



Decision analysis of medical and surgical treatments for trigeminal neuralgia: How patient evaluations of benefits and risks affect the utility of treatment decisions

A.L. Spatz ^{a,1}, J.M. Zakrzewska ^{a,1}, E.J. Kay ^{b,*}

^a *Barts and the London, Queen Mary's School of Medicine and Dentistry, Department of Oral Medicine, Turner Street, Whitechapel, London E1 2AD, UK*

^b *Peninsula College of Medicine and Dentistry, Tamar Science Park, Research Way, Plymouth PL6 8BU, UK*

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Abstract

Trigeminal neuralgia (TN) is a rare form of neuropathic facial pain characterised by severe, paroxysmal pains in the face. Little is known about the decision process in treatment of TN, and management with anti-epileptic drugs or surgical procedures carries risks of side effects, recurrence and complications. One hundred fifty-six previously diagnosed TN patients completed an adapted time-trade-off utility measurement questionnaire to ascertain how they valued the potential outcomes from various surgical and medical treatments. The decision analysis revealed that microvascular decompression surgery (MVD) offered the best chance of improved quality of life or highest maximum expected utility (MEU). MVD (MEU = 16.08 out of a possible 20) was closely followed by balloon compression (MEU = 15.97), percutaneous glycerol rhizolysis (MEU = 15.61) and then radiofrequency thermocoagulation (MEU = 14.93). Medication offered the least optimal chance of improved quality of life (MEU = 14.61). The difference between the highest (MVD) and lowest scoring treatments (medication) was 7.3% (1.46/20). These results were sensitive to some utility values, meaning the preferred treatment is changed by the values patients assign to outcomes. As surgical techniques narrowly offer the highest chance of maximising patient quality of life, all patients with TN should consider surgery. However, surgery is not right for everyone, and patients should be informed about their full range of choices. Treatment decisions must take place after careful consideration of the values patients place on benefits and risks of treatment.

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1. Introduction

Trigeminal neuralgia (TN) is a relatively rare condition that causes severe, intermittent, electric shock-like pains in the face. Recent UK incidence rate is reported as 8/100,000 and the peak age of the disease is 50–60

years with a slight female predominance (MacDonald et al., 2000). Anxiety and depression are common consequences, in addition to deterioration in quality of life (Zakrzewska et al., 1999).

There is a lack of certainty regarding the aetiology and pathophysiology of TN (Nurmikko and Eldridge, 2001) and there are a wide range of treatments available. The condition is not itself life-threatening (Rothman and Monson, 1973), and therefore a decision to have surgery is not a matter of life or death in the conventional sense. However, the pain and its effect on quality

* Corresponding author.

E-mail addresses: a.l.spatz@qmul.ac.uk (A.L. Spatz), elizabeth.kay@pds.ac.uk (E.J. Kay).

¹ Tel.: +44 0207 2671874; fax: +44 0207 2677064.

of life is distressing (Zakrzewska et al., 1999) and treatments can be costly (Berger et al., 2004). As a result, patients and practitioners encounter considerable uncertainty when making treatment decisions.

Medication is often a first line treatment (Nurmikko and Eldridge, 2001, Zakrzewska and Lopez, 2005). Traditionally, it is only when medications fail or severe side effects develop that patients are offered surgical options (Zakrzewska, 2002). Medical management with anti-convulsant (anti-epileptic) drugs carries debilitating side effects and the drugs eventually tend to lose effectiveness (Taylor et al., 1981).

Surgery for TN is either destructive (ablative) where the trigeminal nerve sensory function is intentionally destroyed, or non-destructive where the trigeminal nerve is decompressed, with normal function usually preserved. Surgeries at the level of the Gasserian ganglion are all destructive and include radiofrequency thermocoagulation (RFT), balloon compression (BC) and percutaneous glycerol rhizolysis (PGR). Gasserian ganglion therapies require short acting anaesthetics, are primarily overnight procedures and are classified as minor procedures. Microvascular decompression (MVD) on the other hand is a major neurosurgical procedure requiring full anaesthesia and on average a five-day stay in hospital (Ashkan and Marsh, 2004). All surgeries carry risks of complications either in the immediate peri-operative period or in the long term. There is also a very small risk of mortality for each of the treatments (Sweet, 1990, Zakrzewska, 2002; Kapoor and Hamilton, 2005).

