Overview
Since its beginnings in the 1990's, the science behind the clinical management of concussion has steadily evolved from the use of "one size fits all" guidelines to a more sophisticated, evidenced-based model. This approach has been based on the reality that concussions are experienced and reported differently by different people and that concussed athletes recover at different rates.
Over the past 15 years, ImPACT has developed and implemented a concussion management model that is tailored to the individual and involves many health care specialties. This model is embodied within the ImPACT Best Practice Model.

The article featured in this report presents a sophisticated, multi-disciplinary model for the management of concussion that is based on years of published research. This model highlights the need for multiple assessment modalities and emphasizes the unique contributions of health care professionals from different specialties.

**A Brief History of Concussion Evaluation and Rehabilitation**

Although concussion has long been recognized as a potential consequence of competitive sports, prior to the 1990's, management recommendations were limited to guidelines that were based on a consensus of small panels of physicians rather than being based on scientific evidence. In fact at one point in time during the 1990's, over 20 separate concussion guidelines existed, leading to significant confusion amongst health care professionals. However, in the late 1990's, the concussion management landscape began to change.

**Early Beginnings and the Evolution of Concussion Management**

The publication of a study by Barth and his colleagues from the University of Virginia paved the way for the work done by myself and my colleagues in the introduction of a baseline and post-injury neuropsychological assessment program with the Pittsburgh Steelers. With the accelerated use of the personal computer in the 1990's, the ImPACT program was introduced and eventually became utilized by the entire National Football League. Over time, use of the ImPACT test became more broadly accepted by many major professional sports organizations in the United States such as the National Hockey League, Major League Baseball, NASCAR, Indianapolis Racing League and the US Ski and Snowboard Association, to name just a few. More importantly, this approach is now utilized through ImPACT with thousands of colleges, high schools and many junior sports organizations (Got Soccer, USA Soccer, the New York State Public High School Athletic Association and the Arizona Interscholastic Association).

A particularly important initial step in the evolution of a more evidenced-based concussion management model was taken with the initial meeting of the Concussion in Sports (CIS) group in Vienna, Austria in 2001. The CIS group included a panel of international experts and published the first comprehensive and individually based model of concussion management. This group emphasized the value of neurocognitive testing as well as a progressive, graded approach to return to play that was based on the individual athlete’s signs and symptoms. Return to play was based on the athlete having normal results on neurocognitive testing, as well as being asymptomatic—both at rest and following physical exertion. This model was widely adopted and put into practice internationally and continues to be popular to this day.

As important as the CIS meetings have been in shaping formal recommendations for the management of concussion and return to play after injury, these recommendations have not provided a comprehensive model that highlights specific approaches to treatment and rehabilitation.

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**ImPACT’s Ongoing Commitment to Research**

ImPACT’s database of clinical research contains more than 215 peer reviewed and over 145 independent studies to date. [Click here](www.impacttest.com/research) or visit **www.impacttest.com/research** to read more.
The recently published article, “Establishing a Clinical Service for the Management of Sports-Related Concussion,” which appeared in a special supplement of the journal Neurosurgery, presents a multi-disciplinary model of evaluation and treatment of sports related concussion and provides a conceptual framework for the establishment of a comprehensive concussion management program.

A Brief Summary of the Article
The Reynolds et al. article provides an excellent, detailed summary of how to establish a multi-disciplinary program designed to maximize recovery from injury. This program significantly extends the management of concussion beyond the graded exertion program popularized by the CIS group. More specifically, the clinical model discussed in this article not only identifies common concussion subtypes, but suggests treatment strategies linked to specific symptom profiles. This represents an advancement that may lead to better short and long-term outcome.

This model is based on published research and also incorporates information of the rich experiential base of the University of Pittsburgh Medical Center Sports Concussion program, which was the first and largest program of its kind in the United States.

The UPMC model employs multiple health care providers including neuropsychologists, physicians, athletic trainers and physical therapists, depending on the individual needs of the patient. For instance, if the patient's symptoms are primarily ocular-motor in nature, one specific focus of treatment might be visual therapy. If the primary issue or issues is more cognitive in nature, there may be more focus on the neuropsychological issues that exist. Patients who suffer from debilitating headaches may need a more pharmacologic approach to treatment.

The bedrock of the UPMC model is the categorization of concussion in terms of symptom clusters that provide a strategy for treatment based on “clinical trajectories.” These trajectories represent targeted clinical pathways and involve cognitive, cervical, migraine headache, vestibular, ocular, and anxiety symptom clusters. This article is a “must read” for anyone who is considering the establishment of a broad-based concussion management program or who is interested in improving the recovery of their concussed patients.

1 Schneider, R.C., (1973). Head and neck injuries in football. Williams & Wilkins, Baltimore.