Pediatric trauma at a government referral hospital in the Gambia

Christina Shen[2], Boto Sanno-Duanda[1] and *Stephen W Bickler[1,2]

[1]Department of Surgery,
Royal Victoria Hospital, Banjul, The Gambia
[2]Division of Paediatric Surgery
University of California, San Diego Medical Center
San Diego, CA.

Summary

***Objective:* To determine the pattern of childhood injuries at a government referral hospital in sub-Saharan Africa.**

***Methods:* Twenty-nine month hospital based study at the Royal Victoria Hospital (RVH) in Banjul, The Gambia. Children with injuries were identified from a prospectively recorded pediatric surgery database. Rate of pediatric trauma presenting to RVH was calculated for an urban population of 270,540 (32.3% aged 0–14 years) living within 25km of the hospital.**

***Results:* From January 1996 to June 1998, 798 children aged 0 – 14 years were admitted for treatment of injuries. Injuries accounted for 4.8% of all pediatric admissions. Burns (38.7%), fractures (20.9%), head injuries (16.2%) and soft tissue injuries (9.4%) were the most common injuries – together responsible for 85% of admissions and 74% of total hospital days. Average length of stay was 20.6 days, with injuries accounting for 16,696 total hospital days. Seventeen percent of injured children required a surgical procedure. The most common surgical procedures were burn contracture release (20%), reduction of fracture and dislocations (20%) and skin grafts (18.7%). In hospital mortality was 5.5%, with 71% of deaths related to burns. The annual cases of trauma presenting to RVH from the Greater Banjul Area was 181 admissions, 3317 hospital days, 28 surgical procedures and 7 deaths per 100,000 children aged 0 – 14 years.**

***Conclusion:* Childhood injuries, particularly burns place a significant burden on inpatient services. While accounting for a small fraction of pediatric admissions, injuries account for long hospital stays and surgical procedures.**

Keywords: ***Pediatric, Sub-Saharan Africa, Trauma.***

Résumé

Objectif: Déterminer la tendance des blessures de l'enfance dans un hôpital gouvermental de l'Afrique du sous-Sahara.

Méthodes: Une étude hospitalière d'une durée de vingt neuf mois dans l'Hopital Royal Victoria (RVH) à Banjul la Gambie. Des enfants atteints des blessures ont été identifiés à travers une chirurgie pédiatrique de base des données enregistrées prospectivement. Le taux du traumatisme pédiatrics qui consule les médecins au RVH était calculé en matiére d'une population urbaine de 270,540 soit 32,3% agées de l'ordre 0 – 14ans qui vivent à moins de 25km de l'hôpital.

Résultats: De janvier 1996 au juin 1998, 798 enfants agés de l'ordre 0 – 14 ans ont été admis pour le traitement des blessures. Blessures constituent 4,8% de toutes admissions pédiatriques. Brûlures 38,7%, fractures 20,9%, blessures de tête 16,2% et blessures de tissue mou 9,4% étaient des blessures les plus courantes. Elles constituent dans l'ensemble 85% des admissions et au total 74% des jours d'hospitalisation. La durée moyenne de sejour était 20,6 jours avec des blessures recensées en 16,696 de tous les jours de l'hospitalisation. Le protocoles chirurgical était obligatoire pour dix sept pourcent des enfants blessés. Les protocoles chirurgicaux les plus courants étaient relâchement de la brûlure contracture 20% réduction de la fracture et déboitements 20% et les greffe de la peau (18,7%).

Mortalité dans l'hôpital était 5,5%, avec 71% des morts liées à des brulures. Les cas annuels des trumatismes qui consultent les médecins au RVH dans toute la population du Banjul était 181 cas d'admissions, 3317 sejours dans l'hopital, 28 protocoles chirurgicaux et 7 morts par 100,000 enfants agés de l'ordre 1 – 14 ans.

Conclusion: Blessures d'enfance, la brulure en particulier, est un problème important en matière de soins des patients hôspitalizes. Tandis que la brûlure constitute une petite fraction d'admission pédiatrique, les blessures constituent des longs sejours d'hospitalisation et des protocoles chirurigicaux.

Introduction

Childhood injuries are a common, yet under appreciated problem in sub-Saharan Africa[1,2]. For African children who survive the first 4 years of life, injury becomes the most likely cause of disability and death, and remains so until the fourth decade[3]. In Malawi, 9.7% of all pediatric admissions were related to injury[4]. A household survey found 21% of urban children and 15% of rural children suffer an accidental injury each year, with half visiting a health center. At the largest hospital in Africa, Baragwanath in Johannesburg, 25% of pediatric surgical admissions were for trauma[2].

