ORIGINAL ARTICLE

Preparing to manage the injury burden of Bihar

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Abstract

Introduction: Trauma care in Bihar is beset by a number of problems namely lack of funds, one of the highest population densities in the country, far flung flood prone areas that remain inaccessible to healthcare for several months of an year, lack of formal pre-hospital care services and an organized system of trauma care. EMS services are run by many different organizations such as government, police, fire, hospital or private organizations. There is lack of coordination between these organizations. First response to the injured is very often provided by the police who tend to transfer the patient to the nearest government health care centre. There is no linkage with hospital trauma services. **Methods:** Participants from the Bihar police and Bihar health services were nominated by the government of Bihar. One hundred fifty one participants were imparted a 3 day training that included basics for managing airway, breathing, circulation, extrication, fractures, and spine injuries. Incident management, approach to mass casualty and safe transport were also part of the curriculum. All participants were required to take a pre-test before the training, a post test at the end of the training and another post-test after 6 months after the training. Paired t tests were used to compare the means of tests. Independent t test was used to compare difference of means in the groups that attended to emergencies in the six months after the training with those that did not attend to emergencies during the 6 months after the training. **Results:** One hundred fifty one participants were trained. Of the 151 participants 55 (36.4%) belonged to Bihar police and 96 (73.6%) belonged to Bihar health services. The average number of emergencies attended by the participants was 8.6 per month. Mean post-test score 1 was significantly higher than mean pre-test score. Mean post-test score 2 was significantly higher than mean pre-test score. Mean post-test 1 was significantly higher than mean post-test score 2. Mean post-test 1 score was found to be significantly higher (p value 0.00) in those that attended to emergencies in the 6 months after training than those that did not attend to emergencies in the 6 months after training. **Conclusion:** The plan developed and being implemented at AIIMS, Patna in collaboration with the government of Bihar and Adams Cowley shock trauma centre, Baltimore, USA is successful in raising knowledge levels which are sustained for a period of six months.

Key Words

Injury; Emergency; Trauma

Introduction

Bihar is one of the most backward states of India is beset by a number of problems namely lack of funds, one of the highest population densities in the country, far flung flood prone areas that remain inaccessible to healthcare for several months of an year, lack of formal pre-hospital care services and an organized system of trauma care. There is no standardized system of emergency medical system (1). EMS services in India may be run by many different organizations such as government, police, fire, hospital or private organizations. There is lack of coordination between these organizations. First response to the injured is very often provided by the police (1) who tend to transfer the patient to the nearest government health care centre. While in urban areas this centre can be a tertiary care centre but in rural areas the victim is first transferred to primary and secondary care centres that provide primary management and refer the patient to tertiary care centres located in geographically distant urban areas. These primary and secondary care centres are focused on providing maternal and child care health services. They are ill equipped to provide care to trauma patients as they lack trained manpower, resuscitation facilities, basic equipment (cervical collar and spinal board), and facility for intercostal drainage (2). Another major drawback is lack of communication (3) between the health care facilities before transferring the patient which very often results in inappropriate referral to an already overburdened health care facility (4). Given the absence of all-weather roads navigable during floods and lack of health care facilities providing care to trauma victims in rural areas, it remains impossible for the rescue and retrieval teams to reach standards set in the west (8 minutes in urban areas and 11 minutes in rural areas). As such the role of training people already involved in providing first response at the site, transfer and care at primary and secondary health care facilities is very important.

This paper presents a plan developed and being implemented at AIIMS, Patna in collaboration with the government of Bihar and Adams Cowley shock trauma centre, Baltimore, USA. Course content for the programme was prepared by Adams Cowley shock trauma centre, Baltimore, USA.

Aims & Objectives

To study whether the participants gained significant knowledge at the end of the sessions and whether this gain was maintained significantly over a period of six months or not.

