

Special Section: A Multinational Injury Surveillance System Pilot Project in Africa

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ABSTRACT

This paper describes the development of a pilot project to test the implementation of an epidemiological surveillance system for intentional (violent) and non-intentional injuries, at emergency departments in selected hospitals in five African countries applying the World Health Organization's guidelines. We outline obstacles and opportunities encountered during the process. By definition, a surveillance system systematically collects, reviews, and evaluates information to understand the context in which specific injuries occur. Implementation in diverse sociocultural environments in Zambia, Uganda, Democratic Republic of the Congo, Nigeria, and Kenya has provided an opportunity to gather reliable data on injuries for comparisons between these countries. Analysis of the detailed information may permit researchers to generate evidence-based recommendations. Addressed to public authorities, and health authorities in particular, they can help address injury incidence in their communities from a public health perspective.

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INTRODUCTION

After the World Health Organization's (WHO) release of a landmark report on violence and health (1), a group of concerned health professionals from Africa and the Americas who attended the 6th World Conference on Injury Prevention and Safety Promotion in Montreal in 2004, and the conference on the Role of Public Health in the Prevention of War Related Injury in Vienna in 2006, joined

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efforts in a collaborative public health project. They created a proposal to develop an injury surveillance system in selected hospitals in five countries in Africa where affiliates of International Physicians for the Prevention of Nuclear War (IPPNW) were working on armed violence prevention. They wanted to respond to some of the recommendations in the WHO's report:

- multisectoral and collaborative efforts for the prevention of violent injury;
- more capacity to collect data on violence, and
- research on violence, its causes, consequences, and prevention in different population groups and different cultural settings.

The pilot project tests the viability of an epidemiological surveillance system for intentional (violent) and nonintentional injuries (road traffic injuries) that collects information at emergency departments (ED) in selected hospitals in the five African countries. The authors are the principal investigators based at the selected hospitals. Here, we focus on intentional injuries only. We hope to demonstrate that it is possible to implement a sustainable injury surveillance system in countries with limited resources.

Our system provides an opportunity to gather reliable data on injuries that permit comparisons between these five African countries and other countries with comparable injury surveillance data. Analyses will generate evidence-based recommendations to local government health authorities that wish to address the incidence of injury in their communities from a public health perspective.

We have adopted the ecological model to understand the causes, consequences, and prevention of violence (2). The model suggests that interaction of several factors makes particular segments of the population at greater risk of violent injury. These factors are found at four levels (see Figure 1): the individual, personal relationships, the community, and society (3).

A sustained injury surveillance system creates a scientific base to describe and have a comparative study of the problem – where and who is affected in the communities served by the participating hospitals. Maintaining a surveillance system beyond the 12-month pilot project will rapidly aid the development of preventive intervention strategies. For public health practitioners to make policy recommendations about the control and prevention of injuries

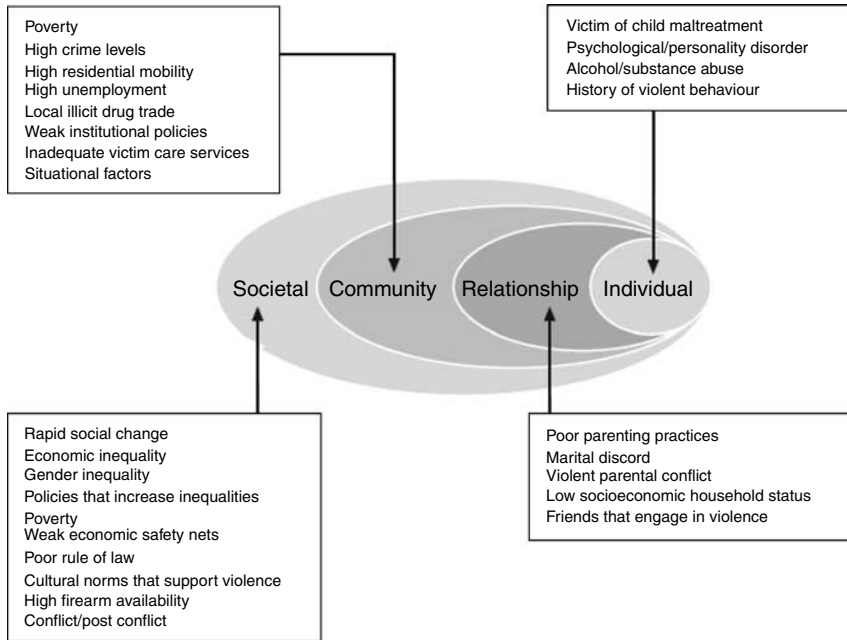


Figure 1

Ecological model showing shared risk factors for subtypes of interpersonal violence.

