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Little is known about trauma in the elderly in the developing world. This study compared injuries in older patients with those in younger adults in a Third World setting. This was a prospective observational study of trauma admissions to a tertiary hospital in Trinidad, comparing injury characteristics and patient outcomes in older versus younger adults. Falls were the most common mechanism of injury in the elderly, accounting for 71% of injuries. Older patients who fell sustained fractures more often and were most likely to injure the limbs and head. Elderly patients were more likely to be admitted to hospital. Trauma in the elderly in Trinidad is similar to that in the developed world. Public health measures in developing countries should be aimed at preventing falls in older persons. The burden of trauma in the elderly is likely to increase in developing countries as the population ages.

Methods
The study was a prospective observational study of all trauma patients presenting to the ED of San Fernando General Hospital over a 1-month period (from 1 May to 31 May 2009, inclusive). Patients were identified from the ED admissions register, from a dedicated trauma register kept in the ED and from the hospital mortuary register. Additional patient information (including age, sex, ethnicity, mechanism of injury, injury pattern and type of injury) was obtained from clinical records. ICD10 codes were determined for all injuries, and abbreviated injury scores were calculated from the ICD10 codes.

Results
During the study period, 1052 patients were entered into the study. Of these, 111 were aged 65 years or older and 941 were aged 18–64 years. There were significantly more female patients in the older age group of trauma patients (Table 1). The ratio of the two main ethnic groups (Indo-Trinidadian and Afro-Trinidadian) was the same in both age groups.

Overall, older patients were more likely to sustain more severe injuries (Table 2). This trend towards more severe injuries in older patients was observed in injuries to the head, chest and upper and lower limbs. With respect to...
Injuries sustained by all patients were similar in both age groups. However, within the subgroup of patients presenting after a fall, older patients were significantly more likely to suffer more than one injury. In younger adults, 233 (93%) suffered an isolated injury after a fall, whereas the number sustaining two or more injuries was 18 (7%). In older patients, these figures were 68 (86%) and 11 (14%), respectively (P = 0.006).

Older patients were significantly more likely to be admitted following trauma compared with younger trauma victims (51.4 vs. 42.9%; P = 0.005). The patterns of referral were also significantly different between older and younger trauma victims. Older trauma patients were more likely to be referred to orthopaedics or neurosurgery, whereas younger patients were more likely to be referred to ophthalmology or ENT (Table 1).

During the study period, a total of five patients presenting to the ED with trauma died before leaving the hospital with a history of trauma (Table 1). Apart from the relation between all trauma and injury pattern, a subgroup analysis of those patients sustaining falls was also undertaken, to identify any specific relation between falls, age group and anatomical injury. For patients who suffered falls, the most common injuries were lower limb (43% of young adult fallers vs. 35% of older fallers), upper limb (25 vs. 19%) or head injuries (17 vs. 26%) (P = 0.686). Older adults were significantly more likely to sustain fractures from their falls compared with younger adults (39 vs. 25%; P = 0.002).

The anatomical injuries sustained from all mechanisms of trauma were similar in both age groups (Table 1). Apart from the relation between all trauma and injury pattern, a subgroup analysis of those patients sustaining falls was also undertaken, to identify any specific relation between falls, age group and anatomical injury. For patients who suffered falls, the most common injuries were lower limb (43% of young adult fallers vs. 35% of older fallers), upper limb (25 vs. 19%) or head injuries (17 vs. 26%) (P = 0.686). Older adults were significantly more likely to sustain fractures from their falls compared with younger adults (39 vs. 25%; P = 0.002).

The number of injuries suffered by all patients was similar in both age groups. However, within the subgroup of patients presenting after a fall, older patients were significantly more likely to suffer more than one injury. In younger adults, 233 (93%) suffered an isolated injury after a fall, whereas the number sustaining two or more injuries was 18 (7%). In older patients, these figures were 68 (86%) and 11 (14%), respectively (P = 0.006).

Table 1  Demographics, mechanism of injury, injury pattern and outcome of patients presenting to the San Fernando general hospital with a history of trauma (n = 1052)

