Health utility reporting in Chronic Rhinosinusitis patients

Running Title: Health Utility reporting in CRSsNPs Patients

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ABSTRACT (250)

Objectives

Direct comparison of different diseases allows clinicians and researchers to place the burden of symptoms and impact on quality of life of each condition in context. Generic health-related quality of life assessment tools allow such analysis, limited data is available for British patients with Chronic rhinosinusitis.

Design

As part of a larger feasibility study, patients underwent baseline assessment using the SNOT-22, SF-12 and EQ-5D-5L tools. Data was analysed using Microsoft excel and algorithms available for the analysis of the later 2 tools. We plotted EQ-5D-5L VAS and utility scores and SF-12 MCS and PCS scores separately against SNOT-22 scores and quantified associations using bivariate ordinary least squares regression analysis.

Setting

Patients were prospectively recruited from 6 UK outpatient clinics.

Participants

Adult patients with chronic rhinosinusitis without nasal polyps (CRSsNPs).

Main Outcome measures

Baseline SNOT-22, SF-12 and EQ-5D-5L scores.

Results

Fifty-two adults were recruited with a mean age of 55 years, 51% were male. The mean SNOT-22 score was 43.82. Mental and physical component scores of the SF-12 were 46.53 and 46 respectively. Mean index score computed form the EQ-5D-5L was 0.75. Worse (higher) SNOT-22 scores were associated with lower EQ-5D-5L VAS and utility scores and SF-12 MCS and PCS scores.

Conclusion

The EQ-5D-5L suggests that British CRSsNPs patients are negatively impacted with regards to quality of life. We found the SF-12 to be less sensitive and conclude that the EQ-5D-5L tool is a quick and accessible method for assessing QOL in order it can be compared with other disease states.

Introduction

There is accumulating evidence of the personal and societal impact of chronic rhinosinusitis (CRS) with regards to symptom severity [1], reduced productivity and absenteeism [2]. Many studies of patients with CRS increasingly use the Sinonasal Outcome Test (SNOT-22) (disease specific, internationally validated questionnaire) as an outcome measure [3]. While this allows for excellent assessment and monitoring of the impact of CRS symptoms at an individual level, it does not allow direct comparison with other chronic conditions. Generic health-related quality of life (HRQoL) assessment tools allow comparison of disease states on both a functional level [4] and with regards to and the burden to society each condition presents. Such tools include the EuroQoL Five Dimension tool (EQ-5D-3L/5L)[5], Health Utilities Index [6], the Short Form 36 (SF-36) [7] and the latter's shortened versions, the SF-12 and SF-6D.

Lange et al published health utility assessments from the trans-European GALEN study that showed a lower health-related quality of life using the EQ-5D-3L in CRS patients compared to those without CRS [8]. A recent study in the USA reported a lower health utility value (also generated by the EQ-5D) for patients with CRS compared to the general population, the value was similar to that of other chronic disease such as mild asthma and migraine [9]. A large UK epidemiological study recently showed those with CRS to have lower QOL using the SF-36, specifically both mental health and emotional domains were lower [10]. The SF-36 was converted to a shorter form, the SF-12 and validated for use within the UK [11]. The SF-12 has itself been used for CRS patients outside the UK[12] and as a short and quicker method of assessing HRQoL than the SF36 it is potentially more attractive for future research. Thus, the aim of this study is to evaluate the EQ-5D-5L and SF-12 health utility measures in a UK CRS population. In addition the data can be seen alongside the widely published disease-specific SNOT-22 questionnaire.

Methods

As part of a feasibility study, a prospective cohort of patients were recruited from six UK centres with a confirmed diagnosis of CRS without nasal polyps (CRSsNPs) just prior to commencing maximal medical therapy [13]. The study was ethically approved by the West Midlands Research Ethics Committee (ref: 12/WM/0359) and included on the UK CRN portfolio (ref: 13417). Funding was provided by a Royal College of Surgeons Pump Priming Grant and supported by the Anthony Long and Bernice Bibby Trusts.

