



Patterns of Trauma and Utilization of Surgical Resources by Pediatric Trauma Patients in Yaoundé

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Background

- Children comprise approximately 875,000 traumatic deaths annually, over 50% of which occur in low- and middle-income countries.
- Challenging environments, increasing traffic, lack of safe play spaces, and absence of child care options combined with greater vulnerability to injury put children at high risk.
- Patterns of injury in the pediatric population may differ from those in adults.
- Risks and patterns of injury specific to children in low- and middle-income countries need to be identified for effective injury prevention and treatment.
- Access to trauma care may be limited for pediatric patients in Cameroon, where 40% of people lived at or below the national poverty line of US\$ 1.25 per day in 2007.

Objectives

- To explore patterns of pediatric injury using a hospital-based trauma registry in Yaoundé, Cameroon.
- To inform injury prevention efforts and targeted health care resource allocation in Cameroon through these findings.
- To understand children's health care costs and resource utilization associated with injury.

Methods

- A hospital-based trauma registry in Yaoundé, Cameroon was used to explore patterns of pediatric injury.
- Data were collected from April to October 2009 on all trauma patients presenting to the Emergency Ward of the Central Hospital of Yaoundé (CHY).
- Demographics, injury context, injury severity score (ISS), clinical management, outcomes, and cost of care were recorded.
- Univariate, bivariate, and multivariate analyses were used to explore patterns of injury and relationships between variables in the pediatric subset (age <20 years).

Results

- 544 pediatric trauma patients presented to the Emergency Ward of CHY over the six-month study period.

Table 1. Demographics & injury characteristics (n=544)

Variable	n	%
Age		
0-4 years	68	12.5
5-9 years	133	24.5
10-14 years	114	21.0
15-19 years	228	42.0
Gender		
Boys	365	67.7
Girls	174	32.3
Residence		
Yaoundé	482	89.6
Outlying villages	56	10.4
Student	360	71.7
Injury severity (ISS value)		
Mild (<9)	359	67.6
Moderate (9-15)	134	25.2
Severe (16-25)	27	5.1
Profound (>25)	11	2.1
Mechanism		
Road traffic injury (RTI)	288	53.8
Fall	74	13.8
Penetrating trauma	67	12.3
Burn	32	5.9
Blunt trauma ^a	27	5.0
Other	50	9.4
Activity		
Leisure or sport	240	48.8
Traveling	71	14.4
Work/School	69	14.0
Routine errands	21	4.3
Other	113	23
Location		
Highway/paved road	258	48.2
Home	144	26.9
Small/dirt road	37	6.9
Sport/recreation site	22	4.1
Farm/field	18	3.3
Other	36	6.7

Percent based on non-missing values only; missing values range from 0.7 to 4.8% of total n, except for occupation (7.7%).

^aExcluding RTI

Results

- 71.7% of pediatric patients were students.
- Injury during sports and leisure activities were most common among pediatric patients (48.8%) and more likely to occur among children than adults (20%, p<0.001).
- 53.8% of patients were victims of road traffic injuries, half of which were pedestrians.

