A model of prehospital trauma training for lay persons devised in Africa
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Objectives: Few low income countries have emergency medical services to provide prehospital medical care and transport to road traffic crash casualties. In Ghana most roadway casualties receive care and transport to the hospital from taxi, bus, or truck drivers. This study reports the methods used to devise a model for prehospital trauma training for commercial drivers in Ghana.

Methods: Over 300 commercial drivers attended a first aid and rescue course designed specifically for roadway trauma and geared to a low education level. The training programme has been evaluated twice at one and two year intervals by interviewing both trained and untrained drivers with regard to their experiences with injured persons. In conjunction with a review of prehospital care literature, lessons learnt from the evaluations were used in the revision of the training model.

Results: Control of external haemorrhage was quickly learnt and used appropriately by the drivers. Areas identified needing emphasis in future trainings included consistent use of universal precautions and protection of airways in unconscious persons using the recovery position.

Conclusion: In low income countries, prehospital trauma care for roadway casualties can be improved by training laypersons already involved in prehospital transport and care. Training should be locally devised, evidence-based, educationally appropriate, and focus on practical demonstrations.

Road traffic injuries, already a major cause of death and disability in developing countries, are forecasted to increase as these countries become increasingly motorised.1 2 A large comparative trauma study found that 51% of all severely injured persons in a large city in the west African country of Ghana died in the prehospital setting, in comparison with 21% in Seattle, United States.3 This suggests that improvements in prehospital care in Ghana could potentially have an important impact on decreasing the mortality of critically injured roadway casualties. Most countries in the developing world, such as Ghana, do not have emergency medical services (EMS) to render prehospital care to roadway casualties. The absence of formal EMS necessitates innovative and low cost solutions be devised to meet the growing need for prehospital trauma care in such countries.

In Ghana, the vast majority of traumatic casualties are transported to the hospital in taxis or minibuses.4 It has also been reported that taxi and bus drivers regularly arrive at traffic crash sites while either injured vehicle occupants or pedestrians are still present, and usually participate in the care and/or transport of such casualties.5 As commercial drivers play such a prominent part in the transport and care of crash casualties, it was hypothesised that if properly trained, these drivers could significantly improve prehospital trauma care.

In 1998, a pilot project was launched for the training over 300 Ghanaian commercial drivers in basic rescue, first aid, and transport of injured persons. The training model was based loosely on other models of first training in developed countries, but tailored for the specific circumstances and resources of a developing one. This training programme was formally evaluated twice, at one and two year intervals. Based on information from these two evaluations and continued courses, the training model and course curriculum have been revised in an effort to maximise first aid skills that can be effectively imparted.

This article reports the methods in formulation and the resulting model of prehospital trauma training of laypersons in a less resourced country.

Methods

The designing of a prehospital trauma course for laypersons in a developing country presented three major challenges: (1) identifying the prehospital interventions that had the highest possibly of changing outcomes of injured persons, (2) finding methods in which such interventions would be taught to persons of low educational background in a short period of time, and (3) tailoring such training to the specific needs and resources of the local environment.

Medline, the Cochrane Library, and various texts on prehospital care and wilderness medicine were queried to identify both high yield and low tech prehospital interventions.6–13 Three methods were used to convey these skills to drivers for whom no assumptions of literacy were made: didactic lectures in native language with visual diagrams, stations where students practised skills on each other, and viewing first aid videos produced by the American Red Cross in English.

Several Ghanaian institutions (a university, Ministry of Health, Ghana Red Cross, and a commercial driver’s union) worked together to organise and conduct the training courses in 1998. Under oversight of local physicians and direct supervision of an emergency medical technician, local nurses and Red Cross first aid instructors taught a total of 335 drivers during 13 separate course sessions in 1998, each one lasting about six hours. The financial cost (about $3 per student) of the course was covered with resources and volunteerism provided by the institutions involved.

One year after the initial courses, drivers who had participated in the training were interviewed regarding the frequency of first aid manoeuvres.14 Two years after the training some of the trained as well as untrained drivers were interviewed regarding the specific nature quality of first aid manoeuvres.15 This study was approved by the Ministry of Health.
While validating the overall effectiveness of the training, the methods of instruction, hands on practice of skills proved to be the most effective manner to convey skills to drivers. Based on the two training evaluations, local expertise, and from interviews warranting emphasis included, the training should be targeted to lay persons who have a high likelihood of coming across and transporting injured persons.

The two areas in which it seemed that the drivers could make the greatest difference in prehospital mortality were protecting airway from obstruction or aspiration and control of extrication equipment. Interviews with untrained drivers who had transported injured persons to hospital identified several instances where casualties were reported to have exsanguinated while being transported to the hospital where no attempts were made to control external haemorrhage. Furthermore, none of the untrained drivers interviewed recognised the importance of maintaining an open airway. Other training areas identified by local surgeons, first aid experts, and from interviews warranting emphasis included, scene management, universal precautions, extrication, splinting, transport, triage, and moving of casualties.

