

Physicians' Concussion Management and Referral Patterns For Adolescent Athletes Following Sports-Related Concussion

Arika L. Cozzi, ATC; Cailee E. Welch, PhD, ATC*; Richelle M. Williams, MS, ATC†; Michelle L. Weber, MS, ATC*;
Ed Bujold, MD, FAAFP, GFMMC‡; Tamara C. Valovich McLeod, PhD, ATC, FNATA**

*A. T. Still University, Mesa, AZ; †University of Michigan, Ann Arbor, MI; ‡Family and Community Medicine, Wake Forest University, Winston-Salem, NC

INTRODUCTION

- While athletic trainers are primarily responsible for concussion management within the secondary school, they work closely with their team physician and community-based physicians who manage concussions outside of the school setting
- To establish proper communication with the athletic trainer, it is important to understand physicians' current knowledge and familiarity of concussion management
- However, little is known about the current concussion management and referral patterns of physicians associated with secondary schools
- The purpose of this study was to determine whether physicians' association with a secondary school influences their concussion management and referral patterns for adolescent athletes following a sport-related concussion

METHODS

Design and Participants

- Cross-sectional, self-reported online survey
- 94 physicians (4.7% response rate) from a convenience sample of physician members of the American Academy of Family Physician's National Research Network and American Osteopathic academy of Sports Medicine
- Participants included 58 males, 18 females, 18 missing
- The average age of participants was 46.7 ± 11.4 years

Procedures

- Participants were solicited via email to complete the *Physicians' Beliefs, Attitudes, and Knowledge of Pediatric Athletes with Concussions (BAKPAC-PHYS)* survey

Instrumentation and Main Outcome Measures

- The *BAKPAC-PHYS* consisted of several multipart questions to assess physicians' current concussion management practices regarding administration and involvement in baseline and follow-up concussion testing as well as established relationships with other health care providers
- The independent variable was the physician association (Team physician, community-based physician)
- The dependent variables were participants' responses to questions regarding concussion management/referral patterns

