GUEST EDITORIAL

Exercise

Can we afford to exercise, given current injury rates?

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Fatalities could be reduced through application of our current knowledge

A lack of adequate and regular physical activity is now recognised as a major factor contributing to many forms of chronic disease, and public health agencies around the world are encouraging the general population to become more active. However, papers such as those of Conn and associates, and repeated surveys from various countries, including Britain, Denmark, France, Finland, Germany, South Africa, and the US note an important social and economic toll from injuries among current exercisers. Some authors have suggested that the incidence of such adverse consequences could be sufficient to counter both health and economic arguments for the advocacy of exercise, whereas others have considered these injuries an inevitable consequence of participation in health giving exercise. A journal such as Injury Prevention can hardly accept the position that such events are unavoidable “accidents”. Nevertheless, it seems appropriate to question both the magnitude of the problem and the ability to generalise the findings, while suggesting appropriate preventive measures.

As Conn and associates point out, the conclusions that can be drawn from a given survey are limited by problems of recall and seasonal effects. When attempting to generalise conclusions to other countries, we must add issues associated with differences in legislation, environmental conditions, and the popularity of various sports. For instance, in some countries the wearing of protective equipment may be mandatory, limb injuries in field sports may be increased by frozen playing surfaces, or a given type of activity may result in few injuries because most young men do not play this particular sport.

There is great difficulty in assessing the severity of injuries from survey data, even within a specific country. There can be little argument in the event of a fatality, but it is much less certain that “one or more days” of absence from school or work implies a severe injury. The true explanation of a day spent within the confines of the medical system could lie in such current issues as a litigious society, the practice of defensive medicine, and time lost through the poor organisation of health services.

Many reports such as those of Conn and associates also lack a denominator expressing the extent of exposure to given types of activity. Those concerned with injury prevention need detailed information concerning each patient’s body build, physical fitness, typical level of competition, cumulative hours of exposure to a given sport, and immediate environmental conditions as a prelude to deciding which combinations of athletic pursuit, intensity, and environment are potentially dangerous. Differences in exposure to specific sports could explain some of the apparent ethnic differences in susceptibility to injury in the US. The main cause of the striking age and gender gradients in injury statistics probably lies in a combination of lack of experience, testosterone-mediated aggressiveness and inappropriate social conditioning among adolescent males, but it is again likely that such influences are tempered by age and gender related differences in the intensity and duration of exposure to dangerous sports.

Even more importantly, current assessments of the risk of a sport induced injury are based on data from individuals who have themselves chosen to adopt specific patterns of exercise. Such assessments are unlikely to reflect the risk of adverse health effects and associated medical costs among those who might be persuaded to increase their current level of physical activity through government propaganda. This point is well illustrated by a quasi-experimental study that compared health outcomes between an office that instituted a moderate aerobic fitness programme for their employees, and a matched control office where there was no such initiative. Employees at the company where the fitness programme was introduced showed no increase in Ontario Health Insurance Plan billings for either orthopedic or cardiovascular services, either relative to their personal experience during the previous year, or relative to billings for employees of the control company during the same year. Indeed, the introduction of the fitness programme appeared to reduce the immediate medical costs of the experimental sample by the equivalent of about three physician visits and a half day of hospital care per employee year.

Most sports injury statistics are undoubtedly inflated by the problem of self selection. Lesions are most likely in boys and young men. Many in this group enjoy taking risks, and danger is a major factor attracting them to dangerous and extreme forms of sport. The discouraging reality is that even if we were to eliminate the risks associated with such forms of sport, it is likely that the participants would then choose to gain an “adrenaline rush” by adopting some other hazardous type of activity, such as driving on an expressway at an aggressive 200 km/h.

This is not to deny our responsibility to implement simple methods of reducing the risk of exercise induced accidents. A first step must be to develop adequate statistics, so that we can rank the various potential activities in terms of risk; then we can encourage the adoption of those pursuits where the ratio of health benefit to risk is high. Brisk walking is a popular, low risk choice among the general population, and at least for the older half of our citizens, it confers many of the preventive medical dividends promised by riskier forms of physical activity. The attention of governments is now turning from the provision of costly sports facilities to encouraging the incorporation of such simple types of regular physical activity into normal daily life—the “active living” option.

