



Review

Efficacy of clinical gait analysis: A systematic review

Tishya A.L. Wren^{a,b,*}, George E. Gorton III^c, Sylvia Õunpuu^d, Carole A. Tucker^e^a Children's Orthopaedic Center, Children's Hospital Los Angeles, Los Angeles, CA, United States^b Departments of Orthopaedics, Radiology, and Biomedical Engineering, University of Southern California, Los Angeles, CA, United States^c Shriners Hospitals for Children[®], Springfield, MA, United States^d Connecticut Children's Medical Center, Farmington, CT, United States^e Temple University, Philadelphia, PA, United States

ARTICLE INFO

Article history:

Received 25 October 2010

Received in revised form 3 February 2011

Accepted 10 March 2011

Keywords:

Gait analysis

Efficacy

Effectiveness

Evidence based medicine

ABSTRACT

The aim of this systematic review was to evaluate and summarize the current evidence base related to the clinical efficacy of gait analysis. A literature review was conducted to identify references related to human gait analysis published between January 2000 and September 2009 plus relevant older references. The references were assessed independently by four reviewers using a hierarchical model of efficacy adapted for gait analysis, and final scores were agreed upon by at least three of the four reviewers. 1528 references were identified relating to human instrumented gait analysis. Of these, 116 original articles addressed technical accuracy efficacy, 89 addressed diagnostic accuracy efficacy, 11 addressed diagnostic thinking and treatment efficacy, seven addressed patient outcomes efficacy, and one addressed societal efficacy, with some of the articles addressing multiple levels of efficacy. This body of literature provides strong evidence for the technical, diagnostic accuracy, diagnostic thinking and treatment efficacy of gait analysis. The existing evidence also indicates efficacy at the higher levels of patient outcomes and societal cost-effectiveness, but this evidence is more sparse and does not include any randomized controlled trials. Thus, the current evidence supports the clinical efficacy of gait analysis, particularly at the lower levels of efficacy, but additional research is needed to strengthen the evidence base at the higher levels of efficacy.

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1. Introduction

The appropriate role of gait analysis in clinical care remains controversial. Proponents argue that gait analysis provides important information needed to optimize the care of patients with complex walking problems [1]. Opponents counter that, although gait analysis is a useful tool for research, as a clinical tool it adds unnecessary cost without providing any proven benefits to individual patients [2]. Consequently, the utilization of gait analysis is highly variable [3]. Whether or not gait analysis is used is largely determined by individual physician preference, availability of motion analysis services, and insurance coverage, which is also highly variable. The uneven utilization and reimbursement are at least partially due to differences in interpreting the evidence related to the efficacy of clinical gait analysis.

Evaluating the clinical impact of a diagnostic test is complex because diagnostic tests have an indirect effect on patient outcomes [4,5]. By influencing the treatment decision-making process, gait analysis may affect patient management and, consequently, patient outcomes. Fryback and Thornbury have proposed a widely used framework for evaluating the efficacy of a diagnostic test [4,5]. This framework organizes evidence of efficacy into a hierarchy of levels ranging from technical data acquisition to treatment decision-making to patient and societal outcomes. This framework was first used to evaluate magnetic resonance imaging, but can also apply to diagnostic tests in general [6,7]. It is widely used in medical technology assessments such as those conducted by the United States (U.S.) Agency for Healthcare Research and Quality (AHRQ) Technology Assessment Program, which provides information contributing to coverage decisions by the U.S. Centers for Medicare and Medicaid Services and insurance carriers [6,7]. In this review, we utilize this framework to evaluate clinical gait analysis.

The aim of this systematic review was to evaluate and summarize the current evidence base related to the clinical efficacy of gait analysis. As noted above, the review was performed using the established framework developed by Fryback and Thornbury [4,5]. Evidence of efficacy is needed by patients,

* Corresponding author at: Children's Hospital Los Angeles, 4650 Sunset Blvd., #69, Los Angeles, CA 90027, United States. Tel.: +1 323 361 4120; fax: +1 323 361 1310.

E-mail address: twren@chla.usc.edu (Tishya A.L. Wren).