

FEATURED PROGRAMME

Applicability of CDC guidelines toward the development of an injury surveillance system in the Caribbean

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Deaths from injuries worldwide are expected to increase 65% from 5.1 million in 1990 to 8.4 million by 2020.¹ This projection is based on increases in population size and age, particularly in young adult men who are at the highest risk of injury related death. Injuries constitute 7.6% of all age adjusted deaths in the developed world and 10.7% in the developing world.¹ In the Caribbean, injuries (intentional or unintentional) are the leading cause of premature death as calculated by years of potential life lost.² This is most likely an underestimate because many Caribbean countries do not monitor injuries, data sources are limited, and there is an inadequate infrastructure for reporting injuries. Improved economic conditions, in addition to increased industrialization and tourism highlight the need for injury prevention and care.

The Caribbean Epidemiology Center (CAREC) of the Pan American Health Organization/World Health Organization (PAHO/WHO) established an injury surveillance system in three countries—Trinidad and Tobago: Port of Spain General Hospital and San Fernando General Hospital; Bahamas: Princess Margaret Hospital; and Barbados: Queen Elizabeth Hospital. The system is based on Center for Disease Control and Prevention (CDC) guidelines which include simplicity, flexibility, acceptability, sensitivity, positive predictive value, representativeness, and timeliness.³ This paper describes system implementation and evaluates the applicability of these guidelines to developing countries.

Simplicity

The structure of the system and ease of operation is measured in seven areas—namely, staff training requirements, time management, data analysis, data transmission, reporting sources, number of organizations receiving reports, and amount of information needed to establish the case diagnosis.

Staff was trained using a train-the-trainer approach. Reporting sources were hospital accident and emergency departments (A&E) where most injuries present.^{4,5} Data analysis and transmission consisted of general summary reports that were sent by mail and facsimile machine.

The initial data collection form and procedures were modeled on the Canadian Hospitals Injury Reporting and Prevention Program (CHIRPP) but modified to permit different administration procedures. For example, information collected by the registration clerk at San Fernando General Hospital is collected by the triage nurse at Queen Elizabeth Hospital. Thus, a core form was devised with flexible administration procedures.

The original intent was to create a universal form to be used by all regions. However, this was met with resistance due to the diverse culture within the Caribbean. For instance in Trinidad and Tobago, religion is integral to the fabric of society and thus a relevant surveillance indicator; this is not the case in Barbados.⁶ A template was created instead and latitude given to the hospitals to manipulate it to suit their needs.

Although surveillance variables and classification schemes were adapted from CHIRPP and the Australian National Injury Program, the software for those programs was too expensive to procure and maintain. Microsoft Access was chosen for its ubiquity, relatively low cost, and accessible maintenance and support. The system was initiated at Princess Margaret Hospital because it had appropriate hardware and could handle huge electronic data transmissions. Hardware installation is currently being negotiated at San Fernando General Hospital, Port of Spain General Hospital, and Queen Elizabeth Hospital.

Simplicity is considered the most important system guideline.⁷ Consequently, the minimal dataset used was based on the WHO International Classification for External Cause of Injury and yet made relevant to the Caribbean. For example, patient immigration status was collected because tourism is high in most Caribbean countries and consequently affects health care demographics.

Flexibility

A system's ability to adapt to changing information needs or operating conditions depends on a committed health care delivery infrastructure. However, the dynamic nature of the Caribbean health system makes it difficult to establish a program with long term goals.

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Turnover among A&E staff is high, so the system is ultimately dependent on the dedication of a few key people. For example, the A&E department at the Princess Margaret Hospital employs 20 physicians of whom only two have job security. The other physicians are University of the West Indies house officers or contracted registrars, conditions of employment that can lead to a decreased commitment toward anything not in the job description. This shifts the burden of program maintenance to other hospital staff. In the Princess Margaret Hospital, the nursing matron responsible for the recruitment and training of A&E staff left for a year long sabbatical, and the system almost ground to a halt.

Furthermore, more than 20 physicians are needed to staff the A&E on a continuous basis, resulting in the recruitment of “moonlighters”. These new individuals, untrained in and unaware of the injury surveillance system, do not complete forms thereby limiting data collection.

