THE DNT 5

A Shortened Version

of the

Diabetes Numeracy Test (DNT)

Last Revised: **April 17, 2011**

Time   **Started:**

Time   **Completed:**

Total Time: _____

THE DNT 5

Description

The DNT 5 is a shortened version of the Diabetes Numeracy Test (DNT). The DNT, DNT15 and the DNT 5 are assessment tests designed to investigate numeracy skills in patients with diabetes. Numeracy can be defined as the ability to understand and use numbers and math skills in daily life. Numeracy is particularly important to patients with diabetes because these patients apply math skills to diabetes self-management activities such as, glucose monitoring, carbohydrate counting, and adjustment of insulin. The questions in the DNT, DNT15 and the DNT 5 were formulated from directions given by health care practitioners to patients with diabetes during a routine clinic visit. In addition, question development was guided by reviewing validated math and literacy tests. Arriving at the answers will require not only the ability to perform a variety of math skills, such as addition, subtraction, and multiplication, but also the application of those skills in the daily setting.

The DNT was shortened to a more clinically useful 15 items (the DNT15) and then verified through random split sample analysis. To perform a split sample analysis, the sample data was randomly split into two smaller sub-samples. Sub-sample 1 was used for the development of the shortened scale and sub-sample 2 was used for confirmation of the results. The DNT was shortened by first selecting the items with >0.6 loading on the primary factor (from principal components factor analysis) in sub-sample 1. Those items with >80% mean score were discarded. Three items with high clinical utility, as determined by practicing diabetologists, were added to bring the total number of items to 15.

Reliability was tested by internal consistency (Kuder-Richardson 20) and validity was established through correlation testing using Spearman's correlations between the DNT15 and the full DNT and comparing the DNT15 to the *a priori* construct validity model for both sub- samples. The DNT15 showed similar internal consistency and validity in both sub-samples as the full DNT. The KR-20 of the DNT15 was 0.90 in the development sample (sample 1) and 0.89 in confirmation sample (sample 2). Correlations with the *a priori* model were similar to the full DNT. Correlations were also similar in both population sub-samples.

The DNT5 was developed by correlating the items from the DNT15 with the total math score from the Wide Range Aptitude Test (WRAT 4), and selecting those scores with the highest correlations with the WRAT. The top five items were then summed to create the DNT5. Further examination demonstrated that the DNT5 and DNT15 were highly intercorrelated ($r > 0.90$), and it was shown that the DNT5 correlated as highly with the WRAT and the REALM as did the DNT15. Further validation of the DNT5 came from a separate study of ~200 Hispanic patients with diabetes who had been administered the Latino version of the DNT15.

Funding

Test Administration
The DNT 5 can be written or orally administered. It consists of 5 questions in four domains: nutrition, exercise, blood glucose monitoring, and medication. The scale covers many math problem types including: addition, multiplication or division, fractions, multi-step mathematics, and numeration/ number hierarchy. The estimated time for administration is 5-10 minutes.

General Guidelines
- Introduce yourself to the respondent.
- If the respondent wears glasses, please ask him or her to put them on. If the respondent wears contacts, remind him or her to wear them to the exam.
- Test the patients' visual acuity using a Rosenbaum Pocket Vision Screener. Patients with corrected visual Acuity >20/50 should be excluded from test.
- Explain the purpose and time frame of the test.
- Hand the respondent a pencil, paper and calculator before starting the exam.
- Ask the respondent to write any calculations on the scrap sheet.
- Ask the respondent to write his or her final answers on the numeracy test in the spaces provided.
- Explain to the respondent that if he or she is to erase, erase completely without leaving smears or markings.
- Do not look at the answer choices while administering the exam.
- Remind respondents who wear hearing aids to bring them to the test.

For oral administration, the test administrator is to follow these directions:
- Read the questions out loud to the respondent
- Allow the patient to examine any figures associated with the question.
- Repeat the question if asked
- Give the respondent time to answer the question
- Only read what's printed in the question. Improvising or interpreting a question for a respondent can invalidate the test results and decrease test efficiency.
- Allow time for the respondent to calculate and record his or her answers
- After the respondent has answered a question, immediately proceed to the next item
- There is no time limit on a particular item.
- Remind respondents who wear hearing aids to bring them to the test.

For respondents who are having difficulty:

- *Repeat any question when asked by the respondent. However, do not repeat the question more than three times.*
- *If the respondent is having difficulty, please encourage the respondent to continue. Appropriate comments are "you're doing fine."   However, do not establish a pattern, such as saying "good" only after correct responses.*
- *If the respondent does not want to resume the test, please respond by saying, "I am not trying to embarrass you or put you down. We can stop now, but I would like to pause to let you know that you are very important to this study, and the information you are providing could be used to help patients with diabetes. May I continue…"*
- *Record any information that you think is relevant or important about the respondent's behavior.*

1. 1/2 cup of potatoes counts as 1 carbohydrate choice. How many choices does 2 cups of potatoes count as?

1. ANSWER _____ choices

2. You ate 1 and 1/2 cups from the food labeled below. How many grams of carbohydrate did you eat?

Nutrition Facts
Serving size: ¾ cup Servings per container 10
Amount per Serving **Calories** 150 Calories

Total Fat 7g
Total Carbohydrates 18 grams
   Dietary Fiber 3g
   Sugars 3g
 Protein 3g

2. ANSWER _____ grams

3. You have to eat 6 grams of carbohydrate for each 30 minutes you plan to walk. You are planning to walk for one hour. You have a bag with 12 crackers. Each cracker contains 10 grams of carbohydrate. How many crackers do you need to eat before your walk?

3. ANSWER _____ crackers

4. You test your blood sugar 3 times a day. You purchase a prescription of 50 strips on March 5th. Of the dates below, by when will you need to buy new strips?

Please circle your answer:

March 21st
April 21st
May 21st
June 21st

5. Please <u>round down</u> to the nearest whole number.

You are given the following instructions: "Take 1 unit of insulin for every 7 grams of carbohydrate you eat."
How much insulin do you take:

When you eat 98 grams at supper?

98 g

5. ANSWER _____units