Pre-hospital Care – Health Outcomes in Pakistan and other countries

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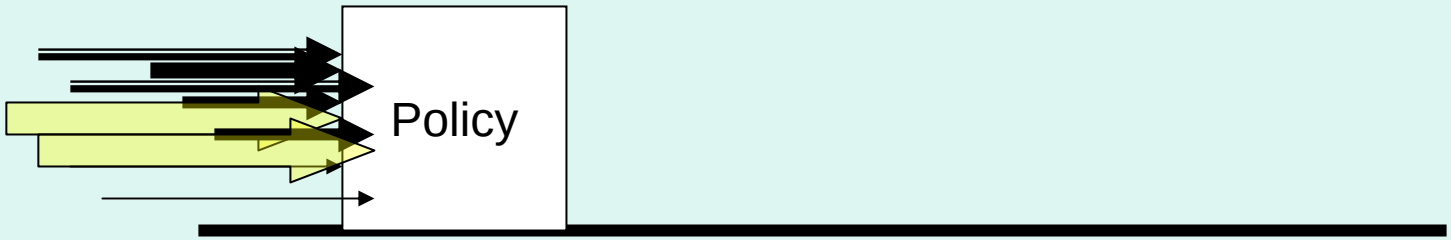
Outline of the talk

- Policy change and evidence
- Prehospital Care
  - Published evidence
- Assessment of paramedical training on deaths in Pakistan
- Lessons Learnt

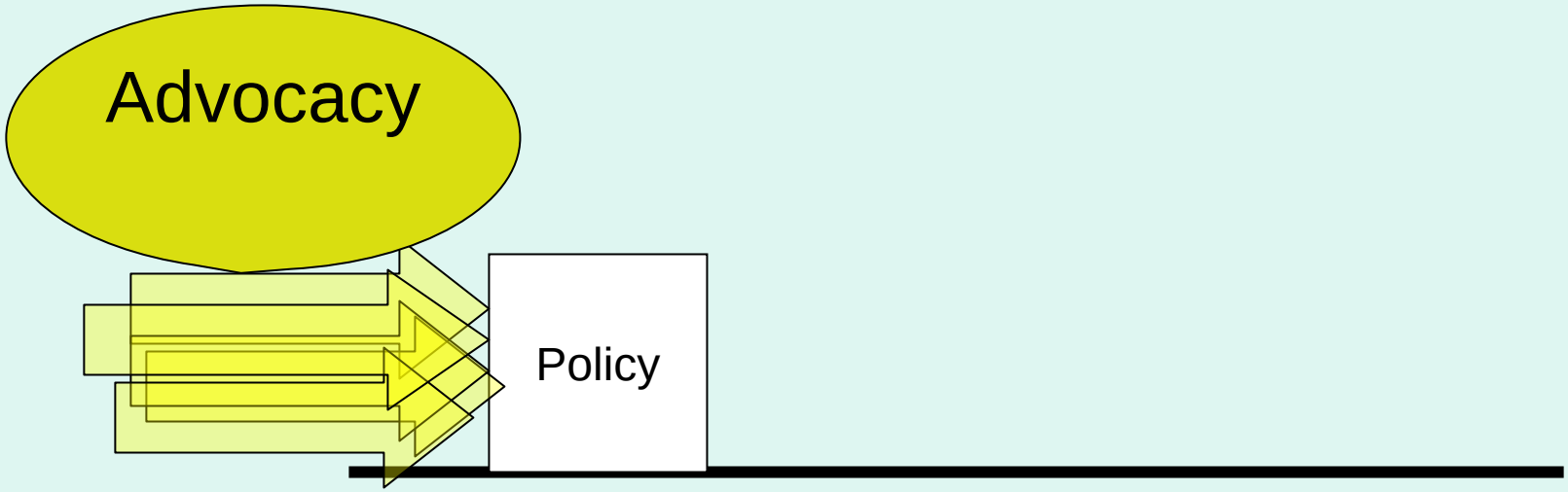
Policy Driven by Evidence



Pathetic

Ideal

Lots of Enthusiasm – No Evidence



Pathetic

Ideal

EMS and Trauma Care

- Trauma Care if often quoted as the main reason for establishment of EMS.
- Golden of Hour of Trauma - justified to a large extent establishment of EMS system in many parts of the world.
- There is no scientific basis for this concept

The Golden Hour: Scientific Fact or Medical "Urban Legend"?