In response, an operations manual was devised. The use of this manual, however, is dependent on the presence of personnel familiar with the system.

Hospital administrators are aware of the need to retain personnel. Turnover of hospital personnel will continue to remain high unless job security, by way of advancements and promotions, can be provided. Even if the system is simple and flexible, sustainability will be difficult to achieve.

Acceptability

More often a proxy for system simplicity, this factor is subjective. It is measured by the participation rates of patients, hospital staff, and outside agencies, the speed with which these rates are achieved, completeness of the forms, and their timeliness.

System acceptability was greater in hospitals in which key personnel such as department and medical staff heads were involved. Although hospital staff in Princess Margaret Hospital, Queen Elizabeth Hospital, and Port of Spain General Hospital believed the system would result in more work, involvement of key personnel at the onset led to the initiation of the pilot system in a reasonable timeframe.

Understaffing is a Caribbean-wide problem and may ultimately lead to the demise of the system. In Trinidad there is one physician per 1200 people and a severe nursing shortage.⁸ In San Fernando General Hospital, a daily average of 1750 patients are seen by seven staff. Although most government policies indicate that health is a fundamental human right, inadequate healthcare budgets often do not meet the demand. Until governments budget for staff recruitment and retention, system acceptability will continue to fluctuate with perturbations among hospital staff.

In the US, acceptability is often achieved through federal or state laws that require reporting, patient to nursing ratios, patient confidentiality, and restrictions on data collection. In the Caribbean, hospitals often operate

independently with the exception of reporting vital health statistics data to the Ministry of Health. Such independence is often detrimental and has resulted in health sector upheavals in certain countries. In Trinidad and Tobago, health sector reform militated against the surveillance system. However, as the reform process became integrated to other legislative bodies and accepted by health personnel, resistance has decreased. A recent survey in Trinidad indicates increasingly favorable perceptions of health care by patients and hospital personnel.⁹

Sensitivity

Sensitivity reflects the system’s ability to measure what it is intended to and it is predicated on good case definition, the likelihood that those with injuries will be treated in the A&E, and on the capacity of the system to detect new events and/or outbreaks. Measurement of sensitivity requires validation of information collected by the system and external determination of the frequency of injuries in the community.

Hospital staff receive training on case definition variables,¹⁰ and a training manual has been devised based on proven educational methodologies.¹¹

Data validation is more difficult. Although most injuries are treated by the A&E, mild ones (based on subjective perceptions by the patient) or severe injuries (resulting in pre-hospital death) may be missed. This is a limitation, and further assessment depends on comparisons to external data sources. The frequency of injuries in the community also must be determined from external sources. Unlike the US, where emergency room documentation provides enough detail for internal validation, Caribbean A&E departments are troubled by poor documentation. Therefore, external sources must be used. In Trinidad and Tobago, the Central Statistics Office (CSO) compiles data on causes of hospital admissions⁷ and discharges that may be used as a source of validation. Barbados and Bahamas have similar agencies.

A problem with external sources is the general nature of their data. Unlike a surveillance system that describes the mechanism, location, context, type, and specific details about each injury incident, CSO data aggregate injuries in general subheadings such as accidents, violence, and poisonings. Consequently, these data may only be used for general comparisons and validation of the hospital’s routine reporting but has limited usefulness in validating injuries presenting to the A&E. Fortunately, even surveillance systems with low sensitivity can be useful provided the sensitivity remains constant.³ Therefore, the challenge over the next few years will be to compare the general information obtained from the system with CSO data. Discrepancies will lead either to audits of local hospitals or to revamping our definitions.

Positive predictive value

The positive predictive value indicates the proportion of persons identified as cases who actually have the condition. Unlike communicable disease, however, injury surveillance systems tend to have high positive predictive values; they were greater than 99.8% in two recent studies.^{12 13} This is probably due to the fact that “injuries” are what they appear to be and their specificity and prevalence are high. This guideline will be measured after data have been amassed from the system.

Representativeness

This guideline refers to how accurately the data describes injuries over time and how generalizable the results are to the entire population. To assess these, population and injury characteristics must be used for comparisons. Limitations can then be described and efforts made to address them.

