The Diabetes Treatment Satisfaction Questionnaire (DTSQ)

Status and Change Versions

USER GUIDELINES

1. Introduction

1.1 The Instrument

The DTSQ in its original status form (© Bradley 1993, latest revision 1994) is recommended for measuring patient satisfaction with diabetes treatment [1,2]. It consists of a six-item scale assessing treatment satisfaction and two items assessing perceived frequency of hyperglycaemia and hypoglycaemia.

The DTSQ has been used extensively to measure patient satisfaction with treatment and has proved highly sensitive to changes in treatment, e.g. from rigid to flexible insulin treatment [3], from tablets to insulin injections [4,5,6], changes in basal insulin [7] changes in short-acting insulin [8] and changes from standard insulin to analogue insulins [9]. Together with the Well-Being Questionnaire [10], the DTSQ has been recommended by the World Health Organisation (WHO) and the International Diabetes Federation (IDF) as useful in assessing outcomes of diabetes care [11].

Although the DTSQ is remarkably responsive to treatment changes, educational and other interventions, ceiling effects are often seen with this instrument, where maximum or close-to-maximum scores at baseline provide little opportunity for registering improvement in satisfaction with the treatment or strategy being assessed [12]. The DTSQ-change version (DTSQc) was designed to overcome ceiling effects [13] and has been shown to do so in trials of insulin lispro [8] and trials of insulin glargine [14]. This instrument contains the same eight items as the DTSQ-status version (now known as the DTSQs) but asks patients to consider their satisfaction with their current treatment *compared with* their previous treatment.

1.2 Target Population

The DTSQs and DTSQc are designed for use with adults and older adolescents (aged 16+) with Type 1 or Type 2 diabetes. They may be administered by mail or in the clinic, for a range of purposes including:

1. an assessment tool with individuals;
2. an assessment tool with groups of patients;
3. a broad cross-sectional survey instrument;
4. a routine part of clinical audit cycles;
5. an outcome measure for clinical research trials evaluating new treatments.

2. DTSQs and DTSQc: Choosing which version to use and when

People often use just the DTSQs. The DTSQc is relevant for studies involving an intervention (such as a change in insulin, tablets or education / training). Whether or not you use the DTSQc, you should always use the DTSQs at least once during your study, preferably at the beginning. This will anchor your findings on the DTSQc, if you do go on to use the change version as well as the status version. The DTSQc will tell you how people's satisfaction and perceived hyper- and hypoglycaemia has changed; it doesn't tell you whether it was high or low to start with, or where it is at endpoint. We recommend that you use the DTSQs at baseline and endpoint (and at one or two interim points in a 12-month trial) and the DTSQc (if used) at one follow-up only.

2.1 Using the DTSQs

We recommend use of the DTSQs at follow-up to provide a 'difference' score for comparison with the many earlier studies that used the DTSQs alone. However, if you use the DTSQs *and* the DTSQc at follow-up, it is important to administer the DTSQs before the DTSQc.

If you are having a long gap between baseline and endpoint (e.g. a year or more), you may wish to repeat the DTSQs in order to have a picture of how satisfied people are during that period. The DTSQs can usefully be used at intervals throughout a treatment period and when steady increases in DTSQ scores are seen (e.g. Witthaus et al 2001, [7]), this provides useful evidence that scores are determined by experience and are not simply an initially hopeful response to a new treatment, which subsequently declines.

6

2.2 Choosing the DTSQc

If you have a study with a series of follow-ups over a long period (say 2 years), we recommend that you use the DTSQc just once. It is possible that one year is as long a gap as can be managed before there is too great a risk of the patient forgetting what the experience of the previous treatment was like. Thus, it is recommended that the DTSQc is used at 12 months in a study that is of 12 months duration or longer. The status version, DTSQs, can nevertheless be used at any later time point.

Please state clearly in your protocol when you plan to administer the DTSQs and the DTSQc.

2.3 Wording of the DTSQc instructions

The wording at the beginning of the instructions needs to relate to the particular intervention in your study. Thus it may need to be changed to be suitable for your particular study. We have produced a wording for the beginning of the introduction that is as generic as possible to minimise the need for changes, but you may need to adapt the wording to be suitable for the study duration and type of intervention. The wording has been based on the study design in which it is most commonly used (i.e. a randomised controlled trial). It may therefore need to be changed for use in an observational type of study. Please note that the last two sentences beginning "Please answer each question…", are the same for all occasions. These latter sentences should not be changed.