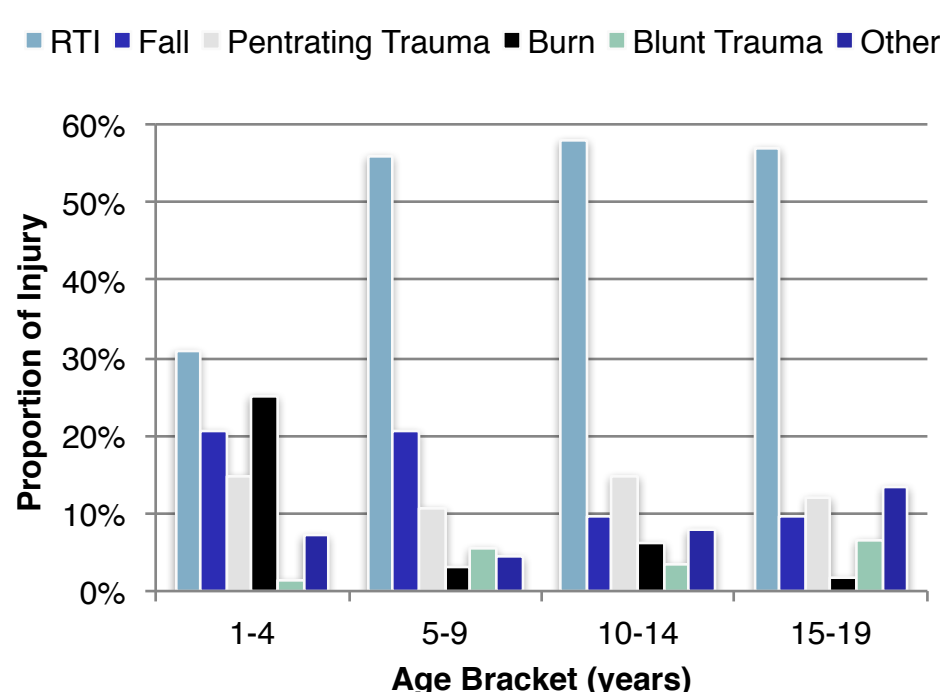


Figure 1. Mechanism of injury by age (n=539)

- Of road traffic injuries, children (53.3%) were more likely to have been injured as pedestrians than adults (34%, p<0.001).
- Pediatric patients were more likely to fall, get burned, or get bitten by an animal than their adult counterparts (p<0.001).
- Pediatric patients (26.9%) were more likely to be injured at home than adults (13.2%, p<0.001).

Table 2. Unadjusted odds ratios for pediatric patients compared to adults (N=2,767)

Variable	Odds ratio	95% CI	p-value
Location of injury			
Own home	2.40***	(1.92-3.01)	<0.001
Other home	0.97	(0.62-1.53)	0.895
Industrial site	0.27**	(0.11-0.67)	0.005
Paved road	0.62***	(0.51-0.75)	<0.001
Dirt road	1.31	(0.90-1.91)	0.163
Sports facility	2.11**	(1.25-3.55)	0.005
School	6.28**	(2.23-17.72)	0.001
Market	0.49*	(0.28-0.87)	0.014
Other	0.37**	(0.18-0.78)	0.008
Mechanism of injury			
Road traffic injury	0.73**	(0.60-0.88)	0.001
Fall	2.46***	(1.82-3.32)	<0.001
Burn	3.15***	(1.97-5.01)	<0.001
Penetrating trauma	1.43*	(1.07-1.92)	0.016
Blunt trauma	1.54	(0.98-2.42)	0.060
Other	0.46***	(0.34-0.62)	<0.001
Injury severity score			
Mild (<9)	1.44***	(1.18-1.76)	<0.001
Moderate (9-15)	0.80*	(0.64-0.99)	0.038
Severe (16-25)	0.54**	(0.36-0.82)	0.004
Profound (>25)	1.01	(0.52-1.97)	0.971

*p<0.05 **p<0.01 ***p<0.001

- Major surgical intervention was necessary for 17.9% of patients.
- Minor surgical intervention was necessary for 20.8% of patients.
- 32.4% of patients had an ISS≥9. These children were more likely to need surgery based on multivariate analysis (OR 10.2, p<0.001).

