Injuries sustained by passengers travelling in the cargo area of light delivery vehicles

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Introduction. Despite its inherently dangerous nature, the practice of transporting passengers in the cargo area of light delivery vehicles (LDVs) is widespread in South Africa.

Objective. To review the patterns and outcome of injuries associated with events involving LDVs transporting passengers.

Methods. All patients presenting to the Pietermaritzburg Metropolitan Trauma Service in KwaZulu-Natal Province following an event in which they had been travelling in the cargo area of an LDV between January 2011 and December 2012 were included in the audit.

Results. A total of 66 patients were treated during the study period; 35% were children under the age of 18, and 90% were ejected from the LDV during the incident. The mean injury severity score (ISS) was 23. Collision events were associated with a higher mean ISS (33) than non-collision events (15) (p=0.008). The region most commonly injured was the head and neck, and 11% of victims sustained a permanent disability. The patients collectively spent 873 days in hospital and 70 days in an intensive care unit, and underwent 17 operations.

Conclusion. Transporting passengers in the cargo area of an LDV is dangerous, as ejection from the vehicle resulting from a collision is associated with significant morbidity and mortality. Legislative initiatives to prevent this practice are required as part of an ongoing comprehensive injury prevention programme.

Objective
This prospective audit describes the demographics of passengers injured while travelling in the back of LDVs, and the mechanism and spectrum of the injuries. It is intended that the data should inform public health interventions designed to prevent injury.

Setting
The Pietermaritzburg Trauma Service (PMTS) aims to provide resources and expertise, as well as strategic and political leadership in trauma care, to the city of Pietermaritzburg and the western rural health districts of KwaZulu-Natal Province (KZN). Pietermaritzburg is the capital of KZN and the largest city in the western part of the province. It has a population of 1,001,000 and is served by a tertiary hospital (Grey’s), a regional hospital (Edendale) and a district hospital (Northdale). There are three private hospitals in the city. Western KZN is predominantly rural, with a population of approximately two million people, and consists of four health districts.[14]

The Pietermaritzburg Trauma Registry
The PMTS runs a comprehensive electronic trauma registry:[14] Ethical approval to maintain an electronic medical registry system has been obtained (ethics no. BCA221/13 BREC UKZN). The registry is a hybrid electronic medical record system that directly captures data into the database during patient admission, during operations and on discharge. Specific ethical clearance was obtained for collecting clinical data on people injured as a result of travelling in the cargo area of an LDV (ethics no. BE 159/11).

Methods
All patients presenting to the PMTS between January 2011 and December 2012 following an accident when they had been travelling in the cargo area of an LDV were included in the study. The primary author (JBH) recorded demographic details and information on the mechanism and pattern of injury, and interviewed each patient included in the study. The trauma registry was also cross-checked for patients who met the inclusion criteria. When necessary, a telephonic interview was performed in conjunction with clinical record review. The data were analysed using a standard statistics package, with the assistance of a qualified statistician.

Definitions. A collision event involved a collision between an LDV and another vehicle or a stationary object. A non-collision event involved passengers being ejected from or falling out of an LDV without a collision.

Results
Sixty-six patients involved in 53 events were identified over the 2-year study period. There were 15 collision events, 28 non-collision events and ten events in which the mechanism was uncertain. For 30 of the 53 events, patients were able to state how many people had been in the back of the LDV with them. There were a total of 217 people in the back of 30 LDVs, an average of just over seven people per LDV. In 42 cases the time of the accident was verified: 35 events occurred during the day and seven at night. A total of 66 patients were treated by the PMTS following an event. There were 43 males (65.2%), the mean age of the patients was 20 years (range 1 - 60), and 23 (34.8%) were children under the age of 18 years. Of the 66 patients, 60 (90.9%) were ejected and four jumped from the vehicle, and two were not ejected. In two cases the LDV had a hard canopy over the cargo area with passengers inside. In one of these cases all three passengers were ejected despite the presence of the canopy, and in the other the patient sustained minor injuries while inside. In 35 cases the type of road was identified: eight patients were injured on gravel farm roads, 18 on secondary tar roads and nine on a highway. Thirty-eight events occurred during the summer and 28 during winter. Fig. 1 schematically describes the patient cohort.

Injury pattern and outcome
The mean injury severity score (ISS) was 23. Of the patients 59 were admitted and seven discharged. The mean hospital stay was 15 days, and 13 patients were admitted to an intensive care unit (ICU). All the patients requiring ICU admission had been ejected from the vehicle. The mean ICU stay was 5 days. Thirteen patients required a total of 17 operations. Thirty-eight patients sustained head and neck injuries, 17 had chest, pelvic and extremity injuries, 12 had abdominal injuries and eight had facial injuries (Table 1). Eleven patients died on the scene. Of the 66 patients who reached hospital, five died (7.6%) and seven (10.6%) sustained permanent disability including paraplegia and quadriplegia. The patients in the collision group had a mean ISS of 33, as opposed to 16 in the non-collision group (p=0.008). The mean ISS was 23 for patients who were ejected from the vehicle, 9 for those who jumped out and 5 for those who were not ejected. However, owing to the high rate of ejection this difference was not significant (p=0.223).

