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Questionnaire: How to Score the Neck Disability Index

The Neck Disability Index is a useful tool for monitoring the effect of neck pain on patients' activities of daily living (ADL). This questionnaire can enhance patient care by serving as a doctor-patient communication device and as a reliable outcome measure and as evidence to demonstrate the value of care to third parties. (See the CSPE protocol: Goals and Outcome Measures *for additional information about using the NDI questionnaire.)*

The Neck Disability Index (NDI) was developed by Vernon and Mior in 1991 (Vernon et al. 1991). It is an adaptation of the Oswestry Low Back questionnaire (Fairbanks et al. 1980) and it has been shown to have a test-retest reliability of 0.94 and good internal consistency (Stratford et al. 1998, Vernon et al. 1991) ♦. It is used to quantify a patient's self-reported, loss of daily function. It can be used to evaluate and document activity intolerances in patients with neck complaints. The NDI is strongly recommended in medicolegal cases (involving patients with neck trouble) or in any complicated case with significant potential impairment.

The NDI has several practical applications:

- It can be used to establish initial severity of the patient's condition (based on the degree of effect on ADL).
- It is a quantifiable method of tracking improvement or regression or establishing maximum therapeutic effect.
- It can be used to identify a patient's impaired activities, which may suggest the need for functional evaluation and therapeutic intervention. (See Table: Suggested Functional Capacity Evaluation and Therapeutic Interventions Based on Patient Response to the NDI.)

Administering the NDI

This questionnaire is for neck problems and is usually administered during the first patient visit, either supervised or unsupervised. It can be given at regular intervals at the clinician's discretion, ranging from every office visit to whenever there is a formal evaluation.

Scoring the NDI

There are 10 sections, each with six items—and a maximum score of 5 for each section, with the first box getting a score of "0" and the last box receiving a "5." For example, in the sample below, patients marking the first box would receive a "0" for this section; those marking the last box would get a "5."

SAMPLE:

SECTION 3: Lifting
- ☐ I can lift heavy weights without extra neck pain.
- ☐ I can lift heavy weights but it gives extra neck pain.
- ☐ Neck pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned, e.g., on a table.
- ☐ Neck pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned.
- ☐ I can lift very light weights.
- ☐ I cannot lift or carry anything at all.

♦ Pearson correlation coefficient (r) - .80 Concurrent validity (comparison of the NDI to the VAS and to the McGill Pain Questionnaire) testing showed moderately high correlations - .60 and .70 (see Vernon and Mior 1991).

If each section is answered, add up the 10 scores, double it, and add a "%" sign after it. For example, a score of 16 would equal 32%. If more than one answer is given in a section, use the highest score.

If a section is not answered, add up the completed sections and divide by the maximum score of sections that were completed. For example, if nine (of the total 10) sections were answered with a score of 15, then divide 15 by the maximum possible from answering nine questions, which would be 45 (9 x 5).

$$15/45 = 0.333$$

Convert to a percentage by moving the decimal two places to the right and end with 33%. Effect on ADLs can then be interpreted using this percentage.

Note: In order for the score to be valid, a patient must answer at least 8 of the 10 sections on the test.

When tracking a patient's progress, the NDI scores may not always match the patient's rate of improvement. The NDI must be combined with the patient history, a functional evaluation and other outcome markers (e.g., Jull's test, cervical range of motion, return to work, etc.).

If the NDI score stays the same over a number of visits then the patient's condition is stable (Maximum Medical Improvement) or the questionnaire is not pertinent to his/her problem.

Interpreting Scores (Fairbanks et al. 1980, Yeoman 2000)

Special note: Scores using the NDI do not constitute a basis for impairment or disability ratings. They are useful for establishing patients' perception of the severity of their problem and for tracking their response or non-response to care.

Qualitative Assessment

It is useful to observe the patient's overall appearance and compare that to the interpretation of the questionnaire. For example, is the patient antalgic, guarded and grimacing? This behavior would be consistent with a higher overall score. Does the patient appear comfortable and able to move their head and arms without painful restriction? This behavior would be consistent with a lower NDI score. Inconsistencies between the NDI scores and a patient's behavior (especially when the scores are high) may alert the clinician to the potential presence of psychosocial yellow flags[▽].

How Much Change is Necessary?