All patients recruited were diagnosed with CRSsNPs according the EPOS 2012 criteria [14] by a rhinologist in a specialist clinic and subsequently underwent 2 face-to-face study visits and a third interaction via postal correspondence (questionnaires and feedback only). Patients who did not complete all questionnaires were excluded from this analysis. Adult patients between 18 and 70 years, with a diagnosis of CRSsNPs as per the EPOS guidelines who had not received maximal medical treatment previously were included, and while previous surgery was not a reason for exclusion no patients had undergone previous endoscopic sinus surgery. Maximal medical therapy was considered as per EPOS 2012 guidelines to be alkaline nasal douches and intranasal corticosteroid preparation, longterm (12 weeks) antibiotics[14].

Patients with CRSwNPs and secondary CRS (eg Wegner's, immunodeficiency) were excluded. Patients received a 12-week course of Clarithromycin 250mg b.d. alongside b.d. nasal douching and intranasal mometasone, (2 squirts, each nostril b.d.), the latter two being continued for a further 12 weeks.

Measures

The SNOT-22 is an internationally validated disease-specific questionnaire detailing both disease-specific (e.g. blocked nose) and global (e.g. sleep disturbance) domains[3]. Twenty-two items are covered and scored on a Likert grading system (0-5). The resulting scores range from 0 – 110, the median score in a normal population without CRS ranges between 6.5 and 7 in published studies [3, 8], .

The SF-12 questionnaire (a condensed version of the SF-36) is a 12-point assessment tool covering eight dimensions of health; two validated scores are produced, the physical component summary (PCS) and the mental component summary (MCS) . The scores compare to a norm-based scoring algorithm where 50 is the typical adult, a score of over 50 indicates better health than the typical person and less than 50, worse health.

The EQ-5D-5L is a standardised measure of health status consisting of a visual analogue scale (VAS) to assess patient reported health state on the day of completing the survey (0 = worst imaginable health state and 100 = best imaginable health state) in addition to a questionnaire with 5 dimensions (mobility, self-care, usual activities, pain/discomfort and anxiety/depression) (EuroQol 2011) [16]. Each of the dimensions asks for a response that corresponds to a health status level of no problems, slight problems, moderate problems, severe problems, and extreme problems that are coded level 1-5 respectively. The levels can then converted into a health index score using the website (https://www.ohe.org/publications/valuing-health-related-quality-life-eq-5d-5l-value-set-england), according to the population setting (in this case UK), on a scale where 1 equals perfect health and 0 equals death, and values less than zero represent states worse than death.

All 3 questionnaires were completed by patients at baseline, 12 weeks and 6 months, for the purpose of this analysis which aimed to report HRQoL for British CRS patients only baseline data is reported.

Analysis

All results were analysed using Microsoft excel. In addition, the EQ-5D-5L was analysed using the euroqol website to give an index score.

We plotted EQ-5D-5L VAS and utility scores and SF-12 MCS and PCS scores separately against SNOT-22 scores and quantified associations using bivariate ordinary least squares regression analysis, regressing each measure separately against SNOT-22 scores.

Results

Fifty-five patients were recruited over a 13-month period (January 2013-January 2014), the mean age was 55 years (range 21-81) and 51% were male. Following exclusions 52 patients who completed all 3 questionnaires were included in this study. The mean SNOT-22 score was 43.82 (Standard deviation 22.4).

SF-12 scores are reported as 2 separate scores, the mental and physical component. The mean MCS was 46.53 (SD of 11.46) and the mean PCS 46 (SD of 11.46), both lower than the score expected for a 'typical adult' (e.g. score of 50 or above).

The EQ-5D has two components, the questionnaire given an index score and the VAS. The mean index score of was 0.75 (SD of 0.23). The questionnaire component is reported as the percentage of patients reporting a particular level within each of the 5 dimensions and is represented in table 1. The mean VAS score was 73.38.

Worse (higher) SNOT-22 scores were associated with lower EQ-5D-5L VAS and utility scores and SF-12 MCS and PCS scores (Figure 1). In all cases the coefficient on SNOT-22 score was statistically significant and negative (all four p-values on the SNOT-22 score regression coefficient<0.05).

