

ORIGINAL ARTICLE

Injury prevention education in medical schools: an international survey of medical students

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Background: Injuries account for an estimated 9% of global mortality. Health professionals worldwide receive little formal injury prevention training, especially in developing countries.

Objective: To identify injury prevention training topics taught in a sample of medical schools throughout the world.

Design and setting: Cross sectional survey of 82 medical schools from 31 countries. Based on a convenience sample, respondents recalled the injury prevention concepts they were taught, estimated the time dedicated to these topics, specified the courses and rotations where these concepts were taught, and noted whether they were compulsory or elective sessions.

Participants: Medical students in their last year of medical training.

Main exposure measures: Student recall of classes and rotations where topics of injury prevention and control were discussed.

Results: Basic injury prevention concepts including risk factors for injuries and injury classification systems were not covered in 60% of medical schools. Concepts related to child abuse and neglect and emergency care were more commonly taught than others such as traffic injury prevention and youth violence prevention. In general, injury prevention and control concepts were less frequently taught in Middle Eastern and African universities compared with other regions and some topics such as violence prevention were more frequently taught in medical schools in the Americas. Injury prevention concepts were taught most frequently in preventive medicine, forensic medicine, emergency medicine, surgery and pediatrics courses, and rotations.

Conclusions: Injury prevention and control education is infrequent and fragmented in medical schools around the world. Inclusion or further development of curricula on this subject could benefit prevention and control efforts.

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Injuries account for an estimated 9% of mortality in the world,¹ and injury prevention and control efforts are inadequate in countries of all income levels. Effective preventive and research measures require that individuals learn how to study and prevent or control injuries in their own communities.^{2–3} Physicians can play a role in the prevention of injuries, as they already do in their diagnosis and treatment.^{4–5} As early as 1969, physicians in the United States pointed out deficiencies in the teaching of injury prevention and control in medical schools.⁶ Injury prevention and control education continues to be limited in medical programs,^{7–9} and those courses that do exist are usually elective courses.¹⁰ In addition, teaching injury prevention is not a criterion for accreditation of academic programs in public health.¹¹

Injury concepts have been more commonly taught in postgraduate or continuing education programs than in undergraduate programs.^{7–10} Few studies have examined injury prevention and control curricula in undergraduate medical school programs, and most were conducted in North America. These studies reported that injury prevention topics were covered in some specialties including pediatrics,¹² emergency medicine,^{13–16} and surgery,³ and the subjects most often covered were family violence, violence against women, sexual violence,^{5 17–26} child abuse and injuries,^{12 27} and suicide.²⁸

There are few comprehensive efforts aimed at expanding or creating curricula on injury prevention and control either at country levels^{11 29} or in multiple countries.³⁰ These efforts target public health students, public health practitioners, and medical students. However, there have been no studies of

injury prevention curricula worldwide. To address this information gap, we developed a survey to determine whether medical schools in several countries included a selection of injury prevention and control subjects in their curriculum. We also asked questions about the frequency and the types of rotations or classes where specific injury topics were taught.

METHODS

Sample and respondents

We invited student leaders of the International Federation of Medical Students' Associations (IFMSA) representing 90 medical student associations from 85 countries to administer the survey. Between April 2002 and April 2003, they invited peers from their medical schools to fill out questionnaires on their exposure to injury prevention and control subjects in their undergraduate medical programmes. Final year students were selected to participate, as they were the most likely to have been exposed to available courses in their academic programs. An attempt was made to identify at least one medical student to complete the survey from each school. Of a total of 1714 medical schools in 157 countries that appear in the World Directory of Medical Schools,³¹ our convenience sample consisted of 88 schools (5.1%) from 31 countries. All of the participating schools were within countries that were affiliates of the IFMSA, a factor that determined the geographic distribution of the sample.

Abbreviation: IFMSA, International Federation of Medical Students' Associations.

Study questionnaire

The main part of our questionnaire consisted of the following list of general injury prevention topics: principles of injury prevention and control, injury research methods, prevention of specific types of injuries, emergency medical systems and rehabilitation, relevant ethical issues, medico-legal aspects, and social aspects of injury prevention and control. More specific subtopics were included under each general topic heading. Students were asked to identify the subjects they were exposed to, estimate the number of hours dedicated to the subject, and to note whether or not the course covering the subject was compulsory. We also collected information on the name and country of the medical school, information concerning who had the authority to develop or modify curricular contents, the existence of specific injury courses in the academic program, whether the school was state owned, private, or of mixed structure, and about the size of the student body of the institution. In addition, students were invited to provide curricular information or syllabi (if existing) with the questionnaire. Students provided personal information including age, sex, current year of study, and total length of undergraduate medical programme. In an open ended question, students had the opportunity to provide their opinion on the need for injury prevention and control courses in their academic programs. We verified the university size and length of academic programs by accessing the websites of all institutions and by cross checking with available information from the World Directory of Medical Schools.³¹

Analysis

Analyses used descriptive statistics. Different topic specific questions were grouped into 18 injury themes. Results are reported at the school level and for some analyses stratified by geographic region. We also examined country income level following the World Bank country income classification.³² For schools where more than one response was obtained, we created a summarized version of all responses. The summarized version included all injury subjects marked by respondents. To identify the number of hours per subject we selected the maximum value indicated by a respondent for that specific medical school.

