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Advanced Sports Medicine Concepts and Controversies

The Evolution of Physical Medicine and Rehabilitation in Sports Medicine

Michael Fredericson, MD, FACSM

Introduction

Sports medicine and physical medicine and rehabilitation (PM&R) have shared roots. Frank Krusen, MD, who is considered the father of physical medicine for his efforts to establish PM&R as an entity in the American Board of Medical Specialties, was one of the first sports medicine team physicians. Krusen, like many of his predecessors and early leaders in that field, was drawn to PM&R as a result of his interest in physical education, exercise physiology, and athletics [1]. Mirroring Krusen's mindset were some of the first U.S. organizations for sports medicine: the American Association for Health, Physical Education, and Recreation in the late 1800s; the National Athletic Trainers' Association in 1938; and the American College of Sports Medicine (ACSM), which was founded by physiologist Joseph Wolfe, PhD, in 1954. This report first profiles clinicians whose contributions to sports medicine and PM&R were essential to the establishment of those disciplines in the spectrum of health care and then provides an overview of the evolution of sports medicine education and training programs in PM&R.

Early Leaders in PM&R and Sports Medicine

Among the early leaders in PM&R and sports medicine was R. Tait McKenzie, MD, an educator, sculptor, and soldier who pioneered physical fitness programs in Canada [2]. A highly accomplished gymnast and overall athlete, McKenzie believed that training and body conditioning would prevent disease, physical breakdown, and accidents, and he developed a program of physical exercise to guard against those events. In 1904, he accepted an appointment at the University of Pennsylvania in Philadelphia that offered him a permanent faculty position and use of the university's new athletic facilities. His position as director of the Physical Education Department there came with the opportunity to develop, test, and implement his theories on health and athletics.

In 1915, at the outbreak of the First World War, McKenzie made his way to England, where he enlisted with the British Royal Army Medical Corps. During that time he reorganized the training program for new soldiers and restructured their hospital facilities "to emphasize fitness and restorative therapy to improve function of the wounded and allow them to return to duty" [2]. He was subsequently recognized as a pioneer in sports medicine by leaders of the ACSM and by sports historians.

Frank Krusen, MD, mentioned previously as the father of physical medicine, published more than 100 articles on the use of physical agents in medical treatment and was an early advocate of the use of physical therapy to treat injured athletes [3]. In 1926 at the young age of 26, Krusen moved to Philadelphia, Pennsylvania, to assume the associate deanship at Temple University, where 3 years later he established the Department of Physical Medicine (a term he coined), of which he was subsequently installed as chairman. He also was appointed team physician for the Temple University football team and, as such, became the first sports medicine physiatrist. That was a milestone for its time, because until that date only nonphysicians (ie, athletic trainers, physical education instructors, physiologists) provided care for injured athletes.

In 1935, an opportunity arose for Krusen to expand the field of physical medicine when he was appointed chairman of the new section of physical therapy at the Mayo Clinic in Rochester, Minnesota. An active proponent of physical therapy, he was appointed to the American Medical Association (AMA) Council on Physical Therapy [3]. It was in that role that he began a collaboration with John S. Coulter, MD, who was president of the American College of Physical Therapy and later the director of the first physical medicine academic program at Northwestern University in Chicago, Illinois [3]. Coulter had focused on the importance of physical therapy since his experience as an Army physician after World War I. He understood the role of physical therapies such as heat, water, massage, and exercise in the

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treatment of disease and believed that physicians must understand and oversee the use of those measures in clinical medicine, educate medical students and other physicians about such treatments, and instruct technicians to become proficient in their use.