A growing body of literature supports the use of a systematic and ‘evidence based’ approach to health care (Freemantle et al., 2000; Eccles et al., 2001), but little is known about the patient decision process in treatment of TN. Decision analysis in the health care context combines evidence and helps to determine the optimal strategy under given circumstances (Bonari et al., 2005; Lipton et al., 2005). When used to analyse decisions, this method helps establish the ‘best’ treatment, from the patient perspective (Fyffe and Kay, 1992; Petitti, 2000). This information can help determine how an individual patients’ own idiosyncratic values effect treatment decision-making.

The present study was carried out in order to try to determine which of the main available treatments (medication, RFT, PGR, BC, and MVD) offers the best chance of maximising patient-perceived quality of life i.e. offers the maximum expected utility.

2. Materials and methods

2.1. Patient selection

Only patients who could converse fluently in English were recruited. Patients who previously had surgery, were taking medication or had MS were all included regardless of length

of time suffering from TN, and regardless of age. The only pre-requisite for participation was a previous diagnosis of TN given by experts in one of the collaborating secondary care centres. This diagnosis was not re-verified by the researchers. There may be variations of diagnostic criteria (and management approaches) between centres of excellence, especially when differentiating ‘atypical’ from ‘typical’ TN (Nurmikko and Eldridge, 2001), but patient-perceived benefit is the issue in this decision analysis, rather than professionally defined diagnoses.

All of the participants were volunteers, paid only for travel expenses, and not their time. Their responses were not available to their treating physicians and did not influence the usual treatment or advice in any way.

2.2. Sample

Patients were recruited directly from four secondary care centres in the UK (Liverpool, London, Southampton and Bristol) and by advertising through the Trigeminal Neuralgia Association. It was not possible to ascertain how many patients were on waiting lists at the time of participation and therefore facing this decision in reality, but pain scores were recorded as well as prior history of medical and surgical treatments. Two of the centres have mainly surgical patients (both pre- and post-surgical) and the other two are multidisciplinary (providing both medical and surgical treatments).

In total, data were collected from 160 patients. In 3 cases (2 women and 1 man) there were missing utility values, and therefore the data from those subjects were discarded. One further participant withdrew because she had difficulty understanding the exercise and was in too much pain. The final sample was therefore 156 patients. Occasionally participants did not completely fill in the general questionnaire, thus for some variables other than the utility values, the sample was slightly smaller.

2.3. The time trade-off

According to Lane (1987) ‘utility’ is a ‘general concept for measuring the value individuals attach to the consequences of various courses of action’. Rohlin and Mileman (2000) defined utility as ‘the level of subjective satisfaction, distress, or desirability that people associate with a particular outcome’. Various survey methods have been developed for eliciting peoples’ valuations of health outcomes. These methods are known collectively as utility measurement. This study used the Time Trade-off (TTO) method of utility measurement due to its relative ease of use compared to other methods of utility measurement (Torrance et al., 1972, Pli-skin et al., 1979, Tversky and Kahneman, 1992, Verhoef et al., 1994, Bleichrodt and Pinto, 2002, Bleichrodt, 2002, Bleichrodt et al., 2003).

When considering the acceptability of a given outcome from treatment, this method asks the respondents to consider a trade-off between *time* alive and *quality* of life. The respondents’ preferences are elicited by asking them to consider the point at which a shorter length of life with a *higher quality* is the same as a longer period of life with a *lower quality*.

In order to obtain utility values, the health state for which the value is required must be described as fully as possible (Petitti, 2000). Thus, each utility included functional, psychological and social impacts of the health state in question.

During the ‘utility interview’ each patient was given a standard explanation of the purpose and method of the time trade-off. It was stressed that the outcomes could potentially occur but would not necessarily be the patients’ own experience. The patients were asked to score the scenarios according to how they would feel if that situation was what they were facing themselves. In order to provide consistency, participants were instructed to judge how they felt about the scenarios based on the idea that the situation was exactly as stated – with no further possibility of additional treatment in the future. Patients were presented with 21 scenarios, which described possible health outcomes. All patients rated all 21 scenarios but they were presented in three different orders, at random. This was in order to diminish any ordering effects (Petitti, 2000). The primary researcher (AS) was available for questioning regarding the content or the process.