We provide an increasing range of ready, made-up ForUse versions linguistically validated in many of the 65 languages available, e.g. saying *for the past few months,* or *for the past few weeks* and versions that can be used to specify the number of weeks/months. This should lessen the need for people to make extra changes.

Please include in your protocol the details (in English and any other language to be used) of any change to the wording of the DTSQc instructions for your particular study. If a run-in treatment period is included and involves a change of treatment for at least some people, the comparison is probably best made with treatment prior to commencement of the study. For crossover studies we would recommend that you make one comparison at the very end of the study, asking participants to compare their current treatment with the previous treatment[1].

1

Example for a crossover design:

For the past N* *weeks you have used either X** or Y**. Today we would like to know how your experience of this treatment for diabetes (including medication and diet) has changed from your experience of the previous treatment, which you used in the* N *weeks before you changed to the treatment you are using now. Please answer …etc.*

Where:

* *N = the number of weeks / months in each treatment period*

** *X and Y = the two treatments being compared*

3. Procedures for use of the DTSQ

3.1 Instructions to patients

Patients need to be given verbal and/or written instructions that explain:

- why the questionnaire is being given to them
- what will be done with the information they provide
- how the questionnaire can be returned
- what, if any, discussion they might have with their health professionals about their responses

Sample patient information sheets are included, which may be adapted to suit particular circumstances [see Appendix 1].

3.2 Anonymity

Whether patients can remain anonymous will depend entirely on how you intend to use the DTSQ. If it is to be used as a broad cross-sectional survey instrument or as a routine part of clinical audit cycles, then it may be appropriate for patients to remain anonymous. In this way, patients can be assured that no-one will be able to identify them. However, in these circumstances it will not be possible to discuss with the patient any particular aspects of treatment with which he/she may be dissatisfied.

If the DTSQ is to be used to evaluate the success of a particular intervention, e.g. a change in insulin, it may also be appropriate for patients to remain anonymous. However, when evaluating a new treatment, it is likely to be more useful for research purposes (and for patient care) if patients' responses before and after the intervention can be matched up. The easiest way to do this is to ask patients to provide their names.

If the DTSQ is to be used as an intervention tool with individual patients, then it would be usual to ask the patient to write their name on the questionnaire and for them to be told that their responses will be kept on their file. Keeping records of patients' responses over time allows you to track any increases or decreases in satisfaction with treatment and identify areas where further intervention may be useful.

If patients are to be anonymous then steps need to be taken to ensure that it is not possible to identify respondents. If questionnaires are to be returned in the clinic, a confidential reply box is needed. This will allow respondents to return completed questionnaires so that they are not visible to onlookers. If mailed returns are to be used, a stamped addressed reply envelope marked 'confidential' needs to be provided.

3.3 Sampling

If the DTSQ is to be used in a survey, as part of an audit cycle or as an evaluation instrument, a representative picture of treatment satisfaction will be achieved only if there is an adequate cross-section of patients responding. Every person attending the clinic during a particular time period might be given the opportunity to complete a questionnaire, though this procedure will be likely to sample more people with problems who return to the clinic more frequently for appointments. For a fully representative sample, it is necessary to take a random sample from the overall clinic list or to include only patients attending for annual review, which involves all patients. If there are different clinics, for example where evening or Saturday clinics are held for those who are working and weekday clinics are held for other patients, the different types of clinics will need to be sampled separately. It will also be important to have a record of the type of treatment each respondent is using (including injecting device and type of insulin if used). Separate analysis of the different patient groups is likely to be the most informative and useful.

4. DTSQ Results

4.1 Individual clinical use

If the DTSQ is being used as an assessment tool with individual patients, it may not be necessary to enter the data onto a spreadsheet or to combine the individuals' responses with others. The eight items can most usefully be examined individually [see Section 4.3 for scoring guidelines].

For the purposes of monitoring an individual's satisfaction with their treatment over time, it may be useful to enter responses on to a spreadsheet so that trends can be observed easily [see Section 4.3]. Certainly, it would be useful to note specific aspects of treatment that the individual is particularly dissatisfied with, any action taken or advice given, and follow-up with checks to determine whether or not satisfaction has increased on the next clinic visit.

