

OFPP

Osteopathic Family Physician

THE OFFICIAL PEER-REVIEWED
PUBLICATION OF THE AMERICAN
COLLEGE OF OSTEOPATHIC
FAMILY PHYSICIANS

JULY / AUGUST, 2018

Volume 10 | Number 4

ofpjournal.com

EDITOR'S MESSAGE

Relax, Reflect & Enjoy the Summer

RESEARCH ARTICLE

Psychosocial Components of Concussion
Reporting Among Adolescent Athletes

REVIEW ARTICLES

Emerging Food Allergy Revolution

Physician Burnout: Action Items to
Confront the Problem

CLINICAL IMAGES

Acute Finger Deformity

PATIENT EDUCATION

Food Allergy: New Treatment Options

Concussions: What to Do if
You Think You Have One



acofp | AMERICAN COLLEGE
OF OSTEOPATHIC
FAMILY PHYSICIANS

www.acofp.org

READERS

Osteopathic Family Physician (ISSN 1877-573X) is published bimonthly by the American College of Osteopathic Family Physicians. Periodicals postage paid at Arlington Heights, IL and additional mailing offices.

USA POSTMASTER

Send address changes to:

American College of Osteopathic Family Physicians
Membership Department:

330 East Algonquin Rd, Suite 1
Arlington Heights, IL, 60005
membership@acofpca.org

CUSTOMER SERVICE

(orders, claims, online, change of address)

American College of Osteopathic Family Physicians

330 East Algonquin Rd, Suite 1
Arlington Heights, IL 60005

800-323-0794 | membership@acofp.org

YEARLY SUBSCRIPTION RATES

United States & Possessions:

Individual \$116 | Institution \$208 | Student \$57

All other countries: *(prices include airspeed delivery)*

Individual \$146 | Institution \$26 | Student \$74
Single issues \$42

To receive student/resident rate, orders must be accompanied by name of affiliated institution, date of orders must be accompanied by name of affiliated institution, date of term and the signature of program/residency coordinator on institution letterhead. Orders will be billed at the individual rate until proof of status is received. Current prices are in effect for back volumes and back issues.

ADVERTISING INFORMATION:

Advertising orders and inquiries can be sent to:

Matt Van Wie
804-550-2312 | matt@esvw.com

AUTHOR INQUIRIES

For inquiries relating to the submission of articles (including electronic submission) please visit www.ofpjournal.com.

Content details for questions arising after acceptance of an article, especially those relating to proofs will be provided by the publisher.

You can track accepted articles and view Author Guidelines through Scholar One at mc04.manuscriptcentral.com/ofp.

The paper used in this publication meets the requirements of ANSI/NISO Z39.48-1992 (Permanence of Paper).

AUTHORS

For a full and complete Guide for Authors, please go to:
mc04.manuscriptcentral.com/ofp.

REPRINTS:

For queries about author reprints, or to order 100 or more reprints for education, commercial or promotional use, contact ACOFP at [800.323.0794](tel:800.323.0794) or email ashleyd@acofp.org.

.....
This journal and the individual contributions contained in it are protected under copyright by ACOFP. The following terms and conditions apply:

PHOTOCOPYING

Single photocopies of single articles may be made for personal use as allowed by national copyright laws. Permission of the Publisher and payment of a fee is required for all other photocopying, including multiple or systematic copying, copying for advertising or promotional purposes, resale, and all forms of document delivery. Special rates are available for educational institutions that wish to make photocopies for non-profit educational classroom use.

Permission may be sought directly from ACOFP:
800-509-9204 | membership@acofp.org.

DERIVATIVE WORKS

Subscribers may reproduce tables of contents or prepare lists of articles including abstracts for internal circulation within their institutions. Permission of the publisher is required for all other derivative works, including compilations and translations.

ELECTRONIC STORAGE OR USAGE

Permission of the Publisher is required to store or use electronically any material contained in this journal, including an article or part of an article.

Except as outlined above, no part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without written permission of the Publisher.

Address permission requests to ACOFP at membership@acofp.org.

NOTICE

No responsibility is assumed by ACOFP for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions or ideas contained in the material herein. Because of rapid advances in the medical sciences, in particular, independent verification of diagnoses and drug doses should be made.

Although all advertising materials is expected to conform to ethical (medical) standards, inclusion in the publication does not constitute a guarantee or endorsement of the quality of value of such product or of the claims made of it by its manufacturer.

EXAM SCHEDULE

CERTIFICATION & OCC (RECERTIFICATION)



| EXAMS | LOCATIONS | POSTMARK DATE |
|--|--|--|
| Family Medicine / OMT Certification / OCC Performance Evaluation Only | ACOFP Annual Convention Las Vegas, NV March 21 - 24, 2019 exam dates TBD | October 1, 2018 <i>Late fee through December 1</i> |
| Family Medicine / OMT Certification / OCC Cognitive Exam | Electronic Testing Regional Sites May 4, 2019 | October 1, 2018 <i>Late fee through December 1</i> |
| Family Medicine / OMT Certification / OCC Cognitive Exam | Electronic Testing Regional Sites September 28, 2019 | April 1, 2019 <i>Late fee through June 1, 2019</i> |
| Family Medicine / OMT Certification / OCC Performance Evaluation Only | AOA OMED Conference Fall, 2019 exam dates TBD | April 1, 2019 <i>Late fee through June 1, 2019</i> |



Osteopathic Family Physician

The Official Peer-Reviewed Publication of the
American College of Osteopathic Family Physicians

BOARD OF GOVERNORS

PRESIDENT

Duane G. Koehler, DO, FACOFP *dist.*

PRESIDENT-ELECT

Robert C. DeLuca, DO, FACOFP *dist.*

VICE PRESIDENT

David J. Park, DO, FACOFP

SECRETARY/TREASURER

Nicole H. Bixler, DO, MBA, FACOFP

IMMEDIATE PAST PRESIDENT

Rodney M. Wiseman, DO, FACOFP *dist.*

PAST PRESIDENT

Larry W. Anderson, DO, FACOFP *dist.*

GOVERNORS

Greg D. Cohen, DO, FACOFP

David A. Connett, DO, FACOFP *dist.*

Gautam J. Desai, DO, FACOFP

Brian A. Kessler, DO, FACOFP

Ronna D. New, DO, FACOFP

Bruce R. Williams, DO, FACOFP

SPEAKER

Elizabeth Palmarozzi, DO, FACOFP

RESIDENT GOVERNOR

Jesse D. Shaw, DO

STUDENT GOVERNOR

Jaclyn Sylvain, OMS II

EXECUTIVE DIRECTOR

Peter L. Schmelzer, CAE

EDITORIAL COMMITTEE

EDITOR

Ronald Januchowski, DO, FACOFP

Associate Dean for Curriculum, VCOM Carolinas Campus, Spartanburg, SC

ASSOCIATE EDITOR

Paula Gregory, DO, MBA, CHCQM, FAIHQ

Family Practice, The Villages, Florida

MEMBERS

Amy J. Keenum, DO, PharmD, *Chair*

Family & Community Medicine, Michigan State University, East Lansing, MI

David Buford, PhD, OMS III

William Carey University College of Osteopathic Medicine, Hattiesburg, MS

Ryan Christensen, DO

Chief Resident, McLaren-Oakland, Clarkston, MI

Tyler C. Cymet, DO, FACOFP

Chief of Clinical Education, American Association of Colleges of Osteopathic Medicine, Chevy Chase, MD

Robin C. Devine, DO

Assistant Program Director, Grant Family Practice Residency, Columbus, OH

Douglas W. Harley, DO, FACOFP

Associate Program Director, Cleveland Clinic Akron General Family Medicine Residency, Akron, OH

Sara E. Mitchell, DO

Family Medicine, HealthEast Care System, St Paul, MN

Jon S. Parham, DO

Program Director/Director of Med Ed, LMU-DeBusk - The University of Tennessee Graduate School of Medicine, TN

Shandilya Ramdas, PhD, OMS II

Kentucky College of Osteopathic Medicine, Pikeville, KY

Wayne J. Reynolds, DO

Family Medicine, Sentara Medical Group, Gloucester, VA

Lindsay Saleski, DO, MBA, FACOEP

Emergency Department, Palmetto Health Tuomey, Sumter, SC

Abraham Wheeler

Librarian, Michigan State Libraries, East Lansing, MI

EMERITUS MEMBER

Merideth Norris, DO, FACOFP

Grateful Recovery, Kennebunk, ME

WRITING MENTOR

Jay H. Shubrook, Jr., DO, FACOFP

Professor, Touro University College of Osteopathic Medicine, Vallejo, CA

DEPARTMENT CHAIR

Greg D. Cohen, DO, FACOFP

Lucas County Health Center Medical Clinic, Chariton, IA

STAFF LIAISONS

Belinda Bombei & Samantha Grycowski

ACOFP, Arlington Heights, IL

WRITING INTERNS

Ashton Dixon

University of Pikeville-Kentucky College of Osteopathic Medicine

Ethan Charles Blocher-Smith

Marian University College of Osteopathic Medicine

Chris Koerber

A.T. Still University SOMA

CONTENTS

7

EDITOR'S MESSAGE

[Relax, Reflect & Enjoy the Summer](#)

Ronald Januchowski, DO, FACOFP, Editor

8

FROM THE PRESIDENT'S DESK

[Why is Prevention So Difficult?](#)

Duane G. Koehler, DO, FACOFP dist.

10

RESEARCH ARTICLE

[Psychosocial Components of Concussion Reporting Among Adolescent Athletes](#)

Guillermo Alfonso, OMS; David Keller, OMS; Christopher Eckman, OMS; Jessica Hass, OMS; Alexis Stoner, DO; Adrienne Ables, OMS; Michael Rovito, DO

16

REVIEW ARTICLES

[Emerging Food Allergy Revolution](#)

Kathryn Smith, DO

22

[Physician Burnout: Action Items to Confront the Problem](#)

Philip B. Collins, DO; Joanna Petrides, PsyD

29

CLINICAL IMAGE

[Acute Finger Deformity](#)

Meridith Marlow, PGY; Lindsay Tjiattas-Saleski, DO, MBA, FACOEP

35

CALENDAR OF EVENTS

[2018 Calendar of Events](#)

36 - 37

PATIENT EDUCATION HANDOUTS

[Food Allergy: New Treatment Options](#)

[Concussions: What to Do if You Think You Have One](#)

OSTEOPATHIC FAMILY PHYSICIAN SPECIALTY PEER REVIEWERS

Nazem Abdelfatta, MD

Family Medicine, Obstetrics, Women's Health

Richard L. Averitte, Jr, MD

Dermatology

Dana Baigrie, DO

Clinical Images

Jeffrey Benseler, DO

Radiology

Shagun Bindlish, MD

Diabetes and Endocrinology

John Bissett, DO

Clinical Images

Warren Bodine, DO

Sports Medicine & Family Medicine

Grace Brannan, PhD

Statistics/Design

Natasha Bray, DO

Ethics

Omar Bukhari, MD

Research

Janis Coffin, DO

Practice Management

Philip Collins, DO

Patient Education

Danielle Cooley, DO

OMM

Rob Danoff, DO

Emergency Medicine, Preventive

Robin Devine, DO

Statistics/Design

Brian Downs, DO

HIV, Wound Care

Dennis Eckles, DO

Diabetes, Rural Medicine

Gail Feinberg, DO, FCOFP

Academic

Matthew Goldfinger

Neurology, OMM

Patricia Happel, DO

Nutrition and Obesity

Nadia Hasan, DO

Clinical Images

Robert Hunter, DO

Health Policy, Hospice/Palliative Care, ER, Diabetes, Wound Care

Ronald P. Januchowski, DO

Military & Rural/Underserved

Holly Kanavy, DO

Dermatology

Amy Keenum, DO, PharmD

Healthy Literacy, International & Patient Education

Uzma Khan, DO

Family Medicine

Frank Komara, DO

Geriatrics

Paul Lazar, DO

Adult Family Medicine, Geriatrics, Academic

Mana Lazzaroto, DO

Clinical Images

Mohammad Mansour, MD

Inpatient Medicine, Cardiology, Pulmonary, Geriatrics, Obstetrics

Sarah Mitchell, DO

Family Medicine

Merideth Norris, DO, FCOFP

Addiction

Michael O'Connell, DO

Pain, Rehabilitation, Musculoskeletal, Neurology, & Sports Medicine

Jon Parham, DO

Preventive Medicine, Pulmonary, Public Health, Geriatrics, Medical Errors

Raena Pettitt, DO

Disease Prevention & Wellness

Kim Pfothner, DO

Diabetes

Prabhat Pokhrel, MD, MS, PhD, FAFAP

Pharmacology, Cardiology, Nephrology, Pulmonology

M. Jay Porcelli, DO, FCOFP *dist.*

Pain Management

Joseph Reyes, DO

Pain Management

Bernadette Riley, DO

Medical Education, Academic, Simulation Medicine, Physician Leadership, Health Policy

Mark Rogers, DO, MA, CAQSM, FAFAP

Family Medicine, Sports Medicine, OMM, Medical Ethics

Lawrence Sawicki, DO

Clinical Images

Kary Schroyer, DO

Direct Primary Care

Christopher Scuderi, DO

Family Practice, Practice Management

Jay Shubrook, Jr., DO, FCOFP

Endocrinology

Leslie Sleuwen, MD

Community Medicine

Frederick Stine, DO

Pediatrics, Nephrology, Emergency & Critical Care

Lindsay Tjiattas-Saleski, DO

Clinical Images, Emergency Medicine

Johnathon Torres, DO

OMM

Michael Watkins, DO

OB/GYN & Women's Health

Stuart Williams, DO

OMM

Barbara Wolf, DO

Psychology

William Woolery, DO, PhD, FCOFP

Geriatrics

Julian Vega, DO

Clinical Images

Sheldon Yao, DO

Cardiology

Peter Zajac, DO, FCOFP

Patient Education

2018 STUDENT ACADEMIC & PEER REVIEW WRITING INTERNS

Sanjhavi Agarwal

Western University of Health Sciences College of Osteopathic Medicine of the Pacific

Vaidehi Ambai

Philadelphia College of Osteopathic Medicine

Benjamin Berthet

A.T. Still University - School of Osteopathic Medicine in Arizona

Ethan Charles Blocher-Smith

Marian University College of Osteopathic Medicine

Lange Clancy

A.T. Still University - School of Osteopathic Medicine in Arizona

Ashton Dixon

University of Pikeville – Kentucky College of Osteopathic Medicine

Alice Doong, DO

Michigan State University College of Osteopathic Medicine

Kelcey Dunaway

A.T. Still University - School of Osteopathic Medicine in Arizona

Thomas Espisito

A.T. Still University - School of Osteopathic Medicine in Arizona

Joanna Ghobrial

A.T. Still University - School of Osteopathic Medicine in Arizona

Jessica Gonzalez Haugen

Western University of Health Sciences College of Osteopathic Medicine of the Pacific

Harmandeep Grewal

A.T. Still University - School of Osteopathic Medicine in Arizona

Ryne Jenkins

Western University of Health Sciences College of Osteopathic Medicine of the Pacific

Liana Kobayashi

A.T. Still University - School of Osteopathic Medicine in Arizona

Chris Koerber

A.T. Still University - School of Osteopathic Medicine in Arizona

Anna Marzvanyan

A.T. Still University - School of Osteopathic Medicine in Arizona

Amelia Ni

A.T. Still University - School of Osteopathic Medicine in Arizona

Wen Ze Niu, PhD

Western University of Health Sciences College of Osteopathic Medicine of the Pacific

Jay Patel

A.T. Still University - School of Osteopathic Medicine in Arizona

Matthew Petersen

Western University of Health Sciences College of Osteopathic Medicine of the Pacific

Elenie Philippas

Western University of Health Sciences College of Osteopathic Medicine of the Pacific

Meghan Piccinin

Michigan State University College of Osteopathic Medicine

Aisha Shamsi

Western University of Health Sciences College of Osteopathic Medicine of the Pacific

Sarah Shu

Western University of Health Sciences College of Osteopathic Medicine of the Pacific

Jonathan Swan

A.T. Still University - School of Osteopathic Medicine in Arizona

Elysia Tjong

A.T. Still University - School of Osteopathic Medicine in Arizona

Fangfei Xiao

Western University of Health Sciences College of Osteopathic Medicine of the Pacific

Jessica Yi

A.T. Still University - School of Osteopathic Medicine in Arizona

2018 CALL FOR PAPERS

Osteopathic Family Physician is the ACOFP's official peer-reviewed journal. The bi-monthly publication features original research, clinical images and articles about preventive medicine, managed care, osteopathic principles and practices, pain management, public health, medical education and practice management.