Immediately after reading each scenario, the patient scored it, utilising the time trade-off method, essentially assigning a value from 0 to 20 for each one. The lower the score, the more years of life a patient would be willing to trade in order to avoid the health state (outcome) in question.

The utility interview usually lasted 1 h, and each patient spent 1/2 hour filling in the additional questionnaires, the results of which will be reported in future papers. Summary descriptions of 21 outcomes measured in addition to three which were not possible to measure (marked “assumed”) are presented in Supplementary Table 1. Supplementary Table 2 contains four examples of health outcomes for which utility values were measured.

3. Data collection

Consent for the researchers to contact patients was sought from the relevant care providers according to the research protocol, which was approved by the local Ethics Committees. All of the readily identifiable and eligible patients in each centre (databases varied between centres) were requested by post to provide consent to contact, and register their interest in the project. Advertisements were also placed in the newsletter of the Trigeminal Neuralgia Association for interested patients. All those from either source, who registered their interest in further information, were sent patient information forms, consent forms and further information about the study.

Interviews with the primary investigator were arranged at the centres, at a time to suit the patient. During the decision-analysis interview, the time trade-off questions were presented in one of three differently ordered formats so that any ordering effects could be reduced and monitored. Patients rated each potential outcome according to the TTO method described above. Basic demographic information such as age, gender, postcode, medical history (particularly of TN) was also gathered at the time of the interview. Various measure-

ments of current pain levels and depression, anxiety and coping style of patients were also taken, and will be reported elsewhere.

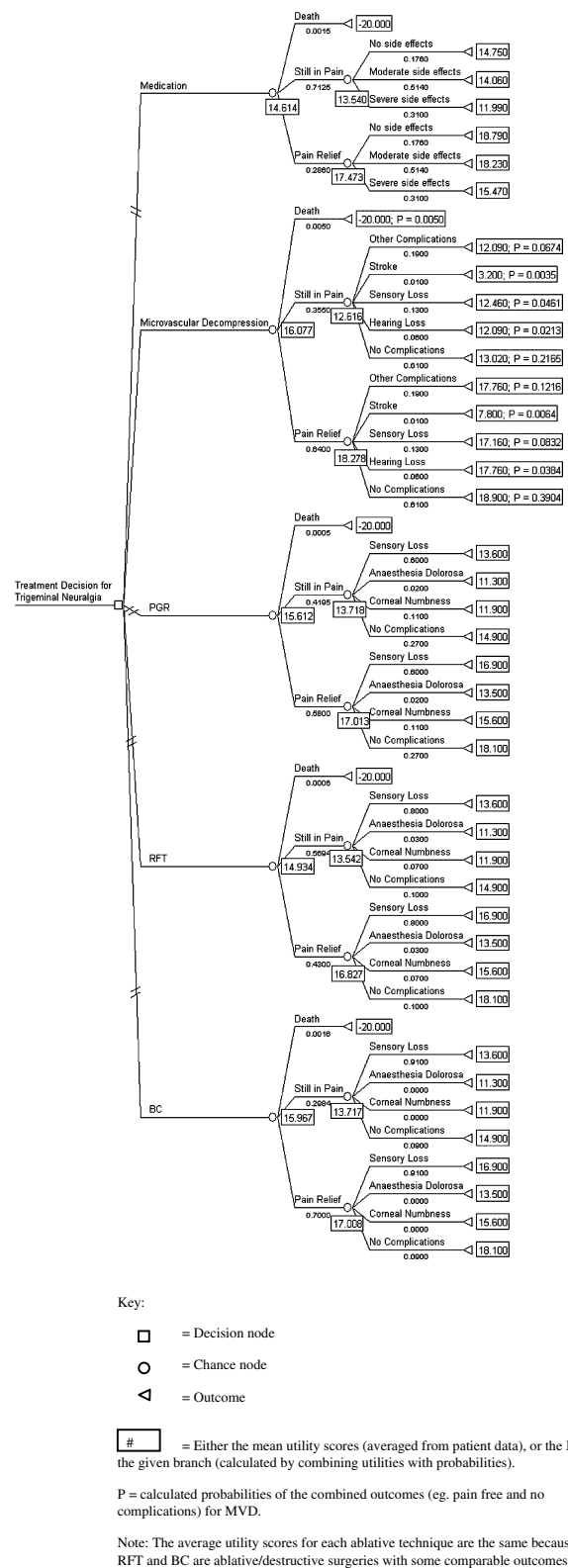


Fig. 1. Decision Tree including probabilities, mean utilities and Maximum Expected Utilities (MEUs).