PLAN

Objective: The plan is to prepare "Quick Medical Response Teams" which will provide trauma care at the site of accident or disaster. It is unique in the sense that is the first programme in India that imparts the same training at the same time to all who are involved in trauma care from 1st responders (policemen) to paramedics and medics that provide trauma care at primary levels and thus ensure that all the stakeholders involved in providing trauma care before the patient reaches a definitive facility understand and speak the same language. Content: Course content includes developing basic understanding about the importance of a sequential management of airway, breathing and circulation.

The content is divided into the following modules

a) Airways: Recognition of the existence of an airway problem it's management using simple techniques like chin lift and jaw thrust or inserting an oral and nasal airway. Skill stations include chin lift, jaw thrust and airway insertion.

b) Breathing: Recognition of the problem and its management using simple techniques like needle thoracotomy.

c) Circulation: Recognition of different types of shock; techniques for palpating major arteries, identifying pressure points and applying pressure bandage.

d) Extrication: Recognizing the importance of safe extrication, saving self at the site of accident, splinting the injured, techniques for moving the patient and the use of spinal board for extrication from a vehicle. Skill station - moving the patient and the use of spinal board for extrication from a vehicle.

e) Fracture: definition and types of fractures; recognizing a fracture and its types; recognizing dangerous fractures; splints for common fractures; splint for pelvic fracture; recognizing neurovascular deficit prior and after to applying splint. Skill stations include splints for upper limb, lower limb and pelvic fractures.

f) Incident management: A structured approach to incident management including assessment of the hazards, assessment of the mechanism of injury, assessment of the patient, communication - with colleague, bystanders, ambulance control, other services, hospital and triage, treatment & transportation.

g) Mass casualty: safety; triage and transport. Skill station – table top mass casualty incident.

h) Spine: Recognition of spinal injuries; dangers of spinal injuries; managing ABC in cervical spine injuries and immobilization; making a cervical collar; supporting an injured cervical spine; using a spinal board. Skill station - Open the airway; make an improvised collar to immobilize the neck; log roll a patient and place on improvised back board; and practice placing a patient on the board while the patient is standing.

Material and Methods

Target audience: Participants are nominated by Police department and Bihar health services. Doctors and paramedics serving in primary and secondary care hospitals of the government of Bihar and policemen below the rank of Inspector were nominated by their departments. All 53 districts of Bihar included with the objective of training at least 2 doctors per health care centre (primary health care centre as well as community health care centre), 2 paramedics per health care centre and 6 policemen per station.

Venue: AIIMS, Patna, Batch size: Twenty five

Duration: Two and half day's residential programme.

Funds: Rs 20 lacs was sanctioned by the Government of Bihar for 6 batches.

Pre-test, Post-test 1 and Post-test 2: All the participants participated in a pre-test (taken prior to training), post-test 1, (at the end of training) and post-test 2 (at six months after the training)

ACTION TAKEN: Six batches have been trained including 55 policemen, 29 doctors, and 67 paramedics.

METHOD FOR ASSESING GAIN IN KNOWLEDGE AND ITS RETENTION

Pre-test: An objective questionnaire was prepared by Adams Cowley shock trauma centre, Baltimore, USA. All participants were asked to mark answers. There were 20 questions in the questionnaire. Marks were given out of twenty. For each correctly answered question one mark was allotted. There was no negative marking.

Post test 1: The same questionnaire was given to the participants at the completion of the two and half days of the training. Marks were given out of twenty. For each correctly answered question one mark was allotted. There was no negative marking.

Post test 2: The same questionnaire was sent by post to the participants after 6 months of receiving the training. Marks were given out of twenty. For each correctly answered question one mark was allotted. There was no negative marking.

Statistical analysis:

- To assess gain in knowledge: Paired t test was used to compare pre-test with post-test 1 and pre-test with post-test 2

- To assess retention of knowledge: Paired t test was used to compare and post test 1 with post-test 2.

- Independent t test was used to compare difference of means in the groups that made practical utilization with those that did not.