RESERVE A TOPIC

Reserve a review article topic today by emailing ACOFP Managing Editor, Belinda Bombei at belindab@acofp.org. Please provide your name and the review title you would like to reserve. Once you reserve a review article topic, you will receive an email confirmation from ACOFP. This will initiate a three-month deadline for submission. If the paper is not received within three months, the system will release the review article topic for other authors to reserve. Articles submitted for publication must be original in nature and may not be published in any other periodical. Materials for publication should be of clinical or didactic interest to osteopathic family physicians. Any reference to statistics and/or studies must be footnoted. Material by another author must be in quotations and receive appropriate attribution. ACOFP reserves the right to edit all submissions. Visit ofjournal.com to view author guidelines, policies, and manuscript checklist.

CLINICAL IMAGES

We are seeking clinical images from the wards that covers essential concepts or subject matter to the primary care physician. Please provide a brief synopsis of how the case presented along with 1-4 questions and approximately 1 page of education with reference to the image and questions.

REVIEW ARTICLE TOPICS

- ADHD Management in Primary Care: with Osteopathic Component
- Disorders of Puberty: An Approach to Diagnosis & Management
- Insomnia: with Osteopathic Component
- Lupus: Review article with osteopathic component
- OMT Treatments for Pediatric Conditions: Systematic Review

RESEARCH TOPICS

We are seeking original clinical or applied research papers. Original contributions include controlled trials, observational studies, diagnostic test studies, cost-effectiveness studies, and survey-based studies. The OFP will accept basic scientific research only if the work has clear clinical applications. For randomized controlled trials, study flow diagrams must be submitted. For all other types of original contributions, flow diagrams are encouraged. Original contributions should be 3000 words with no more than 50 references and 5 tables or figures. OFP requires you to submit a 250-word abstract, along with four to six keywords.

The content should include the following:

Abstract

Discussion

Introduction

Conclusions

Methods

Acknowledgments

Results

EDITOR'S MESSAGE

Relax, Reflect & Enjoy the Summer

Ronald Januchowski, DO, FACOFP, Editor, *Osteopathic Family Physician*

As I write this Editor's message, World Cup football (American translation = soccer) is in full swing. Lucky for our readers, the *Osteopathic Family Physician* comes out every couple of months, instead of every four years!

July and August hold more than just international sports. Summer can be time for relaxation, and after reading the article on confronting burnout, you may look to schedule some time off from work. While on your time off, the other articles in this issue may prove of some value. While participating in your own soccer tournament, be cautious of sustaining a minor traumatic brain injury and read up on the reporting of such injuries among teenagers participating in sports. See if you can put some history behind the clinical image of a crooked finger presented in this issue, and hope for nothing similar from personal experience.

To remember the passing of Anthony Bourdain, your vacation adventures may bring you to novel eateries involving savory (or unsavory) foods. The submission on food allergies may be useful in this situation. I hope you find something in this issue interesting and take some time to relax, reflect and enjoy the summer.

See you in a few months!

Pelé dribbling past a defender in a 1960 game.



FROM THE PRESIDENT'S DESK



Why is Prevention So Difficult?

Duane G. Koehler, DO, FACOFP *dist.*

2018 - 2019 ACOFP President

As physicians, we talk about prevention most of the day. If we see someone's weight or BMI start to rise we have a talk about the dangers of diabetes, followed by our talk about the benefits of exercise and eating healthy.

The next time the patient comes in, it is not surprising to see no change, or worse, the patient has gained even more weight. Blood glucose test numbers are on the rise.

When crossing the street and faced with an oncoming car, we quicken our steps to get out of the way to avoid a tragedy. But when faced with getting type 2 diabetes, the link between making poor food choices, not exercising, and gaining weight does not always impact patient change.

Would patients rather get type 2 diabetes than change their unhealthy habits? In speaking with physicians, it almost seems that way.

What Can Physicians Do Differently?

Instead of telling, listen. Create an environment where you are asking questions and listening to the patient's response. You may find out that the patient has psychosocial issues that need to be addressed. Anxiety and depression are two very common psychological issues that affect patients with diabetes. The patient may need to be referred for counseling or medication to control these condition(s). Once addressed, patients may be more compliant and willing to take responsibility for their health.

Take the time to have these conversations. A colleague shared with me that spending longer than the typical 15-minute visit with his prediabetes and diabetes patients yielded positive results. He asked questions about the patients' exercise habits, and listened. In one case, the patient was not doing any exercise. When the physician asked why, the patient said that he was too tired when he got home from work to exercise.

The physician agreed that, he too, felt exhausted after work. He knew how the patient was feeling. They were then having a conversation about mutual feelings toward exercise. The physician confided that he really had to push himself to exercise for 30 minutes and it was difficult some days. The patient looked up and said, "I believe it is difficult for you." The patient promised to try to exercise two to three times per week. The shift being the patient taking responsibility for his behavior and health.

Television's Impact on Health

Television is an especially insidious part of our culture that affects our health. Not only does every two hours of TV increase a patient's risk of diabetes exponentially, it also increases the risk of heart disease and early death.

The more hours of television watched, the more likely people are to be overweight or obese. A companion to inactivity while watching television is the unhealthy snacking habit – chips, cookies, etc. – the worst processed foods available. Suggest to patients that they begin to cut out at least some of the snacks, use portion control or switch to healthier options.

Negotiate with patients about the television they watch. It is unlikely that they will give up TV altogether, but suggest that in place of one hour of TV they take a 30-minute walk. In the winter months, patients might walk around a nearby mall or on a treadmill.

Small Changes Can Make a Big Difference

Resist the temptation to tell patients all the things they could be doing differently. This only serves to overwhelm them and make them feel hopeless. Change one thing at a time, even if it seems small, and discuss it. Have the patient share with you why it will be important to make that change. You have gotten a commitment from the patient to make the change. That is the best you can DO.

Osteopathically Yours,

Duane G. Koehler, DO, FACOFP *dist.*

2018 - 2019 ACOFP President

REFERENCE:

Harvard T.H. Chan School of Public Health. Simple Steps to Preventing Diabetes. Website. www.hsph.harvard.edu. Accessed June 21, 2018



Traveling together
FOR BETTER CARE



caravanhealth

Lightbeam Health Solutions

- Population Health Management
- Value-Based Care Guidance
- MIPS Quality Manager
- Proven Clinical & Financial Results



Need Help With Your Quality Payment Program Strategy?

Lightbeam is for anyone who has to satisfy CMS Quality Payment Program requirements. Whether you're a solo practitioner, large hospital or ACO, Lightbeam enables you to manage complex patient populations easily and accurately in order to improve outcomes and reduce costs.

ACOFP members will have access to the Lightbeam Platform at a reduced member price. For more information, email Debbie Sarason at debbies@acofp.org or call 847-952-5523.

acofp | AMERICAN COLLEGE
OF OSTEOPATHIC
FAMILY PHYSICIANS

 Lightbeam
Health Solutions

RESEARCH ARTICLE

Psychosocial Components of Concussion Reporting Among Adolescent Athletes

Guillermo Alfonso, OMS-III,¹ David Keller, OMS-III,¹ Christopher Eckman, OMS-III,¹ Jessica Hass, OMS-III,¹ Alexis M. Stoner, PhD, MPH,² Adrienne Z. Ables, PharmD, MS,¹ & Michael J. Rovito, PhD, MA, CHES, FMHI³

¹Edward Via College of Osteopathic Medicine - Carolinas Campus

²Edward Via College of Osteopathic Medicine - Carolinas Campus - Clinical Prevention and Wellness

³The University of Central Florida, Orlando, Florida

KEYWORDS:

Concussions

Adolescents

Osteopathic

Underreporting

Education

Neurology

Introduction: Addressing the current trends of underreporting concussion-related symptoms by adolescent athletes is a critical aspect of improving adolescent athlete health and longevity. The literature is replete with papers on educational interventions regarding concussion symptomatology, however, there is a relative lack of research on interventions that target the behaviors of the athlete. The goal of this study was to identify specific reasons why adolescent athletes may conceal concussions from medical personnel.

Methods: A qualitative phenomenological approach was employed using focus group discussions to identify common themes as barriers to concussion reporting. Topics such as injury history, knowledge of concussion symptomatology, personal influences, and other psychosocial factors such as peer influences and masculinity were discussed. Data were coded individually by a research team member followed by a member check process to ensure the validity of the themes obtained.

Results: Nineteen high school varsity athletes participated in the focus groups. Four common themes were derived from the responses given by the participants: symptomatology awareness, external influences, self-pride, and current concussion educational program flaws. These themes were supported by participants as reasons why concussion symptoms may be withheld from medical personnel.

Conclusion: Applying the osteopathic tenet of a person being a unit of mind, body, and spirit, concussion education should aim to target the multiple behavioral aspects of each person rather than just concussion symptomatology education. Findings from this study provide evidence to support the development of a reliable and effective concussion intervention program that leads to an increase in reporting among adolescent athletes.

INTRODUCTION

As participation in high school and collegiate sports in the United States continues to rise, concussions and head injuries have become major talking points in both the sports and medical communities. With concussions having an incidence rate of 26.1 per 100,000 athlete exposures in the general athletic population, this topic merits attention.¹ The adolescent population is particularly at an increased risk for concussion complications as

it is during these years that there is continuous neurocognitive development.² The occurrence of a head injury during this neurocognitive developmental period has the potential to progress and worsen if not adequately recognized and reported.³ During times of brain insult and injury, neuronal cells require additional metabolic support. Therefore, in an adolescent athlete who is currently experiencing or has recently experienced concussion-associated symptoms, the brain is more vulnerable to subsequent injury.⁴ Continuing to participate in practices and games while experiencing concussion symptoms puts an adolescent athlete's health and longevity in danger due to the risk of receiving concomitant concussive blows. This may increase the risk for developing diseases such as chronic traumatic encephalopathy (CTE) in the future.⁵

CORRESPONDENCE:

Alexis M. Stoner, PhD, MPH | astoner@carolinas.vcom.edu

Of significant concern is the documented lack of reporting by adolescent athletes at the time of the initial insult.⁶ Current literature has shown that the majority of athletes are able to correctly recognize the signs and symptoms of a concussion, yet many still do not report their injury and continue to participate.⁷ Literature also shows that females are more likely to report their head injuries than males, and adolescent athletes with pre-existing psychiatric conditions are more likely to endorse and report post-concussive symptoms.⁸ It has also been suggested that psychosocial factors may impact an adolescent athlete's reporting behaviors.⁹ Despite this knowledge, the target of most interventions for adolescent athletes is based on education regarding the recognition of concussion symptoms and need for treatment.¹⁰

Uncovering barriers to reporting is paramount in changing the behaviors of young athletes. By applying the osteopathic tenet of viewing a patient as mind, body, and spirit, a more comprehensive and holistic approach to decreasing concussion rates and increasing reporting may be achieved. The purpose of this research was to explore the social and psychological factors that influence an adolescent athlete's decision to report concussions. These factors included masculinity and toughness, peer influences, coaching influences, and other external influences. This data may provide a basis for designing more effective interventions to increase adolescent athletes' reporting of concussions.

METHODS

A qualitative phenomenological approach was employed using focus group discussions to identify common themes, as potential barriers to concussion reporting. This study was approved by the Edward Via College of Osteopathic Medicine's Institutional Review Board.

Study Population

Convenience sampling techniques were employed to solicit student athletes from a local high school to take part in the study. Permission was obtained from the athletic director and district superintendent for these athletes to attend the recruitment presentation. Male and female students between the ages of 15-18 years who were current members of a varsity sports team were invited to participate. In addition, students must have earned their varsity letter to participate in the study. Students who did not understand English were excluded from this study, as the focus groups and informed consent process were conducted using the English language.

Participants were recruited via a presentation for both the students and parents at the high school. Upon completion of the presentation, parental/guardian consent and student assent forms were sent home with participants to complete if they were interested in taking part in the study. Upon completion of the informed consent process and meeting the inclusion criteria, the student was included in the study with the ability to withdraw at any point.

Study Procedures

Participants were assigned to groups based on their school schedule availability. Four focus group sessions were conducted with three groups of five participants and one group of four participants. Each focus group consisted of a 45-minute open group discussion with two members of the research team facilitating the discussion. The focus groups took place in a classroom at the participants' high school. This study took place over the course of two weeks with two focus groups conducted per week. Each student participated in one 45-minute session. Saturation of salient themes was achieved at the completion of the fourth focus group session, thus negating the need for further recruitment.

At the start of each focus group, participants were asked to complete a questionnaire to gather demographics and their athletic history. Using a moderator guide, the researchers asked each student athlete to elaborate on 16 questions regarding previous injury history, background knowledge on concussions, personal influences, psychosocial attitudes, and opinions on current concussion interventions in which they had participated (Appendix). This structured approach used previously suggested topics in the literature to guide a group discussion in an attempt to reduce systematic error.¹¹ Before discussing each topic aloud, the moderators first asked the participants to privately write down their responses in a journal that was provided to them. Gathering both verbal and written responses helped limit the anxiety that subjects might feel in sharing their responses aloud, as well as helped limit subjects conforming to the beliefs and ideas of others around them. The discussion was audio recorded without any identifying information being linked to the participant at any time. All data obtained remained completely confidential; athletes were assigned a random identification (ID) number that remained separate from their identity. Participants were referred to by their ID number rather than name during the audio portion of the focus groups in order to maintain confidentiality. Upon completion of data collection, the audio recordings were transcribed and coded along with the journaling portions of the focus group. Hard copies of the journals were destroyed upon completion of data transcription into a digital form.

Using the transcripts and journals, each member of the research team individually identified common ideas and themes throughout the gathered data. Upon completion of the individual coding process, a member check process was employed using a separate research team member to ensure validity of the themes obtained. Once these were identified, the research team met together to weigh and evaluate the importance of each idea and theme together, visualizing the relationships between them. Descriptive analysis was used for demographic information.

RESULTS

Demographics

Nineteen students took part in the focus group discussions. Demographics of the participants are shown in Table 1.

