



Concepts of Athletic Training **SIXTH EDITION**

***Ronald P. Pfeiffer
Brent C. Mangus***

Concepts of Athletic Training

Sixth Edition

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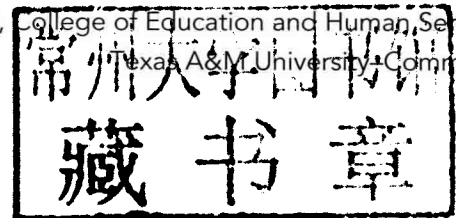
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Production Credits

Publisher, Higher Education: Cathleen Sether
Senior Acquisitions Editor: Shoshanna Goldberg
Editorial Assistant: Prima Bartlett
Associate Production Editor: Julia Waugaman
Associate Marketing Manager: Jody Sullivan
V.P., Manufacturing and Inventory Control: Therese Connell
Composition: Cape Cod Compositors, Inc.
Cover Design: Kate Ternullo
Photo Research and Permissions Supervisor: Christine Myaskovsky
Associate Photo Researcher: Jessica Elias
Cover Image: © image100/age fotostock
Printing and Binding: Malloy Incorporated
Cover Printing: Malloy Incorporated

Library of Congress Cataloging-in-Publication Data

Pfeiffer, Ronald P., 1951– author.

Concepts of athletic training / Ron Pfeiffer, EdD, LAT, ATC, Dept. of Kinesiology Co-Director,
Center for Orthopaedic & Biomechanics Research (COBR), Boise State University, Brent Mangus, Texas A&M University—
Commerce, Dean, College of Education and Human Services.—Sixth edition.
p. ; cm.

Includes bibliographical references and index.

ISBN-13: 978-0-7637-8378-5

ISBN-10: 0-7637-8378-1

1. Athletic trainers. 2. Sports injuries. 3. Sports medicine. I. Mangus, Brent C., author. II. Title.

[DNLM: 1. Athletic Injuries—therapy. 2. Sports Medicine—methods. QT 261]

RC1210.P45 2012

617.1'027—dc22

2010046080

Printed in the United States of America

15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

Preface

The primary theme of this book continues to be the prevention, care, and management of sport and physical activity related injuries. As mainstream media tends to focus on sports at the professional and NCAA Division I collegiate level, especially in American football, baseball, and basketball, it is easy to forget that the vast majority of sports participants are found in secondary schools (interscholastic sports), youth sports clubs, and community recreation programs. Given this demographic, it follows that the majority of sport and activity related injuries also occur outside of professional and collegiate sports. This is not to suggest that injuries do not occur within these latter categories, but for the major professional sports as well as for most collegiate athletes (at least at the NCAA Division I and IAA levels), sports medicine services, including daily access to trained personnel, is the norm. However, this is not the case for the participants at the interscholastic, club, and community recreation levels. The reality is that when injuries occur at a high school junior varsity soccer match, an AAU girls basketball game, or a local adult city recreation softball tournament, the coach is often required to serve as the “first responder.” Therefore, the target audience for the *Sixth Edition* includes anyone planning a career in coaching, athletic training, or Grades 7–12 physical education instruction. This last category must be addressed as these personnel typically coach two or even three sports per year at their respective school. The good news is that there are more BOC Certified Athletic Trainers employed in the nation’s high schools than at any other time in history. However, the reality is that the majority of schools still do not employ such personnel and as a result, coaching personnel, especially those for Grades 7–12, continue to serve as “first responders” in the majority of sports-injury situations. This puts considerable pressure on coaches to become knowledgeable on the “best practices” for management of injuries when they occur. The coach’s initial decisions and subsequent actions are critical in determining the outcome of an injury. In order to make correct decisions, coaching personnel must be properly trained, not only in basic first aid, but in more advanced techniques in order to properly manage injuries that are complicated by sports equipment such as helmets, face masks, and mouth guards. Students majoring in athletic training will also find the *Sixth Edition* extremely relevant to their educational goals. The content will form a solid foundation for more advanced studies in this exciting and constantly evolving allied health field.

The majority of sport and activity-related injuries involve the musculoskeletal system. As such, much of the content of this text is devoted to the recognition, immediate care, and management of injuries such as sprains, strains, dislocations, and fractures in the extremities. Fortunately, only a small percentage of sports and activity-related injuries are life threatening or will result in permanent disability. However, deaths and permanent disability tragically continue to be an outcome in a small percentage of cases. Most of these injuries are related to trauma to the head and/or neck or are heat related. Detailed information on head and neck injuries as well as prevention of heat disorders is provided in Chapters 9 and 18.