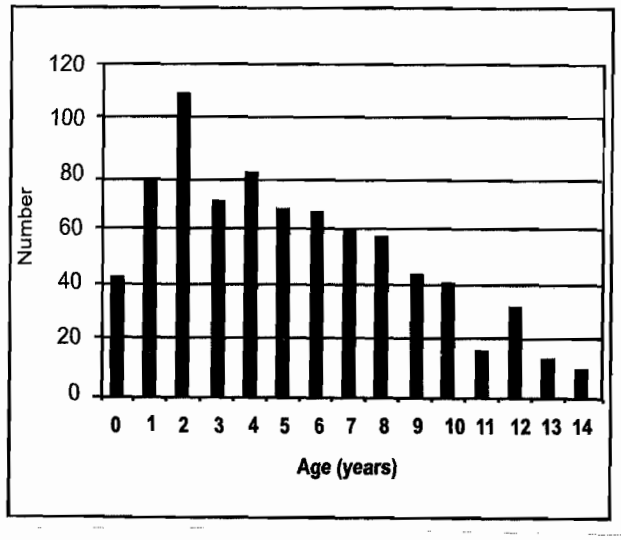

Fig. 1 ***Age distribution of pediatric trauma admissions (N=809).***

**Correspondence*

The purpose of this study was to investigate the pattern of pediatric injuries at a government referral hospital in The Gambia.

Background and methods

Background

The Gambia (population of 1.04 million, total land area of 10,689km²) is situated in West Africa, surrounded on three sides by Senegal, and the Atlantic ocean on the West. In 1997, the country was ranked among the least developed in the world, ranking 165 out of 168 on the Human Development Scale[5]. The estimated per capita income is US $ 302 per year. The infant and under five mortality are 85 and 137 per 1000 live births, respectively[6]. The population growth rate in 1993 was 4.2%.

The Royal Victoria Hospital (RVH) in Banjul is the national referral hospital, and is the sole provider of surgical care in the Western one-half of the country. The 150 bed RVH Pediatric Unit is located adjacent to the main hospital. The pediatric surgical unit has 35 beds.

Methods

Children admitted for treatment of injuries were identified from a prospectively recorded pediatric surgery database[1]. The database recorded all children treated for surgical problems at RVH from January 1996 to June 1998. For each admission the patient's name, age, sex, diagnosis, date of admission and discharge, surgical procedures performed and outcome were recorded.

The incidence of injuries presenting to RVH was estimated for the Greater Banjul Area (pop. 270,540, 32.3% aged 0–14 years). The Greater Banjul area includes the City of Banjul (pop. 42,326) where RVH is located, and the Kanifing Municipal Area, within 25km of the hospital. Population statistics were from the 1993 government census.

Table 1 Epidemiology of pediatric trauma admissions

Diagnosis	Number (%)	Average age (95% CI)	Age range (Years)	Male	Female	M:F
Burn	313 (38.7)	3.4 (3.1 – 3.7)	0.1 – 14	182	131	1.4
Fracture	169 (20.9)	6.8 (6.3 – 7.3)	0 – 14	98	71	1.4
Closed head injury	131(16.2)	6.7 (6.1 – 7.3)	0.3 – 15	88	43	2.1
Soft Tissue injury	76 (9.4)	6.5 (5.8 – 7.2)	0.1 – 13	51	25	2
Burn-contracture	28 (3.5)	6.3 (5.1 – 7.5)	2 – 12	10	18	0.6
Laceration	28 (3.5)	5.5 (4.1 – 6.9)	0 – 13	19	9	2.1
Abdominal trauma	20 (2.5)	7.9 (6.9 – 9.2)	2 – 13	19	1	15
Wound problem	14 (1.7)	4.8 (3.0 – 6.6)	0.8 – 12	9	5	1.8
Dislocation	8 (1.0)	7.4 (5.6 – 9.2)	4 – 11	7	1	7
Post-fracture extremity necrosis	9 (1.1)	8.2 (7.2 – 9.2)	5 – 9.5	6	3	2
Snakebite	6 (0.7)	12.2 (11.4 –13)	11 – 14	5	1	5
Other	7 (0.9)	5.6 (2.9 – 8.3)	1.6 – 10	4	3	1.3
Total	809 (100)	5.4 (5.2 – 5.6)	0 – 15	498	311	1.6

Results

From January 1996 to June 1998, 798 children aged 0 – 14 years were admitted for injuries. This group of children accounted for 809 admissions. Ten children were admitted twice

