

Appraisal

Clinimetrics: Neck Disability Index

Summary

The Neck Disability Index (NDI) is the most widely used assessment tool measuring disability due to acute and chronic neck pain or neck injury.^{1,2} It has been recommended in both Australian and international guidelines as a suitable tool for the assessment of patients with acute whiplash-associated disorders and other neck pain.^{3–5} It can also be used to monitor the effects of treatments over time and to classify chronic whiplash-associated disorder recovery status.⁶

The NDI is a modification of the Oswestry Low Back Pain Disability Index,⁷ and consists of 10 items: pain intensity, personal care, lifting, reading, headaches, concentration, work, driving, sleeping and recreation. The patient rates the impact of their neck pain by ticking one of six boxes on a Likert scale. The tool takes approximately 5 to 10 minutes for the patient to self-administer and requires no special training.² The tool is free to access and can be printed from the Internet.

Instructions and scoring: The total score for the NDI is out of 50. Each of the 10 sections is rated as none, slight, moderate, fairly severe, very severe and worst imaginable, with semantic variations depending on the section. These options correspond with a score

(0 to 5) in ascending order of severity; therefore, a higher total score indicates a higher level of disability. The total score can easily be converted to a percentage by doubling it.

Reliability, validity and responsiveness: There is some disagreement about the reliability of the NDI. Some individual studies have reported high internal consistency and test-retest reliability.^{2,8} However, a systematic review with a particular focus on the quality of the studies concluded that there was limited overall evidence of poor reliability.⁹ Construct validity has been tested against other pain and disability measures such as the SF36 Health Survey Questionnaire and the Visual Analogue Scale, with which the NDI has strongly correlated.^{10–12} Structural validity is supported by moderate evidence and content validity is supported by limited evidence.⁹ The NDI has been translated into 15 languages, although the validity of these versions is generally unsupported with high-quality evidence.¹³ Responsiveness has varied across studies but is generally considered to be moderate.⁹ Minimum detectable change measurements vary from 4.2 to 13.4, and minimum clinically important differences vary from 5 and 9.5.^{2,9,14,15}

Commentary

The NDI is a time-efficient tool that is used to measure the physical effects of neck pain. The uncertainty about some of the clinimetric properties suggests that more high-quality research is needed, not necessarily because the tool has poor clinimetric properties. The uncertainty about responsiveness may suggest it is not the best tool for monitoring very small changes on regular intervals. The advantages are that it is a free, fast and easy to use tool that requires no special training, is widely used, and the score expressed as a percentage can be readily understood by others.

Clinicians should consider that the NDI does not measure the emotional or social aspects of neck pain. Psychological distress such as fear/avoidance and catastrophising could confound the results of the NDI.¹⁶ Ideally, clinicians would make a more thorough assessment that includes a measure of the patient's psychological distress and prioritise treatment accordingly.

A novel use for the NDI is as a tool in a stratification treatment model. The NDI in addition to hyperarousal symptoms (a post-traumatic stress symptom cluster) and age comprise a clinical risk-screening tool (WhipPredict) that was recently developed and validated. Risk stratification treatment models have been shown to improve patient satisfaction and decrease the economic burden of back pain in the StarT Back trial,¹⁷ and this approach is currently being tested in patients with neck pain.¹⁸ In another trial, when patients identified by WhipPredict as being at medium to high risk of poor recovery were provided with physiotherapist-led integrated psychological and exercise intervention, they reported clinically relevant improvements in pain-related disability compared with exercise alone.¹⁹

Overall, despite uncertainty about some measurement properties, the NDI is an efficient and trustworthy tool to measure and monitor neck-related disability.

Caitlin Jones^a and Michele Sterling^b

^aInstitute for Musculoskeletal Health, University of Sydney
^bRECOVER Injury Research Centre, The University of Queensland, Australia

References

- Vernon H, Mior S. *J Manipulative Physiol Ther.* 1991;14:409–415.
- MacDermid JC, et al. *J Orthop Sports Phys Ther.* 2009;39:400–417.
- Guidelines for the management of acute whiplash-associated disorders – for health professionals. Sydney: SIRA (NSW); 2014.
- Bier J, et al. *Phys Ther.* 2018;98:162–171.
- Blanpied P, et al. *J Orthop Sports Phys Ther.* 2017;47:A1–A83.
- Croft AC, et al. *J Chiropr Med.* 2016;15:95–101.
- Fairbank JC, et al. *Physiotherapy.* 1980;66:271–273.
- Jorritsma W, et al. *Eur Spine J.* 2010;19:1695–1701.
- Schellingerhout JM, et al. *Qual Life Res.* 2012;21:659–670.
- Ackelman BH, Lindgren U. *J Rehabil Med.* 2002;34:284–287.
- McCarthy MJH, et al. *Eur Spine J.* 2007;16:2111–2117.
- Jorritsma W, et al. *Eur Spine J.* 2012;21:93–100.
- Schellingerhout JM, et al. *BMC Med Res Methodol.* 2011;11:87.
- Young IA, et al. *Am J Phys Med Rehabil.* 2010;85:831–839.
- Pool JJ, et al. *Spine.* 2007;32:3047–3051.
- Young SB, et al. *Pain Med.* 2009;10:310–318.
- Hill JC, et al. *Lancet.* 2011;378:1560–1571.
- Rebbeck T, et al. *J Physiother.* 2016;62:111.
- Sterling M, et al. *Br J Sports Med.* 2019;53:1240–1247.