The NDI and ODI, Relationships and Limitations

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SESSION II: PATIENT REPORTED OUTCOMES: CURRENT PRACTICES AND FUTURE STRATEGIES

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1. Introduction:

The Neck Disability Index (NDI) and Oswestry Disability Index (ODI) are the most commonly utilized questionnaires addressing disability related to neck and back problems respectively. (Vernon 1991, Fairbanks 1984)\(^1\)-\(^5\)

   a. assess "activities of daily living" providing more information than pain severity, location and duration.

2. The Neck Disability Index

   a. First published in 1991 (Vernon & Mior 1991)\(^1\)

   b. Patterned off the ODI

      i. 10 items with maximum score of 50

         1. scoring: 0-4 no disability; 5-24 mild; 15-24 moderate; 25-34 severe; >35 complete disability (Vernon 1991)\(^1,3\)

      ii. five items are the same as those of the ODI and one is similar

         1. unique items: ‘headache’, ‘concentration’, ‘reading’, driving’ and ‘work’


   c. Most widely used and most thoroughly validated of all self-rated scales of disability related to neck pain (Pietrobon 2002)\(^6\)

   d. Internal consistency varies from .74 to .93 Cronbach \(\alpha\) values in neck pain studies

   e. Minimum clinically important change reported to be less than 2 points in some studies on neck pain but Pool et al showed that MCID was 10.5 (Pool 2006)\(^7\)

      i. Cleland et al showed MCID was 10.2 in patients with cervical radiculopathy (Cleland 2006)\(^8\)

   f. Uses

      i. Classically applied to patients with neck pain from whiplash injury and further applied to evaluate nonoperative treatment modalities

         1. Clinical trials of manipulation, mobilization, physiotherapy, exercise, acupuncture, medication, cervical pillow, laser and relaxation

      ii. Has been applied in the surgical literature to evaluate the response to surgery for cervical radiculopathy, myelopathy and cervical deformity with variable success.

         1. Key outcome measure in PRCT of disc arthroplasty and ACDF

         2. Used to identify a C2-C7 SVA (cervical deformity) threshold of disability (4 cm) (Tang 2012)\(^9\)

      iii. Has been used to validate other neck pain questionnaires
iv. Translations available in many languages
   1. Vernon (1st author) collaborated with French MAPI co. and multiple translations are available at www.proqolid.com

3. The Oswestry Disability Index
   a. First published in 1980 (Fairbank 1980)²
   b. Most common back pain specific outcome measure
   c. Has been multiply modified by the original authors: versions 1.0, 2.0, 2.1, 2.1a
   d. Has been modified without the author's approval by multiple groups
      i. UK Chiropractic version omitted the “sex question”, added a ‘working’ question and modified the language to improve applicability in less impaired patients
      ii. Sex question is often omitted in many studies on pediatric spondylolisthesis, metastatic cancer etc
         1. Some investigators use the unsanctioned versions because the ‘work’ question is preferred over the ‘sex’ question
   e. Has been used to validate other back pain outcome measures and has been shown to correlate with SF-36⁴
   f. FDA defined MCID as 15 point change in patients undergoing spine fusion
   g. Normal population mean ODI found to be 10.2 (range 2.2-12)⁴
   h. Uses
      i. Has been utilized effectively in operative studies on spondylolisthesis, SPORT, PRCT on lumbar TDR, and thoracolumbar deformity

4. Relationships between NDI and ODI
   a. The order of questions does not affect the score (Haines 1998)¹⁰
   b. Scores are elevated in region adjacent to pathology
      i. Due to shared questions, these are not pure assessments of the neck and the back (Ryan 2013)¹¹
      ii. ODI is elevated in patients who present with primary neck complaints (Ryan 2013)¹¹
      iii. NDI is elevated in patients with back problems¹¹
      iv. Among 2169 patient visits where both NDI and ODI were completed, primary complaints were as follows:
         1. 73% back pain only,
            a. mean ODI=41.5, NDI 33.4
         2. 11% neck pain only
            a. mean ODI 32.3, NDI 36.4
         3. 16.5% both neck and back pain
            a. mean ODI 42.4, NDI 42.4
c. Certain questions drive the final score more than others
   i. ODI: ‘social life’, ‘traveling’, ‘sex life’, ‘standing’, ‘walking’, ‘lifting’ correlate with total ODI score (r=.995 to .961, p<0.01)
   ii. NDI: ‘recreation’, ‘work’, ‘sleeping’, ‘reading’, ‘driving’, ‘lifting’ correlate with total NDI score (r=.816 to .735, p<0.01)
      1. from 2169 patient visits where both NDI and ODI were completed
   iii. Total score for NDI and ODI can be predicted with fewer than 10 questions.
      1. Total ODI score can be predicted with accuracy using regression analysis
         a. 9 question r=.995
         b. 8 question r=.989
         c. 7 question r=.983
         d. 6 question r=.971
         e. 5 question r=.961
      2. Total ODI score can be predicted with accuracy using regression analysis
         a. 9 question r=.995
         b. 8 question r=.988
         c. 7 question r=.982
         d. 6 question r=.975
         e. 5 question r=.969
   3. Can NDI and ODI be combined in a shorter “Total Disability” questionnaire that can be used to calculate individual NDI and ODI scores?

5. Limitations
   a. NDI was validated in patients presenting to a chiropractic practice with Whiplash injury
   b. Is it applicable in patients with surgical cervical pathologies such as radiculopathy, myelopathy and cervical deformity?
      i. Questions do not address arm pain, weakness, sensory loss, horizontal gaze, stiffness, swallowing difficulty.
Bibliography / Suggested Reading