YEAR BOOK®

YEAR BOOK OF SPORTS MEDICINE® 1993

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Statement of Purpose

The YEAR BOOK Service

The YEAR BOOK series was devised in 1901 by practicing health professionals who observed that the literature of medicine and related disciplines had become so voluminous that no one individual could read and place in perspective every potential advance in a major specialty. In the final decade of the 20th century, this recognition is more acutely true than it was in 1901.

More than merely a series of books, YEAR BOOK volumes are the tangible results of a unique service designed to accomplish the following:

- to *survey* a wide range of journals of proven value
- to *select* from those journals papers representing significant advances and statements of important clinical principles
- to provide *abstracts* of those articles that are readable, convenient summaries of their key points
- to provide *commentary* about those articles to place them in perspective.

These publications grow out of a unique process that calls on the talents of outstanding authorities in clinical and fundamental disciplines, trained literature specialists, and professional writers, all supported by the resources of Mosby, the world's preeminent publisher for the health professions.

The Literature Base

Mosby subscribes to nearly 1,000 journals published worldwide, covering the full range of the health professions. On an annual basis, the publisher examines usage patterns and polls its expert authorities to add new journals to the literature base and to delete journals that are no longer useful as potential YEAR BOOK sources.

The Literature Survey

The publisher's team of literature specialists, all of whom are trained and experienced health professionals, examines every original, peer-reviewed article in each journal issue. More than 250,000 articles per year are scanned systematically, including title, text, illustrations, tables, and references. Each scan is compared, article by article, to the search strategies that the publisher has developed in consultation with the 270 outside experts who form the pool of YEAR BOOK editors. A given article may be reviewed by any number of editors, from one to a dozen or more, regardless of the discipline for which the paper was originally published. In turn, each editor who receives the article reviews it to determine whether or not the article should be included in the YEAR BOOK. This decision is based on the article's inherent quality, its probable usefulness to readers of that YEAR BOOK, and the editor's goal to represent a balanced picture of a given field in each volume of the YEAR BOOK. In

addition, the editor indicates when to include figures and tables from the article to help the YEAR BOOK reader better understand the information.

Of the quarter million articles scanned each year, only 5% are selected for detailed analysis within the YEAR BOOK series, thereby assuring readers of the high value of every selection.

The Abstract

The publisher's abstracting staff is headed by a physician-writer and includes individuals with training in the life sciences, medicine, and other areas, plus extensive experience in writing for the health professions and related industries. Each selected article is assigned to a specific writer on this abstracting staff. The abstracter, guided in many cases by notations supplied by the expert editor, writes a structured, condensed summary designed so that the reader can rapidly acquire the essential information contained in the article.

The Commentary

The YEAR BOOK editorial boards, sometimes assisted by guest commentators, write comments that place each article in perspective for the reader. This provides the reader with the equivalent of a personal consultation with a leading international authority—an opportunity to better understand the value of the article and to benefit from the authority's thought processes in assessing the article.

Additional Editorial Features

The editorial boards of each YEAR BOOK organize the abstracts and comments to provide a logical and satisfying sequence of information. To enhance the organization, editors also provide introductions to sections or individual chapters, comments linking a number of abstracts, citations to additional literature, and other features.

The published YEAR BOOK contains enhanced bibliographic citations for each selected article, including extended listings of multiple authors and identification of author affiliations. Each YEAR BOOK contains a Table of Contents specific to that year's volume. From year to year, the Table of Contents for a given YEAR BOOK will vary depending on developments within the field.

Every YEAR BOOK contains a list of the journals from which papers have been selected. This list represents a subset of the nearly 1,000 journals surveyed by the publisher and occasionally reflects a particularly pertinent article from a journal that is not surveyed on a routine basis.

Finally, each volume contains a comprehensive subject index and an index to authors of each selected paper.

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Journals Represented

Mosby subscribes to and surveys nearly 1,000 U.S. and foreign medical and allied health journals. From these journals, the Editors select the articles to be abstracted. Journals represented in this YEAR BOOK are listed below.