Frances Hellebrandt, MD, was a physiologist and physiatrist whose academic interests in exercise physiology were similar to those of McKenzie several generations earlier. Her work in exercise physiology had a substantial influence on the development of PM&R and sports medicine [4]. She contributed to the establishment and development of the departments of PM&R at the Medical College of Virginia (now Virginia Commonwealth University) in Richmond, Virginia; the University of Wisconsin in Madison, Wisconsin; and the University of Illinois in Champaign-Urbana, Illinois, and her published work addressed a broad range of topics, including exercise physiology, physical education, physical therapy, and PM&R. Her research investigated the properties of muscle, the science of exercise, and the pathophysiology of muscle disorders, and she is perhaps best known for her theory of muscle overload and pacing that expanded the work of DeLorme and Watkins [5], who developed progressive resistance exercise during World War II. Dr. Hellebrandt also collaborated in her research with Peter Karpovich, PhD, an exercise physiologist at Springfield College in Springfield, Massachusetts, who was one of the principal founders of the ACSM.

In 1932, George Deaver, MD, who often is considered to be the grandfather of rehabilitation medicine [6] and the progenitor of PM&R, coauthored with John Coulter, MD, the influential article titled "Physical Medicine Applied to Athletic Injuries" [1]. Keenly interested in physical medicine and fitness, Deaver practiced sports medicine and also coauthored the text titled *Prevention and Treatment of Athletic Injuries* in 1936 [1]. Deaver served as the medical director of the School of Physical Therapy at New York University and director at the Institute for the Crippled and Disabled (a name later changed to the International Center for the Disabled) in New York City. In 1947, he joined Howard Rusk, MD, to establish the first nonmilitary rehabilitation service at New York University—Bellevue Medical Center in New York City.

In the 1940s and 1950s, Bernard M. Baruch, New York philanthropist and financier, recognized the need to return the war-injured to a state of optimal function. His efforts were largely responsible for the expansion of the field of PM&R at that time. Baruch established a committee of medical and scientific experts in 1943 that included Drs. Krusen, Rusk, and Coulter to plan for and invest in the development of the medical specialty of PM&R [1]. A subcommittee on physical fitness chaired by Robert Darling, MD, the first chairman of the Department of Rehabilitation Medicine at Columbia University in New York City, emphasized the importance of physical fitness and exercise physiology to the development of PM&R. That committee's report [7], published in the *Journal of the American Medical Association*, describes the functional and holistic focus of PM&R in its definition of fitness. The report, which states that "Physical fitness is the functional capacity to perform a task and encompasses the psychological will to do the task as well as the physical attributes such as cardiovascular, muscular, and nervous system attributes" [7], suggests that all physical examinations should include assessments of physical fitness and function, especially for people with a disability, and recommends a prescription identifying specific training or therapy when necessary [1].

In 1947, the American Board of Medical Specialties and the AMA recognized PM&R as a medical specialty. Although the groundwork for PM&R was thus cemented, the expertise of its practitioners was not fully understood. In 1966, Leonard Policoff, MD, stated the frustration of the times in a speech read before attendees of the section on Physical Medicine during the 115th annual convention of the AMA as follows: "The specialty of physical medicine and rehabilitation has almost reached its majority, a 20-year period having elapsed since the founding of its qualifying specialty board. Despite the time lapse and a productive literature, an abysmal ignorance of the true capabilities, viewpoints, and techniques of the practitioners of this specialty and of the specialty itself continues to be widespread. The family physician, the specialist, and the academician seem to share equally a lack of understanding of the specialty of physical medicine and rehabilitation" [8].

Physiatric Association for Spine, Sports, and Occupational Rehabilitation: Redefining PM&R and Sports Medicine

Fortunately, in the last several decades, we in PM&R have made great strides in gaining appreciation from colleagues and patients for our capabilities, particularly those pertaining to musculoskeletal and sports medicine. The guidance of leaders such as Dr. Krusen and later Dr. Ernie Johnson at Ohio State University in Columbus, Ohio, has ensured that physical medicine has always been a featured part of what we as clinicians do. However, the opinions of physical medicine practitioners and those focused on rehabilitation sometimes still differ as they often did in the early days of PM&R. Many PM&R specialists chose jobs in outpatient musculoskeletal medicine, but the bulk of training for residents was performed in patients hospitalized for rehabilitation.

In 1994, the formation of the Physiatric Association for Spine, Sports, and Occupational Rehabilitation (PASSOR) by Jeffrey Saal, MD, tried to address that schism. One of the early missions of that group was an emphasis on nonsurgical and minimally invasive

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