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Sex</th>
<th>AIS &lt; 3</th>
<th>AIS ≥ 3</th>
<th>Total</th>
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<tbody>
<tr>
<td>Total</td>
<td>941</td>
<td>111</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>636 (67.5)</td>
<td>49 (44.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>305 (32.5)</td>
<td>62 (55.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Afro-Trinidadian</td>
<td>387 (41.2)</td>
<td>43 (38.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indo-Trinidadian</td>
<td>445 (47.3)</td>
<td>57 (51.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mixed</td>
<td>101 (10.7)</td>
<td>5 (4.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>1 (0.1)</td>
<td>3 (2.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not recorded</td>
<td>7 (0.7)</td>
<td>3 (2.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site of injury</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total injuries</td>
<td>1314 (100)</td>
<td>141 (100)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Head</td>
<td>409 (31.1)</td>
<td>42 (29.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neck</td>
<td>56 (4.3)</td>
<td>6 (4.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chest</td>
<td>94 (7.2)</td>
<td>12 (8.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abdomen/back/pelvis</td>
<td>103 (7.8)</td>
<td>11 (7.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Upper limb</td>
<td>336 (26.5)</td>
<td>32 (22.7)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lower limb</td>
<td>316 (24.0)</td>
<td>38 (26.9)</td>
<td></td>
<td></td>
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<tr>
<td>Outcome</td>
<td></td>
<td></td>
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<tr>
<td>Discharged</td>
<td>533 (56.7)</td>
<td>53 (47.7)</td>
<td></td>
<td></td>
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<tr>
<td>Referred to specialist</td>
<td>404 (42.9)</td>
<td>57 (51.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Died</td>
<td>4 (0.4)</td>
<td>1 (0.9)</td>
<td></td>
<td></td>
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<tr>
<td>Referral patterns</td>
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<td></td>
</tr>
<tr>
<td>Total number referrals</td>
<td>404 (100)</td>
<td>57 (100)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Orthopaedics</td>
<td>195 (48.3)</td>
<td>37 (64.9)</td>
<td></td>
<td></td>
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<tr>
<td>Surgery</td>
<td>19 (4.7)</td>
<td>4 (7.0)</td>
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<td></td>
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<tr>
<td>Neurosurgery</td>
<td>50 (12.3)</td>
<td>11 (19.3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENT</td>
<td>42 (10.4)</td>
<td>3 (5.3)</td>
<td></td>
<td></td>
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<tr>
<td>Medicine</td>
<td>8 (2.0)</td>
<td>0 (0.0)</td>
<td></td>
<td></td>
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<tr>
<td>Ophthalmology</td>
<td>69 (17.1)</td>
<td>2 (3.5)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>21 (5.2)</td>
<td>0 (0.0)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 2  Distribution of abbreviated injury score by age group and anatomical region injured (n = 1455)

<table>
<thead>
<tr>
<th>Anatomical region</th>
<th>Age (years)</th>
<th>AIS &lt; 3</th>
<th>AIS ≥ 3</th>
<th>Total</th>
<th>P-value (Pearson χ²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Head (n = 451)</td>
<td>&lt; 65</td>
<td>381 (93.1)</td>
<td>28 (6.9)</td>
<td>409</td>
<td>P = 0.004</td>
</tr>
<tr>
<td></td>
<td>≥ 65</td>
<td>34 (81.0)</td>
<td>8 (19)</td>
<td>42</td>
<td></td>
</tr>
<tr>
<td>Neck (n = 62)</td>
<td>&lt; 65</td>
<td>50 (89.2)</td>
<td>6 (10.8)</td>
<td>56</td>
<td>P = 0.007</td>
</tr>
<tr>
<td></td>
<td>≥ 65</td>
<td>6 (100.0)</td>
<td>0 (0.0)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Chest (n = 106)</td>
<td>&lt; 65</td>
<td>87 (92.6)</td>
<td>7 (7.4)</td>
<td>94</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>≥ 65</td>
<td>9 (75)</td>
<td>3 (25)</td>
<td>12</td>
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<tr>
<td>Abdomen, back and pelvis (n = 114)</td>
<td>&lt; 65</td>
<td>92 (89.3)</td>
<td>11 (10.7)</td>
<td>103</td>
<td>P = 0.007</td>
</tr>
<tr>
<td></td>
<td>≥ 65</td>
<td>11 (100)</td>
<td>0 (0.0)</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>Upper limb (n = 368)</td>
<td>&lt; 65</td>
<td>331 (98.5)</td>
<td>5 (1.5)</td>
<td>336</td>
<td>P = 0.006</td>
</tr>
<tr>
<td></td>
<td>≥ 65</td>
<td>29 (90.6)</td>
<td>3 (9.4)</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Lower limb (n = 354)</td>
<td>&lt; 65</td>
<td>306 (96.8)</td>
<td>10 (3.2)</td>
<td>316</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>≥ 65</td>
<td>26 (68.4)</td>
<td>12 (31.6)</td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>All injuries (n = 1455)</td>
<td>&lt; 65</td>
<td>1247 (94.9)</td>
<td>67 (5.1)</td>
<td>1314</td>
<td>P &lt; 0.001</td>
</tr>
<tr>
<td></td>
<td>≥ 65</td>
<td>115 (81.3)</td>
<td>26 (18.2)</td>
<td>141</td>
<td></td>
</tr>
</tbody>
</table>
department, including four patients aged 18–64 years and one aged 65 or older. During this time, a further 16
patients were admitted to the mortuary with a primary
diagnosis of trauma. Of them, 14 were aged 18–64 and
two were aged 65 or older. These patients were a com-
bination of patients brought directly to the mortuary
following death before hospital admission and patients
who died on the wards after admission from the ED.