3.1. Decision analysis

A decision tree (Fig. 1) was constructed to graphically depict the decisions to be made and the potential consequences of each alternative treatment. Decision nodes (square boxes) identify points where there are alternative actions that are under the control of the decision maker. Chance nodes are depicted graphically as circles. These chance nodes identify points at which the probability of the event occurring is beyond the control of the decision maker.

The final events or outcomes of the decision are depicted by rectangles. The outcomes depict the main events that might occur. The decision tree is analysed by multiplying each probability leading to an outcome, then weighing the product (multiplying it) by the value of the outcome itself. The results of these multiplications are then added together for each alternative arm from the decision node, to determine the overall utility value of that given decision (see Fig. 1).

The choice (node) which scores the highest is the decision which is said to have the highest or best ratio of benefit to risk or the maximum expected utility (MEU). It is therefore the choice which maximises the chance of improving quality of life in the sample or individual in question. The particular value of decision trees is that it is possible to undertake a sensitivity analysis. This process checks the robustness of the conclusion drawn, when circumstances change. For example it checks whether the decision is affected by changes in patient scores of side effects and complications.

3.2. Systematic review

In 2002 one of the authors (JZ) and an independent neurosurgeon (BL) completed a systematic review which they reported in *Neurosurgery* in 2003 (Zakrzewska and Lopez, 2003). Using this as a basis they updated the review to include all the literature between 1960 and 2005. To ensure that the search was all inclusive a librarian from the British Medical Association (CA) was asked to develop the search strategy and then to run it in several databases. Databases searched were Medline, Embase and Cochrane Library. The titles and abstracts were then read by JZ and BL who identified the papers that needed to be read in full and graded them. Both JZ and BL independently read and graded 86 papers on RFT, 25 papers concerning BC, 40 on PGR, and 95 papers regarding MVD using quality criteria as specified by Zakrzewska and Lopez (2003). The 10 RFT, four BC, eight PGR, and 15 MVD papers that scored 10 or more points out of thirteen different quality reporting criteria (Zakrzewska and Lopez, 2003) were re-read by the primary researcher (AS) and again by the original physician (JZ) in order to independently extract the relevant data. One article (Barker et al., 1997) that scored 9/13 was

nevertheless included, as it was a specific paper regarding complications from MVD surgery. Any differences in data extraction were resolved by discussion. The raw data from the selected papers were then combined (where possible) in order to determine the probability values for use in the decision tree (Supplementary Table 3), while ensuring the probabilities for each branch added up to one.

For the probabilities in the tree for which no reliable retrospective data were available, self-report data from patients in the present study were used. This was the case for the medical probabilities, as the information available in the literature at the time was not presented in a format by which the incidence and severity of side effects could be determined (Wiffen et al., 2005a,b, Zakrzewska and Lopez, 2005).

For the purpose of this study, severe side effects were defined as those patients reporting three or more side effects. Moderate side effects were defined as those patients reporting one-two side effects, and no side effects meant the patients reported none.

3.3. Analysis

Simple arithmetic means of the patient utility values for all of the 22 measured outcomes were calculated. Fig. 1 depicts the decision-tree. The potential outcomes (utilities) measured were the same for all three ablative techniques, but the probabilities differed according to results from the systematic review. In order to compare the five different treatment modalities, the utility scores for each outcome were multiplied by the probabilities and then each of the results was added together for the various branches in order to calculate the MEU for each treatment. The MEU weights the patient utility values by the probabilities (based on the literature), and thus the treatment with the highest MEU is the one which has the best chance of maximising patient quality of life. Sensitivity analyses on all utility values were carried out using Treeage software.