TABLE 1:
Demographics

| | MEAN (YEARS) | SD |
|-------------------------|------------------|----------|
| Age | 17.7 | .45 |
| Years Involved in Sport | 8.2 | 4.19 |
| | | |
| | | N (%) |
| Gender | Male | 10 (53%) |
| | Female | 9 (47%) |
| Race | Caucasian | 9 (53%) |
| | African American | 9 (47%) |
| | Asian | 1 (5.3%) |
| Sports* | Baseball | 2 (11%) |
| | Basketball | 1 (5.3%) |
| | Football | 10 (53%) |
| | Lacrosse | 4 (21%) |
| | Soccer | 7 (37%) |
| | Track | 8 (42%) |
| | Volleyball | 2 (11%) |
| Wrestling | 4 (21%) | |

Demographics. SD = Standard deviation

*Most participants participated in multiple sports at the varsity level

Reasons for underreporting

Four themes were identified as potential reasons for the underreporting of head injuries and concussions among adolescent athletes. Table 2 shows extracted themes as well as sub-themes derived from each.

Symptomatology Awareness

Regarding symptomatology awareness, 100% of participants indicated knowledge of common concussion signs and symptoms. While somatic symptoms (physical sensations or feelings) were mentioned by all participants, cognitive changes commonly seen in concussed athletes such as confusion, amnesia, and impaired judgment failed to be mentioned. It was also found that more severe concussion symptoms were expressed more

often than minor symptoms. Many milder symptoms such as cognitive changes, mild headaches, and nausea were not mentioned by participants. The thoughts on concussion signs and symptomatology were similar among the participants with one participant stating:

"... I was dizzy, the light hurt my eyes, I had a bad headache, loud noises would get on my nerves and make me angry."

As well as,

"...if you can't see, you can't walk straight, then you just shouldn't play because football isn't your life..."

While these physical changes were mentioned by all participants, cognitive changes that are commonly observed in concussed athletes were not cited as being a part of the original insult or recovery phases.

External Influences

External influences such as parental influences, coaching influences and repercussions, and peer influences had an impact on participants' reporting behaviors. Ninety-five percent of participants stated that at least one of these three factors would influence their decision to report or conceal their concussion. Among these athletes, 42% of participants mentioned these factors as reasons that they may conceal their concussions and remain in the game. There were conflicting responses given on this topic with one participant stating:

"... my coach would most likely want me to keep playing but after the game he would want me to see a doctor."

While another participant stated,

"My coach would require me to get my head injury checked out due to liability, however, I think he would greatly encourage me to return playing."

The views on parental influences and peer influences were unanimous among participants who stated that external influences would influence their reporting behaviors with the participants stating that their parents would want them to report their injury immediately. There also seemed to be a strong sense of commitment towards teammates, which suggests an influence on their reporting behaviors. One participant stated:

"I think teammates have the most influence on my reporting, so if my teammates could tell that I wasn't playing the way that I normally do, I would trust them to let me know."

This was confirmed by an additional participant stating:

"They (my teammates) have my best interest at heart so if they saw that I couldn't do my job on the field, then they would want me to sort it out."

TABLE 2:
Major themes and subthemes

| ORIGINAL TOPICS | EXTRACTED THEMES | SUBTHEMES |
|---------------------------------|---------------------------------------|---|
| <i>Previous Injury History</i> | Symptomatology Awareness | Cognitive changes vs somatic changes |
| <i>Concussion Knowledge</i> | Symptomatology Awareness | Cognitive changes vs somatic changes |
| <i>Personal Influences</i> | External Influences | Parental influences, coaching influences, peer influences |
| <i>Psychosocial Indicators</i> | Self-Pride | Masculinity, toughness |
| <i>Intervention Experiences</i> | Current Concussion Intervention Flaws | Player directed, lack of follow-up, symptom focused |

Identified and extracted themes and subthemes for concussion concealment among participants.

Overall, the influence of team members seemed to be the biggest factor in whether or not the participant would report the injury.

Self-Pride

The theme of self-pride was one which came up repeatedly among participants when discussing reasons why a concussion may not be reported. Appearing masculine and tough were common themes that were brought up by 84% of participants. These participants stated the importance of “looking tough” in the eyes of both their peers and competitors. One participant stated:

“...people do not try to show any signs of weakness when they are injured.”

Another participant said,

“...it is important to show how much of a warrior that I am” and “I try to show as little pain as I can, and I try to play through my injuries.”

This theme was again confirmed by a separate participant:

“...showing weakness means you aren’t strong enough to play.”

Perhaps the most revealing statement given by a participant was,

“Football is for tough people, and if you aren’t tough you can’t play it. You hear people talking about you: ‘he’s weak, he doesn’t really want to play.’”

Overall, the concept of self-pride was a unanimous factor in the reasoning for why athletes may withhold concussion symptoms from their coaches and medical personnel.

Current Concussion Intervention Flaws

Various opinions were given on the issues with current concussion interventions. Over half of the participants (58%) were in agreement that changes needed to be made. One participant stated a video intervention should be designed that could benefit both the players and the coaches.

“...if they showed the coaches too, the coaches could get a feel for it and maybe not hold it against players when they get hurt.”

This not only points to issues with the current concussion interventions, but also the influence that coaches have on the reporting behaviors of their players. In addition to educating the coaches as well as the players, the lack of follow-up throughout the season was mentioned by participants. One participant stated,

“...we talked about it before but throughout the season we didn’t. We did tackle drills, but we didn’t talk about concussions anymore.”

In addition to the aforementioned issues with current interventions, current interventions are also symptom-driven, and the lack of psychosocial components were apparent. Additional comments of the educational interventions being “long” and “boring” were also suggested as areas needed for improvement.

COMMENT

The aforementioned themes derived from the data obtained provides information that suggests a change may be needed in current concussion education protocols in order to improve concussion reporting among adolescents. In agreement with the previous literature, most participants could correctly identify the more serious concussion symptoms such as dizziness, photophobia, and difficulty walking.⁷ On the contrary, more subtle symptoms such as nausea, vomiting, and mild headaches were not mentioned among participants in this study. This may suggest that because these symptoms are less severe and more concealable, they are less likely to be reported. Another consideration is that these symptoms are more generalized and may be attributed to a variety of other causes such as a viral illness. Overall, the findings suggest that adolescent athletes are relatively knowledgeable in recognizing the signs and symptoms of a concussion and are capable of identifying concussion-like symptoms in themselves. However, even with this knowledge, many adolescent athletes are still not reporting their symptoms. The fact that most interventions are driven by symptom recognition suggests the primary reasons for underreporting are not being addressed.

Despite the awareness of these symptoms, young athletes continue to participate and ignore the long-term health repercussions of concussions. It seems that the adolescent mindset is engraved with showing toughness in their sport by playing through their symptomatic head injuries. Rather than choosing to remove themselves from a game or practice to be evaluated, many adolescent athletes forgo such an intervention despite possessing the knowledge of both acute and long-term complications of a concussion. The belief that playing through a concussion injury makes you tough and that removing yourself from a game shows weakness elucidates an attitude that needs attention. There is minimal research addressing these psychosocial factors and their role in concussion reporting, illustrating an avenue and target for future interventions in an attempt to change behavior.

Our data also indicated that there needs to be more effective communication between athletes and the coaching staff regarding concussion reporting. It seems that some adolescent athletes make the assumption that their coaches would want them to continue to participate in their sports despite showing signs and symptoms of a concussion. Assuming coaches have their athletes' best interests at heart, this highlights either a misunderstanding with athletes' interpretation of their coach's views, or simply a lack of communication with the athletes by the coaches. Although many athletes stated they would feel comfortable reporting their concussions to a teammate, this may not result in the injured athlete being removed from play whereas reporting to the coaching staff should. In the adolescent setting specifically, it may be the coach who needs to step up as a role model and educator in proper concussion reporting to protect his or her athletes from potentially harmful complications. There needs to be a sense of comfort and trust between coaches and athletes in order for proper concussion reporting to occur. Ensuring that athletes are aware of the coaching and athletic staff's stance on the issues

of concussion reporting can help to eliminate assumptions and discrepancies. Coaches can then take measures to make themselves more approachable and address issues such as an athlete's perceived toughness or the feeling of letting teammates down.

Limitations

This study has several limitations. The small sample size may limit generalizability, although it was believed that a point of saturation had been reached. Additionally, as a result of choosing an adolescent population, it was necessary to obtain permission from not only the participants and their guardians, but also from the district superintendent and school personnel. For this reason, the data obtained was limited to participants from one school and thus may limit the external validity of the study. Recall bias may have also been present as participants were asked to recount on past situations that they had encountered. Finally, the data was obtained via focus groups and it is possible that some of the verbal responses were influenced by the participants' peers instead of discussing their actual views on concussion reporting.

Future Research

Future research should incorporate athletes who participate in different sports and in different geographic areas in order to improve the external validity of the findings. Future research should also aim to revise current concussion interventions in an attempt to include a more holistic form of education. The interventions should include the behavioral aspects of concussion reporting together with the current practices of symptom recognition.

CONCLUSION

By current standards, adolescent athletes continue to underreport their concussion injuries, hindering them from being evaluated by a physician. This makes these athletes more vulnerable to a second injury, which increases their risk for long-term neurocognitive complications. Concussion reporting in adolescent athletes is an issue that is multifactorial in nature, stemming from an athlete's attitude toward concussion reporting. Our findings suggest that continuing to target awareness of concussion symptoms through interventions will not necessarily translate into increased concussion reporting. It may be beneficial for future interventions to include not only education, but also address behaviors, attitudes, and misinterpretations regarding concussion reporting. Viewing athletes as a whole, and incorporating all aspects of their well-being, as physicians do with their patients, is the first step to improving the safety of our adolescent youth.

AUTHOR DISCLOSURES:

No relevant financial affiliations.

REFERENCES

1. Marshall SW, Guskiewicz KM, Shankar V, McCrea M, Cantu RC. Epidemiology of sports-related concussion in seven US high school and collegiate sports. *Injury Epidemiology*. 2015; 2(13). <https://doi.org/10.1186/s40621-015-0045-4>.
2. Semple BD, Lee S, Sadjadi R, et al. Repetitive concussions in adolescent athletes – translating clinical and experimental research into perspectives on rehabilitation strategies. *Frontiers in Neurology*. 2015; 6(69): 1-16. <https://www.ncbi.nlm.nih.gov/pubmed/25883586>
3. Patel DR, Parachuri V, Shettigar A. Evaluation and management of sport-related concussions in adolescent athletes. *Translational Pediatrics*. 2017; 6(3): 121–128. <http://tp.amegroups.com/article/view/14755/15746>.
4. Giza C, Kutcher JS, Ashwal S, et al. Summary of evidence-based guideline update: evaluation and management of concussion in sports: report of the Guideline Development Subcommittee of the American Academy of Neurology. *Neurology*. 2013; 80(24): 2250 - 2257. <http://n.neurology.org/content/neurology/80/24/2250.full.pdf>.
5. Juneyoung Y, Padaline DJ, Lawrence C, Montenegro P, Cantu R. Chronic Traumatic Encephalopathy. *Current Sports Medicine Reports*. 2013; 12(1): 28-32. http://journals.lww.com/acsm-csmr/Fulltext/2013/01000/Chronic_Traumatic_Encephalopathy.10.aspx
6. Meier TB, Brummel BJ, Singh R, Nerio CJ, Polanski DW, Bellgowan SF. The underreporting of self-reported symptoms following sports-related concussion. *Journal of Science and Medicine in Sport*. 2015; 18(5): 507-511. <https://doi.org/10.1016/j.jsams.2014.07.008>
7. Register-Mihalik JK, Guskiewicz KM, McLeod TC, Linnan LA, Mueler FO, Marshall SW. Knowledge, attitude, and concussion-reporting behaviors among high school athletes: a preliminary study. *Journal of Athletic Training*. 2013; 48(5): 645–653. <http://www.natajournals.org/doi/full/10.4085/1062-6050-48.3.20>.
8. Iverson GL, Silverberg ND, Mannix R. Factors associated with concussion-like symptom reporting in high school athletics. *JAMA Pediatrics*. 2015; 169(12): 1132-1140. <https://jamanetwork.com/journals/jamapediatrics/fullarticle/2448715>
9. Conway FN, Domingues M, Monaco R, et al. Concussion Symptom Underreporting Among Incoming National Collegiate Athletic Association Division I College Athletes. *Clinical Journal of Sport Medicine*. 2018. https://journals.lww.com/cjsportsmed/Abstract/publishahead/Concussion_Symptom_Underreporting_Among_Incoming.99346.aspx
10. Williamson RW, Gerhardtstein D, Cardenas J, Micahel DB, Theodore N, Rosseau N. Concussion 101: The Current State of Concussion Education Programs. *Neurosurgery*. 2014; 75(4): 131-135. https://academic.oup.com/neurosurgery/article-abstract/75/suppl_4/S131/2453590.
11. Rovito MJ, Rivers KO, Rovito KE, et al. A structured phenomenological approach to promoting health among young adult and adolescent males. *Journal of Integrated Design and Process Science*. 2017; 21(3): 23-32. <https://content.iospress.com/articles/journal-of-integrated-design-and-process-science/jid170003>.

REVIEW ARTICLE

Emerging Food Allergy Revolution

Kathryn Smith, DO

St. Lucie Medical Center, Port St. Lucie, Florida

KEYWORDS:

Food Allergy

IgE

Allergen

Food Challenge

Immunotherapy

Food allergies are currently a trendy topic due to their increasing prevalence in the population. An ever-increasing sector of the US population suffers from some degree of a food allergy, with the current prevalence somewhere between 4 and 10%. The most common food allergies are cow's milk (6%), peanuts (1.3%) and shellfish (1.3%). Food allergies present themselves with a variety of mechanisms, but the most common mechanism is an IgE mediated allergy. Clinical responses from this type of allergy include anaphylaxis, urticaria, angioedema, and bronchospasm most commonly. Diagnosis of food allergies is done by first and foremost taking a good history. The allergen is identified through history and then a diagnostic test such as skin prick, measuring antigen-specific IgE or open food challenge, is performed to confirm the diagnosis. Prevention of food allergy is paramount and current research focuses on the early introduction of potentially allergenic foods as the mainstay of prevention. Treatment remains the area with the most need for ongoing and new research focused on immunotherapies with the potential for newer and more novel methods of treatment for an end goal of complete tolerance of the food allergen.

INTRODUCTION

Food allergies are currently a popular topic in today's society, especially among families with young children and the medical professionals that care for them. It is not, however, a topic that has been thoroughly studied with a clear consensus on prevention or treatment. The purpose of this review is to highlight the current trends in diagnosis, prevention and treatment of food allergies in a society where food allergies are a trending topic.

