Weapons injuries during and after periods of conflict: retrospective analysis

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Abstract

Objective: To assess the relative frequency of weapon injuries during conflict and after periods of conflict in the absence of disarmament.
Design: Retrospective analysis of a database of war wounds.
Setting: Region with a protracted conflict between rival combatant groups and a subsequent transition to the uncontested military authority of a single power.
Subjects: 2332 people who received weapons injuries during the conflict or post-conflict periods and were admitted to hospital within 24 hours of injury.
Main outcome measures: Percentage change in mean monthly admission rate by weapon type between conflict and post-conflict periods; annual incidence of injury by weapon type during conflict and post-conflict periods; percentage change in annual incidence by weapon type between conflict and post-conflict periods.
Results: Mean monthly admission rates for injuries from fragmentation munitions decreased by 8% between conflict and post-conflict periods and by 23% for injuries from mines and 32% for gunshot injuries. The decline in admissions for all injuries was 23%. After adjustment for population growth over the study period, declines in annual incidence were 22% for fragmentation munitions injuries, 34% for mine injuries, and 40% for gunshot injuries. The decline in incidence for all injuries was 33%. In-hospital mortality from weapons related injuries increased from 2.5% to 6.1% ($P < 0.001$) between conflict and post-conflict periods.
Conclusions: In this setting, continued availability of weapons is associated with increased mortality and a level of injuries from weapons that is only somewhat reduced from that observed during a period of conflict.

Introduction

The availability, redistribution, and recirculation of weapons during and after armed conflicts is generating increasing unease and policy debate.[1 2] In particular, there is growing concern that the continued availability of weapons in societies that have undergone armed conflicts is an important risk factor for sustained violence.[3] This analysis examined the incidence of weapons injuries in a region that did not undergo disarmament but did experience a transition to control by a single military faction.

The region is situated within a country which, under the Eiseman classification,[4] would be described as having an ongoing minor conventional war, and which has received massive amounts of weapons over much of the past 20 years.[5] By March 1995 this region had come under the uncontested control of a faction that subsequently asserted control over most of the rest of the country. This transition was accompanied by an increasing number of returning refugees, a number of humanitarian organisations starting programs of support, and a shift in the zones of active conflict to areas hundreds of kilometres away. There was clearly no attempt at mass disarmament.

The International Committee of the Red Cross has provided surgical care to people from this region wounded in war since 1983. The principles of neutrality and impartiality by which the International Committee of the Red Cross operates preclude identifying the location of this region; disclosure of this information may have security implications for activities of the International Committee of the Red Cross in the country concerned.

Subjects and methods

Rates of weapons injury were compared between the 50 month period of January 1991 to March 1995 and the 18 month period of September 1995 to March 1997. These periods were designated as "conflict" and "post-conflict"—terms that are open to interpretation but none the less provide labels for referring to two time periods separated by an important military event. The rationale for the 6 month gap between the periods was to incorporate a transition phase between the two.

Subjects had all been injured by weapons and been admitted within 24 hours of injury during either conflict or post-conflict periods to one of two hospitals. Hospital A was an International Committee of the Red Cross hospital established in 1983 and situated adjacent to the region of interest in a neighbouring country. Hospital B, located some 200 kilometres from hospital A in the regional capital, began to receive support from the International Committee of the Red Cross in 1995 when the regional military situation stabilised. After hospital B became functional in May 1996, admissions to hospital A were phased out, ending in July. Both hospitals had about 200 inpatient beds. Hospital B was closer to the site of injury and had staff whose skills were less well developed.

An unknown proportion of people injured by weapons die before reaching hospital, and some facilities not supported by the International Committee of the Red Cross also treated people injured by weapons during both periods, but surveys indicate that hospitals A and B probably cared for at least 75% of injured people who reached hospital.

