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Prevention of spinal cord injuries caused by diving: evaluation of the distribution and usage of a diving safety video in high schools

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Abstract

***Objective*—To determine and assess the distribution and use of *Sudden Impact*, a video designed by Think First and SportsSmart Canada, to help prevent spinal cord injury caused by careless shallow water diving among teenagers in the high risk group (15–24 years old).**

***Design*—Survey of 92 public secondary schools in Toronto, Canada.**

***Subjects*—The heads of the physical and health education departments of the 92 secondary public schools in the Metropolitan Toronto region.**

***Results*—The response rate was 64% (59 schools), of which 76% (45) had actually received the video. Forty one schools (91%) of those that received the video reported using it. Eighty per cent of responding schools showed it to grade 11 students. Eighty per cent of schools with swimming pools used the video compared with only 42% of schools without swimming pools.**

***Conclusions*—There is a need for improvements in the system of distribution to ensure greater use of material such as this video. These may include direct distribution to principals, continuing contact with the schools, or mandatory inclusion of diving safety into the school curriculum.**

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Spinal cord injury is a major public health problem and a leading cause of disability.[1] Sports and recreation related spinal cord injury represents 10%–30% of all such injuries in various countries.[2] In Ontario, Canada from 1948–83, diving accounted for 58.9% of all recreational related spinal cord injury.[3] This amounts to approximately 60 major spinal injuries yearly caused by diving in this province alone.[4] Although few of these injuries are fatal, many cause major disability because in almost all cases the cervical cord is involved.[5 6] Ninety per cent of cord injuries due to diving result in complete or incomplete quadriplegia, whereas only 50% of spinal cord injury of all causes result in some form of quadriplegia.[7]

The typical victims of spinal cord injury caused by aquatic activities are teenage males in unsupervised recreational activities in the summer months. Diving is the most frequent type of aquatic activity leading to spinal cord injury[8] and almost 50% of these injuries involve persons between 15 and 24.[9] Most victims survive but incur lifelong disability and immense financial costs.

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Methods

THE VIDEO

Because we believed most of these injuries were preventable, in 1992, SportSmart Canada, the research division of Think First Canada-Penser d'Abord, a national brain and spinal cord injury prevention program, produced a video. It was entitled *Sudden Impact* and designed to alert teenagers about diving related spinal cord injury. The focus is on the dangers of shallow water diving and other careless behaviours associated with both supervised and unsupervised aquatic settings. The 20 minute video chronicles the histories of seven survivors of spinal cord injury all between 15 and 24, who are now all quadriplegic as a result of a diving injury. The video displays alarming statistics about shallow water diving and aquatic injury to illustrate the need for their prevention. Accompanying the video is a *Leader's Guide*, containing supplementary information, to be used by the classroom teacher as a tool for further classroom discussion.

EVALUATION

Although other evaluations of the Think First head injury and spinal cord injury prevention program have been conducted,[10 11] there has not been an objective assessment of a diving safety promotion strategy, such as *Sudden Impact*. Accordingly, the purpose of the present study was to assess the use and awareness of the video in public secondary schools—that is, a process evaluation and not one addressing behavioural change.

MEASURES

A questionnaire was sent to the heads of the physical and health education departments of all 92 public secondary schools in the six boards of education in the Metropolitan Toronto region. The questionnaire asked about the frequency of use of the video in the 1994–95 school year; its accessibility; the number of students who saw it, their grades; and how and where the video was used. Other questions addressed use of the *Leader's Guide*. Respondents were encouraged to supply any additional feedback.

All the public schools boards received the video but private or separate school boards were excluded from the study. The questionnaire was sent by facsimile to the appropriate person in each school. Confirmation of its receipt was obtained through follow up telephone calls and facsimile reports. Each respondent received up to three follow up phone calls if the questionnaire was not returned.

Results

The response rate was 64% (59 schools) of whom 80% (47) were aware of the *Sudden Impact* video, and of these, 76% reported that their school had received it. It is not evident why it failed to reach the remaining 24% (14). Ninety one per cent (41) of schools that had the video used it during the school year while the remainder stated that they planned to show it in the following year. Eighty per cent of schools with swimming pools showed the video compared with 42% of schools without swimming pools.