E. Brooke Lerner, MS, EMT-P, Ronald M. Moscati, MD

Abstract. The term "golden hour" is commonly used to characterize the urgent need for the care of trauma patients. This term implies that morbidity and mortality are affected if care is not instituted within the first hour after injury. This concept justifies much of our current trauma system. However, definitive references are generally not provided when this concept is discussed. It remains unclear whether objective data exist. This article discusses a detailed literature and historical record search for support of the "golden hour" concept. None is identified. **Key words:** emergency medical services; time; transportation; trauma; golden hour. ACADEMIC EMERGENCY MEDICINE 2001; 8:758–760

THE TERM "golden hour" is ubiquitous in the trauma care literature. The idea is that trauma patients have better outcomes if they are provided definitive care within 60 minutes of the occurrence of their injuries. The golden hour justifies much of the current trauma system. Out-of-hospital care concepts such as scoop and run, aeromedical transport, and trauma center designations with trauma teams in place are, in part,

the term "golden hour." Two articles reference Trunkey for the term.[1,2] However, within Trunkey's article, there is no mention of the "golden hour" and, in fact, although there are no references given, the article describes different time constraints for different types of injury.[3] For example, Trunkey states that head-injured patients must receive surgery within four hours of injury, while

Effect of the Prehospital Trauma Life Support Program (PHTLS) on Prehospital Trauma Care

Ali J; Adam R; Gana T; Bedaysie H; Williams, J

J Trauma, 1997

	Pre-PHTLS	Post-PHTLS
Age (yrs)	37.5 ± 16.3	37.5 ± 15.5
Sex—M/F (%)	76.2/23.8	78.3/21.7
% Blunt	69.6	69.4
ISS	15.4 ± 9.0	15.7 ± 8.6
Mortality (%)	15.7	10.6[a]

PHTLS, Prehospital Trauma Life Support; M/F, male/female; ISS, Injury Severity Score.

[a] $p < 0.05$ compared with pre-PHTLS

Change in Mortality of one in pre and post PHTLS changes the p value from 0.046 to 0.06

ORIGINAL RESEARCH

Cost-Effectiveness and Benefit of Alternatives to Improve Training for Prehospital Trauma Care in Mexico

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Alejandro J. Herrera-Escamilla, Lic;[3,4] Ismael Contreras, EMT-A;[3] Jorge Vargas, EMT-I[5]

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Keywords: ambulance; cost effectiveness;

Abstract

Introduction: In Latin America, there is a preponderance of prehospital trauma deaths. However, scarce resources mandate that any improvements in prehospital medical care must be cost-effective. This study sought to evaluate the cost-effectiveness of several approaches to improving training for personnel in three ambulance services in Mexico.

Methods: In Monterrey, training was augmented with PreHospital Trauma Life Support (PHTLS) at a cost of [US]$150 per medic trained. In San Pedro, training was augmented with Basic Trauma Life Support (BTLS), Advanced Cardiac Life Support (ACLS), and a locally designed airway management course, at a cost of $400 per medic. Process and outcome of trauma care were assessed before and after the training of these medics and at a control site.

Results: The training was effective for both intervention services, with increases in basic airway maneuvers for patients in respiratory distress in Monterrey (16% before versus 39% after) and San Pedro (14% versus 64%). The role of endotrachal intubation for patients with respiratory distress increased only in San Pedro (3% versus 48%), in which the most intensive Advanced Life Support (ALS) training had been provided. However, mortality decreased only in Monterrey, where it had been the highest (8.2% before versus 4.7% after) and where the simplest and lowest cost interventions were implemented. There was no change in process or outcome in the control site.