The National Institute of Allergy and Infectious Diseases (NIAID) defines a food allergy as "an adverse health effect arising from a specific immune response that occurs reproducibly on exposure to a given food."¹ Food allergies have been of great concern in recent years as studies have suggested that the prevalence of food allergies has been increasing over time.² The current prevalence of food allergies in the US is suggested to be anywhere between 4-10%, with the most common childhood food allergies to cow's milk, peanuts and shellfish.³⁻⁵ The prevalence of food allergies in other developed countries is similar to that of the US, with the most common food allergies in Canada being cow's milk, peanuts and tree nuts, and Europe being cow's milk, wheat and egg.^{3,4} While prevalence of all of these food allergies has increased over the last twenty years, it is unknown whether this is due to an actual increase in the number of allergies or an artificial increase due to increased awareness and reporting of food allergies.²

CORRESPONDENCE:

Kathryn Smith, DO | kathryn.marie.smith@gmail.com

A multitude of risk factors have been proposed to lead to increased food allergies or food sensitization. Risk factors identified include sex, genetics, race/ethnicity, obesity, atopy, dietary fat, vitamin D insufficiency, antacid use, antioxidant consumption, hygiene, timing of exposure to foods, and route of exposure to foods (*Table 1*).⁶ Studies have shown that early oral introduction of commonly allergenic foods may lead to the prevention of allergy and that cutaneous exposure may lead to increased hypersensitivity.^{6,7} Genetic factors have not been widely studied, however, it has been seen that a family history of atopy or food allergies in immediate family members leads to an increased risk of developing a food allergy. This increased risk can be up to 80% when there are two immediate family members with allergies, compared with children without allergies in immediate family members.^{3,8} It has also been proposed that genetic mutations in the filaggrin gene lead to decreased barrier function in the epithelial lining of the intestine and thus lead to increased allergen sensitization.^{9,8}

FOOD ALLERGY MECHANISMS

Food allergens are the proteins or chemical haptens found within different foods that the body's allergen-specific immune cells recognize and trigger an immunologic response.¹ These are the result of a type I hypersensitivity reaction, which is an IgE mediated reaction between IgE and mast cells (*Figure 1*).¹⁰ Examples of physical findings associated with IgE mediated responses include urticaria, angioedema, bronchospasm, rhinitis, laryngospasm, diarrhea/vomiting, anaphylaxis, and oral allergy.¹¹ Responses of this type typically occur within 30-60 minutes of exposure to the allergen.¹²

TABLE 1:
Risk factors for food allergies.^{6,7}

| RISK FACTOR | SPECIFICS |
|-----------------------------|--|
| Sex | Male |
| Genetics | Familial associations, HLA, specific genes |
| Race/Ethnicity | Asian and African American |
| Obesity | Inflammatory state |
| Atopy | Concurrent atopic dermatitis |
| Dietary Fat | Decreased consumption of omega 3 fatty acids |
| Antacid Use | Increased use |
| Antioxidant Consumption | Decreased consumption |
| Hygiene | Increased hygiene |
| Timing of Exposure to Foods | Delayed exposure |
| Route of Exposure to Foods | Cutaneous |

FIGURE 1:
Role of mast cell in IgE mediated reactions.¹³

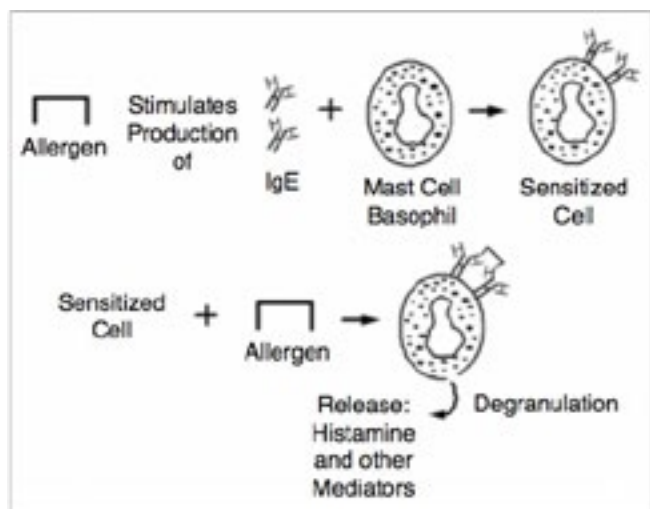


FIGURE 2:
Anaphylaxis¹⁶

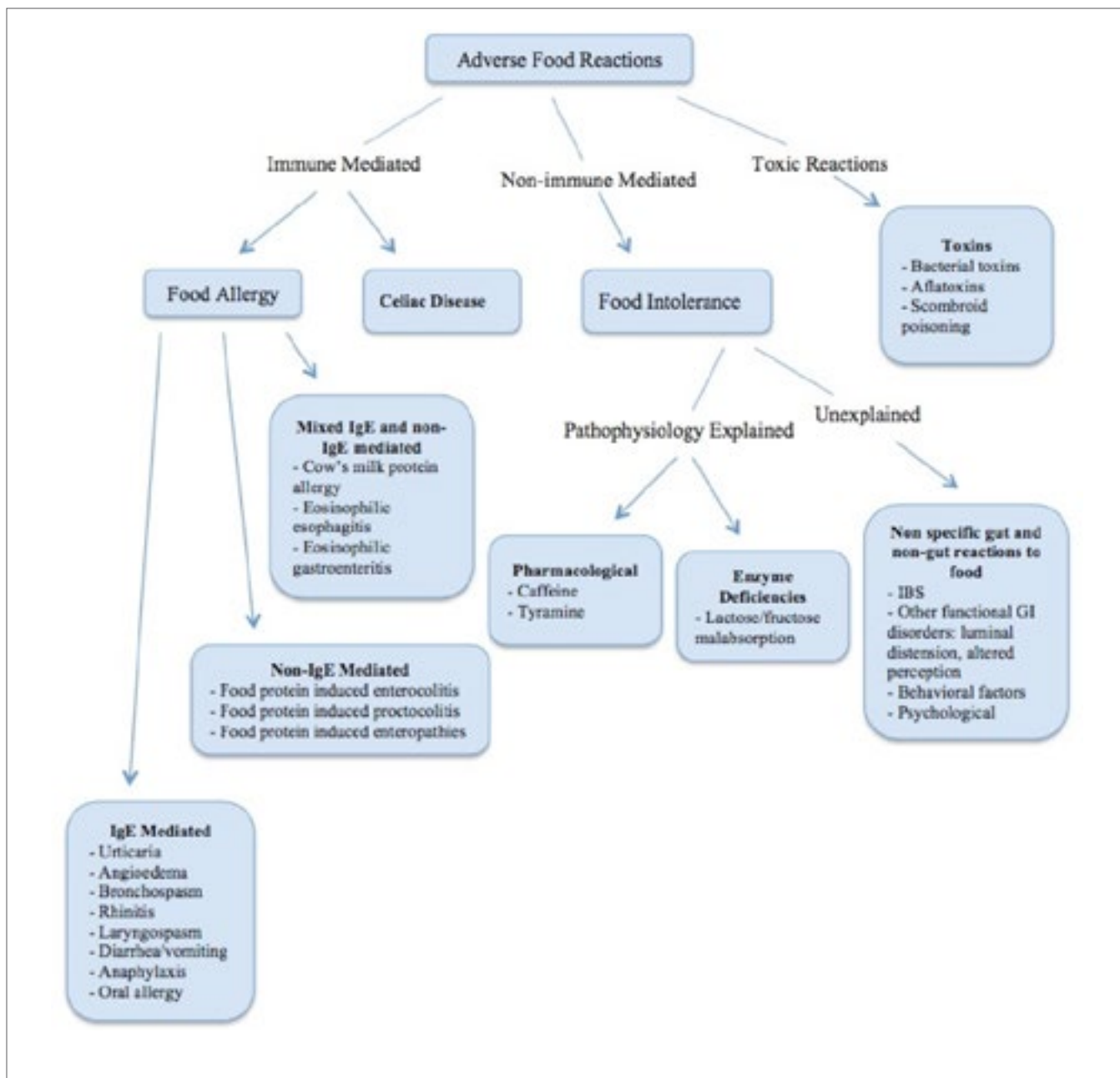


Anaphylaxis is the most severe form of this type of reaction and typically occurs within one hour of exposure. Symptoms generally beginning within 5-30 minutes of exposure, but may not develop for several hours. A biphasic reaction can also occur, where a second acute anaphylactic reaction occurs several hours after the first reaction in the absence of further exposure to the allergen. The second phase of the biphasic reaction typically occurs within eight hours of the first phase but can occur anywhere up to 72 hours after initial exposure. Symptoms of anaphylaxis include periorbital swelling/erythema, angioedema, wheezing, chest tightness, throat constriction, difficulty breathing, stridor, tachycardia, vomiting, headache, and feeling of impending doom (Figure 2).¹⁴ Fatal anaphylaxis from food allergies is rare, with approximately a 0.03-0.3 deaths per one million people annually in the general population and an approximately 1% death rate for all cases coded as food anaphylaxis, with the most common cause of death being delayed epinephrine use.¹⁵

IgE mediated responses are the most common type of food allergy. In addition, there are non-IgE-mediated gastrointestinal food allergies (type IV hypersensitivity) as well as mixed IgE and non-IgE mediated food allergies.^{9,11,12,17} The non-IgE mediated responses include food protein induced enterocolitis syndrome, food protein induced enteropathies, celiac disease, and the mixed responses include cow's milk protein allergy, eosinophilic esophagitis, and eosinophilic gastroenteritis.^{11,12,17}

A variety of other reactions to foods exist aside from traditional food allergies and often get mistaken for food allergies (Figure 3, page 18). Much like many side effects and reactions to medications get mistakenly labeled as allergies, many food intolerances get labeled as allergies when in fact the patient is not having a true allergic reaction. A food intolerance is a response that does not involve the immune system. Pharmacologic responses such as to caffeine or tyramine, enzyme deficiencies such as lactase, and non-specific gut and non-gut reactions to food such as irritable bowel syndrome, are all examples of food intolerances which have all been mistaken as food allergies.¹¹

FIGURE 1:

Role of mast cell in IgE mediated reactions.¹³

DIAGNOSIS OF FOOD ALLERGIES

Currently, there are no set criteria for the diagnosis of food allergies.² As in all areas of medicine, the first step in diagnosis is taking a good, detailed history. The history should be able to tease out the cause of the food reaction and determine whether it is likely IgE mediated versus another type of reaction such as celiac disease, lactose intolerance, food-protein induced enterocolitis syndrome, or any of the other food reactions mentioned previously.⁷ Answers to questions such as "what happened?" should help the clinician to discern allergy versus one of the other above mentioned reactions as they will present with different symptoms. The history is also key in directing the testing of the allergen and any likely cross-reactive foods.¹¹ The history should include asking about and providing food labels, lists of ingredients of foods that have caused reactions, and/or a dietary log in order to discern what may be the potential allergen.⁷

Once it has been decided that a food allergy is present, diagnostic tests are used in order to determine sensitization to the allergen. Common tests used are skin prick tests, atopy patch testing, measuring antigen-specific IgE (sIgE), and the open food challenge.^{7,11}

It is important to be aware that most of these tests are sensitive but not specific, meaning that there is a high probability of false positives.¹¹ Primary care physicians can perform basic IgE testing and skin prick testing if resources allow, but any further testing should be conducted by an allergist.¹⁸

Skin prick testing is common, quick and inexpensive. It consists of placing a small amount of allergen beneath the skin. This forms a wheal, whose diameter is then compared to both a positive and negative control. The positive control is histamine, as the allergic reaction is the result of histamine release from mast cells.⁷ Atopy patch testing, on the other hand, consists of applying food extract to the patient's back and watching for erythema, infiltration and papules after a period of 48-72 hours. This method is not used for IgE-mediated food allergies, but can be used for identifying delayed hypersensitivity reactions.¹¹

SigE tests are performed by taking the patient's serum and using an assay to incubate it with surface-fixed allergens. SigE antibodies found in the patient's blood will be found and identified by binding to labeled anti-IgE. The amount of sigE found in the patient's blood directly correlates with the likelihood of the patient having a clinically significant allergic reaction to the specific food allergen. The amount of sigE does not, however, correlate with the severity of the reaction.⁷ SigE is helpful when positive with a history positive for IgE-mediated allergy, but is not helpful in ruling out allergy when history is positive or when ruling in allergy with a positive history and negative test.¹¹

The gold standard test for diagnosing food allergies remains the double-blinded placebo-controlled food challenge. This challenge consists of ingesting increased amounts of a solution that contains either an allergen or placebo throughout the course of a day, while monitoring for symptoms of allergy. A few days later, the test is performed again with the solution that was not used the first time. Both the clinician and the patient are blinded to the contents of the solution. While this is the gold standard test, it carries with it inherent risks, such as anaphylaxis, and should only be performed in a facility where treatment can be received. In addition, it is a time and labor-intensive test, thus it is not commonly used.¹¹ More commonly used is the open food challenge, which is single blinded and does not involve a placebo. The open food challenge is not only useful in ruling out allergy, but it is also useful in testing for tolerance to allergens, or whether the patient has outgrown an allergy.⁷

A general guideline for the evaluation of suspected food allergies is as follows. If the allergic reaction is mild to moderate (rash, urticaria), an IgE test or skin prick test should be performed. If negative, the food can be allowed back in the diet unless there is a strong history of anaphylactic reactions, in which case the food should be avoided until a supervised oral food challenge can be performed by an allergist. If the IgE or skin prick test is positive and the patient has a history of anaphylaxis, the food should be avoided and the patient set up with an anaphylaxis treatment plan that includes an epinephrine pen and a medical food allergy bracelet. If positive and no history of anaphylaxis, then further evaluation by an allergist with either a blinded or unblinded oral food challenge is appropriate.¹⁸

PREVENTION

With the increase in prevalence of food allergies, an increased emphasis on prevention has been placed. Many different theories have been proposed to help prevent the development of food allergies and promote tolerance to common food allergens. The hygiene hypothesis is one of the most commonly known hypotheses behind both the development and prevention of food allergies. The hygiene hypothesis is that early exposure to a variety of microbes, pathogens and infections leads to a more diverse host microbiome, which leads to both increased immunity and development of oral tolerance of many common food allergens.^{19,20} In contrast, the lack of early exposure to a variety of microbes, pathogens, and infections, or being overly "hygienic," leads to decreased immunity and increased allergies, including food allergies.¹²

Another common hypothesis is the dual-barrier hypothesis. This hypothesis states that allergen exposure happens both through oral and skin exposure as well as possibly through respiratory exposure. The hypothesis proposes that when children with atopy, mainly atopic dermatitis, are exposed to allergens through the skin, they experience an immune response that leads to the production of IgE antibodies against the particular allergen. This is the result of either a weakened or damaged skin barrier, which leads to increased allergic sensitization to foods.^{19,21} Thus, children with eczema tend to develop allergies more easily and more often than those without eczema. In contrast, children without eczema who are exposed to allergens through skin exposure early on have an increased likelihood of developing tolerance to the allergen and thus not developing an allergy.^{12,19,21}

Some of the more popular preventive measures against food allergies that have garnered a decent amount of media attention, are the maternal diet during both pregnancy and lactation as well as the timing of dietary introduction of commonly allergenic foods.¹⁹ It has long been proposed that maternal consumption of foods such as peanuts, milk, tree nuts, and wheat during both pregnancy and lactation leads to fewer allergies.²² There have been very few studies on this, however, and the studies that have been conducted conclude that maternal consumption of highly allergenic foods such as peanuts, milk, tree nuts and wheat does not reduce the risk of food allergies.¹⁹

It was previously thought that allergic sensitization to foods happened by oral exposure to the food and thus it was thought that delaying exposure to potentially allergenic foods would help prevent food allergies. Thus, until 2007, guidelines recommended delaying the exposure to commonly allergenic foods up to three years of age.^{23,24} Since then, early introduction of commonly allergenic foods, however, has been studied and shown to be effective in preventing food allergies.²²

The LEAP (Learning About Peanut Allergy) trial is a landmark randomized controlled trial that looked at whether or not the early oral introduction of peanuts into the diet led to a decrease in allergy to peanuts. The study population was children at high risk of developing peanut allergy between the ages of 4 and 11 months old in the UK. Children were randomly assigned to a group

that would consume peanut products at least 3 times weekly and a group that would completely avoid peanuts until 60 months old. The study found that both early introduction and regular and ongoing consumption of peanut products led to a significant reduction (81%) in the number of children with peanut allergies at 60 months old. The results showed that 17.2% of children in the avoidance group, compared with 3.2% of children in the exposure group, had an allergy to peanuts at the end point of 60 months old.^{19,22,29} This study demonstrated that early oral exposure is an effective way of preventing food allergies.