This latest edition continues to feature a chapter devoted to the adolescent athlete. The rationale for this is simple: The vast majority of school-aged athletes (Grades 7–12) are, in fact, adolescents or even pre-adolescents. As such, they represent an anatomically distinct population when compared to adult athletes. These differences must be recognized and considered by coaching personnel when making decisions regarding not only injury management, but also when designing and implementing injury prevention programs.

The general field of sports medicine continues to evolve rapidly. The authors have made every effort to update critical material throughout the text in order to make the content as current as possible.

New to This Edition

- Statistics have been updated throughout to reflect new topics and data
- All chapters include updated and expanded content and revised artwork to provide the most current and comprehensive information about athletic training
- Chapter 1 has updated information on injuries in popular sports, such as football, baseball/softball, wrestling, and soccer
- Chapter 2 contains an updated discussion about the various professional settings for the practice of athletic training
- Discussion of the increase in the number of lawsuits against coaching personnel and the reasons behind this trend has been added to Chapter 3

- Chapter 4 has new information regarding the safety of participation for athletes missing one of a paired set of organs—for example, those who have only one eye, kidney, or testicle—including the current policy from the American Academy of Pediatrics
- New sections on depression in athletes and recommendations on how best to address the psychological needs of athletes after injury and during rehabilitation in Chapter 5
- Sections on important nutrients, such as carbohydrates, fats, proteins, and minerals in Chapter 6 have been heavily updated and a new section on nutrition in recovery has been added

Technology Integration

As with previous editions, information directing the reader to the Web site is given at the beginning of each chapter. The links found on <http://health.jbpub.com/concepts/6e> provide complementary information to the chapter content and encourage students to become more proficient in using the Web as a learning resource. Additional resources on the Web site, including an interactive anatomy review, flash cards, crossword puzzles, practice quizzes, review questions, scenarios, Web links, and a glossary will enhance student learning.

The updated and improved **Instructor's ToolKit** includes an Instructor's Manual; computerized TestBank, Image and Table Bank; and PowerPoint Presentations with more than 500 slides. These slides make transitioning to the *Sixth Edition* easier, ensuring that both the instructor and students get the most out of this text. They can be used in classroom presentations or printed directly onto overhead transparencies.

Features

- **What If?** features are “real life” scenarios that encourage students to work on critical decision-making skills. These sections provide the sort of information typically available to coaching personnel when confronted with an injury-related problem. These scenarios can have many applications, such as simple decision-making practice sessions alone or with another student or, ideally, as the script for role-play exercises in a sports-injury class laboratory practice session.

- **Time Out** boxes provide additional information related to the text, such as NATA Athletic Helmet Removal Guidelines, guidelines for working with an injured athlete, how to recognize the signs of a concussion, and first aid for epilepsy.
- **Athletic Trainers Speak Out** boxes feature a different athletic trainer in every chapter who discusses an element of athlete care and injury prevention.

Conclusion

This book is an outstanding resource for students studying to become physical education teachers, coaches, and athletic trainers. Personnel charged with the responsibility of providing emergency care for athletes must be trained in the first aid procedures appropriate for sports injuries. The content of this text, the accompanying Instructor's ToolKit, and <http://health.jbpub.com/concepts/6e> will provide instructors and students with a wealth of information on topics related to the care and prevention of sports injuries. The goal, of course, is to give coaching and teaching personnel the necessary knowledge and critical-thinking skills to recognize and differentiate minor from more serious sports injuries. Once decisions are made regarding the nature of the injury, appropriate first aid care and/or medical referral can be instituted.

Acknowledgments

To Paul W. Pfeiffer, my father, mentor, and friend. You gave me many gifts, one of which was perseverance, and without perseverance, this book would never have been written.

—Ron Pfeiffer

Thank you to my family for their support throughout this project. Brenda, Dusty, and Meesha continue to inspire me each day. Now, we look to Ezekiel, Alistair, and Gigi to stimulate our growth and understanding of the greatest things this world has to offer. I would also like to thank the many students and colleagues over the years who have provided me with their feedback and encouragement. My students are a great source of joy and happiness and I grow through their successes. Domo arigato, muchas gracias, vielen dank, and many thanks to all who have had an influence on my career.

—Brent Mangus

The authors would also like to thank Cindy Trowbridge, PhD, ATC, LAT, CSCS, of the University of Texas at Arlington, for contributing to the text and for all of her insight for this edition, as well as her assistance with preparing the PowerPoint Presentations and TestBank for the Instructor's ToolKit.