RESULTS

IFMSA student leaders returned 141 completed questionnaires. Twenty questionnaires were dropped from the analysis because senior medical students did not complete them. We report data from the remaining 121 questionnaires representing 81 medical schools from 31 countries. We obtained more than one response (range 2–10) for 18 medical schools. Three medical schools were from sub-Saharan and South Africa, five from the Middle East, 12 from the American continent, 16 from Asia, and 46 from Europe. Seven medical schools were from low income countries, 27 from middle income countries, and 48 from high income countries.

The mean age of respondents was 23.8 years (range 20–36) and 52% of respondents were female. The mean length of educational programs was six years (range 4–7). The most common student body size of universities was 15 000 to 19 999 students and 80% of schools were publicly owned. In 66 schools (81%) a specific curriculum committee regulated the curricular contents of the medical program; the dean's office did this in three (3.6%), academic departments in 10 (12%), and external advisors in one school (1.2%).

General injury prevention concepts

General injury concepts were more often taught than specific concepts of injury prevention theory. For example, 63% of

schools covered injuries as a health problem, 58% addressed the classification of injuries by intent and mechanism, 40% taught the definition of injury prevention and control, 33% addressed demographic differences for the risk of injuries, but only 6% covered specific injury prevention theory such as the Haddon matrix.

Unintentional injuries

Teaching of unintentional injuries varied by topic. Thirty percent of schools taught about the prevention of automobile and bicycle injuries, almost 26% about motorcycle or pedestrian injury prevention, and 36% about the use of helmets to prevent traffic injuries. A greater percentage of schools taught about risk factors for falls, drowning, and burns (64%, 43%, and 54% respectively), compared with preventive measures on the same topics (43%, 30%, and 40%, $p = 0.06$, $p = 0.29$, and $p = 0.23$ respectively). Sixty four percent of schools taught occupational injuries and 53% sports injuries.

Intentional injuries

Overall, risk factors for interpersonal violence were taught in 40% of schools but only 28% provided information on preventive measures. Coverage of specific topics of interpersonal violence varied. Child abuse and suicide related topics were the most frequently covered. Risk factors for child abuse and neglect were taught in 69% of schools, preventive measures in 59%, related information on referral services in 60%, and signs of child abuse were taught in 75% of schools. Risk factors and the identification of potentially suicidal patients was taught in 70% of schools, suicide prevention in 59%, and local suicide referral services in 54% of schools. For sexual violence 52% of schools taught about risk factors, 63% about the health consequences of sexual violence, and 54% about the role of healthcare providers in the identification and treatment of cases of sexual violence. Risk factors for intimate partner violence were covered in 46% of schools, preventive measures in 38%, and information on referral services in 41%. Regarding abuse towards older people, risk factors were covered in 28%, preventive measures and referral services in 27%, and 30% of schools covered signs of abuse to older people. Youth violence risk factors were taught in 29% of schools, preventive measures in 22%, and referral services in 23%.

Injury care and rehabilitation

Key elements of emergency medical systems were taught by 79% of schools, 68% taught about the role of health personnel in emergencies and the development of trauma systems, 62% about injury scores, coding, or outcome measures, and 56% about the role of rehabilitation in injury control.

Other aspects of injuries

Forty eight percent of schools taught about injuries and local legislation, 36% about international humanitarian law, 37% about social aspects of violence and injuries, and 32% about safety promotion as a human right.

Geographic differences

There were regional differences in the percentages of schools that taught injury prevention and control. Schools from Africa and the Middle East taught fewer concepts of injury prevention and control compared with other regions. Child abuse and abuse against older people were more frequently taught in schools from the Americas, drowning injuries in Asia, sports injuries in Europe, and sexual and intimate partner violence in Africa (table 1). We found no notable differences by country income level or between state owned versus privately owned medical schools.