Cycling to and from school or work is potentially a valuable component of active living, but in most communities there is a need to enhance the safety of such transportation through the provision of dedicated, attractive, and well lit walkways and cycle paths. The alarming toll of head injuries among cyclists could also be almost halved if other legislatures were to follow the initiative of some Canadian provinces by making the wearing of cycle helmets compulsory.

Some people will continue to find their motivation to an active lifestyle through the excitement of competitive sport, or the pursuit of individually challenging objectives. The risk to such individuals could still be substantially reduced through a careful matching of the exerciser’s abilities with that of the competitor or the environment, the refinement and enforcing of rules of fair play, good maintenance of grounds, and insistence on the wearing of appropriate protective equipment. We will continue to see some injuries and even fatalities among walkers, cyclists, football players and rock climbers alike, but we must be disturbed when the current incidence of fatalities could be greatly reduced.
Sports and recreational injury: the hidden cost of a healthy lifestyle

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More exercise will mean less obesity related disease, but exercise related injuries may negate the gain

Sport and recreational physical activity is an integral part of our society and participation in recreational physical activity is widely promoted as part of a healthy lifestyle. However, recent studies, such as the paper by Conn et al in this issue of Injury Prevention, point to the significant, and largely under-researched, injury problem associated with sports and recreational injury. In this guest editorial, we review the evidence for and against increasing the level of physical activity in the general population in developed counties. We also suggest specific collaborations important for controlling sports and recreational injury and for developing future recommendations on physical activity.

Physical inactivity and obesity are a growing problem throughout the developed world. Increasing affluence has facilitated the consumption of a high energy, high fat diet.1 2 But as food portion sizes have grown,3 so too have our waistlines.4 Levels of work related physical activity have dropped with the advent of service-oriented economies in developed countries; concurrently, the time available for recreational physical activity has diminished.5 6 Nearly 75% of US adults report they are not regularly active or are inactive during leisure time.7 In addition, the transportation infrastructure in developed countries increasingly discourages walking or cycling in favor of using a motor vehicle.8 As a result of reduced physical activity, diabetes and other obesity related diseases have increased.9 10 Of great concern is the fact that participation in physical education programs by US children and adolescents is low (only 21% of US adolescents participate in daily school based physical activity programs) and declining, while the prevalence of overweight in this age group is increasing.11 12 In part, this is because the leisure time activities pursued in developed counties are increasingly sedentary. Enormous growth in the market for home video/DVD, electronic games, and computers has led to a decline in active leisure time activities.13 14

In response, the US Surgeon General issued a call to action in 1996.15 A expert panel reviewed the evidence on the protective effects of physical activity in terms of prevention of obesity, cardiovascular disease, colon cancer, diabetes, poor mental health, and musculoskeletal degeneration. It was concluded that, while long duration and/or high intensity exercise conferred the greatest benefits, significant health gains could be achieved through a sequence of short episodes of moderate activity (brisk walking or climbing stairs) spread throughout the day. The recommendation was for each adult to participate in at least 30 minutes of moderate activity per day; this activity could be accumulated in a series of short episodes (say, three sets of 10 minute walks).16 The subsequent implementation of this recommendation has been the focus of numerous public health campaigns and much research effort.