Table 2 Total hospital days and average length of stay by diagnosis

Diagnosis	Total hospital days	% of total	Average Length of stay (days)
Burn	6498	38.9	20.8
Fracture	4390	26.3	26.0
Soft tissue injury	1365	8.2	18.2
Head injury	1185	7.1	9.0
Burn-contracture	1058	6.3	36.5
Wound problem	681	4.1	48.6
Snakebite	433	2.6	72.2
Laceration	365	2.2	13.0
Post-fracture extremity necrosis	271	1.6	33.9
Abdominal trauma	267	1.6	11.4
Other	183	1.1	20.6
Total	16,696	20.6	100

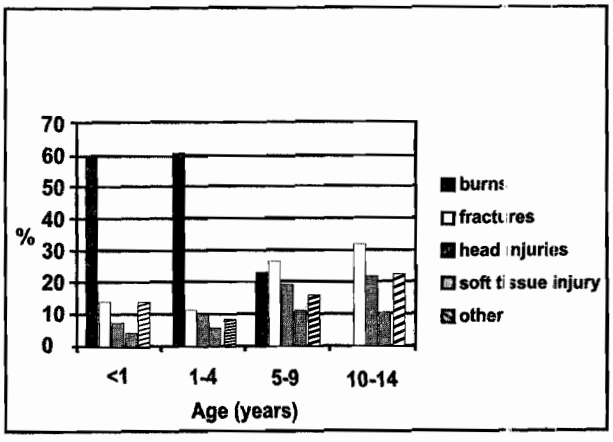

Fig. 2 *Age specific injury patterns*

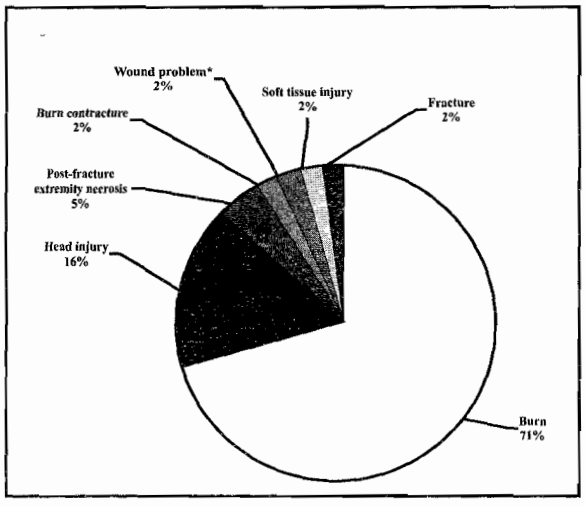

Fig. 3 *Distribution of injury related deaths (N=44)*

Table 3 Injury related surgical procedures

Procedure	Number	%
Burn-contracture release	31	20
Reduce fracture/dislocation	31	20
Skin graft	29	18.7
Wound toilet	17	11.0
Amputation	8	5.2
Laceration repair	7	4.5
Laparotomy	7	4.5
Incision and drainage	4	2.6
Craniotomy	4	2.6
Burn debridement	3	1.9
Dressing change	3	1.9
Sequestrectomy	3	1.9
Other	8	5.2
Total	155	100

and one admitted three times. The clinical base during the study period included 6,630 pediatric surgical outpatient visits, 1,726 pediatric surgical admissions (34,625 total hospital days), 15,236 pediatric medicine admissions, and 25,856 pediatric outpatient visits. Injuries accounted for 46,8% of surgical admissions and 4.8% of pediatric admissions.

The age distribution of pediatric trauma admissions is shown in Fig. 1. The average age of children admitted with injuries was 5.4 years (95% CI, 5.2 – 5.6). Forty-seven percent of children were aged less than 5 years. There were 498 males and 311 females (M:F ratio 1.6: 1.0).

Table 4 Rate of pediatric trauma presenting to the Royal Victoria Hospital from the Greater Banjul Area.

	Number	Annual rate (per 100,000 children aged 0 – 14 years)
Admissions	383	181
Hospital days	7005	3317
Surgical procedures	60	28
Deaths	15	7

The epidemiological features of pediatric trauma admissions are summarised in Table 1. The most common injuries were burns (38.7%), fractures (20.9%), closed head injuries (16.2%), and soft tissue injuries (9.4%). The pattern of injuries varied with age (Fig. 2). Burns, especially scalds related to cooking were the predominant problem in children aged less than 5 years. In the 5 – 9 age group fractures and head injuries became relatively more common. This trend continues in the 10 – 14 age group where fractures (33.1%) and head injuries (23.1%) become the most common injury diagnoses.

The number of hospital days by diagnosis, with their respective average length of stay (LOS) is shown in Table 2. Burns (38.9%), fractures (26.3%), soft tissue injuries (8.2%) and head injuries (7.1%) accounted for the majority of hospital days. Overall, injuries were responsible for 16,696 total hospital days. The average LOS was 20.6 (95% CI, 18.8 – 22.4). LOS ranged from 9.0 days for head injuries to 72.2 days for snakebites. The long hospital stays for children with snakebites were related to extensive tissue necrosis resulting from puff adder bites.