Conclusions: This study highlights the importance of assuring uniform, basic training for all prehospital providers. This is a more cost-effective approach than is higher-cost ALS training for improving prehospital trauma care in environments such as Latin America.

	Monterrey			San Pedro			Santa Catarina		
	Before	After	*p*-value	Before	After	*p*-value	Before	After	*p*-value
Total Number	361	505		295	215		272	232	
Mortality of all patients	10.3%	7.4%	0.13	3.4%	3.7%	NS	6.4%	9.9%	NS
Mortality of transported patients*	8.2%	4.7%	0.04	1.7%	2.4%	NS	2.7%	2.8%	NS

Prehospital and Disaster Medicine © 2004 Mock

Table 5—Mortality for trauma patients treated by ambulance services in Monterrey metropolitan area. (*Excluding deaths at the scene; NS = not significa

The p-value become insignificant with an increase in just one death

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Low-Cost Improvements in Prehospital Trauma Care in a Latin American City

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Objective: Prehospital care is a critical component of efforts to lower trauma mortality. In less-developed countries, scarce resources dictate that any improvements in prehospital care must be low in cost. In one Latin American city, recent efforts to improve prehospital care have included an increase in the number of sites of ambulance dispatch from two to four and introduction of the Prehospital Trauma Life Support (PHTLS) course.

Methods: The effect of increased dispatch sites was evaluated by comparing response times before and after completion of the change. The effect of PHTLS was evaluated by comparing prehospital treatment for the 3 months before initiation of the course (n = 361 trauma patients) and the 6 months after (n = 505).

Results: Response time decreased from a mean of 15.5 ± 5.1 minutes, when there were two sites of dispatch, to 9.5 ± 2.7 minutes, when there were four sites. Prehospital trauma care improved after initiation of the PHTLS course. For all trauma patients, use of cervical immobilization increased from 39 to 67%. For patients in respiratory distress, there were increases in the use of oropharyngeal airways (16–39%), in the use of suction (10–38%), and in the administration of oxygen (64–87%). For hypotensive patients, there was an increase in use of large-bore intravenous lines from 26 to 58%. The improved prehospital treatment did not increase the mean scene time (5.7 ± 4.4 minutes before vs. 5.9 ± 6.8 minutes after). The percent of patients transported who died in route decreased from 8.2% before the course to 4.7% after. These improvements required a minimal increase (16%) in the ambulance service budget.

Conclusion: Increase in sites of dispatch and increased training in the form of the PHTLS course improved the process of prehospital care in this Latin American city and resulted in a decrease in prehospital deaths. These improvements were low cost and should be considered for use in other less developed countries.

Key words: Trauma, Injury, Less-developed country, Prehospital, Developing country, Developing world.

Prehospital Care and Survival of Pediatric Patients With Blunt Trauma

By P. Suominen, C. Baillie, A. Kivioja, R. Korpela, R. Rintala, T. Silfvast, and K.T. Olkkola
Helsinki, Finland and Vantaa, Finland

Background: The aim of this study was to compare the outcome of severe blunt trauma in children receiving prehospital care from either physician-staffed advanced life support (ALS) units, or from basic life support (BLS) units staffed by emergency medical technicians.

Methods: The records of 288 children with severe blunt trauma who required intensive care in the regional level 1 trauma center or who died from their injuries were analyzed retrospectively. Patients were excluded if resuscitation at the scene was not attempted, if the level of prehospital care was unspecified, or if arrival at the level 1 trauma center was delayed beyond 150 minutes. Seventy-two patients met the inclusion criteria of BLS-, and 49 the criteria of ALS-prehospital care.

Results: A reduced mortality rate (22.4% v 31.9%) was seen in the ALS group, which was more apparent in a "salvageable but high-risk" subgroup, characterized by Glasgow Coma of Scale 4 through 8, Pediatric Trauma Score of 0 through 5, and Injury Severity Score (ISS) of 25 through 49. However, a statistically significant difference was only seen when trauma severity was evaluated by the ISS.