In the Caribbean, certain injury characteristics, such as *International Classification of Diseases* (ICD) codes, age and regional distribution, are compiled by other agencies. For example, the Health Information Unit of the Ministry of Health in the Bahamas compiles information on all non-communicable diseases presenting to the Princess Margaret Hospital, including accidents and violence. Although, these data may be a source of comparison, they tend to be general, cursory, and often delayed by a few years. A recent study showed poor concordance, less than 70%, between the ICD three digit codes assigned by the Princess Margaret Hospital and by the Health Information Unit.¹⁴ Similar studies have not been conducted in Barbados and Trinidad; however, the accuracy of their coding should be examined and the judicious use of these external sources is warranted. Given the time lag between information compiled by the Health Information Unit and the surveillance system, the representativeness of our system cannot yet be determined.

To be representative of the population, the largest referral national hospital within each country was selected. In Trinidad and Tobago the geographic distribution of ethnic populations⁸ prompted the use of two national hospitals, Port of Spain General Hospital and San Fernando General Hospital, one in the north and the other in the south.

The quality of data is an important part of representativeness and is influenced by the clarity of surveillance forms, the quality of training, the supervision of personnel involved in completing forms, and the care exercised in data management. The pilot surveillance system initiated in Princess Margaret Hospital indicated form and code clarity and the training sessions were commensurate with our expectations. However, after training ended and some time had elapsed, progress was often hampered by incomplete forms, inadequate coding, and inappropriate data entry. As mentioned before, these problems were often due to understaffing and high turnover of personnel,

reflecting a greater Caribbean health care infrastructure problem.

Timeliness

This guideline refers to the speed or delay between steps in the surveillance system and, therefore, indicates how efficiently the system is functioning.

For the system to function in a timely fashion, staff and hospital personnel must be committed. In the Caribbean, this issue is compromised by several problems mentioned before. Therefore, it was imperative to introduce a simple easy-to-learn form, establish computer capabilities, reorganize staff work patterns to maximize efficiency, involve key personnel, and provide feedback. Currently, hospital staff are involved in a working partnership with CAREC and the Ministry of Health, however this is an ongoing process and it will be some time before a final protocol is achieved.

Conclusion

In developing countries, injury prevention still lags behind public health programs. Although injury surveillance methods are similar between developed and developing countries, progress may be hampered in the latter because of any number of cultural, social, political, and resource factors.⁷ Therefore, guidelines that are applicable elsewhere may not apply in developing countries. For instance, in developed countries injury surveillance data are readily available through vital statistics, hospital discharge summaries, and specialized health survey data. In contrast, in developing countries, due to inadequate infrastructures and resources, these sources may not be usable for a variety of medicolegal, financial, and administrative reasons.¹⁵

Given the rising trend of injuries as serious contributors to morbidity and mortality, injury surveillance systems in developing countries are essential. The surveillance system currently being initiated in Bahamas and concurrently being piloted in Trinidad, Tobago, and Barbados are but first steps. It will be a matter of time before a full protocol can be established. Nevertheless, we assume the lessons being learned can assist others in similar situations wishing to establish their own systems.

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Golf cart water hazard

An elderly woman drowned on a Florida golf course when the cart she was driving veered off a steep slope into a pond. The 71 year old woman could not swim and sank quickly in the water hazard. She and her husband had been playing when he hit a chip shot to the green and waved to her. She drove the cart forward and lost control on the slope. Six elderly golfers tried to rescue her from the nine metre deep hole but the cart settled on the bottom and no-one could reach her (*The Herald-Sun* (Melbourne), March 2001).

Sad final chapter—death in a hot car

In June, a Melbourne court passed sentence on a 41 year old mother who had played poker machines while her 19 month old son was being fatally harmed in a scorching and locked car in the casino car park. The judgment was for a four year jail term but immediate parole after psychiatric assessment. The child went into a coma and died after having been left for two and half hours in a locked car. Temperatures in the car were estimated to have reached 50°C. The only positive outcomes have been a wider awareness of the danger of leaving children unattended in hot cars, wider use of warning signs in car parks, and the adoption by some car park companies of a strategy to deal with children alone in cars (contributed by Ian Scott).

Designated driver

At least one Australian university has learned the lessons of the past. A student bar at La Trobe University has a policy of free non-alcoholic drinks for the “designated driver”.