| Patients referred for inclusion | 69 |
| Patients excluded (fell off the back of a tractor) | n=3 |
| Patients included in analysis | n=66 |
| (n=53 accidents) |
| On enquiry – died at the scene | n=11 |
| Admitted | n=59 |
| Not admitted | n=7 |
| Died in hospital | n=5 |
| Permanently disabled | n=7 |

Fig. 1. Summary of data acquisition.
and an under-estimation of incidence, as mildly injured methodology may have led to an over-estimation of morbidity, included. This was mitigated by attempting to establish the died at the scene of the accident may therefore not have been not injured badly enough to be admitted to hospital or who identified at referral hospitals. Passengers who were either One of the limitations of the study is that the patients were Study limitations

Discussion
Our data indicate that travelling in the cargo area of an LDV is associated with significant risks. We found a high rate of ejection of passengers from the vehicle (90.9%), significantly higher than would be expected in RTCs involving closed sedan-type vehicles. Ejection from a vehicle is a significant mechanism of injury and associated with a diverse injury pattern and an increased risk of mortality and permanent disability.[15-19] In our cohort ejection was associated with a much higher mean ISS and an increased need for ICU admission compared with non-ejection. Collision events had a statistically significantly higher mean ISS than non-collision events.

Passengers involved in RTCs while travelling in the back of an LDV also have a significant chance of sustaining a devastating neurological injury – 10.6% of our patients (7/66) had permanent disability, including quadriplegia and paraplegia. The commonest region injured was the head and neck. This is consistent with the findings of other case series, which found the head and neck to be the most common region injured in incidents involving passengers travelling in the back of a flat-bed truck.[15,19] Although the head was the commonest site of injury, severe injuries to the torso, pelvis and long bones were also commonly sustained. Children and young men were the groups most affected. The majority of the events occurred during daylight hours, indicating that many children and young adults ride in the back of an LDV to get to school and to work.

The injuries resulted in significant costs to the healthcare system, amounting to a total of 873 days in hospital, including 70 days in an ICU, and 17 operations. The economic impact of these injuries to broader society is more difficult to quantify, but is probably significant.

Study limitations
One of the limitations of the study is that the patients were identified at referral hospitals. Passengers who were either not injured badly enough to be admitted to hospital or who died at the scene of the accident may therefore not have been included. This was mitigated by attempting to establish the number of casualties and deaths at each scene. However, this methodology may have led to an over-estimation of morbidity, as only the more severely injured patients came to hospital, and an under-estimation of incidence, as mildly injured passengers did not.

<table>
<thead>
<tr>
<th>Organ system</th>
<th>n</th>
<th>Mean AIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head and neck</td>
<td>38</td>
<td>3.1</td>
</tr>
<tr>
<td>Face</td>
<td>8</td>
<td>2.1</td>
</tr>
<tr>
<td>Chest</td>
<td>17</td>
<td>3.6</td>
</tr>
<tr>
<td>Abdomen</td>
<td>12</td>
<td>3.7</td>
</tr>
<tr>
<td>Pelvis and extremities</td>
<td>17</td>
<td>3.4</td>
</tr>
<tr>
<td>External</td>
<td>34</td>
<td>1.8</td>
</tr>
</tbody>
</table>

Interventions
The three primary interventions to prevent and reduce RTCs are engineering, education and legislation. Other than manufacturing double-cab vehicles to accommodate passengers inside the vehicle, little has been done to deal with the problem from an engineering point of view. Canopies do not offer significant protection, and occupants of enclosed cargo areas have a fatality risk 1.8 times higher than the occupants of the cab.[16,17,19] In our series, three of the four patients travelling in an LDV with a canopy were ejected. Although not statistically significant, this highlights the fact that canopies do not protect against ejection. Furthermore, the back of an LDV is a hard shell without seatbelts, airbags or protective padding, and patients are at risk of a ‘second collision’ even if they are not ejected, as demonstrated by one of the patients in our series.

Education is important, and should be targeted at school-children and their parents as well as young working people. Farm owners and labourers also need to be educated (eight of the injuries in our series occurred on farm roads). However, it has been demonstrated repeatedly that legislation is more effective than education alone in bringing about changes in behaviour, and the introduction of effective road safety legislation is one of the core principles laid out in the WHO Decade of Action campaign to reduce RTCs.[20,21]

The majority of the LDVs in our series were overloaded, with an average of just over seven people travelling in the cargo area of each vehicle in the cases for which information on numbers of passengers was available. LDVs are only licensed to carry two to three passengers. A driver carrying passengers in the back of an LDV can be fined for overloading, but this is rarely enforced. Nevertheless, preventing overloading alone will not be sufficient, and legislation that specifically prohibits travelling in the cargo area of an LDV may be necessary. The introduction of legislation to enforce the wearing of seatbelts and motorcycle helmets has had dramatic effects on road traffic-related mortality and morbidity, and it is hoped that this can be replicated by the introduction of legislation to prevent the transportation of passengers in the back of LDVs.[20,21]

Conclusion
Passengers travelling in the cargo areas of LDVs are particularly vulnerable in the event of a collision, and it is unsafe to transport passengers in this manner. Injuries sustained while travelling in the back of an LDV result in significant preventable morbidity and mortality. A multifaceted injury prevention programme must include educational initiatives and obtain legal sanction if it hopes to reduce road traffic-related mortality and morbidity.

REFERENCES