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The Concept of Sports Injury

MAJOR CONCEPTS

After reading and studying this chapter, the reader will be familiar with the scope and breadth of the topic of sports injury. This chapter discusses the most popular definitions of sports injury currently in use, along with a variety of the most commonly used medical terms related to the type and severity of injury. These terms are used throughout the remainder of the book and can also prove useful to the coach when communicating with members of the medical community about sports injuries. The last sections of the chapter introduce the concept of epidemiology as it applies to the study of sports injury. A straightforward sports classification system is introduced that is based on the relative amount of physical contact that typically occurs during the activity. This chapter concludes with specific participation and injury data from the most popular school sports in the United States.



The Web site for this book offers many useful tools and is a great source for supplementary information for both students and instructors.

Organized competitive high school sports continue to be extremely popular among American children. Recent research indicates that approximately 7.5 million public school children are involved in these activities annually (National Federation of State High School Associations [NFSH], n.d.). Along with modest growth in high school sports programs, there has been massive growth in the number of adolescent and pediatric-aged children playing sports. As a result of community-based programs, a total of approximately 30 million school-aged children are involved in sports in the United States (Adirim & Cheng, 2003). Although these sports may involve children as young as 6 to 8 years, the level of competition is often extremely high as attested by the fact that it is common for teams to travel hundreds and sometimes thousands of miles to compete in tournaments. Further, it is not uncommon for children in sports such as tennis and gymnastics to invest as much as 20 hours a week in their chosen activity (Maffulli & Caine, 2005).

With the implementation of the Title IX Education Assistance Act of 1972, growth in the participation of female athletes in the United States was reported through the 1980s at 700% (Stanitski, 1989). Ironically, as a result of persistent stereotypes in both the lay and coaching communities that girls were not tough enough to play sports, many young female athletes were historically discouraged from participation. Even more disturbing is the fact that such negative stereotypes still persist in some sports organizations. Available evidence suggests that for some sports the injury rates are higher for girls, while in other sports the rates are higher for boys. High school data, for example, indicate that in sports in which both genders compete such as soccer and basketball, there are some differences in injury rates based on gender. For example, in basketball, girls sustain more concussions and knee injuries, while boys sustain more fractures and contusions (Borowski et al., 2008). Injury data from high school soccer show that overall the injury rates are very similar between genders. There is a notable exception, however, in that girls are found to have a much higher rate of knee ligament sprains. The rates for complete ligament sprains in the knee requiring surgery were 13 times higher in girls than in boys (Yard, Schroder, et al., 2008). The majority of these complete ligament sprains resulted from non-contact mechanisms of injury—a phenomenon that continues to be an area of intense research within the sports medicine community. Data support the premise that with respect to severe injuries, for example, those resulting in a loss of more than 21 days of sports participation, the aggregate rate for boys sports was higher than for girls (Darrow et al., 2009). However, when the data were restricted to comparisons of basketball, soccer, and baseball/softball, girls were found to have higher rates of

injuries qualifying as severe. The authors of this study conclude that this finding is the result of the differences in rates between girls and boys basketball (Darrow et al., 2009). (See **Figure 1.1** and **Figure 1.2**.)

Despite the best efforts of parents, coaches, and officials, injury continues to be an unavoidable reality for a significant number of participants. Damore and colleagues (2003) conducted research examining a broader age distribution. They studied emergency department admissions of patients ranging in age from 5 to 21 years at four hospitals for two 1-month periods (October 1999 and April 2000). They recorded a total of 1421 injuries in a group of 1275 patients in the age range of their study. Of these injuries, 41% were attributed to sports participation. The average age for such patients in their study was 12.2 years, with sprains, contusions, and fractures being the most common injuries. Males sustained more injuries (62%) to the musculoskeletal system than did their female counterparts.