Source: Preventing violence. A guide to implementing the recommendations of the *World report on violence and health*. World Health Organization, Geneva, 2004

based on empirical data and not just convictions or opinions, the ongoing surveillance system is essential.

BACKGROUND

Two WHO reports on violence and health quantify the magnitude of violence as a public health problem worldwide. (See discussion of these in Valenti *et al*, *Armed Violence: A Health Problem, a Public Health Approach*, in this Special Section.) The report on the public health impact of small arms and light weapons (SALW) on violent deaths showed that a large proportion of firearm-related deaths in low-income countries could be attributed to homicides, mostly in urban settings, whereas in upper-middle and high-income countries, including the United States, self-inflicted wounds or suicide

dominated (4). In these countries, access to firearms, drug abuse, and alcohol use underlies many violent injuries. Alcohol consumption is one of the strongest predictors of sexual violence among youth, while victims of child sexual abuse are at risk for committing sexual abuse later in life (5). Similarly, once a child witnesses intimate partner violence, this becomes a risk factor for perpetrating intimate partner violence as an adult (3). Identified risk factors have not been systematically documented, much-less evaluated, in most of the world's developing regions including Africa.

IMPLEMENTING THE INJURY SURVEILLANCE SYSTEM PILOT PROJECT

Phase I

Our pilot project consists of two phases. Phase I: preliminary or formative evaluation led by the co-principal investigator (Co-PI) in each country. As a preparatory phase, it helped us understand the administration and supervision of the surveillance system and learn what minimum human resources will be required. Leading investigators in each country understood the critical significance of the time and effort commitment under limited funding available.

As part of Phase I, each investigator evaluated the hospital environment, logistics, and injury caseload expected during the 12 months of data collection in Phase II. This preparatory work helped us organize ourselves in advance logistically and with human resources. We field-tested a pre-coded injury surveillance questionnaire designed by the Central America injury project of the Pan American Health Organization (PAHO) and the US Centers for Disease Control and Prevention (CDC) following WHO injury surveillance guidelines. The questionnaire is currently in use in Colombia, Nicaragua, and El Salvador, modified slightly for local needs. The questionnaire allows researchers to obtain a detailed profile of each injury and the context in which the injury occurred, the place, activity, and mechanism of the injury. It also includes information about the aggressor.

We have worked with guidance from PAHO and CDC injury experts who supported our efforts to expand the use of their data-gathering instrument. One of us, Principal Investigator (DEZ) from

Puerto Rico, visited the CISALVA Institute (Instituto de Investigación y Desarrollo en Prevención de Violencia y Promoción de la Convivencia Social – CISALVA) at the University del Valle in Cali, Colombia, in preparation for a training workshop we held in Nairobi, Kenya in March 2006. The CISALVA Institute coordinates an injury surveillance system in Cali and surrounding cities in Colombia. Their experience and advice contributed to the Nairobi hands-on “training of trainers” workshop. ED physicians at the Kenyatta National Hospital and colleagues from participating countries in Africa field-tested the data collection form and entered the information on a computer database designed in Epi Info. (Epi Info is a computer software package available free at: <http://www.cdc.gov/epiinfo>.) All participants reached a common understanding of the critical steps needed to implement our injury surveillance system. These “trained trainers” were to pass along the learning experiences to their colleagues in their respective countries.

As part of Phase I, we retrospectively collected data on 30 injury cases in each participating hospital, selected at random from the prior 6 months. We wanted to demonstrate to health professionals at the participating hospitals, that in the absence of an injury surveillance system, only limited and inconsistent information is available in medical records. Crucial facts related to the context in which injuries occur would be absent in old records, demonstrating the need to collect this information systematically and consistently. We described completeness and quality of data using relative frequencies of “missing” or “unknown” for selected variables in the surveillance questionnaire. Table 1 is a summary of some of the findings on critical injury information obtained in Phase I.