Conclusion: An improved outcome in children with severe blunt trauma has been demonstrated when prehospital care is provided by physician-staffed ALS units compared with BLS units.

INDEX WORDS: Blunt trauma, prehospital care, physician.

Journal of Pediatric Surgery, Vol 33, No 9 (September), 1998: pp 1388-1392

Table 3. Mortality by Age and Measures of Injury Severity

Measure	ALS Group			BLS Group			*P* Value
	No	Died	Percent	No.	Died	Percent	
Overall mortality	49	11	22.4	72	23	31.9	NS
Survival <6 hours*	11	4	36.4	23	14	60.9	NS
Age (yr)							
<1	0	0	0	2	2	100	
1-4	7	1	14.3	12	6	50.0	NS
5-15	42	10	23.8	58	15	25.9	
GCS							
3	7	7	100	18	18	100	
4-8	17	4	23.5	11	4	36.4	NS
9-15	25	0	0	43	1	2.3	
PTS†							
<0	4	3	75.0	8	8	100	
0-5	21	8	38.1	24	13	54.2	NS
6-12	24	0	0	34	1	2.9	
ISS							
<25	19	0	0	38	1	2.6	
25-49	25	6	24.0	22	12	54.5	.040
50-75	5	5	100	12	10	83.3	
Head injury							
AIS ≤4	18	0	0	37	2	5.4	
AIS ≥5	23	10	43.5	28	19	67.9	NS
Thoracic injury							
AIS ≤4	13	4	30.8	12	5	41.7	
AIS ≥5	0	0	0	6	6	100	—
Abdominal injury							
AIS ≤4	5	3	60.0	8	3	37.5	
AIS ≥5	1	1	100	4	4	100	NS

NOTE. The trauma scores are were calculated on hospital arrival.

Abbreviation: NS, not significant.

*Time of death compared with total number of deaths in each group.

†Mean PTS not known for six patients attended by BLS unit.

Prehospital trauma management: a national study of paramedic activities

S Sukumaran, J M Henry, D Beard, R Lawrenson, M W G Gordon, J J O'Donnell, A J Gray

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Objectives: The benefits of prehospital trauma management remain controversial. This study aimed to compare the processes of care and outcomes of trauma patients treated by paramedics, who are trained in advanced prehospital trauma care, with those treated by ambulance technicians.

Methods: A six year prospective study was conducted of adult trauma patients attended to by the Scottish Ambulance Service and subsequently admitted to hospital. Prehospital times, interventions, triage, and outcomes were compared between patients treated by paramedics and those treated by technicians.

Results: Paramedics attended more severely injured patients (16.5% versus 13.9%, $p<0.001$); they attended a higher proportion of patients with penetrating trauma (6.6% versus 5.7%, $p=0.014$) and had longer prehospital times. Patients managed by paramedics were more likely to be taken to the intensive care unit, operating theatre or mortuary, (11.2% versus 7.8%, $p<0.001$) and had higher crude mortality rates (5.3% versus 4.5%, $p=0.07$). However, no difference in mortality between the two groups was noted when corrected for age, Glasgow coma score and injury severity score.

Conclusions: This large scale national study shows that paramedics show good triage skills and clinical judgement when managing trauma patients. However, the value of the individual interventions they perform could not be ascertained. Further controlled trials are necessary to determine the true benefits of advanced prehospital trauma life support.

There is however continued uncertainty about the benefits of the prehospital interventions they perform on trauma patients. In this study, there was no decrease in mortality for paramedic treated patients after correction for age, GCS on arrival in the ED, and ISS was made. Admittedly the two groups under comparison were not strictly matched, and we could not take into account the regional variations in prehospital service provision across the country. Never-