4.2 Data entry

If the DTSQ is to be used in a survey, as part of an audit cycle or as an evaluation instrument for a group of patients, individual responses to the DTSQ items will need to be combined and analysed in relation to other data. This can be done by:

- entering the data directly into a statistics package such as SPSS, **or**
- creating a spreadsheet, either by hand or in a computer package such as Microsoft Excel or Lotus 123. Instructions for creating a spreadsheet are included [see Appendix 2].

4.3 Scoring

The following are guidelines on scoring, recoding and computing for the Diabetes Treatment Satisfaction Questionnaire (status and change versions). If you have any further queries or suggestions, please contact Professor Bradley [see Section 6].

4.3.1 Scoring Items

The DTSQ status (DTSQs) items are scored on a scale from 6 to 0 and DTSQ change (DTSQc) items are on a scale from 3 to -3.

4.3.1.1 In-between scores

If a patient answers in-between choices (e.g. 1 ½ or 2 ½), we recommend you code as 1.5, 2.5 etc.

4.3.1.2 If a question is answered twice

- If the scores that have been circled are *next* to each other (e.g. 2 & 3), then we recommend you take the mid-point between them (i.e. 2.5), as this is unlikely to be a mistake and more likely to represent difficulty in choosing a score.
- However, if the two answers are not immediately next to each other (e.g. 2 and 5 on the DTSQ, or 3 and 0 on the DTSQc), we suggest you treat this as missing and then follow the instructions for missing scores below.

4.3.1.3 If a respondent circles a number on the scale and also writes a word

If, for example, the respondent circles a number and writes "sometimes" on top of the answer, take the number circled.

4.3.1.4 If the response option words have been circled

If a respondent circles the response option words at one of the extremes of a scale, (e.g. “very satisfied” or “very dissatisfied” on the DTSQs; “much more satisfied now” or “much less satisfied now” on the DTSQc), you can code these as 7 for the positive end and -1 for the negative end on the DTSQs if you want to record this (and likewise 4 and -4 for the DTSQc). You can then recode them as 6 or 0 for the DTSQs (and 3 or -3 on the DTSQc) before carrying out any computes or summing the total. Alternatively, you can leave this step out and code them as 6 or 0 on the DTSQs (3 or -3 on the DTSQc) in the first place.

4.3.1.5 If any respondents have themselves written -1 or 7 as a response

Treat as in 4.3.1.4 above.

4.3.1.6 Missing scores

- ***Initial entry:*** Score all blanks as missing scores.
- ***Psychometric Analysis:*** All missing values to be coded as missing and not substituted for in psychometric analysis. This applies to analyses including Confirmatory Factor Analysis, principal components analysis and reliability analysis (including α coefficient of internal consistency reliability).
- ***Treatment of missing scores when computing scale total:***

  Scale averages can sometimes be used, depending in part on the language of the questionnaire [see Section 4.3.2.2].

4.3.2 Computing the Treatment Satisfaction Scale Total

The scale total is computed by adding the six items 1, 4, 5, 6, 7 and 8 to produce the *Treatment Satisfaction* scale total, which has a minimum of zero and a maximum of 36 on the DTSQs and a minimum of -18 and a maximum of 18 on the DTSQc. Items 2 (perceived frequency of *hyperglycaemia*) and 3 (perceived frequency of *hypoglycaemia*) are treated individually in data analysis. The following therefore concerns only the six Treatment Satisfaction items (1, 4, 5, 6, 7 and 8).

4.3.2.1 Reversals

No reversals are necessary in the DTSQ prior to computing the treatment satisfaction score.

4.3.2.2 Treatment of Missing Scores on the Six Treatment Satisfaction Items

The following applies to the original English version of the DTSQ only. For any translated versions, other than where users are notified specifically about the language concerned, no total Treatment Satisfaction score can be computed when there are any missing scores. The following also applies only to non-psychometric analyses; in any psychometric analyses to be conducted, such as on validated versions but with a different type of population or on new translations, *no* missing values are to be substituted, as to do so would distort the true internal consistency reliability.

- ***Computing a Treatment Satisfaction scale total***

  If you have been informed by us that the language you are using can tolerate a certain number of missing scores without an unacceptable reduction in the reliability, then it is acceptable to compute the Treatment Satisfaction items into a scale score with that number of scores missing. This can be done as follows:

  Step 1: Sum the existing item scores;

  Step 2: Divide this sum by the number of existing item scores;

  Step 3: Multiply by 6 (the number of items in the subscale);

  Step 4: Use this computation to estimate subscale scores [15], providing the number of missing values does not exceed the number tolerable without unacceptable loss of reliability for the language version in use.

