

Your Insurance Matters by Cindy Angebrandt

Occupant Restraints and the Human Collision

Did you think that just because you decided not to wear your seat belt, you were the only one who was at risk in an accident? Besides being illegal, you are risking the lives of everyone else in your vehicle and even other people on the road.. Each year on average there are more than 650,000 crashes, 170,000 people injured and 3,200 killed. Since 1950, a staggering 180,000 Canadians have died on our roads. Increasing the use of occupant restraints by all Canadians is the most effective way of reducing the death toll on our highways. Using seat belts or child restraints will reduce the likelihood of being injured or killed in a traffic crash by 55 and 75 per cent respectively.

Life Space

The occupant space of your vehicle is like a protective box or cocoon. More and more this **life space** is designed and constructed to withstand the force of most impacts.

The **life space** is a safety system, the components of which are due in part to the safety standards and regulations developed by Transport Canada.

For example, air bags, energy absorbing steering columns, padded dashboards, reinforced beams and doors, stronger seats and anchorages, head restraints, etc., have all transformed today's automobile, light truck and van into a safer vehicle.

At the moment of a collision, these safety devices all work together to preserve the **life space** of the occupants.

In most collisions, the passenger compartment stays intact; injuries and fatalities occur when the unbelted occupant is thrown about inside or is ejected from the vehicle.

As such, your **life space** can only be safe if you wear your occupant restraint.

The Collision

Motor vehicle collisions have been studied extensively over the years in an effort to reduce the fatalities and injuries.

Through the use of ultra slow-motion film and precision instruments, these studies have provided much understanding of what happens to the vehicle and to the occupants during a crash.

The Vehicle Collision

A vehicle will stop abruptly when it hits a solid object. At an impact speed of 48km/h, the front of the vehicle crushes about 60cm and comes to a stop within one tenth of a second. The crushing of the front end serves as a cushion for the rest of the vehicle and helps absorb the shock of the collision. The passenger compartment (**life space**) comes to a more gradual stop than the front and usually remains undamaged.

The Human Collision

There are really two kinds of collisions within an accident. The first is the vehicle that hits something, buckles and bends, and comes to a stop.

The second and more important collision is the **human collision**, which occurs when people not wearing seat belts are thrown about inside the **life space** of the vehicle. It is the human collision that causes injury and death.

There are three principal ways of being injured or killed in a collision:

- *You hit something.
- *Something hits you.
- *You are ejected.

In each case, the force of the collision is exerted against the vital areas of the body such as the head, chest and abdomen. At 48 km/h, such a collision would be equal to a fall from a third floor window to the hard ground below. During a collision, the occupants move like projectiles toward the point of impact.

Types of Collisions

There are four common types of collisions:

- *Frontal collision
- *Side Impact
- *Rear collision
- *Rollover

Frontal Collisions

More than one third of all motor vehicle crashes are frontal collisions.

During these crashes, the front end will collapse, absorbing some of the crash energy. Meanwhile, inside the **life space**, all objects and unrestrained occupants move towards the point of impact. The unbelted driver will likely hit the steering wheel, while the unrestrained passenger in the front seat will hit the windshield and dashboard.

Passengers not using restraints in the rear seat will collide with the front occupants or crush them between the seat and the dashboard. At high speeds, a frontal collision can eject the unbelted occupants through the windshield. A seat belt or child restraint will prevent or minimize these **human collisions**.

Side Impacts

More than 40 per cent of all accidents are side impact collisions, and most occur at traffic intersections. Unlike in the frontal collision, the vehicle provides little structure to absorb the energy of a crash. As such, the side of the vehicle can buckle, reducing the occupant's **life space**. All unrestrained occupants will move to the side of the impact, often hitting one another with the full force of the collision. Drivers wearing seat belts are more likely to maintain control of their vehicles in a crash situation and so avoid another collision at an intersection. Although most fatalities are the result of side impacts, seat belts and tethered child restraints can still reduce the perilous nature of these collisions by limiting the severity of injuries and risks of death.

Rear Collisions

Upon impact in a rear collision, the occupants are thrust against the back of their seats. Head restraints (head rests to most drivers) play a more major role in minimizing neck injuries to the occupants in a rear collision. Seat belts prevent ejections.

Although head restraints provide a certain degree of comfort, they were installed as another measure of safety within the **life space** of the vehicle.

If your vehicle is equipped with adjustable head restraints, make sure they are set properly. The head restraint should never be positioned lower than the ear.

In a rear collision, unrestrained occupants rebound towards the front of the vehicle, causing injuries in the same way that would occur in a frontal collision.

If your seat belts are fastened and your head restraint is adjusted properly, the risk of **human collision** is reduced.

Rollovers

For the unrestrained occupant, the rollover is the most dangerous of collisions.

Although rollovers account for only 13 per cent of all accidents, they account for more than one out of every five persons killed in traffic collisions.

A rollover can happen at modest speeds. Ejection can often occur while the vehicle is flipping over and tossing the unbelted occupants about.

About 50 per cent of all passengers not using restraints suffer extensive injuries inside the vehicle before they are ejected.

In rollovers, seat belts and child restraints are key in reducing serious or fatal injuries.

Rollovers are the most dangerous of **human collisions**.

Occupant Restraints/Seat Belts

The combination lap and shoulder belt is your personal emergency brake that will reduce the potential of injury or death. It is the safety device that will help prevent the **human collision** in the **life space** of your vehicle.

Seat belts work because they hold you securely in place and distribute the force of an impact to the more solid areas of the body. The lap belt will help prevent the occupant from being thrown out of the vehicle, while allowing the lower body to absorb much of the force of the collision. The shoulder belt will provide extra protection in preventing injuries to the head and face. It helps avoid these injuries by restraining the upper part of the body.

The lap and shoulder belt is only effective if it is properly adjusted. The lap portion of the seat belt must be firmly adjusted as low as possible on the hips and not over the abdomen. Children 40 to 80 pounds need a booster seat so that the seat belts fit them correctly. Infants and toddlers need a child restraint suitable for their age and size. The shoulder belt must pass over the shoulder and fit snugly over the chest. The shoulder belt should never be worn under the arm. On impact, the pressure of the belt over the heart could cause a ruptured aorta.

Air bags are designed to supplement the protection provided by seat belts. They are not meant to take their place. These inflatable crash devices only offer protection in frontal collisions. They do not prevent injury or death in rollovers, or side and rear accidents. You should always wear your seat belt because air bags **do not stop** you from being thrown out of a vehicle.

Never ride in a vehicle with a baby or a small child on your lap. It is dangerous. In a frontal collision at 50 km/h, an unrestrained 25-pound child can be propelled against the dashboard or windshield with a force of 1200 pounds. Studies show that it is **impossible** to hold on to a child even if you are wearing a seat belt.

As the use of seat belts increases, research shows that those not wearing the restraints are **high-risk drivers**. Roadside surveys have consistently shown a correlation between the level of alcohol impairment and the non-use of seat belts. As the blood alcohol levels of drivers go up, the use of seat belts goes down. While a profile of high risk drivers will show that they drink and drive and don't wear seat belts, they also exhibit reckless driving habits such as speeding and tailgating. This group of drivers, which represents only a small percentage of the driving population, accounts for a significant number of all road fatalities.

What would it mean if everyone wore their seat belts? Transport Canada estimates that a 100 per cent wearing rate would result in an additional 300 lives saved a year in Canada. Road safety agencies are presently planning new enforcement and education initiatives to ensure the continued use of occupant restraints including child restraint devices.