Table 3. Crude and adjusted odds ratios for likelihood of pediatric trauma patients receiving surgery (n=503)

Variable	Crude odds ratio	95% CI	Adjusted odds ratio	95% CI
Age	1.01	0.97-1.06	1.01	0.96-1.06
Sex	1.07	0.66-1.74	0.80	0.45-1.43
Mechanism				
RTI			Reference group: OR = 1	
Fall	2.43**	1.34-4.43	3.14**	1.38-7.15
Penetrating Trauma	0.77	0.34-1.74	0.29	0.05-1.59
Blunt Trauma	2.00	0.79-5.04	1.99	0.50-7.90
Burn	1.58	0.64-3.90	7.38	0.11-476.05
Other	0.69	0.26-1.86	1.20	0.37-3.91
Anatomical Region Most Affected				
Head/Neck			Reference group: OR = 1	
Chest	0.50	0.06-4.07	0.57	0.09-4.87
Abdomen	2.96*	1.06-8.25	4.40*	1.06-18.29
Limb	1.38	0.78-2.44	1.65	0.81-3.39
Wealth Quartiles				
2 nd quartile			Reference group: OR = 1	
3 rd quartile	0.38*	0.14-0.99	0.20*	0.04-0.99
4 th quartile	0.27*	0.10-0.76	0.26	0.05-1.51

Note: Wealth quartiles are relative to Demographic and Health Surveys (DHS) data. 1st quartile is not listed because no participants fell into this quartile based on DHS criteria.

*p<0.05 **p<0.01 ***p<0.001

Results

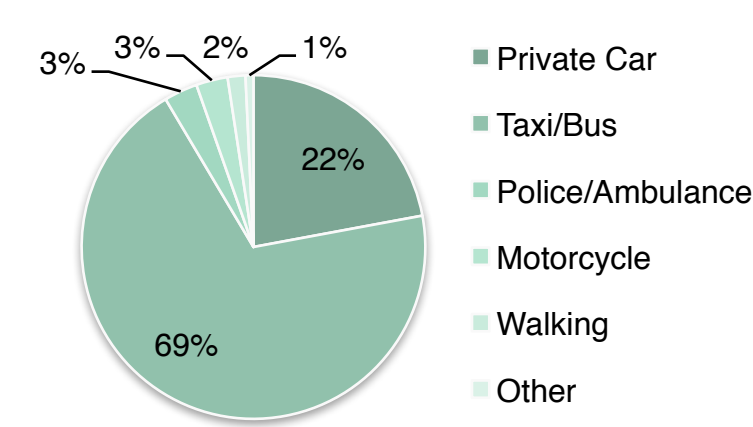


Figure 2. Mode of transport to hospital (n=540)

- Only 1.5% of patients arrived to the hospital via ambulance, while 88.9% arrived via private car or taxi.
- The mean and median costs of care for pediatric patients was US\$17.75 (SD: US\$11.49) and US\$13.12, respectively.
- Most pediatric patients presenting to the Emergency Ward fell into the 3rd and 4th wealth quartiles.
- 76.2% of pediatric patients in the 2nd wealth quartile were students.
- No one from the poorest wealth quartile was represented in the pediatric patient population.

Conclusions

- Surgery comprises a significant proportion of care delivered to pediatric trauma patients, especially those most seriously injured.
- Children are most often injured in road traffic incidents, at home, and during sport or leisure activities.
- The majority of pediatric patients are students.
- Findings highlight opportunities for interventions for pediatric injury focused on prehospital care and accessible transportation to the hospital.
- Opportunities exist for targeted prevention efforts to reduce children's vulnerability to injury from falls, burns, and as pedestrian road users.
- Costs associated with pediatric emergency trauma care are over \$17 per patient.
- Greater representation of wealthier patients to the Emergency Ward suggests inequities in access to trauma care for children.

Policy Implications & Future Research

- Additional resources should be allocated to strengthen surgical delivery.
- Further research into risk factors and interventions to prevent road traffic injuries among young pedestrians is warranted.
- Future research should explore school-based interventions for injury prevention and programs.
- Data is limited describing patterns of trauma and utilization among the poorest wealth quartiles of pediatric patients.
- The high cost of pediatric trauma care suggests the need for research for feasible and sustainable financing and insurance schemes targeted at this population.
- Study findings emphasize specific opportunities for action following the recent WHO resolution on Strengthening Emergency and Essential Surgical Care and Anaesthesia as a Component of Universal Health Coverage.