Acta Psychiatrica Scandinavica
American Family Physician
American Heart Journal
American Journal of Cardiology
American Journal of Clinical Nutrition
American Journal of Diseases of Children
American Journal of Health Promotion
American Journal of Obstetrics and Gynecology
American Journal of Physical Medicine & Rehabilitation
American Journal of Physiology
American Journal of Preventive Medicine
American Journal of Roentgenology
American Journal of Sports Medicine
American Journal of the Medical Sciences
American Review of Respiratory Disease
Anesthesiology
Annals of Allergy
Annals of Emergency Medicine
Annals of Epidemiology
Annals of Internal Medicine
Annals of Rheumatic Diseases
Applied Cognitive Psychology
Archives of Internal Medicine
Archives of Physical Medicine and Rehabilitation
Arthroscopy
Australian Journal of Science and Medicine in Sport
British Heart Journal
British Journal of Radiology
British Journal of Sports Medicine
Canadian Family Physician
Canadian Journal of Sport Sciences
Chest
Chiropractic Sports Medicine
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Circulation
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International Journal of Epidemiology
International Journal of Sports Medicine

International Orthopaedics
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Journal of Rheumatology
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Journal of Sports Medicine and Physical Fitness
Journal of Sports Sciences
Journal of Trauma
Journal of Vascular Surgery
Journal of the American College of Cardiology
Journal of the American Geriatrics Society
Journal of the American Medical Association
Journal of the American Society of Echocardiography
Medecine du Sport
Medicine and Science in Sports and Exercise
National Strength and Conditioning Association Journal
New Zealand Medical Journal
Orthopedics
Physical Therapy
Physician and Sportsmedicine
Postgraduate Medicine
Radiology
Research Quarterly for Exercise and Sport
S.A.M.J./S.A.M.T. - South African Medical Journal
Scandinavian Journal of Rehabilitation Medicine
Spine
Sports Medicine
Thorax
Western Journal of Medicine

Standard Abbreviations

The following terms are abbreviated in this edition: acquired immunodeficiency syndrome (AIDS), the central nervous system (CNS), cerebrospinal fluid (CSF), computed tomography (CT), electrocardiography (ECG), human immunodeficiency virus (HIV), and magnetic resonance (MR) imaging (MRI).

Introduction

You asked for it! With a view to maintaining a close link between the needs of the readers of the YEAR BOOK OF SPORTS MEDICINE and the articles that are selected for review and commentary, a survey of 500 regular readers was conducted this year. We are greatly encouraged both by the relatively high proportion of those contacted (34%) who took time out of their busy schedules to respond, and by the extremely positive nature of the comments that were received.

As we had expected, the readership of the YEAR BOOK OF SPORTS MEDICINE covered a broad range of disciplines related to the practice of sports medicine, including orthopedics, orthopedic surgery, athletic training, chiropractic, physical therapy, and sports medicine. Over 85% of respondents found the topics of injuries, rehabilitation, and orthopedics to hold a high degree of personal usefulness. Other topics that the majority of respondents found to be particularly helpful included muscle training and overtraining, the care of female athletes, nutrition and metabolism, and cardiorespiratory function. More specialized topics, such as the child athlete, exercise and aging, and exercise and immune function, were less popular, although it is probably important that the YEAR BOOK OF SPORTS MEDICINE continue to cover the more important topics in these developing areas of knowledge.

Readers will be happy to see that, once again, a major section of the 1993 YEAR BOOK OF SPORTS MEDICINE is devoted to the latest papers on the medical surgical treatment of not only musculoskeletal injuries but injuries of the spleen and other body regions as well. The topic of head protection continues to be a current issue with regard both to cycling and to "spearing" in contact sports. There are several papers on the dangers of chest injury in baseball, and discussion of more exotic sports, from water-biking and paragliding through board sailing, body surfing, and rock-climbing to ultimate frisbee. Another hot topic, well represented in Frank George's selections, is the rapid rehabilitation of anterior cruciate injuries. The statistical technique of meta-analysis is beginning to find application in the evaluation of treatment in musculoskeletal injuries, although as in the abstracted article on lateral epicondylitis, there are problems of poor experimental design and a lack of consistency of diagnosis and treatment between reports. Nevertheless, the large placebo effect points to the need for more and better trials of this sort. Several papers discuss the persistent complications of arthroscopy, including sepsis and persistent pain, and increasing recognition is given to the fact that many arthroscopies are unnecessary.