Discussion

Synopsis of key/new findings with comparison with other studies

This is the first publication of EQ-5D and SF12 scores in UK patients diagnosed with CRSsNPs in accordance to the EPOS-2012 guidelines. The mean SNOT-22 score in this study is comparable to other larger published cohorts of patients with CRSsNP undergoing medical treatment in a hospital setting, and therefore our results are likely to be generalisable to CRS patients referred for ENT treatment across the UK.

Using the norm-based scoring system published by the developers of the SF-12 (where the mean score in the general population is 50 with a standard deviation of 10 in the USA general population) both physical (self-care, physical and social activities alongside bodily pain and tiredness) component score (46.53) and mental (psychological distress) component summary scores (46) are both reduced. Compared to values for a British population with ‘No reported chronic illness’ (scores of 52.08 (PCS) and 51.60 (MCS) [17], the scores are notably lower and similar to previously reported CRS studies 46.7 and 45.6 (PCS and MCS respectively, USA population) [18].

Overall the SF-12 scores suggest that despite their CRS, patients manage relatively well with regards to both physical and mental quality of life components when compared to other chronic diseases (see table 2). The findings from this study are in contrast with work by Glicklich et al [19] and Erskine et al [10] who used the full SF-36. In the later study overall scores were reduced in CRS patients when compared to non-CRS controls, with a difference of 11-17 points (p<0.001) for overall quality of life. In their study, a significant difference was also found when looking at the mental and emotional health domains; those with CRS scored more negatively than those without, with those with CRSsNPs scoring more poorly than those with nasal polyps. Qualitative interviews have also found significant negative quality of life related issues . There are several reasons for the discrepancy; it may be that the SF-12 lacks the sensitivity to detect the impact of CRS on the HRQoL of the patient, as the tool focuses largely on physical activity and mobility. One common problem for patients relating to quality of life is known to be accessing appropriate treatment, and the feeling that symptoms are not taken seriously hence there may therefore be benefit for the patients in the trial in knowing they are receiving treatment while taking part in a trial. Additionally concurrent asthma contributes negatively on quality of life in CRS, at the main recruiting site of our study 16% of the 38 patients were found to have asthma compared with 21% in the more broadly inclusive CRES study [20] which may explain some of the difference in QoL.

EQ-5D-5L suggests there is a greater impact of CRS as the health index score generated for this group of patients was 0.75. We are limited by the lack of UK studies that use the newest version of the EQ-5D (5 level version as used in this study) when putting this figure into context. Data from the USA shows COPD patients to have an index score of 0.79 [21] and European data showed a score of 0.69 in patients 4 months after a stroke[22] Hence our study would suggest that CRS does impact on quality of life and perhaps surprisingly to similar scale as that seen in other chronic disease states.

Health profile reporting shows that many patients are able to continue about their normal activities of daily living with the majority reporting a level 1 response of ‘no problem’ with regards to mobility, self-care and usual activities. Contrary to this patients were more affected in the domains of pain/discomfort and anxiety/depression with a larger percentage reporting a level 2 (slight problems) or 3 (moderate problems). This is of interest on two accounts, first similar to the aforementioned studies there appears to be a psychological aspect to the disease that is not particularly highlighted with the SF-12. Secondly, that pain/discomfort is reported in a significant number of patients in line with previous studies which have shown that 70% of patients with CRSsNPs undergoing sinus surgery report facial pain[23] alongside higher rates of anxiety and depression [10].

It is interesting that the health index score for our UK cohort of patients undergoing a trial of medical treatment suggests greater disease burden than a US cohort of patients who have already failed medical therapy and have been selected for surgery (index value of 0.81)[9] but may reflect differences in accepted maximum medical therapy between the two nations. In our feasibility study, 50% of patients improved with maximal medical treatment [13], and therefore one would expect those selected for surgery in the US study to be a more severely affected subgroup. Of note, surgical intervention rates in the US are significantly higher than in the UK and may reflect lower thresholds for surgery in the US. In addition it may also reflect differences in primary care treatment, such that only more severely affected patients are treated within secondary care in the UK. This highlights the importance of evaluating health utility in a UK cohort and puts the disease in perspective as compared to other commonly encountered chronic disease states.