The current recommendation by the American Academy of Allergy, Asthma & Immunology is that the window of opportunity to prevent food allergies is from age 4 to 7 months. Thus, peanuts and peanut-containing foods along with other highly allergenic foods should be introduced to the child between 4 and 7 months of age. If the child has developed allergies or severe eczema in the first 4 to 6 months of life, the child should be evaluated by an allergist prior to introducing peanuts or other allergenic foods. In addition, it is also now known that delaying the introduction of potentially allergenic foods beyond 9 months of age may increase the child's risk of developing food allergies.²³

Another more recent popular hypothesis for the development of food allergy suggests that Vitamin D deficiency may lead to increased food allergies.¹⁹ Thus, normal Vitamin D levels would lead to a decrease in food allergies. A cohort study conducted in Australia demonstrated an association between Vitamin D deficiency and food allergy at 12 months old.¹⁹ Several other studies, however, have been conflicting, and suggest that while low levels of Vitamin D from low UVB exposure are a risk factor for allergy development, it is not a linear relationship and thus there may be several confounding factors.²⁵

TREATMENT OF FOOD ALLERGIES

Food allergies may be an ever-increasing problem encountered in today's society, however, treatments for food allergies have not been well developed. There currently exists no definitive treatment for food allergies. The mainstays of treatment that should be recommended by a PCP include avoidance of food allergens and treatment of systemic or anaphylactic allergic reactions with epinephrine. Food labels are key to avoidance of food allergens and in the recent past have been mandated by the FDA to contain allergy-causing agents such as peanuts. Physicians can and should provide education to patients and their families about avoiding allergens, reading food labels, and signs and symptoms of anaphylaxis to look out for. In addition, a dietician may be a helpful resource in learning how to avoid foods that may contain ingredients the child is allergic to.^{22,26}

Physicians should also educate patients and their families about common food allergen cross-reactivity patterns. Cross-reactivity is common with class 2 food allergens and plant-derived proteins (Table 2). Cross-reactivity is typically either oral allergy syndrome with symptoms localized to the mouth, or latex-fruit syndrome with allergy to certain fruits and latex. Cross-reactive foods often are more allergenic when eaten raw as opposed to cooked.

TABLE 2:

Examples of class 2 food allergens and their cross-reactivity.¹⁷

| PLANT-DERIVED PROTEIN GROUP | ALLERGENS |
|---|--|
| Pathogen-related protein 2 group (glucanase) | Latex, avocado, banana, chestnut, fig |
| Pathogen-related protein 3 group (chitinase) | Latex, avocado |
| Pathogen-related protein 5 (thaumatin-like) | Cherry, apple, kiwi |
| Birch Bet v1 homologues (pathogen-related proteins 10) | Apple, cherry, apricot, peach, pear, carrot, celery, parsley, hazelnut |
| Birch Bet v2 homologues (celery-mugwort-spice) profilin | Latex, celery, potato, pear, peanut, soybean |

Allergic reactions from cross-contaminations can also occur such as with peanuts and tree nuts, thus it is imperative that physicians know about cross-reactivity in order to properly educate and protect their patients.¹⁷

Every patient with a food allergy should have two age appropriate non-expired epinephrine autoinjectors on hand at all times. Current guidelines for treatment of anaphylaxis include timely administration of epinephrine and adjunct therapy with corticosteroids and H₁ blockers as well as airway protection. Timely administration of epinephrine prior to cardiac or respiratory compromise is the most important treatment for anaphylaxis and greatly improves survival rates.^{14,15}

Research is currently in progress to investigate the effectiveness of immunologic therapies such as biologics, immunotherapy, and other pharmaceuticals.²⁶ These studies are looking at the effects of subcutaneous, oral, epithelial, and sublingual immunotherapies and the reduction of allergies. The mechanism behind immunotherapy for the reduction of food allergies is to administer an allergen in incrementally increasing doses until a set maintenance dose has been reached. This can be done by introduction of the allergen through the routes listed above, with oral being the most desired route. The allergen is then periodically given until the patient is no longer responsive to that allergen. The ultimate goal of immunotherapy is to achieve oral tolerance, or a "state of clinical unresponsiveness that persists regardless of allergen exposure."²⁷

Currently, there are no FDA approved immunotherapies. Many studies have been performed on oral immunotherapies that show success in achieving tolerance or desensitization, especially to peanut protein, but it is still questionable whether or not

desensitization persists once the immunotherapy is discontinued. The STOP II trial, a randomized controlled trial in 2104, showed tolerance to 1400mg of peanut protein in 62% of subjects. Many of these subjects experienced side effects, most notably nausea and vomiting but anaphylaxis and eosinophilic esophagitis were also noted.^{28,29}

Immunotherapy remains the most promising treatment option for many patients with food allergies. Thus far, efficacy to some extent has been shown for oral, sublingual, and epithelial immunotherapies. More research is still needed as well as a reduction in the number of adverse events occurring with immunotherapy treatment.^{28,29}

CONCLUSION

Food allergies are a common and often life threatening condition that affects the lives of a growing number of children and families across the globe. While standardization of the diagnosis of food allergies remains a challenge, it is evident that there has been significant progress and promise both in the diagnosis and treatment of food allergies. What was once known as a condition that required total avoidance of a specific type of food and often all foods that were in the vicinity of the allergen at hand, is now a condition whose future treatment options show a lot of promise. Not only is research continually being conducted on new treatment options, but also with each new study there is more promise of a more permanent solution. The goal of food allergy treatment remains complete tolerance with as few adverse events as possible.^{28,29}

New technologies are evolving that hopefully will lead to better treatment options and successful desensitization and tolerance of food allergens. A world where children can go to school and not have to worry about avoiding peanuts at all costs and carry epinephrine pens on them at all times is the ultimate goal, and one that the medical community is striving to achieve.

AUTHOR DISCLOSURES:

No relevant financial affiliations.

REFERENCES

1. Boyce, JA, Assa'ad, A, Burks, AW et al. Guidelines for the Diagnosis and Management of Food Allergy in the United States: Summary of the NIAID-Sponsored Expert Panel Report. *Nutrition Research*. 2011; 31:61-75.
2. Schneider Chafen, JJ, Newberry, SJ, Riedl, MA et al. Diagnosing and Managing Common Food Allergies: A Systematic Review. *JAMA*. 2010; 303(18):1848-1856.
3. Savage, J and Johns, CB. Food Allergy: Epidemiology and Natural History. *Immunol Allergy Clin North Am*. 2015; 35(1):45-59.
4. Nwaru, BI, Hickstein, L, Panesar, SS et al. Prevalence of Common Food Allergies in Europe: A Systematic Review and Meta-Analysis. *Allergy*. 2014; 69:992-1007.
5. LeLeiko, NS, Cerezo, CS, and Shapiro, JM. New Concepts in Food Allergy: The Pediatric Gastroenterologist's View. *Advances in Pediatrics*. 2017; 64:87-109.
6. Sicherer, SH and Sampson, HA. Food Allergy: Epidemiology, Pathogenesis, Diagnosis, and Treatment. *J Allergy Clin Immunol*. 2014; 133(2):291-307.
7. Kulis, M, Wright, BL, Jones, SM et al. Diagnosis, Management, and Investigational Therapies for Food Allergies. *Gastroenterology*. 2015; 148:1132-1142.
8. Carter, CA & Frischmeyer-Guerrero, PA. The Genetics of Food Allergy. *Curr Allergy Asthma Rep*. 2018; 18(1):2. doi: 10.1007/s11882-018-0756-z.
9. Valenta, R, Hochwallner, and H, Linhart. Food Allergies: The Basics. *Gastroenterology*. 2015; 148:1120-1131.
10. Sathe, SK, Liu, C, and Zaffran, VD. Food Allergy. *Annu Rev Food Sci Technol*. 2016; 7:191-220.
11. Turnbull, JL, Adams, HN, and Gorard, DA. Review Article: The Diagnosis and Management of Food Allergy and Food Intolerances. *Aliment Pharmacol Ther*. 2015; 41:3-25.
12. Leung, PSC, Shu, S, and Chang, C. The Changing Geoepidemiology of Food Allergies. *Clinic Rev Allerg Immunol*. 2014; 46:169-179.
13. Taylor, SL & Hefle, SL. Food Allergies and Other Food Sensitivities. *Food Technology*. 2001; 55(9): 68-83.
14. Arnold, JJ and Williams, PM. Anaphylaxis: Recognition and Management. *American Family Physician*. 2011; 84(10):1111-1118.
15. Turner, PJ, Jerschow, E, Umasunthar, T et al. Fatal Anaphylaxis: Mortality Rate and Risk Factors. *J Allergy Clin Immunol Pract*. 2017; 5(5):1169-1178.
16. Chatterjee, RA. Anaphylaxis in Children: Recognize and Treat Properly. *Child Health Explanation*. <http://www.childhealth-explanation.com/anaphylaxis-in-children.html>. Accessed April 9, 2018.
17. Ho, MH, Wong, WH and Chang, C. Clinical Spectrum of Food Allergies: a Comprehensive Review. 2014; 46:225-240.
18. Kurowski, K and Boxer, RW. Food Allergies: Detection and Management. *American Family Physician*. 2008; 77(12):1678-1686.
19. Toit, GD, Foong, RM, and Lack, G. Prevention of Food Allergy – Early Dietary Interventions. *Allergology International*. 2016; 65:370-377.
20. Tilg, H and Moschen, AR. Food, Immunity, and the Microbiome. *Gastroenterology*. 2015; 148:1107-1119.
21. Tordesillas, L, Berin, MC, and Sampson, HA. Immunology of Food Allergy. *Immunity*. 2017; 47:38-50.
22. Wong, Y, Hussey Freeland, DM, and Nadeau, KC. Food Allergy: Immune Mechanisms, Diagnosis and Immunotherapy. *Nat Rev Immunol*. 2016; 16(12): 751-765.
23. Larson, K, McLaughlin, J, Stonehouse, M et al. Introducing Allergenic Food Into Infants' Diets: Systematic Review. *MCN*. 2017; 42(2):72-80.
24. Prescott, SL, Bouygue, GR, Videky, D et al. Avoidance or Exposure to Foods in Prevention and Treatment of Food Allergy? *Curr Opin Allergy Clin Immunol*. 2010; 10(3):258-266.
25. Rudders, SA and Camargo, CA. Sunlight, Vitamin D and Food Allergy. *Co-Allergy*. 2015; 15(4):350-357.
26. Yang, Y and Chiang, B. Novel Approaches to Food Allergy. *Clinic Rev Allerg Immunol*. 2014; 46:250-257.
27. Hamad, A and Burks, W. Oral Tolerance and Allergy. *Seminars in Immunology*. 2017, <http://dx.doi.org/10.1016/j.smim.2017.07.001>.
28. Sampson, HA. Food Allergy: Past, Present and Future. *Allergology International*. 2016; 65:363-369.
29. Koberenick, AK and Burks, AW. Active Treatment for Food Allergy. *Allergology International*. 2016; 65:388-395.

REVIEW ARTICLE

Physician Burnout: Action Items to Confront the Problem

Philip B. Collins, DO & Joanna Petrides, PsyD

Rowan University SOM, Stratford, New Jersey

KEYWORDS:

Physician
Wellness

Physician
Burnout

Disease
Prevention &
Wellness

The well-being of physicians has been a trending topic among professionals in the field, medical organizations, and the media in recent years. The increased attention placed on burnout is with good reason, as research indicates that burnout among physicians is increasing at an alarming rate. Burnout can affect aspects of physical, mental, emotional, and spiritual health. Three symptoms define burnout: loss of enthusiasm for work (emotional exhaustion), cynicism (depersonalization), and low sense of personal accomplishment (lack of efficacy). Identifying and combatting burnout can prove to be difficult. The most beneficial way to address burnout is to view it as a two-way street in which organizations and physicians commit to preventing, identifying, and addressing burnout. On the individual level, burnout and burnout prevention can be addressed through various lifestyle changes including mindfulness, adjusting eating habits, maintaining physical activity levels, and improving sleep habits. While we as individuals can try to mitigate the symptoms and causes of burnout, health care organizations and policymakers must do their part in addressing the problem as well. Wellness promotion and burnout prevention can and should begin in medical school, and continue throughout training and into our careers.

INTRODUCTION

The well-being of physicians has been a trending topic among professionals in the medical field, medical organizations, and the media in recent years. The increased attention placed on burnout is with good reason, as research indicates that burnout among physicians is increasing at an alarming rate.¹ A recent survey shows that 42% of physicians report experiencing burnout, and an even greater, 47% of Family Medicine physicians report experiencing burnout.² With aspects of physical, mental, emotional, and spiritual health involved, current evidence indicates that our profession, as a whole, is not “well.”

Burnout is defined by three symptoms: loss of enthusiasm for work (emotional exhaustion), cynicism (depersonalization), and low sense of personal accomplishment (lack of efficacy).³ Signs and symptoms can also include excessive absenteeism, reduced job satisfaction, interpersonal conflicts at home and at work, a feeling of detachment from patients and others, disruptive and impulsive behaviors, lack of empathy and patience, and a feeling of dread before going into work.^{4,5} Among the top causes of burnout are bureaucratic tasks, work hours, lack of respect from administrators/employer, colleagues, or staff, and Electronic Health Record (EHR) systems.² In a changing medical landscape with increasing EHR utilization, it is likely this will not improve without an intervention.

CORRESPONDENCE:

Philip B. Collins, DO | collinsp@rowan.edu

As physicians, we are particularly susceptible to burnout given the high-stakes nature of our work in regularly caring for sick and sometimes dying patients. The burden of responsibility can be quite stressful; therefore, it is not surprising that physicians are more likely than the general population to experience burnout⁶. Additionally, stress management or stress reduction techniques are not taught in medical school. There is a mentality in medical education that implies challenges are meant to be responded to by working harder during medical school and residency.⁷ Given this mentality during training, often times it can be difficult for physicians to find an effective work-life balance and make time for themselves. Physicians work in a field that expects and demands perfection. Having no room for errors is incredibly taxing. Combine this demand for perfection with daily workplace demands, such as crammed schedules, phone calls with insurance companies, and challenging patients, and it becomes easy to see why burnout is very common among physicians. Sometimes the specific job or position carries its own set of stressors. Call rotation, compensation formula, and relationships within the department or group are just a few of the possible issues that may contribute to burnout. Studies have shown that poor leadership can also contribute to burnout⁸. Home life can be another big factor in the development of burnout, or home life can suffer as a result of burnout. Working long hours can often lead to strained relationships with friends and family, and can be particularly difficult on the spouse or partner of a physician. Finding time for your spouse/partner/family, while a priority, can be challenging which might increase stress at work due to not having an appropriate outlet for this stress. Additionally, burnout puts physicians at higher risk for substance abuse due to an absence of more effective coping skills.⁷

Physicians are also just as susceptible as the general population to suffer from depression or other mental illnesses, which can then be exacerbated by the stress associated with being a physician.⁹ It is thought that the prevalence of depression among physicians may be higher than the numbers indicate due to the underestimation of self-reporting and lack of physicians seeking out appropriate treatment for psychiatric difficulties.^{10,11,12} Studies show that approximately 6.4% of physicians experience suicidal ideation.⁶ Unfortunately physicians have higher rates of attempting suicide than the general population and have a far higher suicide completion rate¹⁰. While it is difficult to determine an exact number, most findings estimate that 300-400 physicians complete suicide each year.^{10,13} Depression often goes untreated in physicians for a number of reasons, but the main reason seems to be the stigma associated with the diagnosis.¹⁴ Some physicians fear possible peer judgements, sanctions, restrictions, and other negative consequences from state medical boards, hospitals, and/or employers. Physicians' personal stories of burnout are frequently published and while each case varies, they often share common themes such as high expectations of work output, balancing multiple responsibilities, and unsupported work environments.