Table 1 Number and percent distribution of injury prevention and control topics* taught in medical schools by geographic region, 2002–03

Injury topic	Region, n (%)					p value†
	Africa (n=3)	Americas (n=12)	Asia/Oceania (n=16)	Europe (n=46)	Middle East (n=5)	
Basics	3 (100.0)	10 (83.3)	11 (68.8)	36 (80.0)	2 (40.0)	0.22
Unintentional						
Traffic related	0 (0.0)	7 (58.3)	10 (62.5)	29 (64.4)	1 (20.0)	0.09
Drowning	1 (33.3)	5 (41.67)	12 (75.0)	20 (44.4)	1 (20.0)	0.14
Fall injuries	1 (33.3)	7 (58.3)	11 (68.8)	33 (73.3)	1 (20.0)	0.11
Burn injuries	2 (66.7)	10 (83.3)	11 (68.8)	27 (60.0)	1 (20.0)	0.16
Occupational	1 (33.3)	10 (83.3)	8 (50.0)	34 (75.6)	1 (20.0)	0.02
Sports related	0 (0.0)	6 (50.0)	7 (43.75)	29 (64.4)	1 (20.0)	0.07
Intentional						
Child abuse	2 (66.7)	11 (91.67)	14 (87.5)	36 (80.0)	3 (60.0)	0.52
Youth violence	0 (0.0)	5 (41.67)	6 (37.5)	17 (37.8)	1 (20.0)	0.65
Intimate partner violence	3 (100.0)	11 (91.7)	12 (75.0)	25 (55.6)	0 (0.0)	< 0.01
Sexual violence	3 (100.0)	11 (91.7)	13 (81.3)	28 (62.2)	1 (20.0)	0.02
Elder abuse	0 (0.0)	8 (66.7)	5 (31.3)	17 (37.8)	1 (20.0)	0.14
Suicide	1 (33.3)	10 (83.3)	11 (68.8)	36 (80.0)	4 (80.0)	0.37
Other						
Emergency care	3 (100.0)	10 (83.3)	16 (100.0)	39 (86.7)	2 (40.0)	0.02
Legal issues	1 (33.3)	10 (83.3)	10 (62.5)	25 (55.6)	1 (20.0)	0.13
Social issues	1 (33.3)	6 (50.0)	9 (56.3)	19 (42.2)	0 (0.0)	0.26

*Percent indicates that at least one injury issue within each topic and not necessarily the whole topic was taught in a medical school.

†Pearson χ^2 test for overall differences between geographic regions. Values less than 0.05 in bold.

Courses and rotations

All injury prevention and control topics listed in this survey were covered in the preventive medicine courses from different schools. Specific topics were also taught in forensic medicine, emergency medicine, surgical rotations, pediatrics, and psychiatry or psychology among others (table 2). However, coverage of specific topics varied by course. For example intentional injuries were often covered in psychiatry and psychology but unintentional injuries were not.

Students had different opinions about including injury prevention and control in their medical school's curricula. Of the 103 students who answered this open ended question, most (89%) said that injury prevention and control was important or should be part of their curriculum. They thought that injuries overall were an important health problem (34%), and some expressed interest in learning about specific injury problems (3.9%). Other reasons included their desire to learn more about preventative approaches in addition to curative approaches (25.2%), improving technical skills such as high risk patient identification (20.4%), and learning about patient referral systems (4.9%).

Almost 5% of students thought these concepts should not be part of their basic medical education because of current overload of subjects in their medical program. A similar percentage, mostly from Scandinavian countries, thought that injury prevention subjects were either already sufficiently taught in their country by other institutions or were a field more relevant for other disciplines. One student reported that this topic was not permitted in medical schools in his country.

DISCUSSION

Our results suggest that injury prevention and control education in undergraduate medical school programs was limited, even in settings with good economic resources and in places where injuries have been acknowledged as an important health problem. These results agree with previous findings from the US.^{7–10} The teaching of injury control and prevention was fragmented in many schools, with topics taught in a variety of courses and rotations such as preventive medicine, forensic medicine, emergency medicine, and some surgical rotations. Greater emphasis was placed on concepts

related to the treatment of injuries as shown by the higher percentage of schools teaching emergency care topics. Child abuse and neglect and intimate partner violence tended to receive more attention than other topics, such as the prevention of traffic injuries and elder abuse.

In some cases, the frequency of teaching of specific injury subjects in schools of a particular region coincided with important injury problems in that region.³³ Examples of this were teaching about violence prevention in the Americas, violence against women in Africa, falls in Europe, and burns and road traffic injuries in Asia. In contrast, other topics were infrequent in regions where specific injuries are a problem. Such were the cases with drowning injuries, road traffic injuries, and youth violence in Africa, as well as with intimate partner violence in the Middle East. This could reflect resource limitations in certain areas or already identified priorities. Comparing regional injury priorities with existing injury prevention education might be useful for the development of regional specific curriculum recommendations.

This study has some limitations. We used a convenience sample and may have missed schools that dedicated either more or less time to injury prevention and control. Our survey did not include some countries with large numbers of medical schools such as China and Brazil (150 and 82 respectively) and had few respondents from African countries. It is possible, because participants were self-selected, that some were more interested in or exposed to injury courses than the average student at their school. We did not test knowledge of injury prevention and control but rather recall about injury related subjects. Despite these limitations, we think our results provide useful information about current teaching of injury prevention and control in schools of medicine around the world.