Strengths of this study

This study data is useful in two ways, firstly it provides a reference generic QOL measurement in UK patients with CRS for future researchers. We have shown the mean SNOT-22 scores to be in line with a large UK epidemiological study [24] and hence the data provided here can be used as a benchmark for future patient cohorts. Additionally they allow comparison of CRSsNPs with other chronic disease states, the health index scores obtained from the EQ-5D data indicate it has significant impact on patients. The health index score generated for this group of patients gives a simple value in which to compare other CRS cohorts internationally but also allows comparison with other chronic disease states.

A recent European study found a prevalence of CRS to be at 11% but despite comparable prevalence rates to both asthma and diabetes with similar negative impact upon quality of life and economic burden, there is a considerable disparity in the research funding and publications rates between the conditions. We would hope that the data would support future research into treatments for CRS on par with that for chronic respiratory disease and back pain. Making comparisons to other chronic conditions puts the plight of CRS patients into perspective.

The fact that patients included in this study presented to a specific rhinology clinic (rather than a general ENT outpatient clinic) is a limitation of the study as it means there may be a bias towards those with more severe disease. However, due to the similar SNOT-22 scores to other CRSsNPs patients in larger cohorts [24 25] and because the exclusion criteria prevented those who had tried previous maximal medical therapy from joining the study (therefore unlikely to have had recalcitrant disease), we believe the patients included here to be representative. Time from diagnosis will have varied in the group and some patients within the cohort will have received longer courses of intranasal steroids than others; whilst this may influence the baseline readings in our study it is likely to reflect the general cohort of CRS patients worldwide who have often taken over-the-counter regimes alongside physician prescribed medications during their disease pathway. Other limitations include the small sample size and lack of data from patients with CRS with nasal polyposis, which should be performed in the future.

Clinical applicability of the study

Index value generated from the EQ-5D questionnaire shows UK patients with CRSsNPs to be negatively affected with regards to their HRQoL with scores in line with other chronic disease states. We would advise using the EQ-5D-5L questionnaire, as a quick and reliable method of assessing HRQoL in future studies using CRS cohorts. The SF-12 has not been shown on this occasion to be particularly useful and as such we would not advise it is used in CRS related studies but perhaps replaced by the SF-36 as used in other studies.

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Figure 1a-d. Association between SNOT-22 scores and EQ-5D-5L VAS and utility scores and SF-12 MCS and PCS scores

Table 1: Percentage of patients reporting each level (no problems = level 1, extreme problem = level 5) of the 5 dimension components of the EQ-5D

Table 1 % of patients reporting	**Mobility**	**Self-care**	**Usual activities**	**Pain/discomfort**	**Anxiety/depression**
level 1	69.23	90.38	60.46	32.69	57.69
level 2	11.54	0	15.38	30.77	21.15
level 3	9.62	7.69	15.38	25	17.31
level 4	9.62	1.92	5.77	9.62	1.92
level 5	0	0	0	1.92	1.92

Table 2: Physical Component Scores (PCS) and Mental Component Scores (MCS) of the SF12 Questionnaire.

	PCS	MCS
Current study	46.53	46
Benign Prostatic Hypertrophy[17]	44.57	44.08
Congestive heart failure[17]	31.47	38.36
Parkinson’s[17]	23.30	29.09