Phase II

Phase II, now in place, will collect external injury data at the designated ED in each country for a 12-month period beginning in January 2007. We have included a process evaluation for completeness and quality of data collected. At the completion of the 12-month period, we will undertake a comparative analysis of the injury surveillance data.

Table 1: Proportion of cases with unknown or missing information – injury characteristics

	<i>Proportion of cases with unknown or missing information</i>				
	<i>Country</i>				
	<i>DRC</i>	<i>Nigeria*</i>	<i>Uganda</i>	<i>Zambia</i>	<i>Kenya</i>
<i>n</i> of cases	29	241	27	30	30
<i>Injury characteristics</i>					
Place of injury (%)	3.5	100.0	3.7	27.0	63.3
Date of injury (%)	0.0	100.0	18.5	33.3	16.7
Nature of injury (%)	10.3	0.0	3.7	10.0	8.0
Activity (%)	3.3	88.4	100.0	27.0	100.0
<i>Risk factors</i>					
Suspicion of alcohol use (%)	27.6	100.0	100.0	46.7	86.7
Suspicion of drug use (%)	62.1	100.0	100.0	90.0	100.0

*The large number of cases in Nigeria correspond to an earlier study where similar data was collected.

OBSTACLES AND OPPORTUNITIES

Obstacles

We secured early funding from Foreign Affairs Canada via IPPNW to plan and conduct the training workshop in Nairobi, Kenya for all Co-PIs. Further funding was then secured from Small Arms Survey, Geneva, to implement the actual data collection for 6 months. Despite assertions from WHO and others of critical need for research, funding has been, and remains for us, a critical challenge.

As the pilot project completes the first 6 months of data collection, we face significant logistical limitations. Our coordinating center is located in Puerto Rico, an island in the Greater Antilles of the Caribbean, while the fieldwork is carried out in Africa. Communications among colleagues are often interrupted. Limited access to reliable internet connections such as DSL in Africa precludes internet teleconferencing, thus we use email and occasional telephone calls. Further training for our African colleagues in data management and data analysis will become indispensable in the near future, especially if we seek to consolidate and expand the surveillance system into

other hospitals once the pilot project is completed. Sound analytical skills will be needed by local participants for the surveillance system to fulfill one of its main functions – to report its findings to those in their communities involved in injury prevention.

We also need to maintain 24-hour/7-day-a-week supervision in EDs to assure that all potential injury cases are entered in the surveillance system. Thus far, each participating site has managed to collect the required information with the support of medical personnel and medical students. One of the five participating countries was unable to start data collection until 1 April 2007, due to a delay in the renewal of approval from the hospital ethics and standards committee. Another participating country started data collection on 1 March 2007. We have refrained from suggesting that medical workers be paid for these tasks; this would surely lead to a dependence of the sustainability of the surveillance system on outside funding from inter-governmental organizations or private funding institutions. We believe local health authorities must provide modest resources, using creative reallocation of resources and adequate training.

What does funding for injury prevention in developing countries tell us about government health authorities' ability to support initiatives such as this pilot project and beyond? At the 19th International Papiloma Virus Conference in Brazil, in September 2001, Herdman *et al* presented in-depth interviews with government health officials in seven developing countries in the Americas (6). This study revealed complex factors and competing priorities facing decision-makers implementing cervical cancer prevention strategies. Summarized as *obstacles and opportunities*, the factors, when read carefully, can be applied to injury prevention in developing countries. Table 2 presents this summary. (We have added the word *injury* in italics to make the point.)

Opportunities

Our project has quickly uncovered other opportunities to use the data collection systems that are in place: A proposal to examine pre- and post-election violence in Nigeria; a researcher at the Karolinska Institute in Sweden designed a small study to look at specific costs of injuries and test a new economic modeling program; Nigerian

Table 2: Policy development for cervical cancer (*injury*) prevention in low-resource countries

<i>Barriers</i>	<i>Opportunities</i>
<ul style="list-style-type: none"> ● limited availability of funds, particularly from donor organizations; ● absence or deficient infrastructure for cervical cancer (<i>injury</i>) prevention; ● lack of reliable data of cancer (<i>injury</i>) incidence; and ● limited understanding by health officials about the disease (<i>injury</i>) itself and of its impact, specially in older women (<i>youth</i>). 	<ul style="list-style-type: none"> ● reliable information on cervical cancer (<i>injury</i>) incidence and mortality data that demonstrates the extent of the problem and the financial implications of the disease for the country; ● this information together with provision of technical assistance is needed to develop sustainable cervical cancer (<i>injury</i>) prevention initiatives in developing countries; ● for which donors may be more willing to support

researchers will consider motorcycle-related injuries in Nigeria. In general, the project has offered researchers opportunities to learn or improve their research skills, build local capacity at hospitals, and engage medical students.