The most important deviation of this course from other common forms of prehospital trauma training pertains to spinal immobilisation. Strict cervical spine immobilisation is considered of paramount importance in the prehospital environment in the developed world despite the lack of scientific data.16 17 During long transports to hospitals, in an environment lacking airway equipment and little hope of close monitoring, the simultaneous management of the airway and strict immobilisation of the spine in the supine position would not be possible. Hence the use of the recovery position (lateral decubitus) to protect the airway was emphasised. Simple spinal precautions were taught, such as gentle handling and avoidance of excessive movement of the neck and back during extrication and transport. Several large studies validate the prioritisation of airway protection over stringent mass casualty protocols impractical.18-20

**CONCLUSION**

By combining local input and evidence based sources, models of training can be devised to improve prehospital trauma care rendered to roadway casualties in low income countries. Such training should be targeted to lay persons who have a high likelihood of coming across and transporting injured persons. The training should be hands on in nature, educationally appropriate, and flexible to change as evaluations warrant. To maintain the quality of skills gained, lay persons need to attend periodic refresher trainings.

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**Table 1** Components of prehospital trauma course

<table>
<thead>
<tr>
<th>Area of emphasis</th>
<th>Major components</th>
<th>Modification from standard developed world EMS protocols</th>
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<tbody>
<tr>
<td>Scene management</td>
<td>Leadership and delegation to insure management of traffic, fuel leaks, fires, crowds</td>
<td>No Hazmat equipment</td>
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<tr>
<td>Universal precautions</td>
<td>Protection from blood and other bodily fluids practised during all skill stations Evaluate and safely disentangle casualties entrapped in vehicle wreckage</td>
<td>Training in use of improvised barriers such as plastic bags Without hydraulic spreaders and ‘jaws of life’, improvised tools such as car jacks and pry bars encouraged</td>
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<tr>
<td>Extrication</td>
<td></td>
<td></td>
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<tr>
<td>Moving casualties</td>
<td>Maintaining stability of cervical spine while carrying and moving unconscious or non-ambulatory casualties by using many persons working together under direction of a trained rescuer</td>
<td>Without backboards or cervical collars, a rolled blanket placed around the neck, crossed at the chest with ends under the axilla was practised and recommended</td>
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<tr>
<td>Primary survey</td>
<td>Use of ‘ABCs’ method for rapid evaluation for life threatening injuries. Recovery position (lateral decubitus) emphasised for airway protection</td>
<td>Cardiopulmonary resuscitation CPR excluded secondary to negligible value in trauma resuscitation</td>
</tr>
<tr>
<td>Splinting</td>
<td>Students practised the application of soft and rigid splints on upper and lower extremities to immobilise fractures</td>
<td>Use of improvised splinting materials such as branches, towels, blankets practised and emphasised</td>
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<tr>
<td>Triage</td>
<td>Prioritise casualty care by designating casualties as immediate, urgent, walking, wounded or non-salvageable</td>
<td>Informal nature of prehospital care made stringent mass casualty protocols impractical</td>
</tr>
<tr>
<td>Transport</td>
<td>Drivers were warned against driving casualties to the hospital at excessive speeds and practised placing casualties in the recovery position in their vehicles</td>
<td>Deceased ability to monitor casualties during transport made use of recovery position in unconscious casualties imperative</td>
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<tr>
<td>First aid kit</td>
<td>Drivers were encouraged to assemble an inexpensive first aid kit [gloves, bandages, a blanket, splinting materials, extrication equipment) of readily available materials to keep in their vehicles</td>
<td>Items such as cervical collars, airway adjuncts, and commercial splints excluded due to cost and unavailability</td>
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**RESULTS**

Based on the two training evaluations, local expertise, and evidence from the medical literature an updated course curriculum has been devised (table 1). With regard to methods of instruction, hands on practice of skills proved to be the most effective manner to convey skills to drivers. While validating the overall effectiveness of the training, the evaluations also identified areas of the training that needed revision, most importantly in regards to consistent use of universal precautions and airway protection.

The two areas in which it seemed that the drivers could make the greatest difference in prehospital mortality were protecting airway from obstruction or aspiration and control of extrication equipment. Interviews with untrained drivers who had transported injured persons to hospital identified several instances where casualties were reported to have exsanguinated while being transported to the hospital where no attempts were made to control external haemorrhage. Furthermore, none of the untrained drivers interviewed recognised the importance of maintaining an open airway. Other training areas identified by local surgeons, first aid experts, and from interviews warranting emphasis included, scene management, universal precautions, extrication, splinting, transport, triage, and moving of casualties.

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Financing and creating continued incentives for participation in training are important challenges that must be resolved to ensure that the gains of such programmes are sustainable.

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Please see the journal web site for photographs of the training sessions undertaken by the participants in this study (http://www.emjonline.com/supplemental).

References