- ***Item-by-item analysis***

  We recommend that you treat a missing score as missing for any item-by-item analyses and do not include computed scores in such analyses, unless you have a good reason to do otherwise.

4.3.3 Psychometric Analysis

Psychometric analyses need to be carried out on any newly translated questionnaires. These analyses include factor analysis (usually Confirmatory Factor Analysis) and reliability analysis with Cronbach's alpha.

4.3.3.1 Factor Analysis

Confirmatory Factor Analysis (CFA) seeks to determine whether the factor structure of a scale supports what is expected on the basis of a pre-established theory or previous work. CFA using the Structural Equation Modelling technique can be conducted using the AMOS (Analysis of Moment Structures) software (© SmallWaters Corporation (USA)) or other software such as LISREL (Linear Structural Relationships). Standardised regression weights >0.4 are considered acceptable for scale items. To assess the fit of the hypothesised model to the actual data, at least 24 different fit indices have been proposed. There is no general agreement on a single preferred measure as yet. It is therefore recommended that a number of measures be presented while describing the 'fit' of a model, e.g. the Comparitive Fit Index (FIT), the Bentler-Bonett Normed Fit Index (NFI) and the Tucker Lewis Index (TLI). These three indices are measures of incremental fit and indicate how much better the proposed model fits in comparison to the "baseline" that assumes there are no relationships in the data. Values of these indices range from 0.0 (indicating no fit) to 1.0 (indicating perfect fit) with values >0.90 generally deemed as acceptable. Along with these three indices, the Chi-Square goodness of fit test for the model is usually reported. This test, however, is sensitive to sample size and there is a high probability that a good fitting model is rejected due to small differences between the observed and predicted value. It is mainly due to these limitations of the Chi-Square fit test that other indices have been developed as alternatives.

While conducting CFA on the DTSQ, only items 1, 4, 5, 6, 7 and 8 are included. It is recommended that items 2 (perceived frequency of hyperglycaemia) and 3 (perceived frequency of hypoglycaemia) be dropped

from this analysis mainly because these items may or may not load with other items on this scale. CFA on DTSQ usually results in all six items demonstrating standard regression estimates >0.4 on the single 'treatment satisfaction' variable. The CFI, NFI and the TLI indices usually indicate a good model fit with values greater than 0.9 if the linguistic validation work is conducted according to our recommendations.

4.3.3.2 Reliability Analysis

It is important to note that Qs.2 and 3 (perceived blood glucose control items) are not included and that reliability analysis (including α coefficient of internal consistency reliability) is carried out only on the six Treatment Satisfaction items, i.e. Qs.1 and 4 to 8.

4.3.3.3 Treatment of Missing Scores

Do not substitute average scores for use in psychometric analysis.

You may, however, wish to establish whether you can compute a Treatment Satisfaction scale total when you have missing scores. To do this, it is necessary to test the reliability of the six Treatment Satisfaction items to see how many missing scores can be tolerated without the alpha being reduced to an unacceptable level. For many purposes an alpha of 0.7 will be sufficient for a 6-item scale. For some purposes a higher alpha may be required. If you have already established that there is a satisfactory alpha based on the full six items, you can test whether missing values can be tolerated as follows:

Step 1: Drop the item which contributes most to the internal consistency (i.e. the one which, if dropped, would reduce the alpha the most);

Step 2: Rerun the reliability analysis on the remaining items;

Step 3: If the alpha is still $\geq$0.7 (or a higher figure if required), rerun Steps 1 and 2 and check the alpha again. Where the alpha remains $\geq$0.7 (or that required), it is acceptable to impute a total in the absence of up to two scores (see §4.3.2.2 for how to do this).

The reliability of either the DTSQs or the DTSQc, even when reduced to four items, may be such that it would theoretically be possible to tolerate yet more missing items. However, this is not recommended. It is preferable to retain reasonable equivalence of content between the DTSQs and DTSQc, and between different language versions of each, and include at least four items in the Treatment Satisfaction scale total of each questionnaire.

4.3.4 Re-scaling for Comparative Treatment Change Responsiveness Analyses of the DTSQs and DTSQc

If you have used the DTSQs at endpoint as well as at baseline, please refer to Appendix 3.