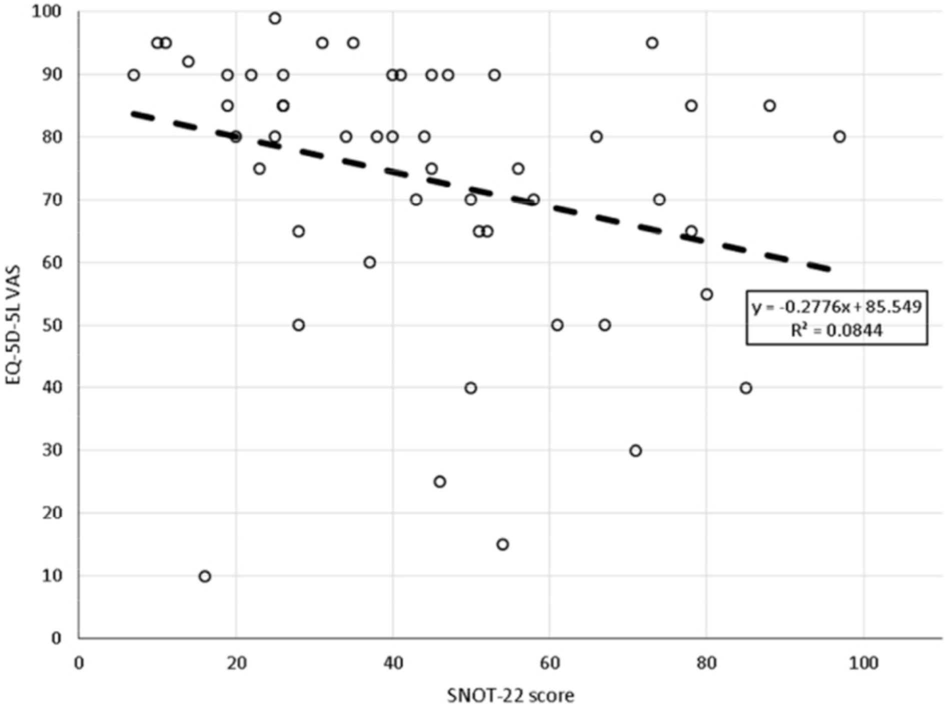

Figure 1a. Association between SNOT-22 scores and EQ-5D-5L VAS

71x52mm (300 x 300 DPI)

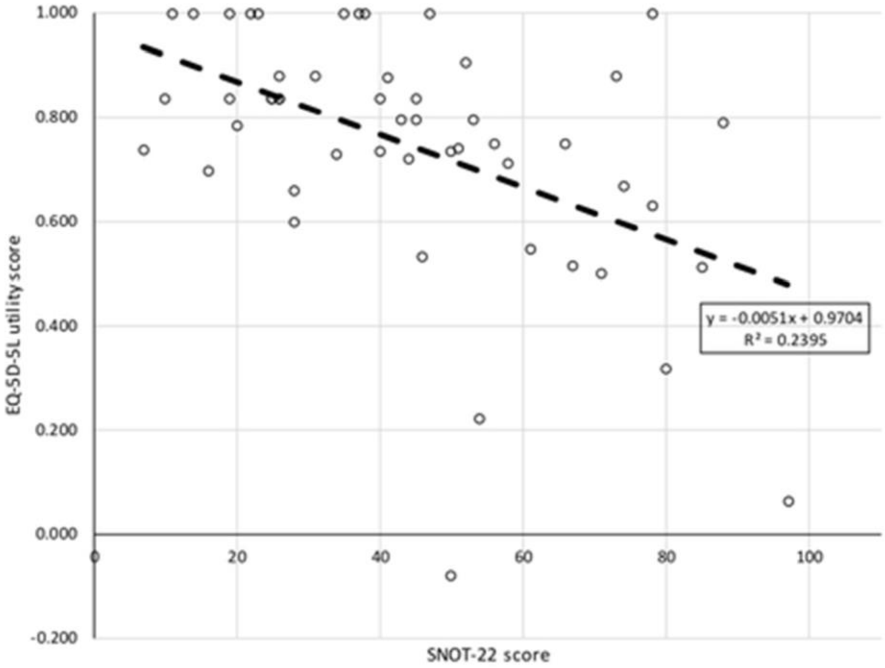

Figure 1b. Association between SNOT-22 scores and EQ-5D-5L utility scores

39x28mm (300 x 300 DPI)

