pedestrian accidents - Your questions answered

- *Pedestrians are usually struck by the fronts of vehicles, rarely sides or rears*

- *Pedestrians are rarely 'run over', but are run under*

- *Adult pedestrians will suffer a head strike on the top of the bonnet or the windscreen - small children generally will not*

- *The speed of the striking vehicle can be calculated using standard equations, and new ones are available*

- *The new set of equations calculate a slightly higher speed than the previous equations*

- *Others methods for speed calculations are available but will give a wider range*

What's the sequence in pedestrian accidents?

Pedestrians are usually struck by the fronts of vehicles, rarely the side or rear. The first point of contact is therefore usually the pedestrian's legs with the front bumper. The next contact depends on the type of impacting vehicle, and the height of the pedestrian. With flat-fronted vehicles, Large Goods Vehicles for instance, the entire body above the bumper height will be struck simultaneously. With other vehicle types, the next point of contact will be the leading edge of the bonnet. The pedestrian may then angulate round so that their head moves towards the bonnet top, or the windscreen. This depends on their centre of gravity height compared to the leading edge of the bonnet, and speed of the striking vehicle. Children may very well not angulate towards the bonnet if their centre of gravity is below the leading edge of the bonnet, and they are simply projected ahead of the vehicle. During these contacts the pedestrian is accelerated to the speed of the vehicle. The vehicle is usually braking whilst the pedestrian continues at the original speed of the impacting vehicle and they don't decelerate until they strike the ground. Pedestrians are therefore usually found ahead of the vehicle when everything has come to rest.

How is speed of the vehicle calculated?

If the striking vehicle left skid marks then a simple skid to stop equation can be used ($v = \sqrt{2\mu g s}$). This requires knowing the coefficient of friction of the road surface via skid testing, or using known ranges for the surface type and condition. If skid marks are not available, then Pedestrian Throw Techniques can be used. This is the relationship between the distance that the pedestrian travelled during impact, and the speed of the vehicle. There are standard equations, universally accepted, which band the speed of the vehicle into a minimum and a maximum.

$$v_{min} = \sqrt{\frac{2\mu g s}{1+\mu^2}} \qquad v_{max} = \sqrt{2\mu g s}$$

In recent developments, Evans and Smith* took many pedestrian accidents in which the impact speed had been calculated from skid marks, and performed a best-fit analysis to the spread of data. From that they developed the following equations:

$$v_{min} = 3.03\sqrt{s} \qquad v = 3.58\sqrt{s} \pm 2.16$$

These equations do not take into account the coefficient of friction of the road surface. The reason they do not is because the authors found that using the entire range of coefficient of friction for the pedestrian on the roads surface made only a 3% difference in calculated speed of the vehicle.

The two different sets of equations produce almost identical minimum speed for the impacting vehicle, but the Evans and Smith maximum speed equation calculates about 10% higher than the corresponding other.

Calculating speed from skid marks or throw distance are always the preferred methods. Where the damage is located on the vehicle and the injuries sustained can be used, but these will have a greater range of possible speeds.

* Vehicle speed calculation from Pedestrian Throw Distance. Proc Instn Mech Engrs Vol 213 Part D

What about the speed of the pedestrian?

- *Distances travelled by the pedestrian can be used to calculate their speed*

If one has been able to calculate the speed of the striking vehicle, and where the pedestrian was struck and come to rest is known, then using the following will give the lateral speed of the pedestrian:

$$\text{Lateral speed of pedestrian} = \frac{\text{Lateral distance travelled} \times \text{speed of vehicle}}{\text{Longitudinal distance travelled}}$$

Similarly, the lateral and longitudinal distances between the first and last contact that the pedestrian made with the striking vehicle can be used to establish the likely speed of the pedestrian.

- *There is published data on travelling speeds of pedestrians, banded by age and sex*

If that is not possible, then one must refer to research performed on pedestrian travelling speeds. An American, Jerry Eubanks, has collected a lot of such data. The data is spilt into age and sex groups, and by travelling modes, i.e., walking, jogging and running. It is important, therefore, to know how the pedestrian was travelling, and this will usually only come from witnesses and involved party statements.

Similar research has been performed in the UK, but it is not nearly as extensive as the US data.

What information do I need in a pedestrian accident claim?

- *Try to have the vehicle preserved in its damaged state so it can be examined*

The most important information in pedestrian accidents is the point of impact, the rest positions of the pedestrian and the vehicle, and the damage to the vehicle. Scene evidence is usually only available in the police report, and the important factors will generally only have been recorded if an accident investigation office attended. The vehicle is an important source of information but it has often been repaired by the time that the case reaches a lawyer's desk, with the exception of criminal lawyers faced with a death by dangerous or careless driving case. If the vehicle has been repaired then efforts should be made to obtain any photographs that may exist of the vehicle in its damaged state.

- *If the vehicle is no longer available, try to obtain photographs*

Medical records for the pedestrian are often very useful. How a cruciate ligament was injured has been used to show that a pedestrian was facing a vehicle, and that information saved a driver from a dangerous driving charge.

Free initial discussion and assessment

- *Many of the principles in pedestrian accidents apply to cycling accidents*

If you wish to discuss any cases free of change, want to send a file for a free assessment, or want a quote or to instruct us, please use the contact details below.

With our compliments

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- *Medical records for the pedestrian is important and occasionally vital*