4.4 Displaying Results

It can be helpful to turn the DTSQ results into a series of charts for ease of interpretation. Instructions for doing so, together with sample charts are provided [see Appendix 4].

5. Note: Conditions of use of the DTSQs & DTSQc

The DTSQ status and change versions are made available to users by formal arrangement with the copyright holder, Professor Clare Bradley, or Health Psychology Research Ltd, which licences her questionnaires. Requests should be made to Professor Bradley [see Section 6]. A user agreement is necessary to avoid breach of copyright and to ensure that the latest and most appropriate version of the questionnaire is used.

6. Contact Information

For permission to use the DTSQs and/or DTSQc and to ensure that you have the most up-to-date versions, please contact:

Professor Clare Bradley

Address: Health Psychology Research
Department of Psychology
Royal Holloway
University of London
Egham
Surrey
TW20 0EX
UK

E-mail: c.bradley@rhul.ac.uk
Fax: +44 (0)1784 414657
Tel: +44 (0)1784 443714 (administration)
+44 (0)1784 443708 (direct line)

Website www.healthpsychologyresearch.com

References

1. Bradley C and Lewis KS (1990) Measures of psychological well-being and treatment satisfaction developed from the responses of people with tablet-treated diabetes. *Diabetic Medicine* **7**, 445-451.
2. Bradley C (1994) The Diabetes Treatment Satisfaction Questionnaire: DTSQ. In Bradley C (Ed) (1994) *Handbook of Psychology and Diabetes: a guide to psychological measurement in diabetes research and practice.* Chur, Switzerland: Harwood Academic Publishers.
3. DAFNE Study Group (2002) Training in flexible, intensive insulin management to enable dietary freedom in people with type 1 diabetes: the dose adjustment for normal eating (DAFNE) randomised controlled trial. *British Medical Journal*, **325**, 746-749 (full 6 page version of paper published on BMJ website http://bmj.com/cgi/content/full/325/7367/746).
4. Witthaus E, Stewart J and Bradley C (2000) Improved psychological outcomes after initiation of insulin treatment in patients with Type II diabetes. *Diabetologia* **43**, suppl 1 A205.
5. Jennings AM, Lewis KS, Murdoch S, Talbot JF, Bradley C and Ward JD (1991) Randomized trial comparing continuous subcutaneous insulin infusion with conventional insulin therapy in type II diabetic patients poorly controlled with sulphonylureas. *Diabetes Care* **14**, 738-744.
6. Cooper HC and Lorains JW (1998) Managing poor control in Type 2 diabetes. *Practical Diabetes International* **15**(6), 173-177.
7. Witthaus E, Stewart J and Bradley C (2001) Treatment satisfaction and psychological well-being with insulin glargine compared with NPH in patients with Type 1 diabetes. *Diabetic Medicine* **18**, 619-625.
8. Howorka K, Pumprla J, Schlusche C, Wagner-Nosiska D, Schabmann A and Bradley C (2000) Dealing with ceiling baseline treatment satisfaction level in patients with diabetes under flexible, functional insulin treatment: assessment of improvements in treatment satisfaction with a new insulin analogue. *Quality of Life Research* **9**, 915-930.
9. Witthaus E, Ashwell SG, Johnston P, Stephens J, Home PD and Bradley C (2004). Quality of life is improved with insulin + regular human insulin in patients with Type 1 diabetes. *Diabetologia* **47** (suppl 1) A306, Abstract 849.
10. Bradley C (1994) The Well-being Questionnaire. In Bradley C (Ed) *Handbook of Psychology and Diabetes: a guide to psychological measurement in diabetes research and practice.* Chur, Switzerland: Harwood Academic Publishers.
11. Bradley C and Gamsu DS for the psychological well-being working group of the WHO/IDF St. Vincent Declaration Action Programme for Diabetes (1994). Guidelines for encouraging psychological well-being: Report of a working group of the World Health Organisation Regional Office for Europe and International Diabetes Federation European Region St. Vincent Declaration Action Programme for Diabetes. *Diabetic Medicine* **11**, 510-516.
12. Bradley C and Speight J (2002) Patient perceptions of diabetes and diabetes therapy: assessing quality of life. *Diabetes Metabolism Research and Reviews* **18**, S64-S69.
13. Bradley C (1999) The Diabetes Treatment Satisfaction Questionnaire (DTSQ): change version for use alongside status version provides appropriate solution where ceiling effects occur. *Diabetes Care* **22**(3), 530-2.
14. Bradley C, Plowright R, Stewart J and Witthaus E (2000) Diabetes Treatment Satisfaction Questionnaire (change) in English and German evaluated in insulin glargine trials. *Diabetologia* **43**, suppl 1, A196.