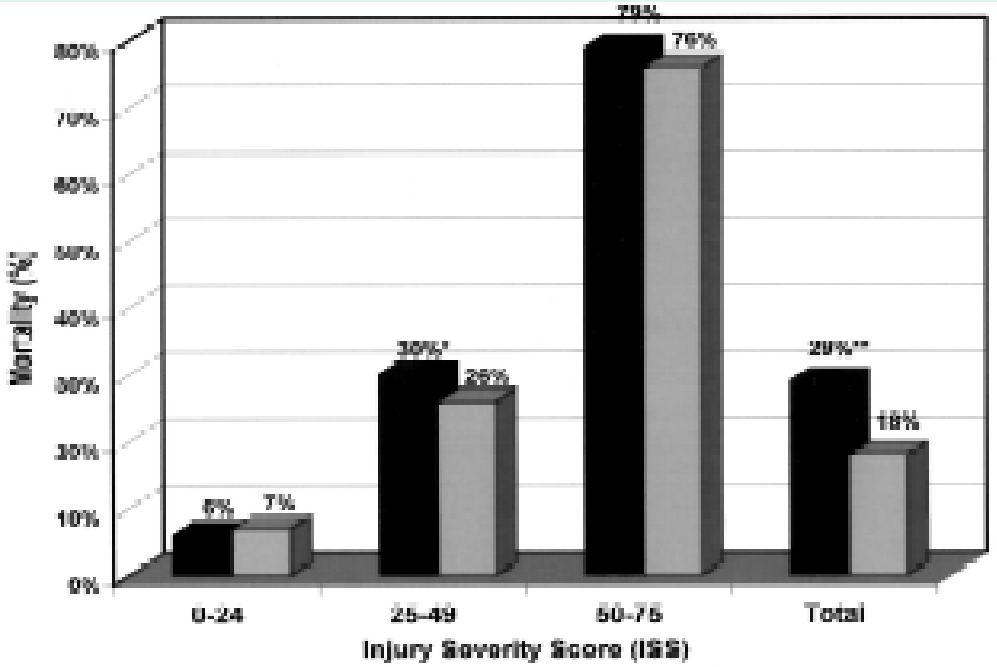

Figure 3. Mortality by on-site care. ■, Advanced Life Support (ALS); □, Basic Life Support (BLS). *P = .01, **P = .001.

Conclusions

In urban centers with highly specialized level I trauma centers there is no benefit in having on-site ALS for the prehospital management of trauma patients.

Cardiac Care

1. Defibrillation
2. Thrombolysis
3. Public Access Defibrillation/AEDs

A Cumulative Meta-Analysis of the Effectiveness of Defibrillator-Capable Emergency Medical Services for Victims of Out-of-Hospital Cardiac Arrest

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Valerie J De Maio, BSc[*]
George A Wells, PhD[*]

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Study objective: More than 1,000 patients experience sudden cardiac arrest each day. Treatment for this includes cardiopulmonary resuscitation (CPR) and emergency medical services (EMS) that provide CPR–basic life support (BLS), BLS with defibrillation (BLS-D), or advanced life support (ALS). Our previous systematic review of treatments for sudden cardiac arrest was limited by suboptimal data. Since then, debate has increased about whether bystander CPR is effective or whether attention should focus instead on rapid defibrillation. Therefore a cumulative meta-analysis was conducted to determine the

Nicole G. Ann of Emerg Med 1999

Table 1.

Data abstracted from literature.