4. Results

In total, data from 156 patients were suitable for analysis. Some responded to the contact letter, and some to the advertisement. The sample was comprised of 42.9% (67/156) men and 57.1% (89/156) women. The ages of the participants ranged from 25 to 85, with a mean age of 62.06 (s.d. 10.97). Eighty-seven percent (136/156) self-reported a diagnosis of typical TN. Four percent (7/156) reported atypical TN, and seven percent (11/156) had symptomatic TN – defined for the purpose of the study, as neuralgia caused by MS, or by some other cause such as a tumour. Eight patients self-reported a second diagnosis of MS, 134 (85.9%) reported no second diagnosis.

The length of time elapsed since first experiencing TN symptoms ranged from two months to 40 years. The mean length of illness was 10.89 years (s.d. 7.53), and the median was 9.5. The mean pain score as measured on a 7 point Likert scale was 0.94 (s.d. = 1.28, range = 0–5), and the median was zero.

At the time of data collection, 76% (117/154) of the sample had previously undergone some form of surgery for TN (peripheral therapies such as cryotherapy and alcohol injections, etc., were considered surgical procedures for this purpose, as well as the others listed previously). Thirty-nine percent (60/154) had undergone one

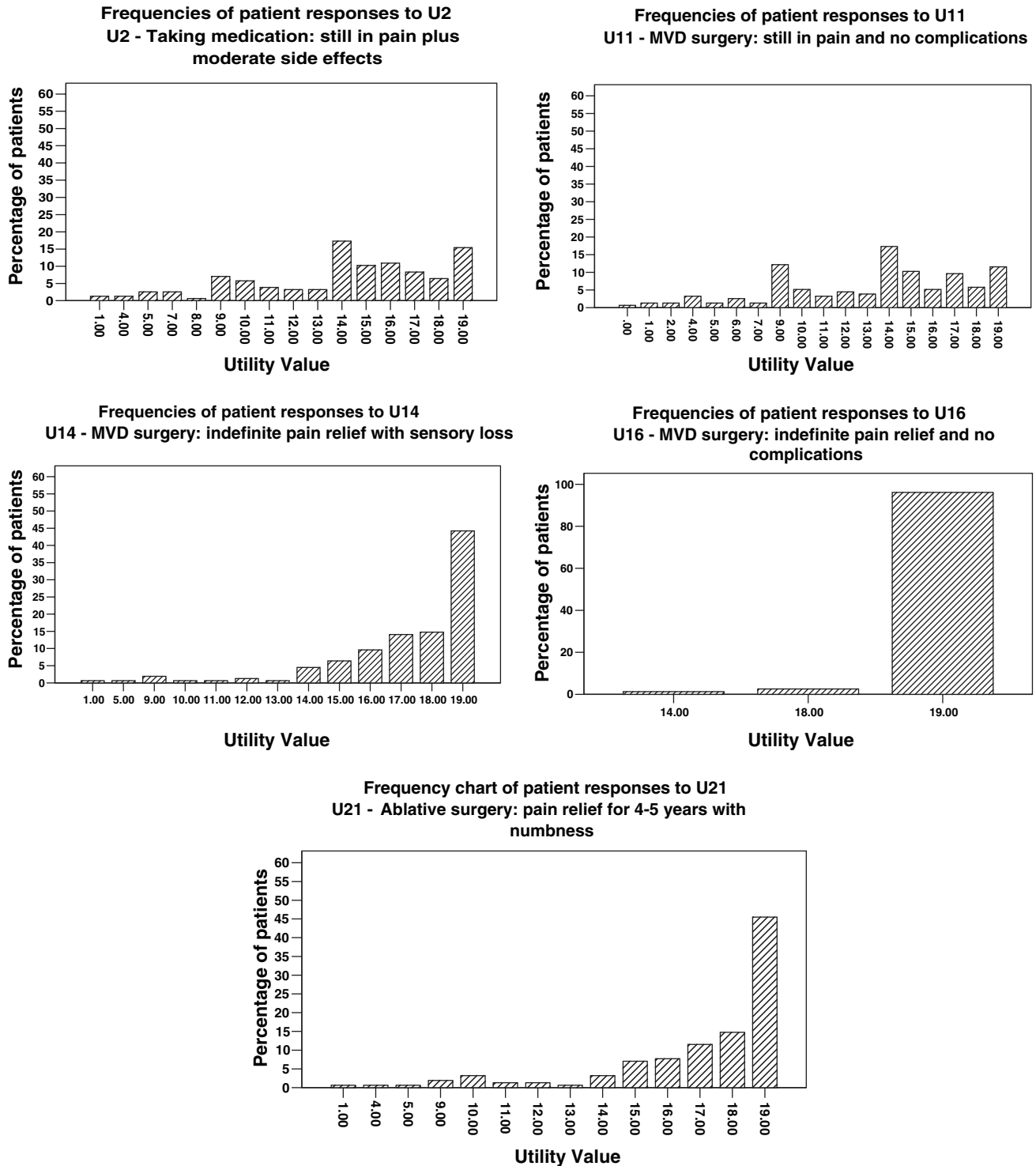


Fig. 2. Bar graph distributions of sample utilities to which the tree is sensitive.

Table 5
Number and proportion of patients “preferring” each treatment, based on the decision analysis

	Medication	MVD	PGR	RFT	BC
Number of patients preferring this treatment	19	53	8	0	76
% of patients preferring this treatment	12.2	34	5.1	0.0	48.7
Number of patients rating this treatment as “2nd Best”	20	30	57	12	37
% Patients rating this treatment as “2nd Best”	12.8	19.2	36.5	7.7	23.7

procedure, 15.6% (24/154) had two procedures, 10.4% (16/154) had three procedures, 3.9% (6/154) had four procedures, and 7% (11/154) had five or more procedures. Of the patients who had previously undergone some form of surgery, 90 (58% of the entire study population) had an MVD. Approximately 50% (77/154) of the study population was taking some form of medication to manage their TN pain at the time of data collection.

4.1. Surgical probabilities