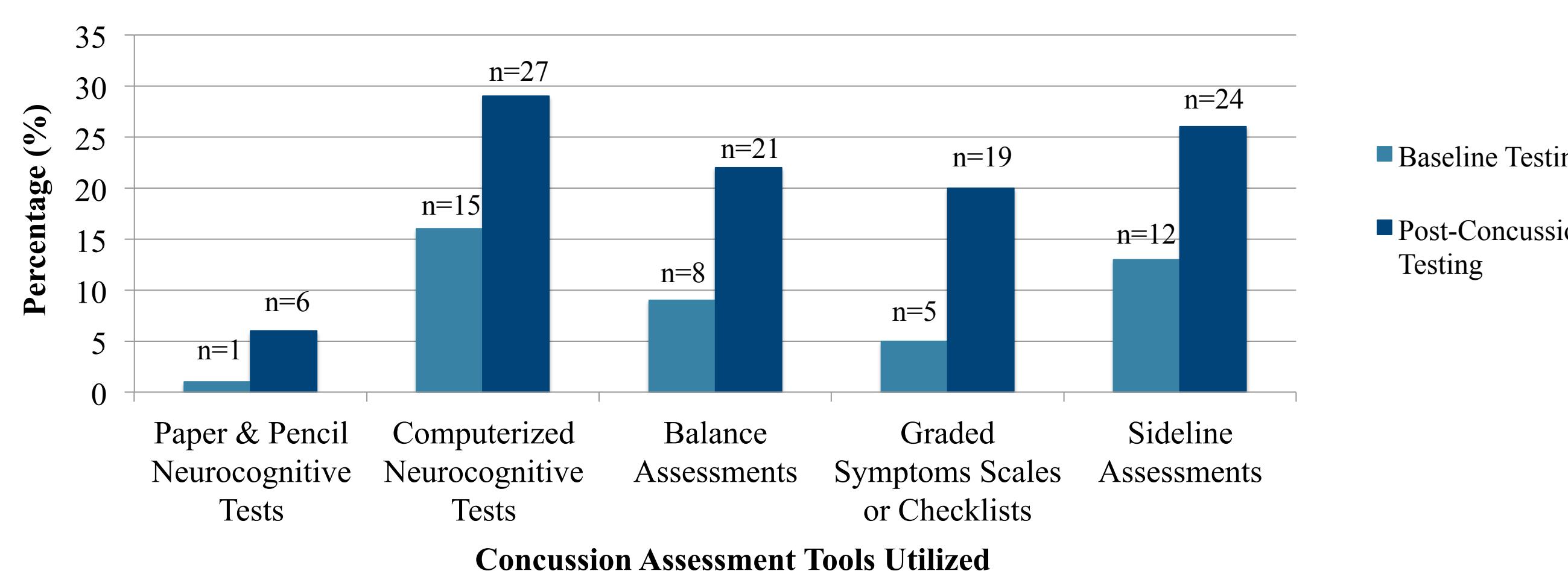
Statistical Analyses

- Descriptive analyses ($\text{mean} \pm \text{SD}$, frequencies) were used to describe overall practices
- Mann-Whitney U tests were utilized to determine differences regarding association roles in baseline and follow-up concussion testing

RESULTS

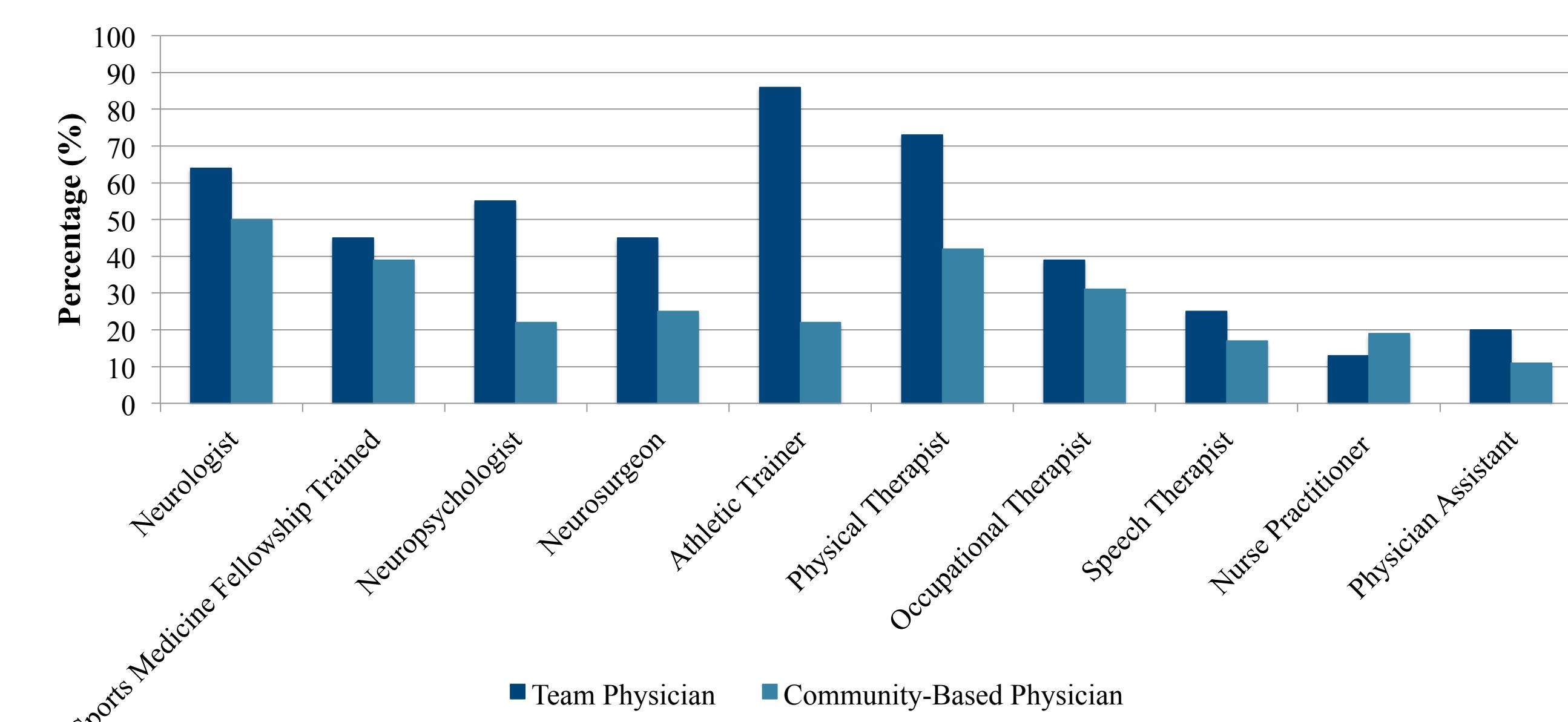
- On average, team physicians ($n=56$) managed 38.9 ± 48.1 concussions per year while community-based physicians ($n=36$) managed 3.1 ± 4.3 concussions
- A significant group difference was found regarding baseline concussion assessment testing ($P = .031$); 77.8% of team physicians ($n=28$) did not offer baseline testing in their practice, while 58.3% of community-based physicians ($n=21$) did not
- There was no significant difference regarding post-concussion testing ($P = .182$)
- Regardless of physician association, the most commonly used concussion assessment tools during both baseline testing and post-concussion testing was computerized neurocognitive tests (Figure 1)