In terms of motivating the average patient to adopt a more active lifestyle, there is continued interest in the minimal amount of activity needed to maintain health and new progress in the development of theoretical models of exercise behavior. The role of the physician as a motivating force is gaining prominence. It is also increasingly recognized that regular participation in exercise does not necessarily imply that the patient has adopted a healthy overall life-style.

Dr. Eichner contributes 3 interesting articles on how to deal with runner's diarrhea. Sometimes the problem is a gastrointestinal infection, and there have been disturbing reports of disease transmission by seawater at a number of beaches. The issue of appropriate measures to protect athletes against HIV infection continues to be a concern of many physicians; increasingly, exercise is becoming accepted as a useful treatment in patients who are HIV positive. Reports continue to discuss exercise as a potential cause of sudden death; excerpted articles cover some of the causes of exercise-induced syncope, the risks of snow shoveling, the peaking of heart attacks in midmorning, and the role of catecholamine secretion in vigorous competition. Rehabilitation of the patient with stable congestive heart failure is gaining acceptance, and (as previously reported in chronic obstructive lung disease) attention is drawn to improvement in gait as an important factor contributing to the success of such rehabilitation. In chronic bronchitis, controversy continues as to how far regular exercise helps in the expectoration of mucus. The evaluation of exercise-induced bronchospasm is now being facilitated by bronchial airway lavage; enthusiasts continue to propose face masks as a means of reducing bronchospasm, and the search continues for prophylactic drugs that will meet the requirement of doping control.

Sports competitions for the spinally injured are now major events; problems currently attracting attention in the population include vulnerability to heat stress, methods of preventing venous pooling, and the therapeutic value of functional electrical stimulation. Attempts to regulate doping of the high-level athlete this year have focused on some new challenges, including natural testosterones, thrombosis induced by steroids, gamma-aminobutyric acid, and permissible levels of caffeine. The debate continues as to how far caffeine really is ergogenic. As the population ages, more and more is being written about the ability of regular exercise to limit the otherwise inexorable deterioration of both cardiac and muscle function; a number of reports document how exercise programs can sometimes lead to dramatic gains in the quality of the final years of life.

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Is Population Involvement in Exercise Programs Increasing?

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The role of regular, vigorous physical activity in the improvement of population health is now established beyond reasonable doubt (1), and the promotion of greater physical activity has become an important facet of public health policy in many of the developed nations of the world. However, it is less certain how far such efforts have succeeded. There are some encouraging signs that suggest people may have an increased awareness of the need for physical activity, but the evidence for the desired change in health behavior remains quite limited and requires critical examination. We will look briefly at current meanings of the words "sports" and "health," will examine the potential contribution of various types of physical activity to population health and, finally, will consider whether there is indeed a secular trend to an increase of health-giving activity in the population at large.

Meanings of the Terms "Sports" and "Health"

Unfortunately, the debate has been clouded by differences in interpretation of the words "sports" and "health." It is thus useful to begin with some definitions.

SPORTS

In Canada and the United States, competition, fair or otherwise, is a dominant aspect of sports. For many North Americans, participation in a fitness class or a substantial walk would not be considered a sport, and it is interesting that in some follow-up studies of athletes, "controls" have been drawn from other individuals renting locker space in an athletic facility (2)! On the other hand, sports may include activities where the individual is personally challenged, such as downhill skiing, sailing, whitewater paddling, or rock climbing. In England, sports participation usually conveys the idea of amusement through a fair contest; the contest is commonly against another athlete, but it can also be against a fox (as in hunting) or even a fish (as in angling). United Nations Educational, Scientific, and Cultural Organization (UNESCO) and much of the remainder of western Europe adopts a broader definition of sports, encompassing all forms of physical activity except required programs of physical education; in some countries, sports further include competitions for powerboats and motorcycles.

For the purpose of this article, let us adopt the broad UNESCO interpretation of sports, examining participation in all forms of vigorous physical activity.