The systematic review revealed that there were no randomised controlled trials of surgical management in TN at the time of the search. The available data were often not presented in the format required for this study e.g. proportion with specified complications or side effects, and few studies provided the raw data. Very few specified whether outcomes were assessed by an independent observer. Most concentrated on pain outcomes and few reported complications in detail or how these changed over time. Many of the reports on ablative surgery omitted data on post-operative numbness. The final number of studies utilised to generate the probabilities is as follows: six for MVD, five for RFT, seven for PGR, and three for BC. [Supplementary Table 3](#) presents the literature derived estimates of probability for each outcome as well as the associated sources.

4.2. Medical probabilities

At the time of data collection, 82.4% (61/74) of patients taking medication were suffering from some side effects. The main side effects reported were: dizziness, drowsiness, lack of concentration, loss of memory, ataxia (unsteadiness on the feet), high blood pressure, ulcers, altered perceptions (hallucinations) and nausea. Thirteen of the participants who were taking medication (17.6%) reported suffering from zero side effects, 20 (27.0%) were suffering from one side effect, 18 (24.3%) were suffering from two side effects, 15 (20.3%) were suffering from three side effects, five (6.8%) were suffering from four, and three (4.1%) were suffering from five or more side effects. These values were utilised for the probabilities of the medical outcomes in the decision tree ([Supplementary Table 3](#)), and were adjusted to accommodate the death rates. Death-rates were obtained via the literature.

4.3. Utility analysis

According to a one-way ANOVA, there was a significant ordering effect for two of the utility scores: U4 ($F = 4.3$, $p = 0.015$) and U5 ($F = 4.0$, $p = 0.02$). However, the decision was not sensitive to the value of these two utilities, so this ordering effect does not alter the outcome of the analysis. There was no significant ordering effect for any of the other remaining utilities.

After integrating the assigned probabilities with the averaged utilities from the sample according to the format as depicted in the decision tree ([Fig. 1](#)), MVD offers the highest MEU. The MEUs for the treatments were as follows: MVD = 16.10, BC = 16.01, PGR = 15.64, RFT = 14.97, Medication = 14.62. The difference between the highest MEU (MVD) and the lowest MEU (medication) is equivalent to 1. Forty eight utility points out of a possible 20. This equates to 7.4% of total quality of life (1. 48/20) as measured in the current study.