One hundred and thirty-three (16.7%) children required a surgical procedure (Table 3). Twenty-two children underwent multiple operations. Children undergoing multiple operations averaged 2.6 procedures per child (range 2 –5 procedures). Release of burn contractures (20%), reduction of fractures and dislocations (20%) and skin grafting (18.7%) were the most common injury related surgical procedures.

Of 89 surgical deaths during the study period, 44 (49.4%) were related to injuries. The distribution of injury related deaths are shown in Fig. 3. The most common cause of deaths were burns (71%) and head injuries (16%). The overall injury-related mortality was 5.5%.

The cases of pediatric trauma presenting from the Greater Banjul area is summarised in Table 4. Of the 809 admissions, 383 were from the Greater Banjul Area. The annual presentation rate of pediatric trauma was 181 per 100,000 children aged 0 – 14 years. The annual in-hospital death rate was 7 per 100,000. The annual inpatient services were 28 operations and 3317 hospital days per 100,000 per year.

Discussion

This hospital-based study from an urban area of The Gambia shows that children are commonly admitted for treatment of injuries, and pediatric trauma places a significant burden on health services. Of these diagnoses burns were the predominant problem, responsible for 39% of admissions and 39% of total hospital days. Burns were most common in the younger age children – particularly the 1 – 4 year age group. Of the surgical procedures performed for injuries, burn contracture release (20%) and split thickness skin grafting (18.7%) were two of the most common. Burns were also the leading cause of injury related deaths (71%). Fractures and head injuries were the second and third most common injury diagnosis. We have previously reported seasonal variations in head injuries related to children climbing trees to collect firewood and mangoes[1].

Children admitted for treatment of fractures were those that could not be managed as outpatients. Femur fractures were especially common, accounting for 59.2% of fracture admissions. We managed the vast majority of femur fractures non-operatively, with three weeks of skin traction followed by ambulation on crutches. While many of these children could have been managed as outpatients using spica casts, limited

quantities of plaster prevented this from being the routine. Nine children in our series presented with limb gangrene related to fracture management by traditional bone setters – four of which required proximal extremity amputations[7].

Our presentation rate of pediatric trauma from the Greater Banjul Area (181 per 100,000 per year) was similar to that reported from Ghana. In a hospital-based study from Kumasi, the admission rate for pediatric injuries was 230 per 100,000 children aged less than 15 years[8]. We are unaware of any published data from sub-Saharan Africa to compare our length of stay or rate of surgical procedure data. These data should be valuable for future comparative studies.

Finally, it should be noted that hospital admission data greatly underestimates the true rate of trauma in the community. Hospital admission data does not include children treated as outpatients, those dying from injuries prior to arriving to the hospital, or children treated by traditional healers. Available data suggests only a small fraction of those injured will receive hospital-based care, and even a smaller percentage will be admitted. In rural Ghana, one-half of those sustaining a nonfatal injury received no formal medical care, with only 20% receiving hospital-based care[9]. Of children presenting with injuries to a township health center in South Africa, only 18% of children were admitted[10].

References

1. Bickler SW, Sanno-Duanda B. Epidemiology of paediatric surgical admissions to a government referral hospital in the Gambia. Bull World Health Organ 2000; 78: 1330 – 1366.
2. Bickler SW, Kyambi J, Rode H. Pediatric surgery in sub-Saharan Africa. Pediatr Surg. Int. 2001; 17: 442 – 447.
3. Kibel SM, Joubert G, Bradshaw D. Injury-related mortality in South African children, 1981 – 1985. S. Afr. Med J 1990; 78: 398 – 403.
4. Simmons D. Accidents in Malawi. Arch Dis Child 1985; 60: 64.
5. UNDP Report. United Nations Development Programme, New York, 1997.
6. UNICEF Report. State of women and children in the Gambia, Banjul 1998.
7. Bickler SW, Sanno-Duanda B. Bone setter's gangrene. J Ped Surg. 2000; 35: 1431 – 1433.
8. Abantanga FA, Mock CN. Childhood injuries in an urban area of Ghana a hospital-based study of 677 cases. Pediatr Surg. Int 1998; 13: 515 – 518.
9. Mock, C, Ofosu A, Gish O. Utilisation of district health services by injured persons in a rural area of Ghana. Int J Health Plann Manage 2001; 16: 19 – 32.
10. Zwi KJ, Zwi AB, Smettanikov E, Soderlund H, Logan S. Patterns of injury in children and adolescents presenting to a South African township health centre. Injury Prevention 1995; 1: 26 – 30.