A major strength of this project was the wide participation, organization, and support from medical students. We relied on students' reports of injury prevention and control concepts following a similar strategy used by Butler and colleagues in the US.⁷ We were interested in knowing what students recalled, rather than what universities reported they offered.

This study contributed in part to the development of several student initiatives within IFMSA. For the first time, a

Table 2 Percent distribution of injury prevention and control topics by courses or rotations within academic programs. *Obstetrics and gynaecology

Injury subject	Type of course or rotation, n (%)										
	Preventive medicine	Forensic medicine	Emergency medicine	Surgical rotations	Pediatrics	Psychiatry/psychology	Ob/Gyn*	Medicine	Rehabilitation	Sports medicine	Other
Basics	61.7	19.1	8.2	7.4	1.2	1.2	0.0	0.0	0.0	0.0	1.2
Unintentional											
Transport	24.5	40.5	13.1	5.9	0.0	0.0	0.0	0.6	0.0	0.0	15.4
Drowning	18.8	56.3	9.4	3.1	6.3	0.0	0.0	6.3	0.0	0.0	0.0
Fall injuries	20.6	16.8	0.9	25.2	0.0	0.0	0.0	7.5	0.0	0.0	29.0
Burn injuries	10.2	21.6	9.1	27.3	15.9	0.0	0.0	6.8	0.0	0.0	9.1
Occupational	50.0	20.0	0.0	0.0	0.0	0.0	0.0	0.0	6.7	0.0	23.3
Sports	2.8	5.6	2.8	38.8	2.8	0.0	0.0	5.6	5.6	25.0	11.0
Intentional											
Child abuse	17.0	15.2	0.0	0.4	51.0	9.7	0.0	0.0	0.0	0.0	6.7
Youth violence	23.8	10.7	4.8	0.0	20.2	17.9	0.0	6.0	0.0	0.0	16.6
Intimate partner violence	28.8	11.1	7.8	0.0	2.0	20.3	15.7	1.3	0.0	0.0	13.0
Sexual violence	7.7	39.7	1.9	0.0	5.1	14.7	15.4	1.9	0.0	0.0	13.6
Elder abuse	16.7	13.5	5.2	0.0	0.0	15.6	0.0	32.3	0.0	0.0	16.7
Suicide	3.8	15.8	0.0	0.0	0.0	77.6	0.0	0.0	0.0	0.0	2.8
Other											
Emergency care	9.8	0.0	35.0	40.2	0.0	0.0	0.0	11.5	1.3	0.0	2.2
Legal issues	20.3	65.2	2.9	4.8	0.0	0.0	0.0	0.0	0.0	0.0	6.8
Social issues	80.0	5.7	0.0	2.9	0.0	0.0	0.0	2.9	0.0	0.0	8.5

Key messages

- Medical students are an important source of information about injury prevention and control education in medical schools.
- There are regional differences between injury topics covered in medical schools.
- We found no notable differences in injury education between universities from high versus middle and low income countries.
- Most injury prevention topics were covered in a few courses and rotations.
- Injury prevention education is still uncommon in medical school curricula around the world.

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special theme on Violence and Health was discussed during the General Assembly of IFMSA.³⁴ In addition, an issue of the IFMSA thematic journal *Medical Student International* focused on violence as a preventable problem³⁵ and students organised several related workshops and activities. Perhaps most importantly, the IFMSA made an official statement³⁶ on including violence prevention in medical education in support of a WHO resolution on the implementation of the recommendations of the World Report on Violence and Health.³⁷ These activities are encouraging and could lead to student participation in improving injury control and prevention curricula. In Israel, Toker and colleagues have found that medical student participation in improving a curriculum for the prevention of sexual violence and other topics led to increased student community involvement, motivation, and levels of communication between them and their teachers.³⁸ Similar strategies could be applied to the development of injury prevention and control topics in medical schools.

To our knowledge this is the first survey to document injury prevention and control education in medical schools curricula globally. Little is known about how injury prevention curricula could be integrated into already existing courses, or whether separate injury courses would be more effective, what core knowledge is ideal for physicians, and how can schools currently offering injury prevention training collaborate to promote injury prevention education in settings where it is not taught. An important concern is how injury prevention education can be sustained in settings with limited human and economic resources, given that in many of these places the injury burden is large. In addition, factors that increase student and institutional motivation for developing injury prevention education should be examined.

Answering these questions is important because our results show that education in injury prevention and control is infrequent and fragmented in medical schools around the world and educating medical students who are potential leaders in public health can bring benefits to the field.

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