Sudden Impact was shown a mean of six times per school (range 1–39) to a mean of 174 students per school (22–975). In all, 6793 saw the video, however, the mean per cent of students in each school who saw it was only 16% (1%–95%). The video was shown to high school grades 9–13 (ages 14–18), although the per cent of each grade who saw it ranged from 29% to 80%. Only 46% of schools used the accompanying *Leader's Guide* to facilitate classroom discussion and for teacher preparation.

The "additional feedback" section of the survey contained no negative comments but some constructive criticisms. Thirty five respondents stated that the directness of the video strongly reinforced its message, and that students were very moved. Many students told their teachers that they would be more careful in the future and that their previous view that this type of injury could not happen to them was dispelled by watching the video. The video also stimulated class discussion about the causes, nature, and severity of these injuries. Many teachers expressed the opinion that viewing the video should be mandatory. The most frequent criticism was that the video featured no members of ethnoracial minorities.

Discussion

In the field of aquatic spinal injuries, several major prevention efforts have been launched in various countries in recent years. They include media campaigns, often involving celebrities, educational programs in high schools, changes in regulations concerning permissible depth for diving and other features of swimming pool design, and improved standards of spinal injury rescue and immobilization techniques.[7] Nevertheless, many authors continue to reiterate the need for further prevention efforts.[12–14]

The timing of prevention strategies is considered crucial so that the messages reach the target population before the diving season begins.[4 15 16]

The survey showed that almost all schools that received *Sudden Impact* used it. This suggests that this is an effective way of providing prevention materials to schools. However, almost one quarter of the surveyed schools did not have a copy of the video even though the distribution strategy was designed to deliver one to every public high school in Ontario. Possible reasons for the distribution failure include personnel changes in the school or school boards, lack of communication between the boys and girls physical and health education personnel within a school, the video reaching the wrong person, or being misplaced.

The response rate of 64% prompts consideration about non-respondents. Some may not have replied because the survey was conducted at a busy time in the academic schedule. It is also likely that some non-respondents did not have the video, or were unaware of it, and therefore, did not participate. Clearly, there is a need to improve the method of distribution of this and similar educational or motivational material.

It was interesting to note that the percentage of teenagers who saw the video at schools with a swimming pool was nearly double the percentage who saw it in schools without a pool. This result is not unexpected as schools with pools probably feel the need to emphasize water safety more than the others. However, the students in the latter schools are no less susceptible to spinal cord injury and must be reached equally. The only way to ensure this is by incorporating *Sudden Impact* into the physical and health education curriculum as mandatory viewing by all students.

A disappointing result was that only 16% of the students in each school saw the video. A likely explanation is that the video was shown most frequently in physical and health education classes and students enrolled in these courses only comprise between 15%–20% of the population in the schools surveyed (physical and health education is not compulsory after grade 10). These findings suggest that future distribution of prevention materials should not be restricted to physical and health education departments. A better strategy would be to send them to the headmaster or principal to ensure viewing by most students—for example, in assemblies.

Implications for prevention

The school setting represents an ideal opportunity to teach injury prevention and reach large numbers of students of diverse social and cultural backgrounds in an inexpensive fashion. The results suggest, however, that the distribution mechanism requires major improvements as described above. Some method to ascertain receipt of the material such as a return postcard is essential. Continuing contact with the schools is likely to be necessary to encourage greater use of the material. Showing a video to assemblies especially as part of a compulsory curriculum on injury prevention would ensure greater use. These measures to improve the distribution and use of this prevention program should also apply to other school based injury programs. In all cases, however, parallel efforts are needed to ensure that the educational material succeeds in changing behaviour in the desired manner.

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1 Cushman R. Injury prevention: the time has come. *Can Med Assoc J* 1995;152:21–3.
2 Tator CH, Duncan EG, Edmonds VE, *et al*. Changes in epidemiology of acute spinal cord injury from 1947 to 1981. *Surg Neurol* 1993;40:207–15.