City	Year	No. of Cardiac Arrests	EMS System	Bystander CPR (%)	Mean Response Time Interval* (min)	Second Response Time Interval† (min)	Survival to Discharge (%)
Stockholm, Sweden[19]	1987	307	BLS-D	15.0	7.8‡	—	3.6
Stockport, England[4]	1987	113	BLS-D	38.0	4.5‡	—	0
Nottinghamshire, England[20]	1987	403	BLS-D	44.7	9.0‡	—	10.9
Iowa, USA[21]	1984	110	BLS-D	20.0	5.7‡	—	10.9
Milwaukee, USA[22]	1989	566	BLS-D	49.0	7.1‡	—	6.4
Arrowhead, USA[23]	1986	116	BLS-D	32.0	6.5‡	—	5.2
Brighton, England[24]	1973	216	BLS-D	15.0	16.0‡	—	2.3
Rochester, USA[25]	1988	100	BLS-D	35.0	—	—	6.0
Stockholm, Sweden[26]	1990	109	BLS-D	27.0	8.0‡	—	1.9
Scotland[27]	1996	10,081	BLS-D	37.0	8.0‡	—	6.7
Ipswich, Australia[28]	1992	167	BLS-D	26.0	5.3‡	—	9.0
Odense, Denmark[29]	1991	148	BLS-D	15.0	—	—	1.4
Ontario, Canada[30]	1992	756	BLS-D	19.0	7.6‡	—	2.9
New Westminster, Canada[31]	1978	224	ALS	—	—	—	8.5
Pittsburgh, USA[32]	1984	187	ALS	21.0	6.0‡	—	9.6
Los Angeles, USA[33]	1983	294	ALS	38.0	5.0‡	—	10.2
Lucas, Kent, Southfield, USA[34]	1988	3,849	ALS	20.0	4.7‡	—	7.0
Vancouver, Canada[35]	1983	244	ALS	14.0	5.7‡	—	11.5
Chicago, USA[7]	1991	3,221	ALS	24.9	8.0‡	—	1.7
Torrance, USA[36]	1977	112	ALS	0	—	—	13.4
West Yorkshire, England[37]	1990	1,196	ALS	31.0	6.4‡	—	5.4
Cincinnati, USA[38]	1978	147	ALS	—	—	—	15.0
St Louis, USA[39]	1990	243	ALS	31.0	5.0‡	—	4.5
Royal Oak, USA[40]	1989	244	ALS	—	—	—	9.1
South Glamorgan, England[41]	1989	108	ALS	11.0	6.0‡	—	5.6
Milwaukee, USA[42]	1989	4,216	BLS + ALS	—	2.0	5.0‡	12.6
Lincoln, USA[43]	1974	169	BLS + ALS	—	—	—	20.7
Tucson, USA[44]	1992	372	BLS + ALS	29.8	4.1	5.1†	5.9
Seattle, USA[45]	1988	600	BLS + ALS	22.4	3.4	5.1‡	8.6
Taipei, Taiwan[46]	1994	554	BLS + ALS	5.8	7.4	—	1.3
Memphis, USA[47]	1993	432	BLS + ALS	12.1	3.5	—	6.3
Minneapolis, USA[48]	1977	514	BLS + ALS	15.0	4.6	6.5‡	16.1
King County, USA[49]	1980	349	BLS + ALS	20.0	2.7	7.7‡	17.2
Tucson, USA[50]	1990	298	BLS + ALS	28.9	3.0	5.0‡	8.4
Seattle, USA[45]	1988	687	BLS-D + ALS	25.9	3.2‡	5.1	13.9
King County, USA[51]	1987	321	BLS-D + ALS	61.0	4.8†	11.2	12.8
Fresno, USA[52]	1995	297	BLS-D + ALS	16.2	4.0‡	—	4.7
San Francisco, USA[52]	1995	607	BLS-D + ALS	18.1	4.0‡	—	5.1
Memphis, USA[47]	1993	447	BLS-D + ALS	13.4	3.5‡	—	8.9

*In BLS + ALS and BLS-D + ALS, this is the response time of the first vehicle.
†Response time interval of the second vehicle in BLS + ALS and BLS-D + ALS.

Effect of EMS, CPR, and time to defibrillation interval on odds of survival to hospital discharge

	No.	Odds Ratio	95% CI	*P* Value*	*P* Value†
EMS system‡	11	1	—	—	.01
ALS	8	1.71	1.09–2.70	.01	—
BLS + ALS	4	1.47	0.89–2.42	.07	—
BLS–D + ALS	6	2.31	1.47–3.62	<.01	—
Bystander CPR§	30	1.06	1.03–1.09	—	<.01
Defibrillation response time interval (min)‖	—	—	—	—	<.01
≤6	18	1	—	—	—
6 to 11					
BLS–D	7	0.85	0.73–0.99	.02	—
ALS	3	0.72	0.61–0.84	<.01	—
BLS + ALS	1	0.95	0.81–1.12	.29	—
BLS–D + ALS	0	—	—	—	—
>11	1	0.53	1.47–3.62	.11	—

P value was from the test for equal effects of comparative levels* and for overall effect of the factor of interest.†

‡Compared with BLS–D.