Health

Some hospitals describe programs of tertiary and quaternary medical treatment as "health care." However, this negates the original meaning of the word "health," meaning hale, or whole. According to the World Health Organization (3), health is not the mere absence of illness. Rather, it implies a state of complete physical, social, and psychological wellness that maximizes the potential of the individual. Thus, a true health-care program should not be dealing with disease, but should seek to conserve or restore the wholeness of a person. Ever-increasing medical expenditures are forcing governments and insuring agencies to look at the economic benefits that can be derived from the true care of health, and this may be one of the most significant features of the revolution in medical practice that is likely to occur during the next decade (4). Physicians will relearn their dominant responsibility for the prevention of disease and the optimization of health.

Sports as a Means to Health

Professional Sports

Before discussing participatory sports, it may be useful to look quickly at the health implications of spectator sports, whether professional or ostensibly amateur in orientation. Can an international athlete make any contribution to the physical, social, or psychological health of the population? Occasional enthusiasts have suggested such sports can provide a catharsis for violent emotions (5), or that major stars offer role models that encourage young students to undertake prolonged and rigorous training.

Few would deny the mass entertainment that currently is provided by spectator sports. However, many sociologists would argue that, far from providing an outlet for aggression, violence in football stadiums and hockey arenas spawns aggressive hooliganism among the spectators during and after the game (6). Young boys' keen interest in ice hockey almost certainly can be traced to the impact of major league hockey stars. However, the beneficial impact on the growing child is quite short-lived, and during the early teenage years there is a high dropout rate from local ice hockey leagues. Only large and heavy boys persist in playing what rapidly becomes a brutal form of competition (7). The example of professional and international athletes is also far from helpful. Doping, the quest for astronomic salaries and sponsorships, the abuse of drugs such as cocaine, and training to the exclusion of all other interests do not provide a good role model for the developing youngster. Indeed, by the time they reach middle age, North Americans who were involved in major athletic competition as young adults commonly have become less active and more overweight than their nonsporting peers. Moreover, a higher percentage of former athletes are now cigarette smokers and heavy users of alcohol (8).

Certainly, there are better ways to improve health than to build a $500 million all-weather stadium for professional sports, or to invest even larger sums in the hosting of the Olympic Games.

Direct Effects on Health

The direct effects of sports on health depend on the type, intensity, and duration of the activity that is undertaken, although details of the dose/response relationships remain unclear.

Type of Exercise—Participation in some forms of physical activity has a positive effect on health because of group influences. A fitness class may offer both life-style instruction from the class leader and group support. Class camaraderie has a much more positive influence on the mood-state and perceived health of an extravert with an external locus of control than on an introverted individual with an internal locus of control.

Other types of exercise modify arousal. Light exercise may provide relaxation to a person who is chronically anxious and sleepless because of a stressful job. In this context, the environment in which the exercise is performed may be much more significant than the precise intensity and duration of activity.

Other people face a boring, repetitive job on a production line. They need arousal and excitement to stimulate cerebral function and counter depression. Arousal may be increased by an appropriate manipulation of the exercise environment by the use of bright lights, colors, and loud music; by vigorous movements, challenging competition, and sometimes the physical danger of the chosen sport.

Intense Activity—Intensive activity may be rewarding because of participation in or the winning of a major contest. Success may bring peer praise and even financial dividends. Participants may also enjoy the feeling of mastery over self, the vertigo of rapid movements, or the thrills of physical danger.

Whether the person wins or not, his or her body becomes habituated to the sensations and physiologic changes that accompany all-out exertion. Animal studies also suggest an enlargement of the coronary arterial tree, with the development of collateral blood vessels, but this has not yet been demonstrated in humans, perhaps because they undertake less rigorous exercise (9).

On the debit side, the more intensive the activity, the greater the risk that exercise will cause musculoskeletal injuries (10) or provoke a heart attack (11).

Moderate Activity—Many of the sports normally undertaken for recreation and health (e.g., walking, jogging, swimming, cycling, and participation in fitness classes) involve bouts of moderate aerobic activity, at perhaps 60% to 70% of peak aerobic power. Such activity trains both the oxygen transport system and oxidative enzymes in the working muscles (12).

The decrease in heart rate and blood pressure at any given rate of working decrease the work rate of the heart. There is also a relative increase in the length of the diastolic phase of the cardiac cycle; and because most of the blood flow to the left ventricle occurs during diastole (13), perfusion of the myocardium is improved. Plasma volume expands, increasing the stroke volume of the heart at the initial expense of a decrease of plasma hemoglobin concentration, whereas the combination of humoral changes (an increased secretion of growth and thyroid hormones) and an increase in the activity of oxidative enzymes increases fat metabolism during submaximal exercise.

