A study to determine the cost implications of violence related injuries to a radiology department

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Abstract

OBJECTIVE: To determine the cost implications of violence-related injuries of patients admitted to the resuscitation unit of an academic hospital by investigating the numbers of radiographic procedures performed over a period of one year.

SUBJECTS & METHODS: A retrospective, quantitative study was conducted and data were collected for the period January - December 2004. Injuries inflicted by means of knives, firearms or blunt objects resulted in four hundred and forty three violence-related admissions.

RESULTS: The violence-related injuries consisted of 90 gunshots, 188 stab wounds and 165 blunt injuries. Approximately 30% of all admissions were violence-related. A total of 1513 radiographic examinations were performed which resulted in a total public health expenditure of approximately R624 533-00.

CONCLUSIONS: The study revealed that a high percentage of admissions in the resuscitation unit are violence-related. Every effort should be made by government to address this high incidence of violent injuries by educating people and by creating job opportunities.

Keywords: Gunshot, stabbings.

Introduction

Violence-related injuries are one of the main reasons people are admitted to South African hospitals' trauma units. These types of injuries are placing an added burden on the public health system with its already limited resources. Annual cuts in the healthcare budget and a chronic shortage of skilled healthcare professionals are only a few of the limitations. Researchers agree that violent interpersonal disagreements commonly lead to severe injuries which are caused by firearms, knives, sticks and other dangerous blunt objects [1]. Poverty, unemployment, poor education and substance abuse are the most common factors in the continued high incidence of blunt and penetrating trauma [2]. High levels of criminal activity, gangsterism and lawlessness directly stem from these factors and lead to increased pressure on state hospitals with emergency facilities as a result of the increased numbers of violence-related admissions [1].

Patients, with violence-related injuries, who are admitted inevitably are referred for a radiographic service as radiology plays a vital role in the detection and diagnosis of the extent of injuries. International and South African research data suggest that violence is a problem of epidemic proportion among the youth and is regarded by many South Africans as a legitimate solution to conflict [3].

This retrospective quantitative study focused on how violence-related injuries affected the workload of a radiographic department and the financial implications thereof.

Materials and methods

The focus group in this pilot study was those subjects that were admitted to the resuscitation unit of an academic hospital and referred for a radiographic service. Ethics approval was obtained prior to the commencement of the study. Primary data regarding the injuries was obtained from the statistics registers of the resuscitation unit as well as the hospital's database with respect to the radiographic examinations. Information was categorized according to the type of injury, radiographic procedures performed, cost of imaging procedures and was analyzed accordingly. The target population was all subjects admitted to the resuscitation unit due to violent injuries between January to December 2004. A purposive sampling technique was employed to obtain the desired data [4].

There were 1510 admissions to the resuscitation unit of which 443 were violence-related. The violent injuries of subjects were categorized as stabbings, shootings, or injuries caused by blunt objects. Non-violent admissions included subjects involved in motor vehicle accidents, post-operative complications, burns and suicide attempts but were not included in the study.

All imaging procedures performed on subjects were calculated and all follow-up examinations for a period of one week later only were included in the calculations. Follow-up examinations beyond this time period were excluded from the study to prevent the inclusion of irrelevant or confounding data. Approximate overall costs of radiographic procedures performed were obtained by multiplying the numbers of examinations by the average private patient tariffs for a public hospital. Blunt objects encountered in the study included injuries caused by glass bottles, baseball bats, bricks and spades. Types of injuries, such as stab,

shot or blunt were also quantified to establish the most prevalent type of violent injury.

The study only included statistical data. No questionnaires or personal contact with subjects was necessary.

Results

Figure 1 presents the different types of violent injuries, namely gunshots, stabs and blunt injuries. A total of 90 subjects were admitted due to gunshot injuries. One hundred and eighty-eight subjects were admitted due to stab wounds and 165 due to blunt injuries.