Sadly, burnout, depression, and suicide extend their reach into trainees as well. Among medical students, suicide is the second leading cause of death after accidents.¹⁰ It is estimated that the prevalence of a history of depression among medical students is 15-30%.¹⁵ One study of fourth year students and first year residents revealed 9.4% reported thoughts of suicide in the previous two weeks.¹⁶ Long hours, high responsibility, inexperience, learning to handle the death of patients, and being away from family are just a few of the potential factors contributing to this alarming trend.¹⁰ Another study found that the harassment and belittling by superiors contributed to mental distress among students and the development of depression in some.¹⁷ Several medical schools are now implementing programs to help identify, treat, and manage stress and depression among medical students.¹⁸

Unfortunately, the consequences of physician burnout extend beyond the physician. Burnout among physicians has been shown to increase medical errors and lead to lower patient satisfaction.⁷ Not surprisingly, medical errors and decreased patient satisfaction can lead to higher malpractice risk.⁷ The overall happiness among physicians at home can be affected negatively as well.¹⁹ In addition to the health and well-being of physicians and patients, physician burnout can affect ancillary staff and the patient care they provide. There are higher turnover rates among staff working with physicians suffering from burnout.^{7,20} As physicians experience burnout, they are more likely to place extreme demands on others, create role ambiguity, and struggle with providing effective feedback to staff.^{4,5,20,21} This can result in diminished social support in the workplace and lead to staff feeling a reduced sense of accomplishment in the work they do and the effectiveness of their role in patient care.^{4,20,21} When working in such strained conditions, individuals are likely to develop passive, defensive coping mechanisms, engage in the bare minimum of their role, and refuse to take on responsibility for improving the work place.⁵ Physicians with burnout will also be less likely to

recognize staff efforts and accomplishments, therefore resulting in a lack of appropriate rewards and appreciation, thus fueling staff negativity.⁴ Stronger staff members may feel more significant effects if physicians begin to designate more work to stronger staff members, resulting in an overload.²² Additionally, if the effects of burnout on staff are not addressed, any new staff that enters the office will quickly experience the effects of burnout as well.²⁰

On a more personal level, physician burnout can result in a loss of interest in personal life matters and personal relationships, thus having an effect on partners and family members.²³ Physicians who experience burnout are also less likely to respond to personal life events in effective ways, thus causing increased stress and disappointment for everyone involved in such situations.²⁴ Events such as marriage, the birth or adoption of a new child, and loss of a family member are not given full attention by physicians who experience burnout.²⁴ Additionally, personal relationships of physicians are likely to become more strained when physicians are burned out as a result of physicians requiring ongoing and increasing needs for support from family and friends, which was evident in research from as early as the mid-1990s.²⁵ This can leave family members and friends feeling equally drained and resentful towards the physician as a result of an imbalance in the relationship. Furthermore, negative effects on family life can include feelings of neglect by spouses or children and poor communication, which can vary in severity based on physician career stages and lead to increased risk of divorce or separation and lack of effort in maintaining healthy relationships.^{26,27,28}

BURNOUT PREVENTION & SOLUTION STRATEGIES

A prominent challenge in combatting and managing burnout is a lack of awareness of its presence, both on the organizational level and the individual physician level.^{5,29} The most beneficial way to address burnout is to view it as a two-way street in which organizations and physicians commit to preventing, identifying, and addressing burnout.⁵ On the individual level, burnout and burnout prevention can be addressed through various lifestyle changes. Many physicians begin their day just as busy as they ended the previous one, which emphasizes the need to begin each day with a relaxing ritual, particularly one involving mindfulness. Mindfulness is defined as a state of active, open attention on the present. It is the practice of living in the moment of the current experience rather than dwelling on the past or anticipating the future.³⁰ Physicians are more likely to dive right back into their patient duties at the onset of their day, however, taking a few minutes to enjoy the qualities of a warm beverage in the morning (i.e.: noticing the qualities of the drink as being warm, aromatic, steaming, and soothing), engaging in prayer or reflection, or observing thoughts and feelings without judgement can have a strong effect at setting the tone of the day as one involving less stress from the onset. Mindfulness can also be utilized at any time throughout the day by simply taking a moment to yourself to notice your breathing (Is it too rapid? Too shallow?), and allow yourself to take several deep breaths to relax the muscles. Another quick exercise you can engage in during the work day is conducting a body scan in which you take

a few minutes to mentally scan your body from head to toe and notice any tension or discomfort, making adjustments to posture or the tension as necessary.⁴ Additional mindfulness and stress reduction resources can be found in Table 1.

Physicians can also reap benefits from adjusting eating habits, maintaining physical activity levels, and improving sleep habits.³⁷ It is important for physicians to eat as consistently as possible and to monitor intake of “emotional” foods such as caffeine, sugar, and alcohol, which can have a strong effects on how individuals react to situations and their tolerance for stress throughout the day.^{4,37} Physicians are also encouraged to incorporate any kind of physical activity to the daily routine which can include a short walk during a break in the day and/or taking a few minutes to stretch stiff muscles.^{4,37} It is also important to monitor habits prior to bed and ensure that you are doing all you can to achieve a restful night’s sleep.³⁷ One common mistake at the end of the day is not allowing time for a transition from a highly demanding schedule before going to bed. Additionally, we are also at risk of overusing technology or binge watching television prior to bed which can confuse the brain into thinking it is not yet time to rest. It is important to have a power down routine prior to bed, as well as to set limits to electronic use, which allows you to decompress from the day.

Another way to manage stressors which make you more susceptible to burn out is to participate in activities which stimulate the more creative side of the brain.^{4,37} Day-to-day operations as a physician include high levels of recalling and implementing information, and such sustained thinking can lead to exhaustion and loss of enthusiasm.⁴ By engaging in activities of pleasure during non-working hours, you can mitigate some of the effects of a demanding workday. Some activities include engaging in artwork of any kind including mandalas (more popularly known as adult coloring books), participating in group activities or group sports, and challenging yourself to a more complex skill of an existing hobby or seeking out a new hobby.

Furthermore, developing and maintaining appropriate boundaries enhances the seemingly elusive work-life balance³⁷. Boundaries may include refusing to take on new roles or duties that are outside of your scope of ability or would demand more time than you have to offer. Delegating duties to coworkers or sharing the burden with colleagues is an effective way to maintain work-life boundaries. Additionally, it is important to designate some “non-negotiable” events in your life.⁴⁵ For example, making a commitment to attend specific family events, such as a child’s school play or sports game, can enhance your ability to draw the line between work and personal life.⁴ Likewise, if you find it difficult to leave work at the end of the day, insisting that you will complete just one more thing, you may benefit from scheduling appointments close to the end of the work day which will require you to leave work promptly.⁵ It is also recommended to utilize earned vacation time periodically to take time away from typical stressors, as well as increase attention to the need for mental health days and to take mental health days when needed.³⁸ Lastly, becoming comfortable with asking for help in both our professional and personal lives goes a long way. Asking for help involves recognizing your own limits and giving yourself permission to say no when necessary.³⁷

While physicians can try to mitigate the symptoms and causes of burnout, health care organizations and policy makers must do their part in addressing the problem as well^{39,40}. Recently, the National Academy of Medicine began a national collaborative effort to identify causes and find solutions to clinician burnout⁴¹. The American Medical Association has created online modules to help with preventing burnout and depression. They also have modules available to help deal with other common stressors such as technology and workflow (For additional burnout prevention resources, please see Table 2). Furthermore, the American Osteopathic Association has announced an upcoming curriculum along with online resources aimed at preventing burnout and promoting physician wellness⁴².

TABLE 1:
Mindfulness and Stress Reduction Resources (31-36)

| ONLINE RESOURCES | | |
|---|--|--|
| Online Mindfulness-Based Stress Reduction | www.palousemindfulness.com | Defining and explaining mindfulness and its usefulness |
| Relaxation Techniques | www.helpguide.org/articles/stress/relaxation-techniques-for-stress-relief.htm | Various techniques to promote relaxation |
| Controlling Anger | www.apa.org/help-center/controlling-anger.aspx | Tips for identifying and managing anger |
| Controlling Stress | www.apa.org/help-center/stress-tips.aspx | Tips for identifying and managing stress |
| Mental Health America Stress Screener | www.mentalhealthamerica.net/stress-screener | Screening tool for stress |
| Mayo Clinic | www.mayoclinic.org/healthy-lifestyle/stress-management/basics/stress-basics/hlv-20049495 | Stress Management |
| MOBILE APPLICATIONS | | |
| Free | The Mindfulness App | Meditation practice & reminders |
| Free | Headspace | Daily Meditations |
| Free | Calm | Meditations and calm sounds |
| Free | Insight Timer | Guided Meditations |
| Free | Aura | Daily Personalized Meditations |

TABLE 2:

Burnout Prevention Resources (43-46)

| TITLE | URL | DESCRIPTION |
|------------------------------|---|---|
| AMA Steps Forward | https://www.stepsforward.org/modules/physician-burnout | Modules designed to help prevent burnout |
| AMA Steps Forward | https://www.stepsforward.org/modules/physician-wellness | Modules designed to promote physician wellness in training |
| National Academy of Medicine | https://nam.edu/initiatives/clinician-resilience-and-well-being/ | Action Collaborative on Clinician Well-Being and Resilience |
| The Happy MD | https://www.the-happymd.com | Resources for Burnout Prevention |

CONCLUSION

Physician burnout is more than dissatisfaction with a job or career – it affects all aspects of a physician’s lifestyle and those involved with the physician. Burnout is a serious risk to all physicians and the patients for whom we provide care to. It is imperative that we as a profession make wellness a priority, not just for ourselves, but also to model this self-care for our patients and our families. Those of us that are educators should implement self-care and burnout prevention as a priority for our students as well. Wellness promotion and burnout prevention can and should begin in medical school, and continue throughout training and into our careers. In order to provide appropriate and adequate care for our patients we must first take care of ourselves.

AUTHOR DISCLOSURES:

No relevant financial affiliations.

REFERENCES:

- Shanafelt TD, Hasan O, Dyrbye LN, et al. Changes in Burnout and Satisfaction With Work-Life Balance in Physicians and the General US Working Population Between 2011 and 2014. *Mayo Clinic Proceedings*. 2015;90(12):1600-1613. doi:10.1016/j.mayocp.2015.08.023.
- Peckham C. Medscape National Physician Burnout & Depression Report 2018. Medscape. <https://www.medscape.com/slideshow/2018-lifestyle-burnout-depression-6009235>. Published January 17, 2018. Accessed February 21, 2018.
- Maslach C, Jackson S, Leiter M. *Maslach Burnout Inventory Manual*. 3rd ed. Palo Alto, CA: Consulting Psychologists Press; 1996.
- Burnout Response. *Workplace Strategies for Mental Health - Burnout Response*. <https://www.workplacestrategiesformentalhealth.com/managing-workplace-issues/burnout-response>. Accessed September 10, 2017.
- Paiva T. Kissmetrics Blog. How to Prevent Employee Burnout. <https://blog.kissmetrics.com/prevent-employee-burnout/>. Accessed September 5, 2017.
- Shanafelt TD, Boone S, Tan L, et al. Burnout and satisfaction with work-life balance among US physicians relative to the general US population. *Arch Intern Med*. 2012;172:1377-1385.
- Drummond D. Physician Burnout: Its Origin, Symptoms, and Five Main Causes. *Fam Pract Manag*. 2015 Sep-Oct;22(5):42-47.
- Shanafelt T, Gorringer G, Menaker R, et al. Impact of organizational leadership on physician burnout and satisfaction. *Mayo Clin Proc*. 2015;90(4):432-440.
- Schernhammer ES, Colditz GA. Suicide rates among physicians: a quantitative and gender assessment (meta-analysis). *Am J Psychiatry*. 2004 Dec. 161(12):2295-302.
- Andrew LB. Physician Suicide. Medscape website. <http://emedicine.medscape.com/article/806779-overview#a1>. June 12, 2017. Accessed July 14, 2017.
- Guille C, Speller H, Laff R, Epperson CN, Sen S. Utilization and Barriers to Mental Health Services Among Depressed Medical Interns: A Prospective Multisite Study. *Journal of Graduate Medical Education*. 2010;2(2):210-214. doi:10.4300/jgme-d-09-00086.1.
- Morris NP. Why doctors are leery about seeking mental health care for themselves. *The Washington Post*. https://www.washingtonpost.com/national/health-science/why-doctors-are-leery-about-seeking-mental-health-care-for-themselves/2017/01/06/b19bc4ba-ad02-11e6-a31b-4b6397e625d0_story.html?utm_term=.10059eb458a5. Published January 7, 2017. Accessed December 30, 2017.
- Center C, Davis M, Detre T, Ford DE, Hansbrough W, Hendin H, Laszlo J, Litts DA, Mann J, Mansky PA, Michels R, Miles SH, Proujansky R, Reynolds III CF, Silverman MM. Confronting Depression and Suicide in Physicians: A Consensus Statement. *JAMA*. 2003;289(23):3161-3166. doi:10.1001/jama.289.23.3161
- Hendin H, Reynolds C, Fox D, et al. Licensing and Physician Mental Health: Problems and Possibilities. *Journal of Medical Licensure and Discipline*. 2007. 93:6-11.
- Puthran R, Zhang MW, Tam WW, Ho RC. Prevalence of depression amongst medical students: a meta-analysis. *Med Educ*. 2016 Apr. 50(4):456-68.
- Goebert D, Thompson D, Takeshita J, Beach C, Bryson P, Ephgrave K, et al. Depressive symptoms in medical students and residents: a multischool study. *Acad Med*. 2009 Feb. 84(2):236-41.
- Frank E, Carrera JS, Stratton T, Bickel J, Nora LM. Experiences of belittlement and harassment and their correlates among medical students in the United States: longitudinal survey. *BMJ*. 2006 Sep 30. 333(7570):682.
- Moutier C, Norcross W, Jong P, Norman M, Kirby B, McGuire T, et al. The suicide prevention and depression awareness program at the University of California, San Diego School of Medicine. *Acad Med*. 2012 Mar. 87(3):320-6.
- Peckham, C. Medscape Lifestyle Report 2013: Physician Lifestyles -- Linking to Burnout: A Medscape Survey. <https://www.medscape.com/features/slideshow/lifestyle/2013/public>
- Burnout: Impact on Nursing and Quality of Care. NetCE. <http://www.netce.com/coursecontent.php?courseid=1167>. Accessed September 6, 2017.
- Brown LW, Quick JC. Environmental Influences on Individual Burnout and a Preventive Approach for Organizations. *Journal of Applied Biobehavioral Research*. 2013;18(2):104-121. doi:10.1111/jabr.12002.