Figure 1. Description of Concussion Assessment Tools Utilized By Both Team and Community-Based Physicians



- Team physicians most commonly reported having an established relationship with athletic trainers (85%, $n=48$), physical therapists (73.2%, $n=41$) and neurologists (64.3%, $n=36$)
- Community-based physicians most commonly reported having an established relationship with neurologists (50%, $n=18$) and physical therapists (41.7%, $n=15$); only 22.2% ($n=8$) community-based physicians had an established relationship with an athletic trainer (Figure 2)
- Of the team physicians that had an established relationship with an athletic trainer, 45.8% ($n=22/48$) always and 18.8% ($n=9/48$) almost always referred concussed adolescent to athletic trainers

Figure 2. Description of Physicians' Established Relationships With Other Healthcare Professionals



CONCLUSIONS

- Our results highlight that team physicians have better established relationships with a variety of health care providers and are more likely to include athletic trainers in their referral process for concussed adolescent athletes
- Athletic trainers should continue to strengthen their relationships with their team physician and seek out opportunities to educate and collaborate with community-based physicians who are not associated with their secondary school to build a stronger interprofessional concussion management teams (Table 1)

Table 1. Concussion Management Roles¹

Healthcare Professional	Roles	Resources
Athletic Trainer	<ul style="list-style-type: none"> Immediate care Management/assessment 	http://www.nata.org/
School Nurse	<ul style="list-style-type: none"> Symptom Assessment at school 	http://www.nasn.org/
Primary Care Physician	<ul style="list-style-type: none"> Referral to further specialist Concussion Management 	http://www.aafp.org/home.html
Neuropsychologist	<ul style="list-style-type: none"> Neuropsychological evaluation Neurocognitive test interpretation 	https://www.nanonline.org/Default.aspx
Neurologist	<ul style="list-style-type: none"> Long term concussion management care Neurocognitive testing 	https://www.aan.com/
Vestibular Physical Therapist	<ul style="list-style-type: none"> Vestibular rehabilitation therapy for treatment of dizziness, oculomotor or balance deficits 	http://www.neuropt.org/special-interest-groups/vestibular-rehabilitation

1. Williams RM, Valovich McLeod TC. Which medical professionals should be part of my concussion management team? Quick Questions in Sport-Related Concussion. Edited by Valovich McLeod TC. 2015; Thorofare, NJ: Slack, Inc.