Data were collected from all patients admitted to either hospital as part of the wound database that was started by the International Committee of the Red Cross in 1991.[6] Data include age, sex, type of weapon injury, delay between wounding and admission, in-hospital mortality, and variables relating to operative treatment and classification of the wound.[7]

A total of 2332 people were injured by weapons during conflict or post-conflict periods and admitted to hospital A or B within 24 hours of injury. The time of

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Table 1 Descriptive data for patients with weapons injury during conflict and post-conflict periods

	Conflict period: Hospital A	Post-conflict period		
		Hospital A	Hospital B	Total
Months of observation*	50	11	10	18
Mean daily patient census	99	108	92	100
Mean (SD) age	25.6 (12.6)	26.2 (10.7)	24.2 (12.3)	25.2 (11.5)
Proportion (%) male	94	97	97	97
Mean No of operations	2.4	2.8	2.2	2.5
Median length of stay (days)	15	15	11	14
Number (%) of admissions				
All weapons	1825	266	241	507
Guns	670 (37)	55 (21)	110 (46)	165 (33)
Fragmenting munitions	426 (23)	84 (32)	57 (24)	141 (28)
Mines	729 (40)	127 (48)	74 (31)	201 (40)
In-hospital mortality (%)				
All weapons	2.5	5.3	7.1	6.1
Guns	3.3	3.6	5.5	4.8
Fragmenting munitions	2.3	3.6	3.5	3.5
Mines	1.8	7.1	12.2	9.0

*Hospital A contributed data from January 1991 to March 1995 during the conflict period, and from September 1995 to July 1996 during the post-conflict period. Hospital B contributed data only during the post-conflict period, from May 1996 to February 1997.

admission was restricted to reduce the possibility of including injured people who came from outside the region.

The wound database classifies injuries as those caused by guns, fragmentation munitions (bombs, shells, and grenades), and mines (antipersonnel or anti-tank mines). The primary analysis was a comparison of the mean admission rate during conflict and post-conflict periods for these three categories of weapons injuries and for all weapons injuries.

The annual incidence for injuries was calculated to adjust for population growth, using the population of the three provinces most likely to have been the site of injury for people who reached hospital within 24 hours. Population estimates were calculated from unpublished figures from the United Nations High Commissioner for Refugees. These figures provide numbers of refugees living in neighbouring countries by province of origin, along with annual returns by province. The projected population assumes an annual growth of 2.2%, based on historical demographic data.

Table 2 No of refugees returning to area of conflict and estimated year end population for three provinces affected by conflict

	No of refugees returning	Estimated population
1991	29 924	1 220 000
1992	152 737	1 400 000
1993	38 881	1 470 000
1994	18 370	1 530 000
1995	38 580	1 600 000
1996	22 130	1 660 000
1997*	2 241	1 660 000

*To end February 1997.

Table 3 Mean monthly admissions to hospital and annual incidence of weapons injuries resulting in admission during conflict and post-conflict periods

	Monthly admissions			Annual incidence*		
Injury	Conflict period	Post-conflict period	Decline (%)	Conflict period	Post-conflict period	Decline (%)
Guns	13.4	9.2	32	11.21	6.69	40
Fragmenting munitions	8.5	7.8	8	7.40	5.77	22
Mines	14.6	11.2	23	12.27	8.15	34
All weapons	36.5	28.2	23	30.88	20.61	33

*Adjusted for population growth: mean annual incidence of injuries per estimated 100 000 population observed during conflict and post-conflict periods.

Results

Table 1 provides descriptive data pertaining to the study population.The proportion of gunshot injuries in hospital B was higher than for hospital A and mortality rose for all types of injury across periods.

The number of refugees returning each year and estimated year end population (table 2) were used to calculate the annual incidence of injuries per 100 000 population (table 3). Mean monthly admissions to hospital declined by 8% for injuries from fragmentation munitions, 23% for mine injuries, and 32% for gunshot injuries. Overall, mean admissions for weapons injuries declined by 23%.

Adjusting for population growth provides the declines given in the final column of table 3. This adjustment is subject to several limitations. Population estimates assumed that historical rates of population growth remained constant, injuries were underascertained, and figures from the United Nations High Commission for Refugees account for returns but not departures from the region over the study period. Notwithstanding these limitations, these figures provide an estimate of temporal changes in weapons injuries, adjusted as well as possible for population growth. Such figures provide a means to compare weapons injury rates in different settings but are rarely published because the limitations described here almost always apply.