§Per 5% increase in bystander CPR.

‖Constant effect <6 minutes, linear effect between 6 and 11 minutes, and constant effect >11 minutes. For 6 to 11 minutes, the odds ratio was expressed as the effect on survival by 1–minute increase in time to defibrillation.

Nichol: Ann Emerg Med, Volume 34(4, Part 1).October 1999.517-525

Ambulance Service in Karachi

Data on Ambulances - Karachi

No. of Ambulance Services	10
Total Number of Ambulances	172
A/C Ambulances	15
Equipped Ambulances	72
O_2 cylinder	72
First Aid Kid	54
Proper Ambulance Gurneys	72

Training of Pre-hospital Care Providers -1998

- Total number of Drivers = 336
- Formal Training = 6

Training of Pre-hospital Care Providers -2005

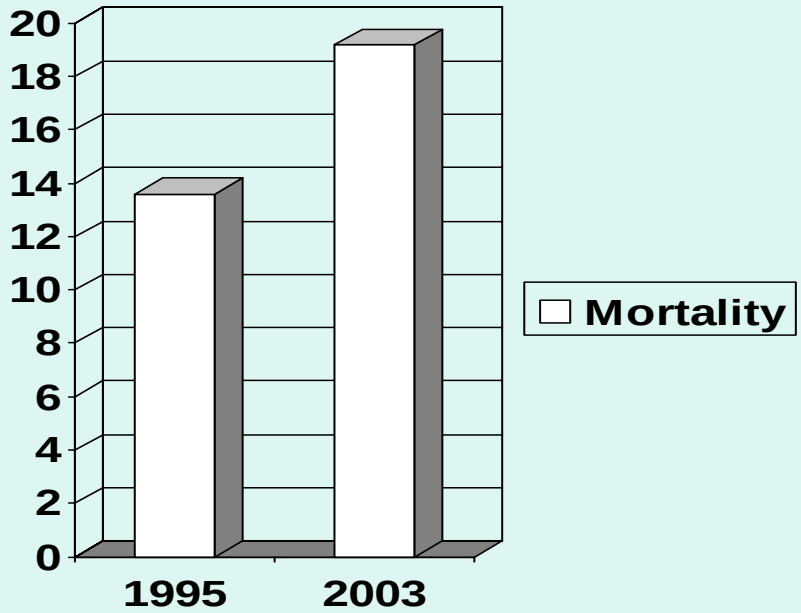
Total No. of drivers	446
Driver's Training –Trained Drivers •Formally trained •Informal training –Not trained	 319 319 31 96
Communication system –Mobile Phones –Wireless	 52 120

Utilization and Charges

Average no. of visits/month	19000
Visits to the ER only	570 (3%)
Charges for Non AC vehicle Rs./km	10-14
Charges for AC vehicle Rs./km	12-16