22. Garton E. Employee Burnout Is a Problem with the Company, Not the Person. *Harvard Business Review*. <https://hbr.org/2017/04/employee-burnout-is-a-problem-with-the-company-not-the-person>. Published July 20, 2017. Accessed September 5, 2017.
23. Gundersen L. Physician Burnout. *Ann Intern Med*. 2001;135:145-148. doi: 10.7326/0003-4819-135-2-200107170-00023.
24. Dyrbye LN, Thomas MR, Huntington JL, Lawson KL, Novotny PJ, Sloan JA, and Shanafelt TD. Personal life events and medical student burnout: A multicenter study. *Academic Medicine*. 2006; 81 (4), 374-385.
25. Adams GA, King LA, and King DW. Relationships of job and family involvement, family social support, and work-family conflict with job and life satisfaction. *J of Applied Psychology*. 1996; 81 (4), 411-420. <http://dx.doi.org/10.1037/0021-9010.81.4.411>.
26. Lacy BE and Chan JL. Physician burnout: The hidden health care crisis. *Clinical Gastroenterology and Hepatology*. 2018; 16 (3), 311-317.
27. Law M, Lam M, Wu D, Veinot P, and Mylopoulos M. Changes in personal relationships during residency and their effects on resident wellness: A qualitative study. *Academic Medicine*. 2017; 92 (11), 1601-1606.
28. Hill EJ, Jacob JI, Shannon LL, Brennan RT, Blanchard VL, and Martinengo G. Exploring the relationship of workplace flexibility, gender, and life stage to family-to-work conflict, and stress and burnout. *Community, Work & Family*. 2008; 11 (2), 165-181.
29. Maslach C, Schaufeli WB, Leiter MP. Job Burnout. *Annual Review of Psychology*. 2001;52(1):397-422. doi:10.1146/annurev.psych.52.1.397.
30. Mindfulness. *Psychology Today*. <https://www.psychologytoday.com/basics/mindfulness>. Accessed December 30, 2017.
31. Online MBSR/Mindfulness (Free). *Online MBSR/Mindfulness (Free)*. <https://palousemindfulness.com/>. Accessed February 22, 2018.
32. Robinson L, Segal R, Segal J, Smith M. Relaxation Techniques. *Help Guide*. <https://www.helpguide.org/articles/stress/relaxation-techniques-for-stress-relief.htm>. Published February 2018. Accessed February 22, 2018.
33. American Psychological Association. <http://www.apa.org/helpcenter/controlling-anger.aspx>. Accessed February 22, 2018.
34. American Psychological Association. <http://www.apa.org/helpcenter/stress-tips.aspx>. Accessed February 22, 2018.
35. Stress Screener. *Mental Health America*. <http://www.mentalhealthamerica.net/stress-screener>. Published February 3, 2014. Accessed February 22, 2018.
36. Stress management Stress basics. *Mayo Clinic*. <https://www.mayoclinic.org/healthy-lifestyle/stress-management/basics/stress-basics/hlv-20049495>. Published March 31, 2017. Accessed February 24, 2018.
37. Jedynek-Bell C. Physician Burnout and Physician Wellness. http://cymcdn.com/sites/www.txosteo.org/resource/resmgr/2015_Annual/Sun_10AM_Physician_Burnout_a.pdf. Published August 9, 2015. Accessed September 13, 2017.
38. Forbes Coaches Council. Avoid Workplace Burnout: How To Get Your Employees To Take A Vacation. *Forbes*. <https://www.forbes.com/sites/forbescoachescouncil/2017/07/14/avoid-workplace-burnout-how-to-get-your-employees-to-take-a-vacation/#31df5b16615a>. Published July 14, 2017. Accessed September 13, 2017.
39. Wallace JE, Lemaire JB, Ghali WA. Physician wellness: a missing quality indicator. *Lancet*. 2009;374(9702):1714-1721
40. Dyrbye LN, Shanafelt TD. Physician burnout: a potential threat to successful health care reform. *JAMA*. 2011;305(19):2009-2010
41. Action Collaborative on Clinician Well-Being and Resilience. *National Academy of Medicine website*. <https://nam.edu/initiatives/clinician-resilience-and-well-being/>. Accessed August 12, 2017.
42. Raymond R. Addressing Doctor Burnout and Depression: Resources for Trainers, Families coming soon. *The DO website*. <https://thedo.osteopathic.org/2017/08/addressing-doctor-burnout-depression-resources-for-trainers-families-coming-soon/>. August 15, 2017. Accessed on November 11, 2017.
43. Preventing Physician Burnout. *AMA Steps Forward*. <https://www.stepsforward.org/modules/physician-burnout>. Accessed February 22, 2018.
44. Physician Wellness: Preventing Resident and Fellow Burnout. *AMA Steps Forward*. <https://www.stepsforward.org/modules/physician-wellness>. Accessed February 22, 2018.
45. Clinician Resilience and Well-being. *National Academy of Medicine*. <https://nam.edu/initiatives/clinician-resilience-and-well-being/>. Accessed February 22, 2018.
46. Drummond D. Stop Physician Burnout Tools, Coaching, Speaking, Training. *Stop Physician Burnout Tools, Coaching, Speaking, Training - TheHappyMD.com*. <https://www.thehappymd.com/>. Accessed February 24, 2018.

SEE THE FOREST AND THE TREES



WHERE HEALTH IS PRIMARY.



Brought to you by
America's Family Physicians

Increased collaboration between primary care and public health is key to addressing the biggest health challenges facing our country today.

Family doctors are working to bridge the gap between personal and public health.

Let's make health primary in America.
Learn more at healthisprimary.org.

[#MakeHealthPrimary](https://twitter.com/MakeHealthPrimary)

TAKE ADVANTAGE OF YOUR MEMBER BENEFITS ON THE GO!



Download the ACOFP app to access the latest news and upcoming events. You can view CME resources, the OFP Journal, the ACOFP Career Center and more!

Download today!
www.acofp.org



acofp | AMERICAN COLLEGE
OF OSTEOPATHIC
FAMILY PHYSICIANS



CAREER CENTER

FIND A JOB OR FILL A POSITION

The ACOFP Career Center can help you find your perfect job. You can inventory your skills and accomplishments, proactively manage your career, and create a professional action plan tailored to your goals. Jump start your career by adding or updating your professional profile today and gain access to valuable tools and resources.

acofp | AMERICAN COLLEGE
OF OSTEOPATHIC
FAMILY PHYSICIANS

www.acofp.org

Explore opportunities by visiting acofp.org

Acute Finger Deformity

Meridith Marlow, PGY¹ & Lindsay Tjiattas-Saleski, DO, MBA, FACOEP²

¹ Grand Strand Medical Center - Myrtle Beach SC/Edward Via College of Osteopathic Medicine - Carolinas Campus

² Greenville Health System Emergency Department, Greenville SC

A 43-year-old man presents to the Fast Track of the Emergency Department with chief complaint of injury and pain to the middle finger of his left hand. He fell onto his out-stretched hand this morning during his morning run. He thought at first that he had simply “jammed” his finger, but when he noticed that he was unable to fully extend the distal aspect of the digit, he decided to seek treatment. He has no known prior trauma or injury to this hand and no other pertinent medical or surgical history.

On physical exam, the distal interphalangeal joint (DIP) of the third digit of his left hand is in flexion at rest (Figure 1). The dorsum of his DIP and proximal phalanx are swollen and ecchymotic, and both areas are tender to palpation. The DIP was able to be fully extended with passive motion, but the patient was unable to actively extend the joint. Passive and active ranges of motion were elicited at the other left upper extremity joints proximally and distally with intact neurovascular and ligamentous integrity. Radiography illustrated no avulsions, misalignments, or other bony abnormalities.

QUESTIONS

1. What is the name of this patient’s specific injury?

- A. Boutonniere deformity
- B. Jersey finger
- C. Mallet finger
- D. Swan neck deformity

2. The main treatment option for the noted deformity includes:

- A. Immediate surgical intervention
- B. Physical therapy only
- C. Splinting in the extended position
- D. Splinting in the flexed position

FIGURE 1:

Flexion of the distal interphalangeal joint

Photo credit: Palmetto Health Tuomey Emergency Department



CORRESPONDENCE:

Lindsay Tjiattas-Saleski DO, MBA, FACOEP

LTjiattas-Saleski@ghs.org

ANSWERS

1. What is the name of this patient's specific injury?

Correct answer: C) Mallet Finger

Mallet finger is an extensor tendon injury of the DIP, with the hallmark presentation being the inability to actively extend the DIP and the DIP being in flexion at rest.¹ Boutonniere Deformity is an injury to the extensor tendon overlying the PIP joint, involves the PIP joint being hyper-flexed and the DIP joint being forced into hyper-extension.^{2,3} Jersey finger is a flexor digitorum profundus tendon injury at the base of the distal phalanx.⁴ The mechanism of injury occurs when an already maximally flexed DIP joint is forcefully hyperextended. On physical exam there may be pain and tenderness over the volar aspect of the DIP with the finger in slight extension at rest on a hard surface and no active flexion of the DIP.⁵ Swan neck deformity is hyperextension of the PIP joint with flexion of the DIP joint, and can either be physiologic, secondary to a chronic mallet finger injury or secondary to inflammatory diseases.³

2. The main treatment option for the noted deformity includes:

Correct answer: C) Splinting in the extended position

In a non-complicated mallet injury, non-operative, conservative management is the best and most preferred option for treatment.⁶ The recommendation is strict continuous splinting of the DIP joint in extension for approximately 6-10 weeks, with a strict minimum of 6 weeks.^{2,7,8}

DISCUSSION

Mallet finger, an extensor tendon injury of the distal interphalangeal joint (DIP), is the most common closed-tendon injury of the fingers, primarily affecting the dominant hand's middle finger, and secondarily the ring finger and 5th digit.¹ The injury frequently presents in young and middle-aged men with a mechanism of injury involving collision sports such as football, rugby, baseball, or even in falls, depending on hand placement and force.¹ In the elderly population, much less force is required to sustain injury; for example, a minor action such as pulling up a bed sheet could result in the deformity.⁸

Mallet finger results from forced flexion of the distal phalanx (fingertip) and subsequently causes a partial or complete tear to the extensor tendon.¹ An accompanying avulsion fracture of the distal phalanx may occur.¹ The superficial location of the tendon as well as the relatively avascular insertion predispose the tendon to injury and longer healing time.² Mallet finger is considered a minimally disabling deformity, although it can be quite concerning to patients' due to appearance and fear of function limitation.⁹

The finger may have swelling, ecchymosis, and tenderness to palpation of the dorsum of the DIP joint, with the hallmark presentation being the inability to actively extend the DIP and the DIP being in flexion at rest.¹ However, extension of the DIP is possible passively.¹ Integumentary, neurovascular, and collateral

ligament integrity should also be evaluated.¹ Anterior-posterior, lateral, and oblique radiographs, should be performed to assess for avulsion fractures, malalignments, or significant bony injury, but may be normal with only ligamentous injury.^{1,9} Some individuals with joint hyperlaxity could have pseudo-mallet swan neck deformities that are unrelated to trauma or mallet finger history.³ Also, in elderly patients, due to osteoarthritic changes, a pseudo-mallet deformity may be present.³

Doyle classification of mallet fingers is utilized to describe the injury as well as to guide treatment.³ A Type I mallet finger injury, the most common type, is defined as a closed injury, with or without a small avulsion fracture (dorsal), and is considered non-complicated if there is no subluxation or the intra-articular fracture involves less than 1/3 of the articular surface.³ The injury worsens in presentation and prognosis with Type II to Type IV, all of which are open injuries.³

The first reported treatment for Type I mallet finger injuries by Dr. Mason in 1930 advocated for immediate surgical intervention.⁹ It was not until 1962 that a consensus grew to support conservative therapy with splinting, which has persisted as the mainstay of treatment.⁹ In cases of a Type I, non-complicated mallet injury, non-operative, conservative management is the best and most preferred option for treatment.⁶ The recommendation is strict continuous splinting of the DIP joint in extension for approximately 6-10 weeks, with a strict minimum of 6 weeks.^{2,3,7,8}

There are numerous reported splinting techniques, but when considering which splint type to use, the type of splint is not necessarily as important as the patient's compliance.⁶ The goal of splinting is to slightly hyperextend the DIP joint to restore functional anatomy and reduce extensor lag to the pre-injury state.⁹ Stack splints (Figure 2: Stack Splint) were the earliest utilized conservative treatment, and while it still yields similar outcomes to other splint types, there have been reported skin complications.⁶ More recently, custom thermoplastic (molded) splints are available via orthopedic specialists, which are very similar in design to the original Stack splints, however these can be more costly.⁹ In the outpatient setting, or if cost is a concern, dorsal padded or volar padded aluminum splint could be utilized (Figure 3: Volar splint). Dorsal splints must be used with care as they may inflict pressure on the actual site of tendon rupture, an already relatively avascular area, and could further compromise healing or cause ulceration.⁹ Volar splints avoid direct pressure on the dorsum of the finger, reducing skin complications, but do not restrict DIP flexion as well.⁹ Each type of splint carries risks of transient sensory problems, skin irritation, maceration, or ulceration.⁹ There are no studies that illustrate a significant difference in clinical outcomes (extensor lag) between dorsal padded splints, volar padded splints, or custom-made splints.³ It is up to the physician to consider each patient's risk factors, lifestyle factors, and expected compliance to determine which splint type would be most suitable.

Whichever splint type is chosen, proper splinting places the DIP in slight hyperextension while still maintaining full range of motion at the PIP joint.³ This splinting must be strictly maintained continuously for a minimum of 6 weeks.^{2,3,7,8} It is crucial to stress

to the patient the importance of adherence to splinting treatment and that the DIP should not be allowed to flex at any time during the splinting period, or the treatment “clock” must be re-set to zero.^{2,3,9} If the splint needs to be removed for any reason, the finger should remain in extension on a hard, flat surface.³ After a full 6-week period, the finger is re-assessed and active extension is attempted. If achieved, then weaning from use of the splint can be initiated.³ However, if at the initial 6-week evaluation an extension lag or a fixed flexion deformity persists, continue strict splinting for another 4-6 weeks.^{3,8} The DIP extensor lag is more of an aesthetic concern than a functional one, with patient reports of high satisfaction for unhindered function and minimal difficulties with work or activities of daily living; thus it is advised to attempt nonoperative treatment multiple times prior to orthopedic consultation.^{3,8,9} However, if the extensor lag is significant, the patient complains of worsening pain, or decreased function secondary to the injury, then orthopedic consult could be considered earlier.^{6,8}

If conservative management has been dutifully attempted and failed or if disability is present, surgery can be considered.⁶ Surgery should also be considered in more complicated cases of injury, those with subluxation of the distal phalanx, large articular fractures (bone fragments more than 1/3 of the joint surface), diastasis greater than 3mm, concomitant open injury, or recurrent injuries.⁶ Hand physical therapy or home exercises can be incorporated throughout the duration of treatment, such as PIP flexion exercises, to prevent stiffness and maintain functional use of hands.³

This differential diagnosis of mallet finger should include, but are not limited to jersey finger, swan neck deformity, DIP dislocation, distal phalanx fracture, and Boutonniere deformity.

