rupture and premature labor and delivery. It is possible for the fetus to sustain major damage even in accidents where there is only minor maternal injury. The fetal mortality rate from road traffic accidents in a Swedish study was found to be over three times that of the maternal mortality rate. The high rates of fetal morbidity and mortality are
unsurprising considering the vulnerability of the fetus and its sensitivity to any changes in feto-maternal circulation. Even in cases where no harm is sustained to the mother, fetuses are at an increased risk for preterm labor, low birth weight and Infant Respiratory Distress Syndrome. Moreover, severity of fetal injury is not directly correlated with severity of maternal injury which can be exacerbated by the fact there is a risk of delayed presentation. Evidence suggests that there is a link between trauma sustained during RTAs and the incidence of Cerebral Palsy in neonates, a grave cause for concern. Direct acute injury, preterm labor and maternal hypotension have all been suggested as potential pathological mechanisms for hypoxic brain injury to the fetus. More research must be carried out in order to better determine the adverse outcomes of road traffic accidents on the fetus.

One of the problems faced in improving car safety for pregnant women is the lack of reliable accident simulation models and anthropometric information about the driving habits of pregnant women. Both anthropomorphic (crash-test dummies) and computer-generated simulations have been used to assess the effects of high impact on the gravid uterus, however, these simulations will not provide predictive information unless they accurately reflect the driving habits of pregnant women. Seat positioning is an example of an important contributing factor when assessing road traffic accidents involving pregnant women. F. Auireault et al. discovered that pregnant women have significantly altered body positioning particularly in the later stages of their pregnancy. This renders traditional biophysical crash models as inadequate for properly reflecting the driving experience of pregnant women. For example, prior to pregnancy the average distance between the steering wheel and abdomen of these women was found to be 16.8 ± 5.4cm, which fell significantly to 11.9± 4.1cm between 6-9 months gestation, indicating that the pregnant abdomen is far closer to the wheel than previous thought. The previous assumption was that pregnant women were making suitable adjustments to their seat positioning in order to maintain distance from the wheel. This assumption was based on controlled studies (Motozowa et al. 2008) of pregnant women’s seating positions in laboratory-controlled settings. Auireault found, perhaps unsurprisingly, that real driving habits varied significantly than those in the observed laboratory setting. This is a particularly worrying find considering that the distance between wheel and abdomen was found be of most importance when predicting fetal
morbidity and mortality. Real driving habits must be used when designing future accident simulation models in order to allow them to reliably predict accident outcomes. Moreover, these simulation models are used to design safety systems such as seatbelts and airbags for pregnant drivers, which are our primary safety interventions in motor vehicle accidents.

Airbags were originally designed to reduce injury and death in occupants of vehicles during road traffic accidents. While the benefits of airbags in the normal population have been well documented, their efficacy amongst the pregnant population is less well demonstrated. A problem with air bag use amongst pregnant women is the difficulty in maintaining the ten inches from the airbag recommended for safe deployment of the airbag. There is conflicting evidence on the use of airbags with several case reports documenting airbag deployment in a relatively minor motor vehicle accident causing extensive fetal brain injury, uterine rupture and placental abruption. In contrast, a Pennsylvanian case report review found that when used in conjunction with a seatbelt there is no significantly increased risk to the fetus. More research is required to determine whether airbags are of the same benefit to pregnant women as they are amongst the rest of the driving population.

Along with air bags, seat belts are one of the most important methods by which we reduce injury and death amongst vehicle occupants. Klinich et al. 2008 showed that proper use of restraints was the second most important factor resulting in an acceptable fetal outcome during a crash, with the first being low crash severity. Proper seat belt use prevents ejection from the vehicle with 33% of crashes that result in maternal ejection from the vehicle leading to demise of the mother. Moreover, 47% of crashes with maternal ejection from the vehicle resulted in fetal demise. Unbelted women are 2.8 times more likely to experience fetal death than belted women in car crashes. Despite this, a 2009 study (Jamjute et al. 2005) on driving habits amongst pregnant women in Northern Ireland discovered seatbelt use sits around at a surprisingly low 74.6%. Women who refrain from wearing seatbelts find them uncomfortable or fear that they will cause damage to the fetus. An even lower percentage of pregnant women (57.5%) demonstrated the correct use of the three-point system of seat belt restraint, which is widely considered the safest and most effective method. Lap-belt position, in which the seatbelt is placed over the body of the uterus, was demonstrated by over half of
respondents in the study. Considering that lap-belt position can be harmful to the fetus this demonstrates a worrying lack of proper education about correct driving habits.

Are midwives, general practitioners and obstetricians providing pregnant mothers with the correct counseling about correct seatbelt use and its importance? It would appear not, based on a survey of Northern Irish health care officials. Despite the clear evidence of the life-saving benefits of seatbelt use, the rate of pregnant women receiving advice from healthcare professionals was found to be as low as 22%, while 16% of health care providers demonstrated an incorrect knowledge of correct seat belt positioning. The majority of doctors (67.8%) and midwives (57.1%) only gave the information if the patient requested it. This is despite the many studies (Pearlman and Philips 1996; Johnson and Pring 2000) that suggest pregnant women who received information about correct seatbelt use were more likely to use one and to position it correctly. A 1-2 minute consultation involving a visual aid was all that was required to impart the necessary information. Considering the efficacy of seatbelt use in reducing maternal and fetal mortality, educational interventions for healthcare professionals in Irish hospitals and the primary care setting could be easily implemented to ensure that all Irish pregnant women have been counseled about appropriate seatbelt use.

So what can be done to improve the safety of Irish pregnant drivers? Firstly, there is a paucity of available data on the driving of pregnant women in the Republic of Ireland, which must be rectified in order to better serve the needs of our pregnant population. Important data that should be collected includes the number of road traffic accidents involving pregnant women each year in the Republic of Ireland, pregnant admissions to Irish emergency rooms, maternal and fetal outcomes from those pregnant women that are involved in road traffic accidents as well as their seat positioning and their use of seatbelts. Pregnant Irish mothers should be made aware of the dangers of unsafe driving habits as a routine part of their multi-disciplinary care during their pregnancy. National guidelines should be drawn up regarding prenatal counseling from obstetricians and midwives about safe driving habits and the need for extra vigilance while driving, particularly during the first month of the second trimester. As seen previously from the Northern Irish survey on seat belt usage, safe driving habits amongst the pregnant population are not universal and only a fraction of women are receiving routine
prenatal advice about correct driving habits. In Ireland, there are currently no national obstetric guidelines for prenatal counseling regarding safe driving habits and these are not routinely taught in obstetric or midwifery programmes. Modules on traffic medicine could be made a feature of both Obstetric and Midwifery programs in order to better educate healthcare professionals on correct driving habits, in particular, the correct employment of the three-point seat belt system.

In conclusion, the road safety of pregnant women should be made a public health priority and more funds allocated to research. Through greater awareness and simple educational interventions, it will be possible to maximize safety on Irish roads for pregnant women.