15. Mitchell J and Bradley C (2001) Psychometric evaluation of the 12-item Well-being Questionnaire for use with people with macular disease. *Quality of Life Research* **10**, 465-473.

Appendix 1

Example of Patient Information Sheet (for anonymous completion*)

"We are looking at how we can improve satisfaction with diabetes treatment for people attending this clinic. It is important for us to obtain feedback about the extent to which you are satisfied (or dissatisfied) with your diabetes treatment. We would be glad if you would give a few minutes of your time to completing this questionnaire.

Please do not write your name on the questionnaire, as it is intended to be anonymous. If you do not wish to complete it please return the questionnaire (see below), and write on it any comments you would like to make.

If you would like some help in filling out the questionnaire, perhaps because of eyesight problems **……[insert information on how the person can obtain assistance, eg 'ask the receptionist, who will get someone to help you'].**

We ask you to seal the completed questionnaire in the envelope provided and place it in the box **…… [give location of collection box, eg 'at the reception desk'].**

The results will be fed back by **…… [describe the way in which feedback will be given to patients, eg 'a poster which will be put up on the notice board in the clinic'].** It will not be possible to provide feedback on individual responses. Your responses will be combined with those of other people and used as a basis for improving treatments for people attending the clinic.

Thank you for your participation. Your responses will be put to good use in helping to improve treatment for people with diabetes."

[Name, position and telephone contact details of principal investigator]

[Name(s), position(s) and telephone numbers of clinic consultants and / or diabetes specialist nurses sharing responsibility for and giving support to the study]

Note: If only one name is given, plural wording such as 'we are' will need to be changed to the singular where appropriate throughout the document.

*** This information sheet stresses the protection of identity. It would be appropriate to ensure anonymity if the DTSQ was to be used in a survey or as part of an audit cycle. It may also be appropriate if the DTSQ was to be used as an instrument for evaluating the success of an intervention aimed at a group of people. It would not be appropriate to ensure anonymity if the DTSQ was to be used on a one-to-one basis (see next page) or in clinical trials where outcome data need to be related to other information on individual participants.**

Example of Patient Information Sheet (for one-to-one contact)

"We are looking at how we can improve satisfaction with diabetes treatment for people attending this clinic. It is important for us to obtain feedback about the extent to which you are satisfied (or dissatisfied) with your diabetes treatment. If you are not completely satisfied with your current treatment, we may be able to find ways in which it could be changed to suit you better. We would be glad if you would give a few minutes of your time to completing this questionnaire.

It is important that you write your name on the questionnaire so that we can keep your responses with your medical notes and take action where needed.

If you would like some help in filling out the questionnaire, perhaps because of eyesight problems **……[insert information on how the person can obtain assistance, e.g. 'ask the receptionist, who will get someone to help you'].**

We ask you to bring the completed questionnaire to your next appointment with **……[insert name of Dr, nurse, dietitian etc. who will be examining the answers given and considering possible interventions]** who will go through your responses with you and discuss with you how your treatment might be adapted to suit you better if this is needed.

Thank you for completing this questionnaire. Your responses will help us to provide you with diabetes care that suits your individual needs.

[Name, position and telephone contact details of principal investigator]

[Name(s), position(s) and telephone numbers of clinic consultants and / or diabetes specialist nurses sharing responsibility for and giving support to the study]

Note: If only one name is given, plural wording such as 'we are' will need to be changed to the singular where appropriate throughout the document.

Appendix 2

Data entry by hand, or using a spreadsheet package such as Excel

Probably the simplest way to handle the data is to create a spreadsheet table of responses for each item. The first column will record 'patient number' and then there will be one column for each item score. The first 6 patients of an example spreadsheet for DTSQ item responses are given in Figure 1.