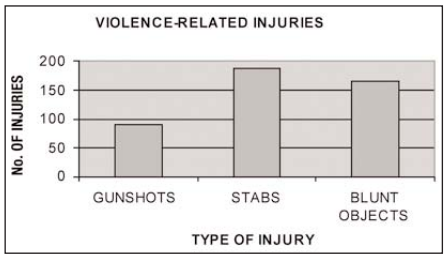


Figure 1. Bar-graph depicting the most frequent type of violent injury observed during this study.

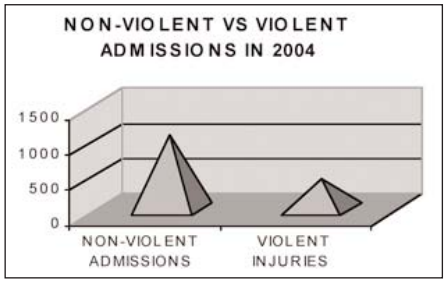


Figure 2. Graph depicting the ratio of violent versus non-violent related injuries admitted to the resuscitation unit.

Figure 2 presents the relationship between violent and non-violent-related admissions in the resuscitation unit in 2004. A total of 1067 subjects were admitted due to non-violence and 443 subjects were violent-related admissions thus approximately 30% of subjects admitted were violence-related.

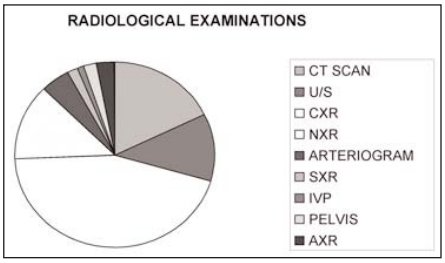


Figure 3. Pie chart depicting the examinations most frequently requested during the time of the study.

Figure 3 presents the majority of radiographic procedures that were performed on the subjects. Radiographic examinations performed are listed from highest to lowest numbers. Chest x-rays (CXR) 622, computed tomography (CT) scans 249, cervical spines 186, ultrasound (US) examinations 162, extremities 72, arteriograms 65, abdominal x-rays (AXR) 37, pelvis 34, barium swallows 30, skull x-rays 21, excretory urograms 16, micturating urograms 5, and other 14. Data suggest that CXRs and cervical spines were the most frequently requested examinations while CT scans, ultrasound and arteriogram represent the highest numbers of specialized radiographic procedures. The most expensive procedures are often the most frequently requested examinations. These examinations, such as ultrasound, are often more time consuming examinations, adding extra pressure on often reduced staff numbers after hours.

Table 1 presents the costs of requested radiographic procedures based on the average private patient tariffs at public hospitals. Violence-related injuries have huge financial implications on the public health budget. The approximate overall amount spent on radiographic procedures in 2004 in this study was R624 533-00.

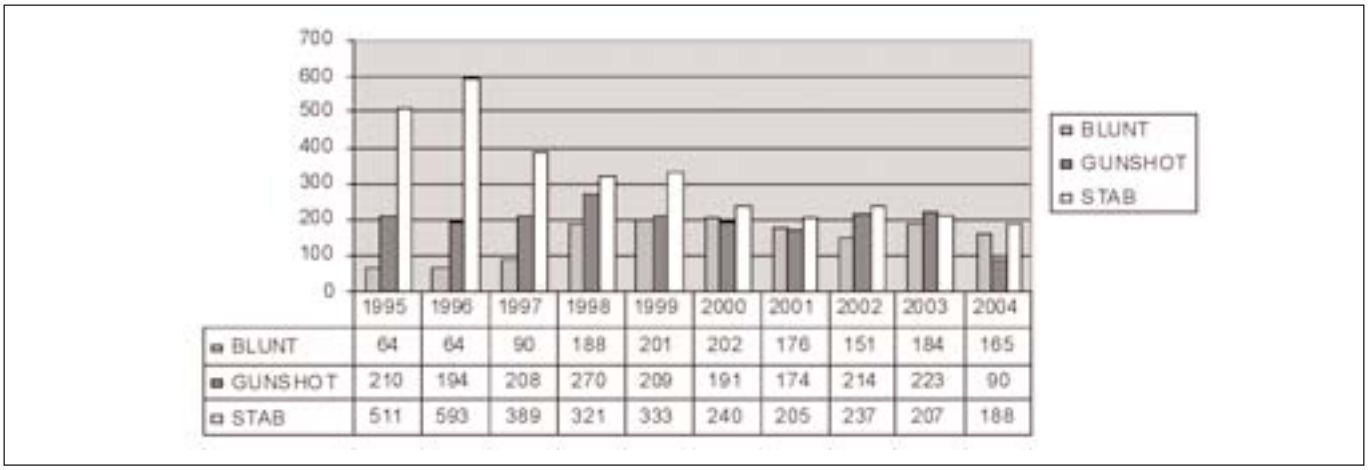
Figure 4 (on opposite page) presents the trend that violence-related injuries followed over a period of 10 years. It is evident that the numbers of patients with stab wounds and gunshots admitted to the resuscitation unit decreased while the number of blunt object injuries substantially increased over the last 5 years.