Discussion
In this study, the most common mechanism of injury in
older trauma patients presenting to the ED was falls, and
these patients were more likely to suffer injuries to their
lower limbs and head, sustain fractures and be admitted
to hospital. These findings are similar to those of other
studies on trauma in older patients [3,4,7]. However, falls
were more prevalent as a mechanism of injury in this
study compared with previous studies, in which they
accounted for between 64 and 70% of all elderly trauma
cases [3,4,8]. Motor vehicle crashes (MVCs) accounted
for less than 10% of elderly trauma cases, less than that
reported in other studies. For example, Gowing and Jain
[7] reported that 27% of elderly trauma cases were as a
result of MVC. This relatively low incidence of MVCs in
this study may indicate less independence in the elderly
population in Trinidad, reducing the opportunities for
involvement in MVC. This hypothesis is supported by
the finding in this study that older patients were more
likely to sustain their injuries at home.

There was no difference in injury patterns between older
and younger trauma patients in this study. Injuries to the
limbs and head were most prominent, followed by inju-
ries to the chest. These patterns have been seen in other
studies [3,4,7,8].

The higher incidence of fractures and multiple injuries
after falls in elderly patients seen in this study has been
documented previously. Spaniolas et al. [9] found an
increased mortality following falls in the elderly, and both
lower limb fractures and intracranial haematomas were
common. Other studies have found increased injury
severity, despite less severe mechanisms of injury in the
elderly – a pattern that was also noted in this study [7,8,
10].

There was a higher admission rate in our elderly patients,
a phenomenon noted by other authors. The greater
demand on healthcare resources caused by elderly
trauma is of concern in Third World economies with
limited resources [5,8]. This burden is set to increase and
needs careful management. In our study, the referral
patterns for older patients also coincided with their
injuries. Older trauma patients were most likely to be
referred to either the orthopaedic or neurosurgical ser-
vice, as these were the most common injuries they
suffered. Younger adults were more likely to be referred
to ophthalmology/ENT because of the prevalence of
corneal foreign bodies sustained at work.

Unfortunately, the data on trauma mortality presented in
this paper are unlikely to reflect the true mortality rates
for trauma in the population studied. On the one hand,
deaths occurring in the ED are likely to be an under-
estimation of the total number of deaths in trauma
patients (as some would have died following transfer
from the ED). In contrast, trauma-related deaths identi-
fied from mortuary records are a combination of ward
deaths, deaths from the ED and deaths from out of
hospital (which would have included some deaths from
outside of the catchment area of this study). As such,
mortality rates quoted in the results section should be
interpreted with caution.

This study provided a useful insight into trauma in older
patients in Trinidad. However, it was a single-centre
study conducted over a restricted time frame (1 month).
This may have biased results, although the hospital sur-
veyed serves a catchment area that broadly reflects the
population makeup of the island as a whole. In addition,
there is little seasonal variation in temperature and
weather in this tropical setting, and thus temporal varia-
tions in trauma are less likely compared with a temperate
country. Further research is planned into the underlying
risk factors for falls in elderly patients in Trinidad.

The study demonstrates a need for public education
campaigns for the prevention of falls in the elderly in
Trinidad, which may be applicable to other similar
settings.

Acknowledgements
Conflicts of interest
There are no conflicts of interest.

References
www.un.org/esa/population/publications/worldageing2050/Executive-
2 World Health Organisation. Trinidad and Tobago health situation analysis and
trends summary. Available at: http://www.tpho.org/English/DDAIS/cp_.
3 Howard JK, Oraskovich MR, Copass MK, Carrico CJ. Geriatric trauma: injury
4 Clement N, Tennant C, Muwangwa C. Polytrauma in the elderly: predictors of
the cause and time of death. Scand J Trauma Resusc Emerg Med 2010;
18:26.
risk trauma in older adults in Hong Kong: a multicentre study. Injury 2008;
39:1034–1041.
6 Broska CA Jr, de Folchini AB, de Ruediger RR. Comparative study of trauma
in the elderly and non-elderly patients in a University Hospital in Curitiba. Rev
7 Gowing R, Jain M. Injury patterns and outcomes associated with elderly
8 Atiken LM, Burmeister E, Lang J, Chaboyer W, Richmond TS. Characteristics
9 Spaniolas K, Cheng JD, Gestring ML, Sangosanya A, Stassen NA,
Bankey PE. Ground level falls are associated with significant mortality in
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<td>Please provide the postal code for the correspondence address.</td>
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