Results

One hundred fifty one participants were trained in 5 batches of 25 each and 1 batch of 26 participants. It included 117 (77.5%) males and 34 females (23.5%). Of the 151 participants 55 (36.4%) belonged to Bihar police and 96 (73.6%) belonged to Bihar health services. Participants from Bihar health services included doctors and paramedics posted at primary and community health care centres. The average number of emergencies attended by the participants was 8.6 per month. However 48 participants had not attended to an emergency during the last six months, 12 had attended to only 1 emergency in the last 6 months and 23 had attended only 2 emergencies in the last six months. Seventy three participants attended to emergencies during the six month after the training. However 47 participants did not attend to any emergency during the six months after the training. These 47 were also in the group of 48 who had not attended to any emergency in the six months preceding the training.

Mean post-test score 1 was significantly higher than mean pre-test score. Table 1 Mean post-test score 2 was significantly higher than mean pre-test score. Table 2 Mean post-test 1 was significantly higher than mean post-test score 2. Table 3

Mean post-test 1 score was found to be significantly higher (p value 0.00) in those that attended to emergencies in the 6 months after training (Post Utilization +ve)than those who did not attend to emergencies in the 6 months after training (Post Utilization –ve). Table 4 Difference of means (Post-test 1 Vs Post-test 2) in the two groups was significantly lower in the group that attended to emergencies in six months after training. Table 4.

Discussion

An alarming finding of our study is that 48 (31.8%) participants had not attended to an emergency in 6 months prior to the training. This choice of participants probably shows lack of proper identification of participants resulting in nomination of participants whose current role in the department did not require attending to emergencies. Lack of proper identification of the participating subjects, as pointed out by us is one of the serious limitaions of the plan being implemented. Once the training was imparted these participants should have been shifted to roles that required attending to emergencies once they had been trained. However 47 of these 48 participants did not attend to an emergency during the six months after the training. This is probably a result of lack of coordination between administrative, health and police departments of the government of Bihar. Concerned administrative officials were informed to ensure utilization of services of these 47 trainees at roles that require attending to emergencies.

Our finding that our module was able to increase the knowledge is similar to other studies that have reported enhanced knowledge as a result of training. Evidence in literature has shown that informal mechanisms for pre-hospital care, such as imparting training to an enlightened citizen, are successful at enhancing knowledge (5). There is considerable variation between low income countries in the type of emergencies, as well as their time, place and person distribution, the skills of first responders available to tackle them, and transport times to a treatment facility (5). Despite these variations, innovative solutions have been developed and found to be effective at the local or regional level in countries as diverse as Ghana, Iraq and Cambodia. Mock *et al*. reported results of training drivers in Ghana in providing pre-hospital care. They reported that control of external haemorrhage was quickly learned and used appropriately by the drivers. They concluded that the training should be locally developed, evidence based, educationally appropriate, and focus on practical demonstrations (6). Tiska *et al*. conducted interviews with 71 of the 335 drivers receiving 6 hours of training in Ghana at a mean of 10.6 months after the course. Sixty-one percent indicated that they had provided first aid since taking the course. There was considerable improvement in the provision of the components of

first aid in comparison to what was reported before the course: crash scene management (7% before versus 35% after), airway management (2% versus 35%), external bleeding control (4% versus 42%), and splinting of injured extremities (1 versus 16%). They concluded that even in the absence of formal Emergency Medical Services, improvements in the process of pre-hospital trauma care are possible by building on existing, although informal, patterns of pre-hospital transport (7).

In a 5 year prospective study Husum *et al* tested a model for rural pre-hospital trauma care in North Iraq and Cambodia (8). It involved training 135 local paramedics and 5,200 lay first responders to provide in-field trauma care over a period of 1997 to 2001. The study population comprised 1,061 trauma victims with a mean evacuation time of 5.7 hours. They reported a reduction in the trauma mortality rate from a pre-intervention level of 40% to 14.9% over the study period (95% CI for difference 17.2–33.0%). There was a reduction in trauma deaths from 23.9% in 1997 to 8.8% in 2001 (95% CI for difference 7.8–22.4%), and a corresponding major improvement of treatment effect by year. The rate of infectious complications remained at 21.5 % throughout the study period.