Radelet and colleagues (2002) studied injuries in a population of children (1659) involved in community

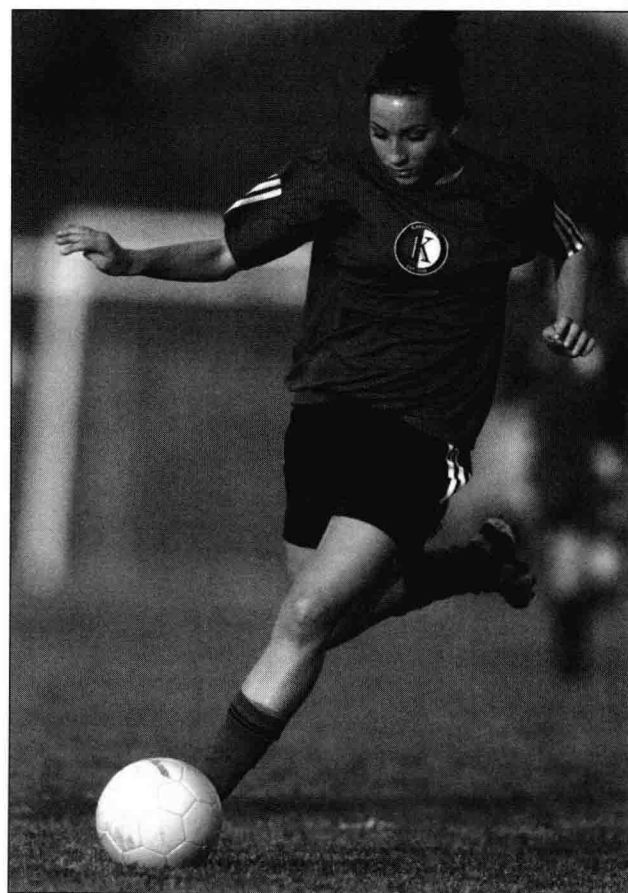


FIGURE 1.1 Historically, females were discouraged from sports participation based on unfounded fears of gender-based vulnerability to injury.



FIGURE 1.2 Although data show that in some sports females have a higher risk for some injuries compared to their male counterparts, it is also true that in other sports, rates for males are higher.

sports programs over the course of 2 years. Specifically, they monitored the injuries in children ranging in age from 7 to 13 years who were involved in baseball, softball, soccer, and football. An injury was defined as “requiring on-field evaluation by coaching staff, or causing a player to stop participation for any period of time, or requiring first aid during an event.” They further defined an “athlete exposure” as one athlete participating in one event (game or practice). Their results, expressed as the rate of injury per 100 athlete exposures, were that soccer had the highest rate at 2.1 injuries, followed by baseball at 1.7, football at 1.5, and softball at 1.0. In all sports, there were more injuries in games than in practices, with contusions being the most common injury overall. It is also interesting to note that in soccer, there were no gender differences in injury rates.

Definition of Sports Injury

Though logic seems to argue that determining what constitutes a sports **injury** would be simple, just the opposite is the case. Despite the efforts of many in the sports medicine community, a single, universally acceptable definition of sports injury remains unavailable. Debates about precise definitions among academicians

may seem petty to the injured athlete; however, from a clinical and scientific viewpoint, having a standard set of definitions can greatly improve the usefulness and impact of future injury studies.

Most current definitions of sports injury incorporate the length of time away from participation (time lost) as the major determinant of injury severity. In 1982, the National Collegiate Athletic Association (NCAA) established the Injury Surveillance System (ISS), which established a common set of injury and risk definitions for use in tracking collegiate sports injuries. To qualify as an injury under the ISS, that injury must meet the following criteria:

1. Occurs as a result of participation in an organized intercollegiate practice or game
2. Requires medical attention by a team athletic trainer or physician
3. Results in restriction of the student athlete’s participation or performance for one or more days beyond the day of injury (Benson, 1995)

The NCAA monitors injuries at Division I, II, and III institutions across all regions of the country and produces an annual report of the findings.

The National Athletic Trainers’ Association (NATA) commissioned two national surveys of high school sports injuries, each spanning 3-year periods (i.e., 1986–88 and 1995–97). The injury definitions used in the NATA studies are similar to those used in the ISS because they rely on estimates of time lost from play as the indicator of injury severity (Foster, 1996).

Even though time lost is a convenient method for identifying an injury, such a definition does not lend itself to an accurate reflection of the severity of the injury. Severity of injury determinations may be made by a variety of people, including the coach, physicians or other sports medicine personnel, parents, or perhaps even the athlete. A related problem is that no standard is currently in use by all organizations monitoring sports injuries for the amount of time—hours, days, weeks, or months—that must be lost to qualify as a specific level of injury severity.

From a scientific standpoint, using the amount of time lost as a definition of sports injury is subject to significant error as previously described, depending on the method of data collection and injury definitions employed. However, once an injury is identified, several qualifiers are available to enable sports medicine personnel to better describe the precise characteristics of the injury. These include the type of tissue(s) involved, injury location, and time frame of the injury, that is, either acute or chronic.

injury Act that damages or hurts.