

PREHOSPITAL CARE

A model of prehospital trauma training for lay persons devised in Africa

M A Tiska, M Adu-Ampofo, G Boakye, L Tuuli, C N Mock

Emerg Med J 2004;21:237–239. doi: 10.1136/emj.2002.002097

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 possibility 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.

Table 1 Components of prehospital trauma course

Area of emphasis	Major components	Modification from standard developed world EMS protocols
Scene management	Leadership and delegation to insure management of traffic, fuel leaks, fires, crowds	No Hazmat equipment
Universal precautions Extrication	Protection from blood and other bodily fluids practised during all skill stations Evaluate and safely disentangle casualties entrapped in vehicle wreckage	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
Moving casualties	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	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
Primary survey	Use of "ABCs" method for rapid evaluation for life threatening injuries. Recovery position (lateral decubitus) emphasised for airway protection	Cardiopulmonary resuscitation CPR excluded secondary to negligible value in trauma resuscitation
Splinting	Students practised the application of soft and rigid splints on upper and lower extremities to immobilise fractures	Use of improvised splinting materials such as branches, towels, blankets practised and emphasised
Triage	Prioritise casualty care by designating casualties as immediate, urgent, walking wounded or non-salvageable	Informal nature of prehospital care made stringent mass casualty protocols impractical
Transport	Drivers were warned against driving casualties to the hospital at excessive speeds and practised placing casualties in the recovery position in their vehicles	Decreased ability to monitor casualties during transport made use of recovery position in unconscious casualties imperative
First aid kit	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	Items such as cervical collars, airway adjuncts, and commercial splints excluded due to cost and unavailability

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 external haemorrhage. 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 while 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 supine immobilisation by reporting that the incidence of unstable cervical fractures to be only 2% to 3% in blunt trauma patients with decreased level of consciousness who would be at high risk of airway obstruction.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.

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.

ACKNOWLEDGEMENTS

With regard to the training project and its evaluation, acknowledgements are due to G W Brobby, the dean of School for Medical Sciences at Kwame Nkrumah University of Science and Technology in Ghana, for his approval of this project. Professor Lawrence Addae-Mensah, head of the department of surgery affiliated with the university also deserves thanks for use of his department's staff and resources. Several nurses affiliated with Holy Family Hospital in Berekum, notably Kennedy Obeng, served as instructors. Much credit for their voluntary support and expertise goes to officials and volunteers of the Ghana Red Cross, including Secretary General A Gyedu-Adomako, Ashanti Secretary Francis Obeng, and the many voluntary first aid instructors that assisted in both implementation and evaluation of the project. Yaw Owusu, Chairman of the Ashanti Ghana Private Road Transport Union (GPRTU) enthusiastically provided drivers and significant logistical and monetary support for the training. We also acknowledge the many commercial drivers who volunteered their time to take this training course. Officials from the Ghana Ministry of Health should be recognised for their approval and assistance with the project.



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

Authors' affiliations

M A Tiska, School of Public Health, George Washington University, Washington, USA

M Adu-Ampofo, G Boakye, L Tuuli, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

C N Mock, Harborview Injury Prevention and Research Center, University of Washington, Seattle, USA

Correspondence to: M Tiska, 3345 N Street, Sacramento, 95816, USA; riskababy@yahoo.com

Accepted for publication 1 May 2003

REFERENCES

- 1 **Murray CJ**, Lopez A. *The global burden of disease*. Vol 1. A comprehensive assessment of mortality and disability from diseases, injuries and risk factors in 1990 and projected to 2020. Cambridge: Harvard University Press, 1996.
- 2 **O'Neill B**, Mohan D. Reducing motor vehicle crash deaths and injuries in newly motorising countries. *BMJ* 2002;**324**:1142–5.
- 3 **Mock CN**, Jurkovich GJ, nii-Amon-Kotei D, *et al*. Trauma mortality patterns in three nations at different economic levels: implications for global trauma system development. *J Trauma* 1998;**44**:804–14.
- 4 **Forjuoh S**, Mock CN, Freidman D, *et al*. Transport of the injured to hospitals in Ghana: the need to strengthen the practice of trauma care. *Pre-hospital Immediate Care* 1999;**3**:66–70.
- 5 **Tiska M**, Mock CN, Adu-Ampofo M, *et al*. The involvement of commercial drivers in prehospital first aid in Ghana: a potential building block in emergency medical system development. 5th World conference on injury prevention and control, New Delhi, India, 2000.
- 6 **Campbell JE**. *BTLIS: basic trauma life support for the EMT-B and first responder*. 3rd edn. New Jersey: Brady, 2000.
- 7 **McSwain NE**. *PHTLS: basic and advanced prehospital trauma life support*, 4th edn. St Louis: Mosby, 1999.
- 8 **Henry MC**, Stapleton ER. *EMT: prehospital care*. Philadelphia: WB Saunders, 1992.
- 9 **Werner D**. *Where there is no doctor: a village health care handbook*. Palo Alto: Hesperian Foundation, 1994.
- 10 **Varghese M**, Mohan P. *When someone is hurt: a first aid guide for laypersons and community workers*. New Delhi: The Other Media Communication Private Ltd, 1998.
- 11 **National Safety Council**, Wilderness Medical Society. *Wilderness first aid: emergency care for remote locations*. Boston: Jones and Bartlett, 1998.
- 12 **Schimelpfenig T**, Lindsey L. *NOLS wilderness first aid*. Wyoming: National Outdoor Leadership School, 1991.
- 13 **Isaac J**, Goth P. *The outward bound wilderness first-aid handbook*. New York: Lyons and Burford, 1991.
- 14 **Mock CN**, Tiska M, Adu-Ampofo M, *et al*. Improvements in prehospital trauma care in an African country with no formal emergency medical services. *J Trauma* 2002;**53**:90–7.
- 15 **Tiska MA**, Tuuli L, Adu-Ampofo M, *et al*. Where there is no ambulance: an assessment of first aid rendered by commercial drivers in Ghana. Sixth world conference of injury prevention and control, Montreal, Canada, May 2002:1059–60.
- 16 **Kwan I**, Bunn F, Roberts I. Spinal immobilisation for trauma patients. *Cochrane Library*, Issue 2. Oxford: Update Software, 2002.
- 17 **Hauswald M**, Ong G Tandberg D, Omar Z. Out-of-hospital spinal immobilization: its effect on neurologic injury. *Acad Emerg Med* 1998;**5**:214–19.
- 18 **Hills MW**, Deane SA. Head injury and facial injury: Is there an increased risk of cervical spine injury? *J Trauma* 1993;**34**:549–54.
- 19 **O'Malley KF**, Ross SE. The incidence of injury to the cervical spine in patients with craniocerebral injury. *J Trauma* 1988;**28**:1476–8.
- 20 **Holly LT**, Kelly DF, Counelis GJ, *et al*. Cervical spine trauma associated with moderate and severe head injury: incidence, risk factors, and injury characteristics. *J Neurosurg* 2002;**96**:285–91.