When the decision tree was recalculated for each individual patient’s utility values, the analysis showed that 48.7% of patients were predicted to prefer balloon compression, as a first line of treatment and 34% would prefer MVD, 12.2% medication and 5.1% PGR (see [Supplementary Table 4](#)). RFT never attracted the highest utility for any patient as a first line of treatment. The second most preferred treatments were as follows: PGR = 36.5%, BC = 23.7%, MVD = 19.2%, Medication = 12.8% and RFT = 7.7%.

The decision was sensitive to some utility values ([Fig. 2](#)). The meaning of the results and the proportions of patients whose utilities were above or below the threshold value are shown in [Table 5](#), which shows that the utilities U2, U3, U7, U9, U10, U11, U12, U14, U15, U16, U17, U20, U21 and U24 are the outcomes which are axiomatic to the decision. [Table 5](#) shows how specific variations in the patient ratings of each outcome will affect the decision.

5. Discussion

In this sample, the surgical procedures included in the tree are narrowly preferable to medication. Of the surgeries, MVD, BC, PGR, RFT offer on average, the best chance of maximising quality of life in that order. However, the 1.48 difference in potential to maximise quality

of life between the highest and lowest scoring treatments is small [7.4% (1.48/20)]. Importantly, these data highlight that using a population ‘mean’ utility may lead to poor treatment decision-making. Assuming that all patients value various outcomes in a similar way, or in the same way as the clinician, will lead to poor outcomes for the patient. This is shown by the calculation of the decision tree for each individual, which illustrates that although MVD attracts the mean maximum expected utility (i.e. is the ‘preferred’ treatment) for an ‘average’ patient, in reality most patient’s evaluations of the treatment outcomes suggest that their “best” choice of treatment would be balloon compression. Interestingly PGR attracts the 2nd highest utility value for 36.5% of patients, although it only attracts the highest for 5.1% of patients (see [Supplementary Table 4](#)). In addition, there were a wide range of utility values between the patients ([Supplementary Table 1](#)) and the decision was sensitive to many of these values ([Table 5](#)).

As shown in [Table 5](#), of particular importance to the decision are the values a patient places on the potential outcome of numbness following ablative surgery either with or without pain relief (U.17, U.21). The tree is particularly sensitive to these outcomes, in that the threshold values are close to the utility values entered in the tree. Thus, only slight patient variations from the mean on U.17 and U.21 (scoring above 14 and 17.1, respectively) will alter which treatment attracts the MEU. This implies that the less a patient minds the idea of facial numbness as a complication, the more likely it is that the patient will benefit from an ablative technique over MVD surgery.

The decision tree is however also sensitive to the outcomes including sensory loss following MVD surgery (U.9 and U.14). Thus, the *lower* a patient rates sensory loss following MVD surgery (below 10.1 and 15.8, respectively), the more likely it is that they would benefit from BC over MVD.

Additionally, the tree is sensitive to the pairs of outcomes including MVD surgery and ablative techniques accompanied by ‘no complications’ (U.11 and U.16; U.20 and U.21). The fact that the tree is sensitive to these outcomes, which do not involve complications, suggests that the patients’ perceptions of MVD or an ablative surgery influence patient’s decisions, as well as the end health state or outcome achieved.

Temporary peri-operative complications (MVD: other complications) are collectively estimated to account for around 19% of the potential outcomes for MVD surgery ([Supplementary Table 3](#)). According to the sensitivity analysis ([Table 5](#), U7 and U12), the lower patients rate the outcomes including ‘other complications’ following MVD (U.7, U.12), various different ablative techniques become preferable. This result suggests that patients’ perceptions of the impact of minor complications associated with major surgery are also pivotal to the decision.

[Table 5](#) also indicates that if a patient scores outcomes including hearing loss following MVD surgery (U.10 and U.14) lower than 6.9 and 15.8, respectively, then ablative techniques are preferable. Therefore, the more a patient minds the prospect of unilateral hearing loss following MVD surgery, the less likely it is that MVD surgery is the best choice. This indicates that the extent to which a TN patient relies upon their hearing for their livelihood or quality of life may affect their treatment decision.

This paper describes the first formal attempt to analyse the decision-process for management of TN. The strengths of the research lie in the relatively large sample, the identification of specific complications and side effects that are particularly important to address in the decision-making process, as well as the potential for a decision analytic approach to underpin patient discussions with their doctors and surgeons, especially regarding the outcomes to which the tree is sensitive.