Arreola-Risa *et al*. (9) have reported that pre-hospital trauma care improved after initiation of the Pre-hospital trauma life support (PHTLS) course. Use of cervical immobilization increased from 39% to 67% for all trauma patients. They also reported considerable increase in use of oropharyngeal airways, suction and administration of oxygen for patients with respiratory distress. There was a significant increase in use of large bore intravenous lines for hypotensive patients. Despite improvements in pre-hospital treatment, the mean time at the scene (5.7 ± 4.4 minutes before versus 5.9 ± 6.8 minutes after) did not increase. The percentage of patients transported who died en-route decreased from 8.2% before the course to 4.7% after.

We have reported significant increase in knowledge level of the participants which was sustained over a six month period. The knowledge level did decrease during the six months after the training. However, they were still significantly higher than the pre-test levels. An important finding of our study is that the knowledge levels of those participants who attended to emergencies in the six months after the training were significantly higher than those who did not

attend to emergencies in the six months after the training. Though the knowledge levels in groups that attended to emergencies did decrease over the six month period, but the decrease was significantly less in the group compared to the group that did not attend to emergencies after being trained. Further studies on factors determining retention of knowledge are required to explain the phenomenon of greater retention of knowledge in those that made practical utilization of the training. The role played by utilization of training cannot be answered on the basis of the results of the present study. Also whether this gain in knowledge will lead to a lower mortality or better pre-hospital care of the injured as reported by other studies (8) is a question that needs to be answered by means of further studies.

Conclusion

The plan developed and being implemented at AIIMS, Patna in collaboration with the government of Bihar and Adams Cowley shock trauma centre, Baltimore, USA is successful in raising knowledge levels which are sustained for a period of six months provided the participants continued to attend to emergencies. A serious limitation of the plan is lack of any criteria for selection of participants.

Recommendation

A system for identifying participants needs to be developed so that those who regularly attend to emergencies are preferred to those that do not attend to emergencies regularly. Another limitation of the plan is lack of utilization of the trained participants in roles that require them to attend to emergencies. Those who have undergone the training should be utilized in roles that require attending to emergencies.

Authors Contribution

All authors have contributed equally in study.

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Tables

TABLE 1 PRE-TEST (BEFORE TRAINING) & POST-TEST1 (IMMEDIATELY AFTER TRAINING)

Pre Test (Mean±SD)	Post Test 1 (Mean±SD)	Mean Difference	t-Value	d.f.	p-value
8.76±2.43	10.90±1.91	-2.13	-11.25	150	0.0001[a]

TABLE 2 PRE-TEST (BEFORE TRAINING) AND POST-TEST 2 (6 MONTHS AFTER TRAINING)

Pre Test (Mean±SD)	Post Test 2 (Mean±SD)	Mean Difference	t-Value	df	p-value
8.76±2.43	9.61±2.38	-0.847	-5.38	150	0.0001[a]

TABLE 3 POST- TEST 1 (IMMEDIATELY AFTER TRAINING) AND POST-TEST 2 (6 MONTHS AFTER TRAINING)

Post Test 1 (Mean±SD)	Post Test 2 (Mean±SD)	Mean Difference	t-Value	df	p-value
10.90±1.91	9.61±2.38	1.28	8.91	150	0.0001[a]

TABLE 4 COMPARISON OF UTILIZATION OF TRAINING POST-TEST 1 SCORE & POST-TEST 2 SCORE

	Post test 1 mean±SD	Post test 2 mean±SD	Mean Difference	t –value & df	p-value
Post Uti + ve	11.54±1.59	11.15±1.49	0.397	4.01,72[a]	0.0001
Post Uti – ve	10.29±2.00	8.17±2.15	2.11	9.34,77[a]	0.0001
Post uti +ve Vs post uti – ve difference			t & d.f. ,6.79,149[b]		0.0001