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But a hidden danger lurks beneath the surface of the Surgeon General’s rec-
ommendation, and that danger is sports and recreational injury.2 An increased
risk of injury was identified in the Surgeon General’s report as the major
negative consequence of increasing the level of physical activity in the popula-
tion. The authors of the report suggested that these injuries could be prevented in
sedentary individuals by “gradually working up to a desired level of activity.”2 However, this suggestion is
not supported by the epidemiology of sports and recreational injury. Sports and recreational injuries arise in a wide
diversity of activities and occur to persons at all levels of fitness and condition-
ing. In fact, the evidence linking physical fitness and prevention of sports injury is
shaky at best.3,26–28
By far the biggest determinant of injury risk in sports and recreational injury is
the nature of the activity itself, with contact sports carrying the greatest risk of
injury.29–31 Personal history of injury also has an important role, especially in the
young athlete.2 Given the above, it would have been useful if the authors of the
Surgeon General’s report could have made specific recommendations about those physical activities which provide
maximal cardioprotective benefits while minimizing the risk of injury.2
In fairness to the Surgeon General’s office, the descriptive epidemiology of
sports injury in the US remained an undeveloped area throughout much of the
1990s. Fortunately, three recent reports from the Centers for Disease
Control and Prevention have changed that.22–24 The most recent of these
reports appears in this issue of Injury Prevention.2 As a result of this work, the
scope of sports and recreational injury in the US has been documented in much
greater detail than was possible in previous reports.24 The findings from this paper underscore the
enormous magnitude of the problem of sports and recreational injury.1 Using
data from the National Health Interview Survey, an annual face-to-face survey of
over 37 000 households in the US, the authors estimate that there are 26 sports
and recreational injuries per 10 000 persons per year; this rate exceeds the
rate for transportation related injury.1 Obviously there are a marked differences
in severity between sports and recrea-
tional injuries and transportation inju-
ries, however, 20% of schoolchildren are
absent from school at least one day a year
due to sports injuries, and 28% of work-
ing adults lost at least one day a year
from work due to sports injuries. Perhaps
the most staggering statistic is that for
those persons ages 5 to 24 years, sports
injuries account for one out of every five
injury episodes.1 Data such as these call into question the wisdom, in public health terms, of
attempting to increase in a broad based
manner the level of physical activity in the population. There is a urgent need for
specific guidance as to which physical activities confer the greatest health ben-
efits in terms of preventing chronic disease, while minimizing the injury
risks. Public health recommendations need to address the specific mix of mild,
moderate, and vigorous physical activity not only in terms of chronic disease pre-
vention and treatment, but also in terms of management of the risk of injury.36
One of the first steps in identifying issues of public health concern is the gathering of incidence statistics. From
an injury control perspective, the problem of sports and recreational injury has gone underexamined for far too long. This is in part due to the fact these inju-
ries tend to be of lower severity. As a result, much of the burden of these inju-
ries has fallen outside the scope of standard data collection systems for fatal
and hospitalized injuries. It is also due in part to deficiencies in previous coding
systems used to categorize injury, such as International Classification of Diseases, ninth revision, clinical modification (ICD-9-
CM), which were unable to comprehen-
sively classify sports injuries. Finally, it
must be admitted that social dynamics have also played a role; public health professionals have tended not to engage
intellectually and socially with their col-
leagues in exercise and sports science, and vice versa.
What can be done to make sports and
recreational activity safer? Protective
equipment interventions are one option; in the sports of recreational baseball and
softball, safety bases, softer balls, and pro-
tective faceguards have all been shown to be effective and are widely adopted.34–36 Rule changes also have great potential; the rule changes and player education programs introduced into North Ameri-
can football in the 1970s reduced the inci-
dence of catastrophic injury in that sport from 36 per annum to zero.27 More problematic are nebulous, ill defined inju-
ries such as concussion,28 or those due to
intrinsic forces, such as rupture of the
anterior cruciate ligament.39
An important first step in analytic epidemiologic studies in sports and
recreational injury is the use of the prospective cohort design. This study
design has great applicability to the study of sports and recreational injury because cohorts can be assembled and data on putative risk factors obtained at the
start of the sports season.40 Athletes can then followed over the course of the
season and injuries prospectively identi-
fied by their health care providers. The
time between acquisition of risk factor
data and ascertainment of injuries is
typically short—weeks or months, as
opposed to the years or decades common
in occupational or environmental epide-
miology. Cohort sizes can be quite
modest (hundreds rather than thou-
sands) because sufficient injuries typi-
cally present during only a few seasons of follow up. Acquisition of accurate data on participation in sports (so-called “exposure” data) is critical to success of these studies.41 Methodologic research on the most efficient techniques for obtaining participation or exposure data is required.
From the prevention standpoint, the sports injury community is notable for the presence of a group of medical
professionals known as certified athletic trainers (ATCs). ATCs specialize in the
prevention, assessment, treatment, and
the dissemination of prevention mes-
themselves in an excellent mechanism for
the volunteer work of ATCs.
Sport and recreational physical activity is an integral and vital component of
our society. Increasing the level of physi-
cal activity in children and adults is a pressing public health concern; however, the
injuries resulting from sports and recrea-
tional activities are also a grave
public health concern. For the US, we
now have a clearer picture of those inju-
ries than ever before.1 22–24 The burden of
responsibility now rests on the shoulders of the injury control professionals to
partner with sports medicine profession-
als and exercise science researchers in
order to develop physical activity guide-
lines that minimize the risk of injury in
sports and recreational activities, while
maximizing the public health gain from
prevention of obesity and other inactivity
related disease.