Figure 1: Sample spreadsheet

	DTSQ item								Treatment satisfaction
Pt no	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	
1	6	1	1	6	5	5	6	6	34
2	5	0	1	5	6	5	6	5	32
3	4	2	2	4	4	4	4	4	24
4	5	1	2	5	6	4	5	5	30
5	3	4	4	3	4	3	3	3	16
6	4	1	1	4	4	5	4	4	25
Mean	**4.5**	**1.5**	**1.8**	**4.5**	**4.8**	**4.3**	**4.7**	**4.5**	**26.8**

For each individual, record their responses to each item according to the scoring guidelines described in Section 3.3.

A Treatment Satisfaction score for each respondent is obtained by summing individuals' scores for items 1, 4, 5, 6, 7 and 8. Note the instructions in Section 3.3 regarding missing data.

When all patient responses have been recorded in the spreadsheet, mean scores for each item can be obtained.

Appendix 3

Re-scaling for Comparative Treatment Change Responsiveness Analyses of the DTSQs and DTSQc

If you have used the DTSQs at endpoint as well as at baseline, you are able to measure change not only using raw DTSQc scores, but also using computed DTSQs Difference scores, i.e. measuring the difference between baseline and endpoint (based on raw scores from the DTSQs).

'Difference' scores for the DTSQ status questionnaire (DTSQs) can be calculated by subtracting baseline scores from endpoint scores. Increases in Treatment Satisfaction then produce positively signed scores and decreases produce negative scores. Since, however, the scales for the two questionnaires have different widths (see below), one questionnaire needs to be re-scaled when carrying out comparative analyses of sensitivity between the DTSQs Difference scores (DTSQsDiff) and the DTSQ Change scores using the DTSQc.

1. ***Treatment Satisfaction***

   Treatment Satisfaction scores on the DTSQc range potentially from -18 to +18. Treatment Satisfaction scores on the DTSQsDiff range potentially from -36 to +36. Therefore, to enable the comparison of differential sensitivity to be made and since the width of the DTSQs scale is exactly double that of the DTSQc, the DTSQsDiff scores need to be divided by 2 in order to bring the scaling into line with that of the DTSQc.

2. ***Perceived Blood Glucose Control Items (items 2 and 3)***

   The same relative differences exist between the scale widths when subtracting baseline from endpoint scores for the perceived frequency of hyper- and hypoglycaemia items. Thus the DTSQsDiff scores for these two items need also to be divided by 2.

The re-scaled DTSQsDiff data need only be used in differential sensitivity analyses using ANOVAs; it is not necessary to re-scale for correlational analyses.

