Exploring functional limitations in people with traumatic and nontraumatic neck pain

Chapter 10

IMPACT PARAGRAPH

This chapter provides a reflection on the relevance and innovativeness of the findings described in this thesis. It presents the scientific and social impact of the results from the perspective of patients, health care professionals and researchers.

Relevance

Neck pain is one of the most prevalent and burdensome health problems, with substantial impact on the patient's own and public health [1,2]. Neck pain is also regarded as one of the most disabling health conditions worldwide [1,3]. The economic burden related to neck pain is increasing and costs are rising, mainly due to work absenteeism and usage of health care services. People with neck pain form a highly diverse population presenting differences in patho-anatomic changes, biomechanical behaviour of the spine, physical impairments, activity limitations, personal factors, and societal factors. Despite its high prevalence in and high impact on society, knowledge gaps on the topic of neck pain remain.

The studies conducted in this thesis address a number of important research priorities. First, it is considered important to identify clinical features and clinically important subgroups within the heterogeneous population of people with neck pain in order to contribute to a specific diagnosis, and to identify which treatment leads to a better outcome for specific individuals with neck pain [4]. A special focus lies on the subgroup of traumatic neck pain.

Further, the studies conducted in this thesis answer the need for the development and evaluation of diagnostic instruments for differential diagnosis of neck pain. This includes investigating the measurement properties of these instruments [4]. Finally, the studies carried out in this thesis meet the recommendations to ensure that the methods used, and the research data generated, are clinically applicable and easy to use to ensure that research evidence is used to guide neck pain management [4].

Innovativeness

The innovative elements of this thesis involve: 1) the development and validation of new, clinically applicable measurement instruments; 2) the implementation of a new method to evaluate the clinimetric properties of measurement instruments to reliably quantify cervical range of motion, and 3) a new approach to gain a better understanding of the differences in complexity between nontraumatic neck pain and traumatic neck pain.

Despite aCROM being the most routinely collected measure of function by physiotherapists, valid and applicable instruments to assess 3-dimensional aCROM are lacking. To that purpose, a valid and new, condition specific and clinically usable iPhone application that measures planar aCROM and associated 3-dimensional coupling motions, was developed.

Another innovation is the development of a new condition-specific and clinically relevant questionnaire, tailored specifically to people with traumatic neck pain, which measures activity limitations and participation restrictions, as defined by the ICF framework [5]. Using this questionnaire allows clinicians to address the specific limitations of people with traumatic neck pain, while not simultaneously measuring other theoretical constructs of health.

Assessment of neck mobility is used for diagnostic purposes and for evaluating effects of therapy, both in clinical settings and in scientific research. ACROM values normally vary between measurement sessions due to biological variation, even if the patient's neck pain related symptoms remain stable over time. Traditionally, research on measurement error of instruments measuring cervical mobility is carried out with two testers and two measuring moments in short succession. In clinical practice, however, measurements are often carried out with more days in between assessments, which is why we introduced a study method performing measurements 3 times a day, on 7 days, spread over a period of 3 weeks, to explore intraday and interday variability of aCROM in order to better interpret aCROM measurements in clinical practice and research.

People with traumatic neck pain demonstrate higher levels of disability compared to people with nontraumatic neck pain and different mechanisms seem to be at the root of nontraumatic neck pain and traumatic neck pain. Both groups are assumed to represent complex health conditions. The degree of complexity lies in the unpredictable and nonlinear relationship between clinical features, in how they interact, and in how they affect disability. In order to explore differences between nontraumatic neck pain and traumatic neck pain, however, previous studies mostly limited themselves to reporting differences in clinical characteristics between the conditions. This, however, appears to be insufficient in terms of accounting for account for the complex, multifactorial nature of the health problems. To the best of our knowledge, we were the first to explore interactions between potential factors explaining disability in people with nontraumatic neck pain as compared to those with traumatic neck pain.

Scientific impact

The findings presented in this thesis contribute to the body of scientific knowledge about the characteristics of people with neck pain and the different subgroups. Measurement tools and knowledge about differences between subgroups and distinctive clinical features of people with neck pain are used in the design of new research and in the interpretation of available evidence. Acquired knowledge is implemented in the educational program and research programs of SOMT University of Physiotherapy, and in addition, the newly developed questionnaire and the iPhone application have been used in research programs of different universities. The developed measurement instruments (questionnaire and ROM application) for example, have been used by researchers and students in two large scientific projects, in which the specific limitations of subgroups of people with neck pain were assessed.

Conducting the research for this thesis also contributed to the research collaboration between SOMT University of Physiotherapy and the Vrije Universiteit in Brussels, resulting in joint research and educational activities. Moreover, interprofessional collaboration was achieved in other research projects in which researchers from different departments and universities took part. Finally, studies in this thesis explore new methodological challenges to investigate the measurement properties of instruments, and to understand the complexity of neck pain. As such, they offer insights into the challenges of different methodologies used in our practice-based research.

Societal impact

The higher goal of this thesis was to improve care for people with neck pain in primary health care. With the results of this thesis, health care professionals can now use specific diagnostic and evaluative instruments that are clinically applicable and easy to interpret. The knowledge gained in this thesis is being used by physiotherapists and students at SOMT University of Physiotherapy for diagnostic, prognostic and therapeutic purposes. The results of our research provide insights into relevant clinical characteristics of people with neck pain that can be used to set a patient-specific diagnosis and can be used to direct treatment decisions. This may lead to better outcomes for specific individuals with neck pain and could reduce the burden of neck pain for the individual patient and society,

assuming that better treatment outcomes are likely when the treatment is tailored to individual-specific characteristics.

Activities and further dissemination

All research articles have been submitted or published in international peer-reviewed journals. Summaries of the findings have been presented on several conferences and symposia, where we shared our acquired knowledge with other researchers and professionals. Furthermore, research results are also shared with other universities, for instance through means of providing capita selecta, as was the case at the Vrije Universiteit in Brussels. To spread our knowledge in the most efficient way among clinicians in The Netherlands, we published summaries in Dutch in the 'Fysiopraxis', the journal of the Royal Dutch Society for Physical Therapy (KNGF), and have used social media to highlight and disseminate our results. Our work has already been cited by other authors for over 100 times.

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