The funding obstacle described above, also presents an opportunity for local, regional, and national health authorities to re-examine allocation of health resources and to pay for injury research that can help them use public health tools to craft prevention strategies.

CONCLUSIONS

EDs in secondary or tertiary care hospitals provide an opportunity to implement injury surveillance systems. The hospitals we selected for this multinational project were established medical institutions caring for large segments of the population in their cities, as well as the surrounding regions. Our preliminary evaluation of the information already collected in their EDs shows great variation in specific information useful to assess injuries from a public health perspective.

An injury surveillance system can resolve several key issues. In Phase I, the documentation available prior to the establishment of a surveillance system was clearly inadequate to provide the data recommended by WHO to describe the context in which injuries occur. Systematic collection of uniform data would accumulate more than the minimum data set suggested by WHO's injury surveillance guidelines. It might actually improve or optimize the documentation process of patients attending EDs.

The success of this pilot project depends primarily on the commitment of all investigators who have dedicated a significant amount of time and effort to the implementation of this project. We wish to provide convincing evidence that it is possible to implement a surveillance system in countries with limited resources. However, this effort requires a sustained commitment of both health professionals and local health officials to transform this pilot project into a permanent component of a public health policy in their countries. With the successful completion of the 12 months of data collection, we intend to provide a detailed analysis of the data in each hospital so that each investigator will be able to demonstrate the value of quality injury data. This will also enhance advocacy for development of health policies that aim to facilitate the expansion of the surveillance system in other hospitals, and to demonstrate the usefulness of surveillance data for development of injury prevention and control policies in their respective countries.

To provide a better understanding of the context in which intentional and nonintentional injuries occur in low-income countries, high-quality injury data must be systematically collected and analyzed. A surveillance system that includes all health facilities in a city is of great benefit. In Cali, Colombia, comprehensive injury data collection has facilitated insightful analysis of injury epidemiology and development of intervention strategies. Better understanding and evidence-based recommendations for the prevention and control in African countries will be possible.

Krug *et al* from WHO assert that decreasing the burden of injuries, especially in low-income countries, remains a leading challenge for public health in this century (7). All the investigators involved in this project are aware of the importance of demonstrating that the implementation of an injury surveillance system may not require large investment of funds, but rather a creative organization

of data collection in EDs. Experience in Colombia and Central America suggests that the surveillance system be an integral part of the regular collection of information from patients treated in EDs. The surveillance system should not be seen as a special, temporary project, but rather as a fundamental element of a long-term strategy for the control and prevention of injuries in our communities.

REFERENCES

1. Krug EG, Dahlberg LL, Mercy JA, editors, *World Report on Violence and Health*. Geneva: World Health Organization; 2002.
2. World Health Organization. *Preventing Violence: A Guide to Implementing the Recommendations of the World Report on Violence and Health*. Geneva: World Health Organization; 2004.
3. Butchart A, Cerdá M, Villaveces A, Sminkey L. *Framework for Interpersonal Violence Prevention. Framework Development Document*. Department of Injuries and Violence Prevention, Noncommunicable Diseases and Mental Health. Geneva: World Health Organization; 2002.
4. World Health Organization. *Small Arms and Global Health. WHO Contribution to the UN Conference on Illicit Trade in Small Arms and Light Weapons*. Geneva: World Health Organization; 2001.
5. Abbey A, Zawacki T, Buck PO, Clinton AM, McAuslan P. Alcohol and sexual assault. *Alcohol Res Health*. 2001;25:23-51.
6. Herdman C, Sherris J, Bingham A. Bringing about change: policy development for cervical cancer prevention in low-resource countries. Abstract No. 0-49. 19th International Papillomavirus Conference. Florianópolis, Brazil. 1-7 September 2001.
7. Krug EG, Sharma GK, Lozano R. The Global burden of injuries. *Am J Public Health*. 2000;90(4):523-6.