Discussion

The results show that the violence-related injuries increased the radiographic workload considerably. According to the 2004 annual radiographic report 79 radiographers are needed to staff the radiography department where the study

EXAM	COST PER UNIT	NO. OF EXAMS	TOTAL COST
CXR	R109-00	622	R67798-00
AXR	R109-00	37	R4033-00
CT SCAN	R1449-00	249	R360,801-00
U/S	R302-00	162	R48924-00
ARTERIOGRAM	R1449-00	65	R94185-00
C/SPINE	R109-00	186	R20274-00
PELVIS	R109-00	34	R3706-00
EXTREMITIES	R109-00	72	R7848-00
IVP	R302-00	16	R4832-00
MCUG	R302-00	5	R1510-00
SWALLOW	R109-00	30	R3270-00
SXR	R109-00	21	R2289-00
OTHER	R362-00	14	R5063-00
GRAND TOTAL			R624,533-00

Table 1. Cost of examinations in Rands.



	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
BLUNT	64	64	90	188	201	202	176	151	184	165
GUNSHOT	210	194	208	270	209	191	174	214	223	90
STAB	511	593	389	321	333	240	205	237	207	188

Figure 4. Type of violent injuries observed over ten years.

was conducted. Sixty radiographers are currently practicing in this department [5] thus it is understaffed by approximately 19 radiographers.

These preventable injuries are causing added pressure to an already understaffed department. The Personnel Administration Standard (PAS) of November 1993 suggested that 3 300 examinations be performed by each radiographer per year, but currently there is no formula to determine staff/patient ratio. It is recommended that a formula be developed to ascertain the correct patient/staff ratio in order to meet the staffing requirements according to departmental needs. Interesting to note was that chest radiography, CT scans, ultrasound scans, and cervical spine radiography were amongst the examinations mostly performed.

It is a well known fact that CT scans for example are very expensive examinations. Ultrasound, although not expensive, can be time consuming and this has a direct influence on workload as the presence of a radiologist and often a radiographer is required during the performance of such examinations. This impacts on the availability of these staff at other work areas.

Violence-related injuries are often preventable therefore it can be argued that this amounts to unproductive use of human and physical resources. The financial implications of these preventable injuries on already reduced budgets of radiographic departments are enormous. The total costs of these examinations calculated only included expenses of the radiology department. The total cost of, for example, consumables such as catheters, needles and drips, cost of surgery, etc therefore would probably run into the millions. This is money which could have been applied in other areas of healthcare, where the needs are higher.

Every effort should be made by government and non-governmental organizations to reduce violence amongst the population. This could be done by educating people, in an effort to raise their level of education thereby reducing the high incidence of violent crimes.

It is postulated that the high incidence of unemployment has also an influence on these violence-related injuries and must be addressed by those sectors responsible for job creation.

The approximate amount of money spent on radiographic procedures was calculated to be R624 533-00 which could have been used more productively if people found other ways of dealing with and solving conflict.

Conclusion

Violence-related injuries amount to a high percentage of admissions in the resuscitation unit. South African hospitals are already short staffed and these preventable injuries are adding pressure to short-staffed departments as well as increasing service delivery costs.

Acknowledgements

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