Duration of Activity—The duration of exercise at any given intensity of effort determines the total energy expenditure of the patient. A minimum weekly energy expenditure seems necessary to control obesity, to optimize the lipid profile (14), and to correct maturity-onset diabetes (15).

If exercise is sought through competitive sports, the duration of activity is predetermined by the rules of the game. In some team sports, much of the nominal playing time is spent merely sitting on the bench. Because of the need to assemble fellow team members, the number of sessions of recreational team sports that are played per week may also be relatively few. In contrast, individual participation in track-and-field, swimming, or rowing competitions may stimulate many hours of demanding training each week.

The more deliberate health-seeking activities of the North American executive (such as jogging and attendance at fitness classes) commonly have an active phase of 20–30 minutes per session. The exercise professional recommends 3–5 sessions of such activity per week (16), but unless the activity is built into the normal working day, many participants fall short of this goal.

Other Types of Activity.—It is important that major muscle groups be exercised regularly to avoid a progressive loss of lean tissue with aging. Many types of competition have the disadvantage that they optimize function in one particular group of muscles, but strength is lost from other parts of the body as training continues. A single noncompetitive activity, such as jogging, has a similar disadvantage. The ideal regimen involves all of the muscles, joints, and bones of the body in a wide variety of movements.

In older individuals, flexibility also assumes ever-increasing importance to function, and is thus important to our definition of good health. A good exercise program takes each of the major joints through its full range of motion on a regular basis. It is also vital to halt the loss of calcium from the skeleton by a program that places a load-bearing stress on the main bones of the skeleton.

Community Patterns of Physical Activity.—The types of activity that are currently most popular require little in the way of facilities or organization—walking, cycling, and swimming being the most frequent cita-

tions (17, 18). Despite a massive investment of government and community funds in the building of arenas and the subsidizing of coaching programs, organized sports, workplace fitness programs, and the use of community recreational facilities are not common sources of activity for the average adult.

It is instructive to ask people what sports they would like to begin in the next 12 months, and to compare such perceptions with those sports that are currently showing a rapid growth in participation. In Canada, the stated demand is for simple pursuits such as walking and cycling, but in practice the fastest growth has been in costly, status activities, such as indoor racquet sports and downhill skiing (17, 19).

Optimal Activities for Health.—The impact of physical activity on health is commonly assessed in terms of all-cause mortality or sudden cardiovascular death. Blair and associates (20, 21) found the largest reduction in mortality when sedentary subjects were compared with those who had only a slightly better fitness status. The additional health dividends from the pursuit of more vigorous sports seemed quite small. Paffenbarger and his colleagues (22) found a decrease of mortality in Harvard alumni who undertook 2 megajoules of leisure activity per week, and benefit peaked among those who spent 8 megajoules/week. Again, much of the activity was in the form of walking and stair climbing, rather than involvement in competitive sports, although for a given weekly energy expenditure there was slightly more protection from sports than from other types of activity. Likewise, Morris et al. (23) found vigorous walking and stair climbing explained much of the difference between civil servants in whom a fatal myocardial infarction developed and those in whom it did not.

Thus, the American College of Sports Medicine (16) now recommends participation 3–5 times per week in sessions of 20–60 minutes of aerobic activity at 50% to 85% of maximal oxygen intake, plus 8–10 sets of strength training exercises 2 days per week.

Indirect Life-style Effects

A further potential health benefit from participation in sports is a favorable change of overall life-style. Some studies seem to support such a hypothesis. Morgan et al. (24) noted that a high percentage of Masters athletes had been successful in stopping smoking. However, Kavanagh et al. (25) later showed that smoking withdrawal antedated involvement in Masters competition. Rather, both phenomena reflected a common interest in a healthy life-style.

National population studies have generally shown little correlation between the percentage of smokers and involvement in physical activity (17). The lack of relationship may reflect the differing motives for participation in various categories of physical activity. In pursuits that stress excitement and social interaction, the proportion of smokers is fairly high, but in health-seeking activities, such as jogging, the percentage of smokers is much lower.