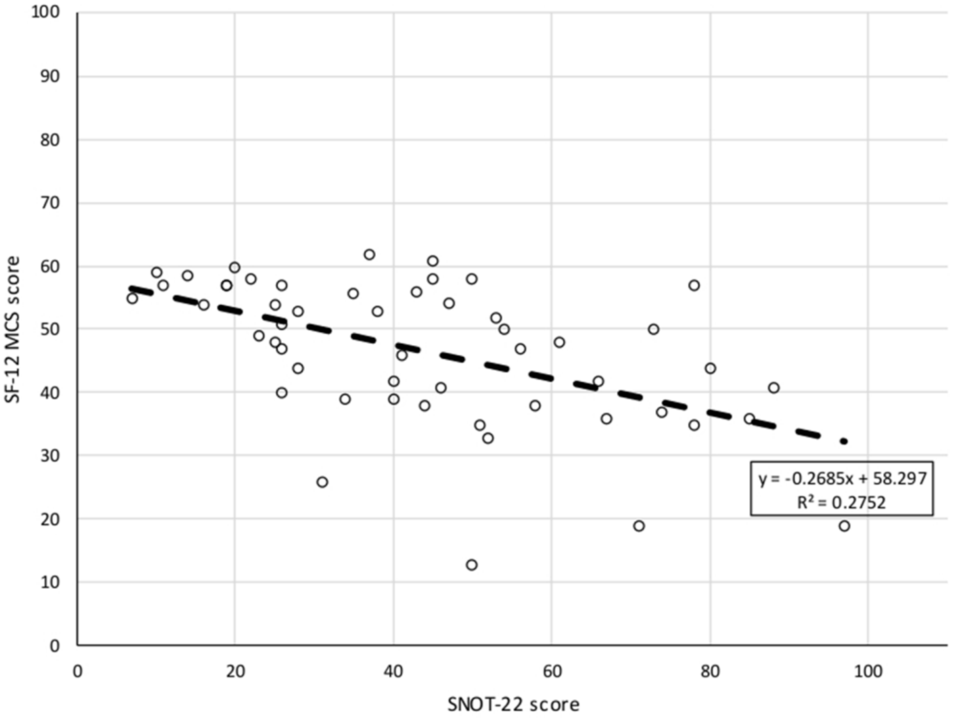

Figure 1c. Association between SNOT-22 scores SF-12 MCS scores

70x51mm (300 x 300 DPI)

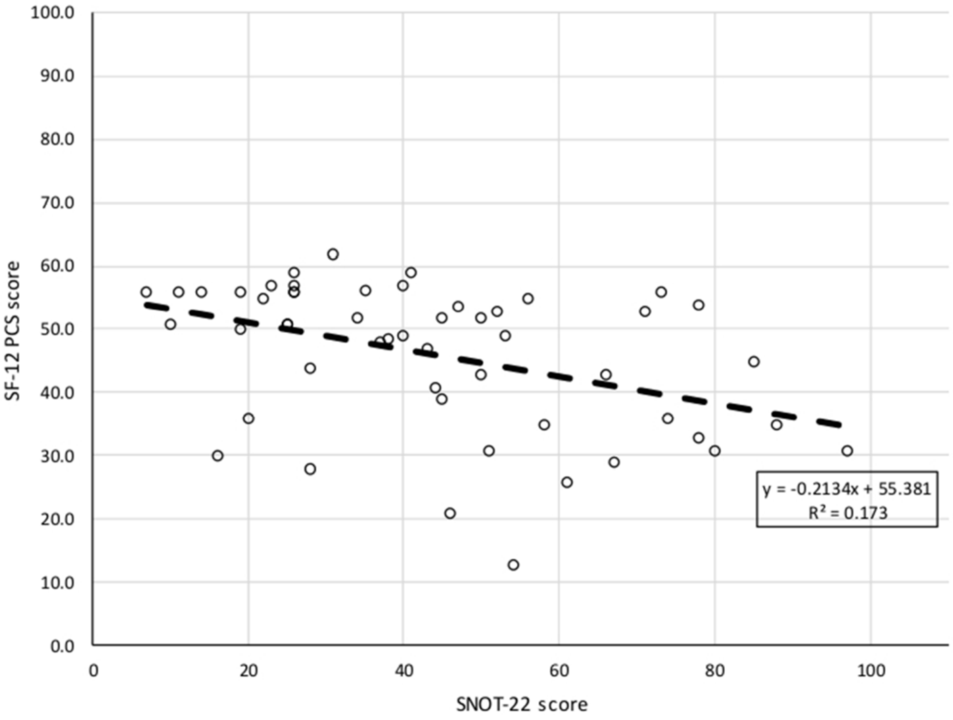

Figure 1d. Association between SNOT-22 scores SF-12 PCS scores

66x49mm (300 x 300 DPI)