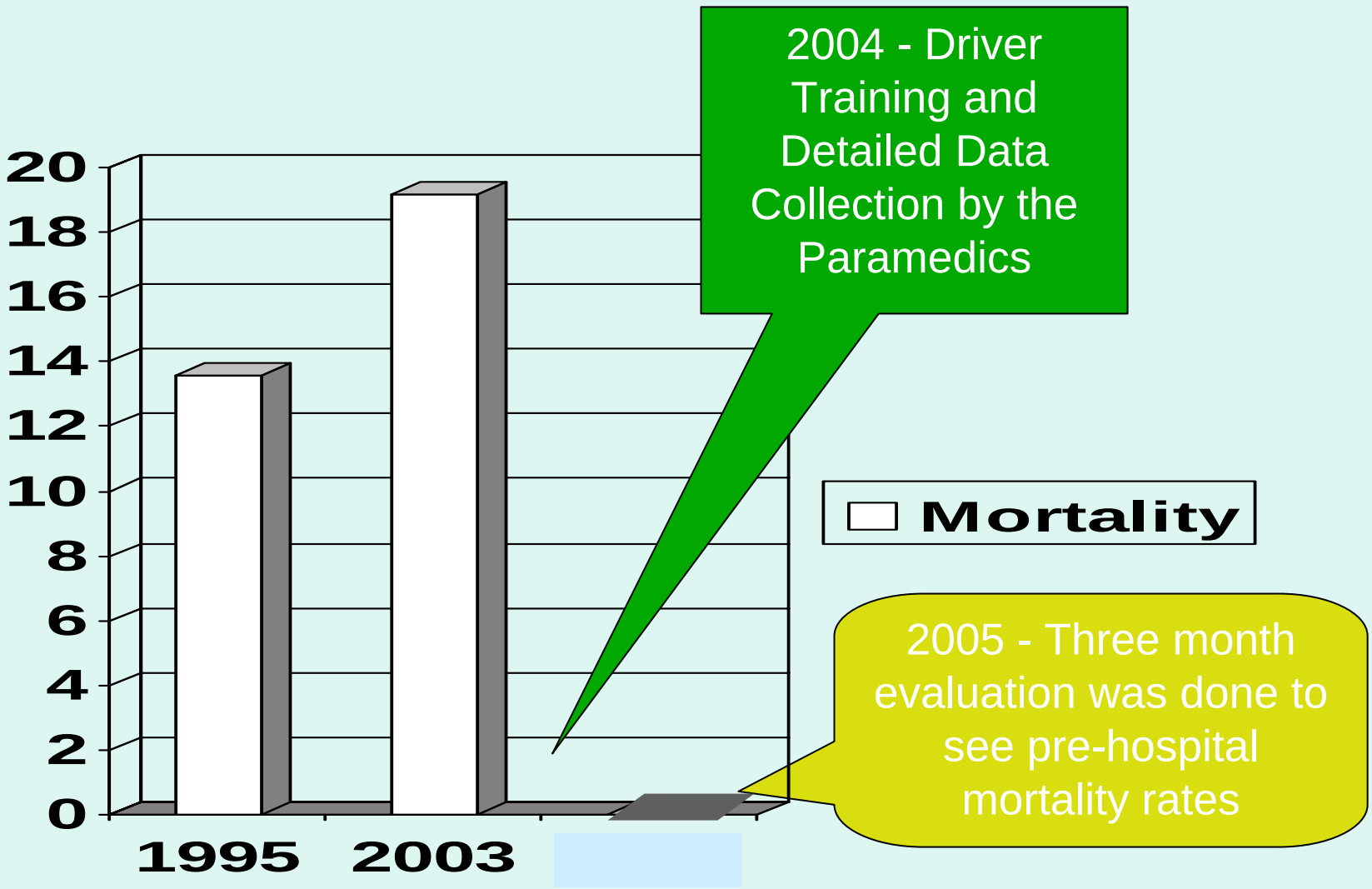
Increase in Mortality from Trauma

Pre-hospital and emergency department mortality for road traffic injuries in Karachi – from Edhi ambulance service log books



The data pointing to worsening of care in the field and immediately after reaching hospitals

Razzak et al, 2005


2004 - Driver Training and Detailed Data Collection by the Paramedics
20
18
16
14
12
10
8
6
4
2
0
1995
2003
Mortality
2005 - Three month evaluation was done to see pre-hospital mortality rates

Explanation

- Data collection methodology was completely different in 2003 and 2005
- Increased scrutiny of ambulance crew for the outcome
- No one was pronounced dead in the field and every one was being taken to the hospital with ongoing CPR

Lessons Learnt

- Scientific injury related interventions are uncommon in LMICs and thus outcome studies;
- Not everything published as an outcome study shows improvement in outcome;
- Evaluation has to be included in the initial phase of planning of an intervention;

Lessons Learnt

- Health outcomes measured in hard measures like death may not give the whole picture;
- Besides death, other measures are difficult to measure and therefore not often done;
- Process measures are sometimes very important