Mortality

Table 1 shows an increase in mortality between the two periods for all injury types, and particularly for mine injuries. In fact, the observed increase in mortality was of such magnitude that, despite the overall decline in weapons injuries, more people died of weapons injuries per month during the post-conflict period than before. Several factors that may account for some of this increase are shown in table 4. In general, patients treated at hospital B were more likely to arrive within 6 hours of injury, more likely to be less than 10 years old, and less likely to receive blood transfusions. Reduced chance of receiving blood transfusion and weapons injuries occurring in children can easily be seen to affect subsequent mortality. Rapid access to hospital is associated with higher mortality because severely wounded people who might have died during a longer evacuation survive long enough to die in hospital. Indeed, the hospital situated in the area under study had higher mortality for gunshot wounds (5.5% *v* 3.6% in hospital A) and mine injuries (12.2% *v* 7.1%) ($P < 0.05$).

The extent of the increase in mortality due to mine injury during the post-conflict period raises the question of whether the factors discussed here account for all of the increase in mortality or only a portion. None of these factors apply to Hospital A, in which mortality for mine injury tripled during the post-conflict period. Other potential explanatory mechanisms include the laying of new mines with a higher explosive charge and the resettlement of new areas

Table 4 Data relevant to in-hospital mortality by period, hospital, and type of injury

	Conflict period: Hospital A			Post-conflict period					
				Hospital A			Hospital B		
	Gun	Fragment	Mine	Gun	Fragment	Mine	Gun	Fragment	Mine
In-hospital mortality (%)	3.3	2.3	1.8	3.6	3.6	7.1	5.5	3.5	12.2
Proportion (%) of injury type arriving within 6 hours	12	11	16	4	1	6	15	7	55
Proportion (%) male	94	90	96	96	100	95	99	98	95
Mean (SD) blood units transfused	0.5 (1.6)	0.4 (1.3)	0.9 (1.8)	0.3 (0.9)	0.6 (2.0)	0.9 (1.9)	0.1 (0.4)	0.1 (0.4)	0.4 (1.0)
Mean (SD) age	26.7 (11.7)	24.7 (13.7)	25.2 (12.7)	25.9 (6.8)	28.3 (10.2)	24.9 (12.1)	26.3 (11.3)	22.4 (7.5)	22.4 (15.9)
Proportion (%) aged under 10 years	4	9	6	2	0	6	6	7	16

where mines of higher explosive charge have been previously laid.

Discussion

This study quantifies the decline in rates of weapons injury observed in a region that experienced a transition to military stability and in which disarmament did not occur. Declines were in the range of 10-30% depending on injury type, and 20-40% after adjustment for population growth.

Limitations, potential biases, and terminology

Several limitations and sources of potential bias should be considered. A more sophisticated analysis might have been carried out on these data. For example, trend analysis or spline regression might have been used to examine whether trends of injury or admission rates over time existed between the two periods, or whether important non-linearities existed in incidence over the two periods. These methods, however, might have obscured the simpler message that was the aim of the present paper. In addition, restricting the analysis to comparing injury rates during the conflict period with those from the final 6 months of the post-conflict period (September 1996 to February 1997) resulted in smaller declines than those seen in table 3 for all categories of weapons with the exception of mine injuries.

There are three important sources of bias in the present analysis. Firstly, one might expect to see increased numbers of hospital admissions over the two time periods because of the opening of a second hospital during the post-conflict period. Secondly, some individuals in the dataset were evacuated by air to hospital B from areas of active conflict outside the region of interest. This number is thought to be small, and not all would have arrived within less than 24 hours. Finally, the increased proportion of patients arriving within 6 hours of injury at hospital B is a bias, since some probably would have died during the longer evacuation to hospital A during the conflict period.

These biases can be addressed by repeating the analysis presented in table 3 on data for hospital A alone. This shows an increase in the declines observed for gunshot and fragment injuries (from 32% to 63% and 8% to 10%, respectively) and a decrease in the decline observed for mine injuries (from 23% to 21%).

Weapons, societies, and conflict

This analysis has shown that the risk of weapons injury remains high in the area studied. Though this might seem self evident and merit little further consideration, there are several reasons why such a reaction may be misguided.

Firstly, it is important to note that much of this injury is not related to landmines and required an act of volition on the part of the weapon user. The implication is that the continued availability of weapons provides a means to resolve differences. This has profound implications for how a society will function. Indeed, a convincing case has been made that weapons availability is an especially important risk to the social future of cultures attempting to emerge from the aftermath of conflict.[8]

Secondly, the end of the Cold War and the waning of restraint by the superpowers has led to an increase in regional and communal conflict.[9] Traditional notions of conflict are being replaced by a complex picture of skirmishes, mass killings, and largescale criminal activity. All of these are being carried out by armed elements within populations that may well not exist within any formal chain of command.