The standard error of measurement is estimated to be 2.7 NDI points, but a 5-point change is recommended as the minimal change to be clinically meaningful. (Liebensen 2007)

Stratifying the Impact

Minimal Impact on ADLs: 0 - 20%

This group of patients can cope with most ADLs with or without any modification. It is possible that no treatment or minimal treatment is needed apart from advice on lifting, reaching, reading posture, physical fitness and diet. (In some cases, patients with scores below 20% will still benefit from treatment. In these cases, outcome measures other than the NDI may be more appropriate.)

[▽] Psychosocial yellow flags are risk factors associated with chronic pain or disability. They include illness behaviors such as fear avoidance behavior, anxiety, loss of sense of control and catastrophization. For further information on psychosocial yellow flags see:

Hansen DT, Psychosocial Predictors in Spine Care. Top Clin Chiro 1999;6(2):38-50.

Liebenson C. Improving activity tolerance in pain patients: A cognitive behavioral approach to reactivation. Top Clin Chiro 2000;7(4):6-14.

Moderate Impact on ADLs: 21 - 40%

This group experiences a greater impact on ADLs and may show more pain with movement. They may be off of work. The neck condition can usually be managed by conservative treatment.

Severe Impact on ADLs: 41 - 60%

Pain remains the main problem in this group of patients. Personal care, social life, and/or sleep are affected. A more detailed investigation is often needed and consideration should be given to the need for psychological evaluation.

Crippling Impact on ADLs: 61 - 80%

Neck pain impinges on most aspects of these patients' lives both at home and at work, and positive intervention is required, which may include surgery, conservative care, and/or psychiatric consultation.

Bed Bound or Symptom Magnification: 81 - 100%

These patients will spend most of their time in bed due to actual pain or they are exaggerating their symptoms. Differentiation can often be accomplished through careful observation of the patient during the examination. Psychological or psychiatric consultation should strongly be considered.

Note: Surprisingly high scores are often seen on initial presentation of apparently healthy patients with acute mechanical neck pain. Fear avoidance behavior, anxiety and confusion about the meaning of benign, self-limiting symptoms seem to induce symptom amplification in susceptible patients. Reassurance about the benign nature and favorable natural history of acute neck trouble may be all that is needed to enhance some patients' coping skills and allow them to resume normal activities. In cases like these, expect an immediate substantial decrease in NDI scores.

Charting

An interpretative statement should be made in the patient's chart each time s/he completes the NDI. Include the following:

- Compare any previous scores.
- Report NDI scores as a percentage (e.g., 20%).
- Use a narrative format. Sample language:
  - "The NDI Questionnaire score of 40% suggests a moderate impact on activities of daily living. This score is consistent with the patient's observed behavior."
  - "Today's NDI score of 10% suggests a minimal impact on ADL and indicates substantial improvement as compared to the previous score of 40%."

Table: Suggested Functional Capacity Evaluation and Therapeutic Intervention Based on Patient Response to the NDI

- **Personal care, work, driving and recreation.**

Ask patients what specific activities they are having trouble with and why. Have them demonstrate the motion or activity. Analyze for poor movement strategies or muscle or postural imbalances that may need to be addressed.

- **Lifting**

Have the patient lift items (from floor to table, table to floor, onto overhead shelf, etc.). Observe the patient. Teach the patient lifting strategies that minimize strain on both the neck and back. Consider evaluating for poor shoulder girdle strength. (See CSPE care pathway, *Shoulder Impingement Syndrome* for evaluation and management of shoulder girdle conditions.)

- **Reading**

Have the patient demonstrate sitting/reading posture. Consider postural training.

- **Sleeping**

Analyze sleeping posture. Consider using pillows and positioning to identify more comfortable sleeping positions.

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REFERENCES

Fairbanks JCT, Davies JB, Couper J, et. al. The Oswestry low back pain disability questionnaire. Physiotherapy 1980;66(8):271-3. *[For further information about the Oswestry Low Back questionnaire see the CSPE protocol,* Questionnaire: Oswestry Disability Index (Revised).*]*

Liebensen C. Rehabilitation of the Spine, 2nd ed. Philadelphia: Lippincott Williams & Wilkins: 2007.

Stratford PW, Riddle DL. Use of generic versus region-specific functional status measures on patients with cervical spine disorders. Phys Ther 1998;78(9):951-63.

Vernon H, Mior S. The neck disability index: a study of reliability and validity. J Manipulative Physiol Ther 1991:14:409-15.

Yeomans S. Clinical Application of Outcomes Assessment. Appleton & Lange Publications; 2000: 73.