- **Jersey finger** is a flexor digitorum profundus tendon injury at the base of the distal phalanx.⁴ Mechanism of injury occurs when an already maximally flexed DIP joint is forcefully hyperextended, as when a player has a strong grip on a jersey and the opposing player attempts to pull away, hence the name “jersey finger.”¹⁰ Ring finger is most commonly involved due to its fingertip being more prominent during grip.⁴ On physical exam there may be pain and tenderness over the volar aspect of the DIP with the finger in slight extension at rest on a hard surface and no active flexion of the DIP.⁵ If the patient presents within 10 days of the injury, surgical repair is warranted, if past ten days, then decisions must be individualized.¹¹
- **Swan neck deformity**, hyperextension of the PIP joint with flexion of the DIP joint, can either be physiologic, secondary to a chronic mallet finger injury, or secondary to inflammatory diseases. It is important to discern between a mallet finger injury and a swan neck deformity, as both present with visible flexion of the DIP.³ A “distal Bouvier-type maneuver” can be utilized to distinguish a lax PIP source of DIP flexion from a swan neck deformity secondary to a chronic (possibly untreated) mallet finger.³
- **DIP dislocations** are rare, due to the enhanced stability of the adjacent tendon insertions and soft tissues tightly enveloping the joint. When present, they are commonly dorsal and lateral in direction and frequently associated with an open wound.³ If a closed dislocation is suspected, a closed reduction can be attempted following digital or wrist block anesthesia.^{2,3}
- **Distal phalangeal fractures**, the most common fractures in the hand, usually result from crushing or shearing forces and if there is tendinous involvement, more commonly appear at the base.^{2,12} Epiphyseal injuries, in children and adolescents, can occur when the distal phalanx has been hyper-flexed and can present like an open mallet deformity and easily misdiagnosed as a joint dislocation.¹² Treatment involves a volar or hair-pin splint, without immobilization of the PIP joint and surgical follow up.^{2,12}
- **Boutonniere Deformity**, injury to the extensor tendon overlying the PIP joint, involves the PIP joint being hyper-flexed and the DIP joint being forced into hyper-extension.^{2,3} Treatment entails maintaining the PIP joint in strict extension for 5 to 6 weeks, similarly to the mallet finger but involving the PIP joint.^{2,3}

FIGURE 2:
Stack splint

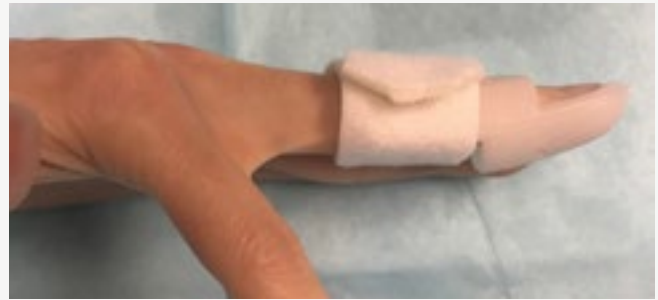


FIGURE 3:
Volar Splint of distal interphalangeal joint
Photo credit: Palmetto Health Tuomey Emergency Department



The patient in Figures 2 & 3 had findings consistent with a Type I, non-complicated mallet finger injury. He was splinted with a volar padded splint with the DIP in slight hyperextension. He was counseled on the importance of strict maintenance of the DIP extension at all times and referred to outpatient hand surgery follow-up.

When patients present with any finger injury it is important for the physician to consider a broad differential diagnosis as surgical intervention may be required for some injuries. Dorsal, volar, or custom-made splints are all similarly effective treatment options, and the splint that facilitates the highest patient compliance should be chosen.^{3,6,9} Counsel patients that most studies illustrate that following splinting compliance, despite residual extensor lag, pain was negligible and finger function was highly satisfactory, with no significant effect on work or daily activities.^{3,6}

AUTHOR DISCLOSURES:

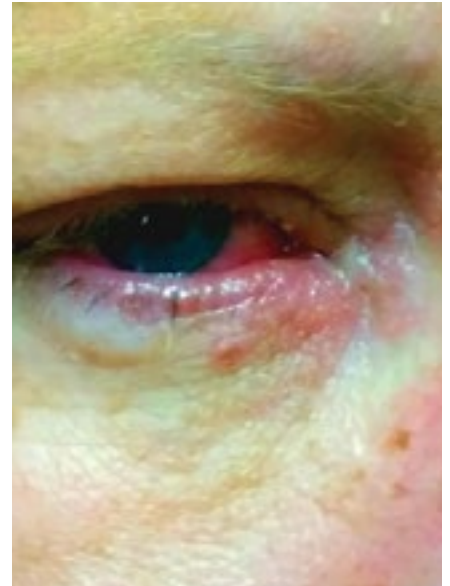
No relevant financial affiliations.

REFERENCES:

1. Bendre AA, Hartigan BJ, Kalainov DM. Mallet finger. *J Am Acad Orthop Surg.* 2005;13(5):336.
2. Davenport, M., & Tang, P. (2016). *Tintinalli's Emergency Medicine: A Comprehensive Study Guide (8th ed.)*. Chapter 268: Injuries to the Hand and Digits. McGraw-Hill Education.
3. Strauch, R. J. (2017). *Green's Operative Hand Surgery (7th ed.)*. Chapter 5: Extensor Tendon Injury and Chapter 8: Dislocations and Ligament Injuries of the Digits. Philadelphia, PA: Elsevier.
4. Hyatt MD, Brad (2016). Absent Ring Finger Flexor Digitorum Profundus Presenting as a Jersey Finger. *Journal of Hand Surgery*, 41 (5): 95-97.
5. Seiler III, J. G. (2017). *Green's Operative Hand Surgery (7th ed.)*. Chapter 6: Flexor Tendon Injury. Philadelphia, PA: Elsevier.
6. Leinberry, C., MD. (2009). Mallet Finger Injuries. *Journal of Hand Surgery*, 34A, 1715-1717. Retrieved July 13, 2017.
7. Renfree, K. J., MD. (2014). Acute, Closed Tendinous Mallet Injuries. *Journal of Hand Surgery*, 39, 2502-2505. Retrieved July 13, 2017.
8. Suh, N., MD, & Wolfe, S. W., MD. (2013). Soft Tissue Mallet Finger Injuries With Delayed Treatment. *Journal of Hand Surgery*, 38A, 1803-1805. Retrieved July 13, 2017.
9. Pike, J., MD, Goetz, T., MD, et. al. (2010). Blinded, Prospective, Randomized Clinical Trial Comparing Volar, Dorsal, and Custom Thermoplastic Splinting in Treatment of Acute Mallet Finger. *Journal of Hand Surgery*, 35A, 580-588. Retrieved July 13, 2017.
10. Leggit J. C. (2006). Acute finger injuries: part I. Tendons and ligaments. *American Family Physician*, 73 (5): 810.
11. Tuttle H. G. (2006). Tendon avulsion injuries of the distal phalanx. *Clinical Orthopedic Related Research*, 445:157.
12. Day, C. S. (2017). *Green's Operative Hand Surgery (7th ed.)*. Chapter 7: Fractures of the Metacarpals and Phalanges. Philadelphia, PA: Elsevier.

NOW SEEKING

CLINICAL IMAGES



OSTEOPATHIC FAMILY PHYSICIAN

ACCEPTING SUBMISSIONS FOR THE SECTION TITLED "CLINICAL IMAGES."

This section showcases clinical images from the wards that cover essential concepts or subject matter to the primary care physician.

Each installment of "Clinical Images" comprises 1 or 2 medical images along with a brief synopsis of how the case presented along with 1- 4 questions and approximately 1 page of education with reference to the image and questions.

Submissions should be submitted online at ofpjournal.com via our Scholar One publication process.

OFP

OSTEOPATHIC FAMILY PHYSICIAN
The Official Peer-Reviewed Publication of the
American college of Osteopathic Family Physicians



COME TOGETHER

Join us for five days of inspiration,
connection and medical education.

acofp | AMERICAN COLLEGE
OF OSTEOPATHIC
FAMILY PHYSICIANS



MED 18

OCTOBER 5 - 9, 2018

SAN DIEGO, CALIFORNIA

34.5 Category 1-A CME credits anticipated
for osteopathic family physicians.

Register online at acofp.org

2018 CALENDAR OF EVENTS

JULY 13 - 15, 2018

Direct Primary Care Summit
Indianapolis, Indiana
www.dpcsummit.org

JULY 16 - 22, 2018

AOA House of Delegates
Chicago, Illinois
www.osteopathic.org

JULY 25 - 29, 2018

Florida ACOFP Annual Convention
Orlando, Florida
www.fsacofp.org

AUGUST 2 - 5, 2018

acofpCA'42
California ACOFP Annual Scientific Medical Seminar
Anaheim, California
www.acofpca.org

AUGUST 2 - 5, 2018

Michigan ACOFP Summer Family Medicine Update
Mackinac Island, Michigan
www.maofpevents.org

AUGUST 3 - 5, 2018

POFPS Annual CME Symposium
Hershey, Pennsylvania
www.poma.org

AUGUST 10 - 12, 2018

North Carolina Society ACOFP Annual Meeting
Pinehurst, North Carolina
www.nc-acofp.org

AUGUST 24 - 26, 2018

ACOFP Intensive Update & Board Review
Rosemont, Illinois
www.acofp.org

OCTOBER 5 - 9, 2018

OMED®18
AOA/ACOFP Osteopathic Medical Conference & Exposition
San Diego, California
www.acofp.org

CME Resource: Osteopathic Family Physician Offers 2 Hours of 1-B CME

ACOFP members who read Osteopathic Family Physician can receive two hours of Category 1-B continuing medical education credit for completing quizzes in the journal. Visit the eLearning Center at www.acofp.org to access the quizzes.

Food Allergy: New Treatment Options

Chad Cochran, DO

Ronald Januchowski, DO, FACOFP, Editor | Paula Gregory, DO, FACOFP, Health Literacy Editor



Food allergies affect many people, including 4-6% of children under the age of 18. Children with food allergies are also more likely to have other allergic conditions or asthma. Children at high risk of food allergies are those with a strong family history of allergic conditions or those with eczema and egg allergies. There are over 170 known food allergies, with eight major ones that account for 90% of the food allergies in the United States. These include; milk, egg, peanut, tree nuts, soy, wheat, fish and shellfish. Food allergies send many people to the emergency room every year. While some children do outgrow their food allergies, being prepared for a reaction can save a life.

PREVENTION & MANAGEMENT

Children can typically outgrow allergies to milk, eggs, and wheat, but not always. It is important to see your osteopathic family physician to determine if further testing should be performed.

With regard to peanut allergies, there are some new changes recommended. The most current recommendation from the National Institute for Allergy and Infectious Disease (NIAID) is to introduce peanut-containing foods early, around 4-6 months. **You should never give whole peanuts at this age, as they are a choking hazard.**

If you have any symptoms of the food allergies listed, you should seek medical treatment immediately. Bad reactions can occur with any exposure to a food allergen, even if you have not had reactions in the past. In case of any emergency, you should call your doctor or 911 right away.

WHAT TO WATCH FOR:

Symptoms of an allergic reaction can involve many parts of the body. The lungs, stomach and skin are just a few. Symptoms can present in one or more of the following ways:

- Vomiting and/or stomach cramps
- Hives
- Shortness of breath, wheezing, cough
- Low blood pressure and weak pulse
- Tight throat, hoarse voice, trouble swallowing
- Swelling of the tongue, affecting the ability to talk or breathe
- Pale or blue coloring of skin
- Dizziness or feeling faint
- Anaphylaxis, a potentially life-threatening reaction that can impair breathing and send the body into shock; reactions may simultaneously affect different parts of the body (for example, a stomachache accompanied by a rash)

TREATMENT OPTIONS:

- Epinephrine (adrenaline) auto-injectors are the first-line treatment for anaphylaxis reactions. People with food allergies should always keep one of these with them at all times. If you use this treatment, you should seek medical treatment immediately for further evaluation.
- Once a food allergy is diagnosed, avoiding that food is typically the best treatment. This includes careful checking of food labels and asking about prepared food while eating at restaurants.
- Antihistamines and corticosteroids can also play a role in the treatment of more mild reactions but should not replace the role of epinephrine.

SOURCE(S): American College of Allergy, Asthma & Immunology. (2017). *Food Allergy*.

Centers for Disease Control and Prevention. (2017). *Food Allergies in Schools*. National Institute of Allergy and Infectious Diseases (NIAID). (2017). *Guidelines for the Diagnosis and Management of Food Allergy Frequently Asked Questions*.

The *Osteopathic Family Physician Patient Handout* is a public service of the ACOFP. The information and recommendations appearing on this page are appropriate in many instances; however, they are not a substitute for medical diagnosis by a physician. For specific information concerning your medical condition, ACOFP suggests that you consult your family physician. This page may be photocopied noncommercially by physicians and other healthcare professionals to share with their patients. **For additional patient related educational material please visit our website at www.acofp.org.**

Concussion: What to Do if You Think You Have One?

Nuzhat Nisa, MD

Ronald Januchowski, DO, FCOFP, Editor | Paula Gregory, DO, FCOFP, Health Literacy Editor



Concussion is the most common and sometimes serious type of brain injury. It is most often caused by a sudden direct blow or bump to the head. Concussion can happen during sports, car and bicycle accidents, work-related injuries, falls, and fighting. The brain is made of soft tissue. It is cushioned by spinal fluid and encased in the protective shell of the skull. When one sustains a concussion, the impact can jolt one's brain. Sometimes, it literally causes it to move around in the head. This can cause bruising, damage to the blood vessels, and injury to the nerves.

SIGNS OF A CONCUSSION:

Concussions are tricky. It is difficult to say for sure if one has a concussion. That's why one needs to see a doctor. For some problems, the person should go right to a hospital emergency room. For other problems, a call can be placed to the doctor for advice about what to do next.

Go to a hospital for these symptoms:

Loss of consciousness (knocked out), severe headache, including a headache that gets worse, blurred vision, trouble walking, confusion and saying things that don't make sense, slurred speech, unresponsive (can't be woken up).

One should call the doctor right away for these symptoms after getting hit in the head:

Vomiting, dizziness, headache and trouble concentrating.

IMPORTANT STEPS TO TAKE:

- An adult should monitor you for the first 24 hours. It's important to watch for behavioral changes.
- Do not give medications, including aspirin, which may cause bleeding.
- If concussion was sustained during athletic activity, stop play and sit it out. Brain needs time to properly heal, so rest is key.
- Do not resume play the same day. If play is resumed too soon, there is a greater chance of having a second concussion, which can compound the damage.
- Repeat concussions cause cumulative effects on the brain. Successive concussions can cause brain swelling, permanent brain damage, long-term disabilities, or even death. Victims are advised to not to return to normal activities if still have symptoms. Get a doctor's clearance so one can return to work or play with confidence.

PROTECT YOUR BRAIN:

By its very nature, a concussion is unexpected, so it is tough to prevent. But there are several common-sense precautions that can be taken to lessen the possibility:

- Wear protective equipment. Participation in high-contact, high-risk sports such as football, hockey, boxing, soccer, skateboarding, snowboarding, horseback riding, and roller blading are threat to brain's health. Wearing headgear, padding, mouth and eye guards and helmet can help safeguard against traumatic head injuries. Ensure that the equipment is properly fitted, well maintained, and worn consistently.
- Drive and ride smart. Always wear a seatbelt, obey posted speed limits, and don't use drugs or alcohol, because they can impair reaction time.
- Don't fight. Concussions are often sustained during an assault, and more males than females report traumatic head injuries.

GOOD NEWS:

All concussions do get better and you return to your normal daily routine.

SOURCE(S): American Academy of Neurology

The *Osteopathic Family Physician* Patient Handout is a public service of the ACOFP. The information and recommendations appearing on this page are appropriate in many instances; however, they are not a substitute for medical diagnosis by a physician. For specific information concerning your medical condition, ACOFP suggests that you consult your family physician. This page may be photocopied noncommercially by physicians and other healthcare professionals to share with their patients. For additional patient related educational material please visit our website at www.acofp.org.

American College of Osteopathic Family Physicians
330 East Algonquin Road, Suite 1
Arlington Heights, IL 60005

Non-Profit Org.
U.S. Postage
PAID
Carol Stream, IL
PERMIT NO.
1746



AUGUST 24 - 26, 2018

Loews Chicago O' Hare Hotel
Rosemont, Illinois

acofp | **INTENSIVE UPDATE**
& BOARD REVIEW

INNOVATIVE • COMPREHENSIVE • HANDS-ON

The ACOFP Intensive Update & Board Review in Osteopathic Family Medicine is a 3-day intensive workshop for family physicians and residents who want to update their knowledge, as well as for those preparing for their board exams.

Learn more and register at acofp.org