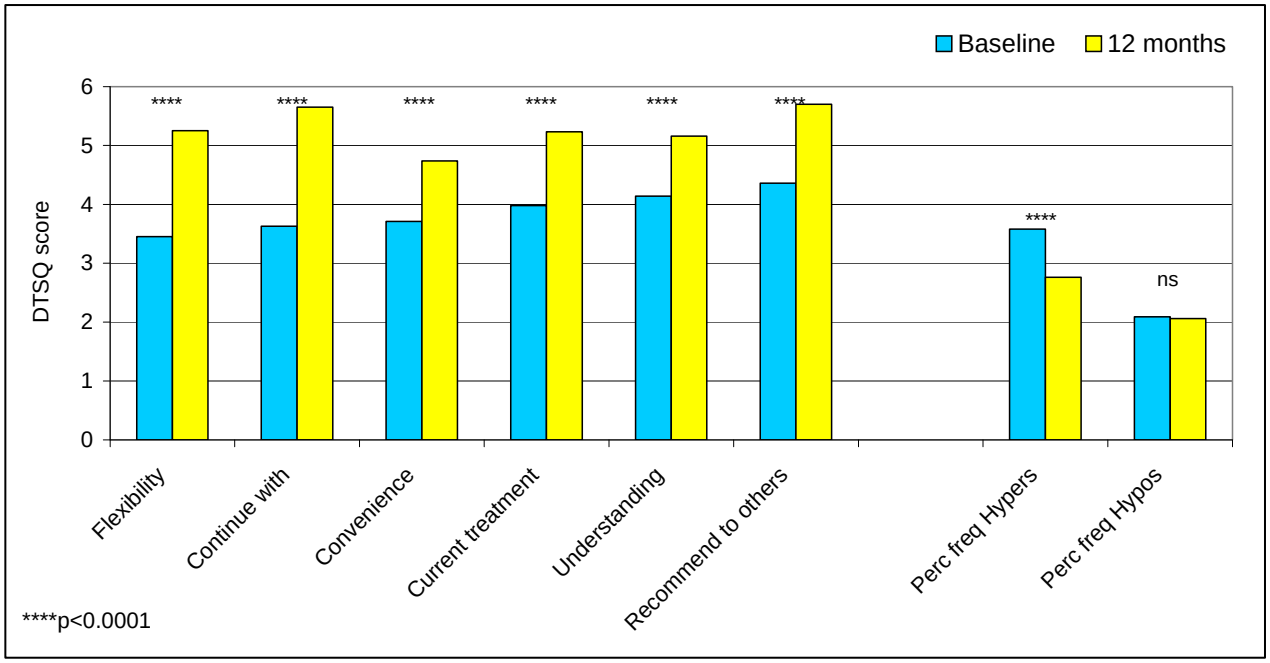
Appendix 4

Instructions for displaying data

The individual DTSQ item scores can be used to create a chart that shows the results in a format that is easy to follow. The bar chart may be the most convenient way of displaying results for all DTSQ items on one page. You may wish to show results:

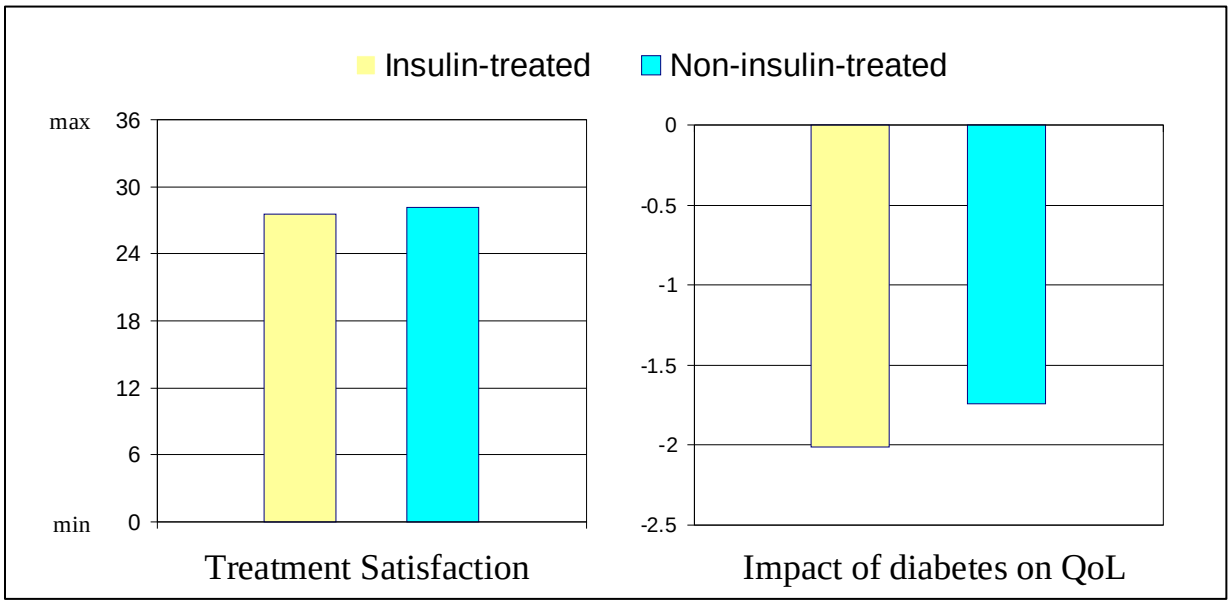
- in order of baseline satisfaction, indicating the aspects of treatment with which respondents are most and least satisfied [see Figure 2]
- for different subgroups of patients, e.g. tablet versus insulin treatment or before and after an intervention [see Figure 3]
- for the total satisfaction score in comparison to another measure, e.g. the average weighted impact score of the ADDQoL [see Figure 3]

Figure 2: Effect of DAFNE training on treatment satisfaction (differences between baseline and 12-month scores for all participants)



Extracted from: Speight J and Bradley C. The DAFNE Trial: Analysis of the DTSQ. A report on the effects of DAFNE training on satisfaction with diabetes treatment (including standard DTSQ and extended items re: insulin and food). Internal report to the DAFNE Steering Group.

Figure 3: Total satisfaction versus average weighted impact (AWI) of diabetes on QoL



Extracted from: Bradley C and Speight J (2002) Patient perceptions of diabetes and diabetes therapy: assessing quality of life. *Diabetes Metabolism Research and Reviews* **18**(3), S64-S69.