A further limitation of the study is that the radiosurgery (gamma knife) procedure was omitted from the decision tree and cannot be compared to the other treatment options in this paper. It was not possible to include radiosurgery in the current analysis because five year follow up data were not available at the time of the start of the research.

When interpreting the results, it is also important to highlight that not all reports in the literature specifically state the absence of certain key complications ([Zakrzewska and Lopez, 2003](#)). There were only three out of 25 studies on BC that mentioned anaesthesia dolorosa and corneal numbness as side effects, and they reported an incidence of 0 for each. Because of these probabilities, BC comes out ahead of the other ablative techniques, as the utility measurements were the same for all three of the ablative techniques ([Supplementary Table 1](#)). Should these probability data change as a result of further research, the results of this decision-analysis might also be altered.

Another limitation of the current research is that it was not possible to directly measure the utility values for outcomes U.7, U.8, and U.12, and these values were assumed. This was necessary for several reasons. Primarily, when completing a decision analysis, patient fatigue has been shown to skew utility scores ([Petitti, 2000](#)) and there were too many ‘other complications’ within outcomes U.7 and U.12 ([Broggi et al., 2000](#)) to include them separately. In addition, it seemed insensitive to describe to vulnerable patients the possible outcome of stroke, with no pain relief (U.8).

When generating the assumed utilities for the peri-operative complications, these temporary problems were considered at worst, to be as disruptive as a permanent complication such as hearing loss in terms of impact on quality of life. As a conservative estimate, the outcomes

including ‘other’ complications (U.7 and U.12) were given an assumptive average utility value to match those of pain relief and continued pain in the presence of hearing loss in the current sample (17.8 when accompanied by pain relief, and 12.1 when pain continued). Although this may not be the case for some individuals, this was the best available estimate based on the actual values of this sample.

The assumed value for stroke plus continued pain was also generated from the patient data in this sample. The value for U.8 was assumed to have the same utility value of outcome U13 (stroke plus pain relief) minus the average utility gain for pain relief (approximately 3.5–4.5 utility points). Since it would be very unusual for anyone to value a stroke without pain relief more highly than a stroke with pain relief, this assumed utility is unlikely to undermine the validity of the results.

The issue of discounting should also be considered. Assigning utility values to outcomes such as those described in the scenarios in this study in effect required the respondents to weigh a number of conflicting outcomes against each other. However outcomes for treatments for TN can and do change over time (Burchiel, 1988). Potential negative outcomes which occur sometime in the future may have a lower utility than real negative outcomes occurring now. Similarly, positive outcomes in the future have lower utility than positive outcomes now. This is clearly an important consideration for treatments which can bring about a dramatic but temporary improvement, and for treatments which give late side effects. Another consideration which is not taken into account in this analysis is the possibility of second procedures and how the availability of these might affect positively or negatively, the utility of the outcome from a first procedure.

Clearly, there is a need for better quality data to be generated to underpin decision analytic models such as the one presented here. Prospective multicentre single-arm studies using standard diagnostic criteria, and standardised procedures are needed so that accurate estimates of complication rates can be derived. In particular, it is currently very difficult to pinpoint the impact of temporary ‘other’ complications on the TN patients, treatment decision, due to the uncertain probability data. The effect of ‘minor’ surgical complications on patient decision-making may currently be underestimated. The medical literature also provides little data about the prevalence of side effects. The generation of reliable probability data for all of the risks associated with treatments for TN would improve the usefulness of the current decision-tree as well as generally improve the accuracy of information available to patients and doctors during the decision-making process.

Future research should also focus on gaining a greater understanding of the way in which TN patients perceive the processes involved with surgical options (anaesthesia,

length of recovery time, etc.) and the associated benefits and risks. Measuring utility values is a potential method for achieving this understanding, as it relies on patients weighing benefits and risks for themselves.

6. Conclusion

This study indicates a need for in-depth communication with patients regarding the benefits and risks of treatments, with a view to eliciting each patient’s own individual views of their ability to cope with the various potential outcomes.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at [doi:10.1016/j.pain.2007.02.009](https://doi.org/10.1016/j.pain.2007.02.009).

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