Thirdly, the international community is increasingly confronted by popular demand to mount some form of response to such situations. Experiences in settings where such efforts have been undertaken have shown the importance of disarmament, demobilisation, and reintegration of former combatants into post-conflict society.[10] Such undertakings are costly, difficult, and require a long term commitment that often extends beyond the time frame of popular concern.

Conclusion

The availability of weapons is increasingly being implicated as a factor in social destabilisation; the problem is increasingly passing out of the framework of the nation state; and efforts to respond to it are complex, costly, and prone to failure.[2] Although there are no simple solutions, the trade in arms is clearly the overarching issue.[1] Viewed in the context of these considerations, the index of sustained violence observed here should give rise to some sobering thought, particularly among policy makers and those in government who are concerned with the issue of weapons transfer and its implications.

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The quality of health care in prison: results of a year's programme of semistructured inspections

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Abstract

Objectives: To assess, as part of wider inspections by HM Inspectorate of Prisons, the extent and quality of health care in prisons in England and Wales.
Design: Inspections based on a set of "expectations" derived mainly from existing healthcare quality standards published by the prison service and existing ethical guidelines; questionnaire survey of prisoners.
Subjects: 19 prisons in England and Wales, 1996-7.
Main outcome measures: Appraisals of needs assessment and the commissioning and delivery of health care against the inspectorate's expectations.
Results: The quality of health care varied greatly. A few prisons provided health care broadly equivalent to NHS care, but in many the health care was of low quality, some doctors were not adequately trained to do the work they faced, and some care failed to meet proper ethical standards. Little professional support was available to healthcare staff.
Conclusions: The current policy for improving health care in prisons is not likely to achieve its objectives and is potentially wasteful. The prison service needs to recognise that expertise in the commissioning and delivery of health care is overwhelmingly based in the NHS. The current review of the provision of health care in prisons offers an opportunity to ensure that prisoners are not excluded from high quality health care.

Introduction

Health care in prisons has long been a matter of concern.[1 2] Research has shown high levels of mental disorder[3–5] and drug misuse[6 7] and general poor health among prisoners.[8] Health screening on entering prison is only moderately effective,[9] and the Health Care Service for Prisoners is at times seen by prisoners as more interested in the needs of the prison as a secure institution than their needs as patients.[10] The practice of shackling patients—especially women—has been widely criticised.[11–13] On the other hand, it has been claimed that the Health Care Service for Prisoners provides quicker access both to primary and specialist care than the NHS does, and all prescription are free.[14]

HM Inspectorate of Prisons

Since 1791 prisons have been subject to inspection, but only in 1979 was a truly independent inspectorate of prisons established.[15] The inspectorate's work comprises announced inspections lasting a week, shorter unannounced inspections, and a series of thematic reports. Inspection reports are public documents available from the inspectorate or on the internet (www.penlex.org.uk).

In 1996 a review of prison health care by the inspectorate concluded that it was no longer sensible to have a healthcare service for prisoners separate from the NHS, and that disadvantages arose from having two parallel systems.[16]

We report some results from the inspection of 19 prisons (for men, women, and young offenders) in England and Wales from September 1996 to August 1997. The prisons have a population of some 7250 prisoners, about 12% of the total prison population.

Methods

The inspectorate works to a set of "expectations" of the level and quality of service that it expects to find in prisons. Expectations for health care[17] are based on existing healthcare quality standards in the prison service,[18 19] and, for areas not covered by these standards or for which the published standards are not explicit, they reflect the standards in the NHS as the prison service has a commitment to provide "the same standards of health care as those provided by the NHS."[20]

Healthcare inspections—carried out by a doctor and, when necessary, a nurse—last one to three days and involve (*a*) visits to all healthcare areas, (*b*) discussions with staff (both those employed by the prison and visiting specialists), (*c*) review of the annual reports on health care in the prison and of local guidelines and protocols, and (*d*) meeting patients both individually and, when appropriate, in a group. During a full inspection 10% of inmates are asked to complete a questionnaire about aspects of prison life. The sample is not random, though attempts are made to ensure that all categories of inmate get questionnaires. The questionnaire allows responses on a five point scale