Health-related quality of life in patients with chronic rhinosinusitis measured by the Vietnamese EQ-5D-5L set value

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Abstract

Background: Chronic rhinosinusitis (CRS) is one of the most prevalent chronic conditions, leading to significant health and economic burdens. Health-related quality of life can be reflected by Health Utility Index (HUI). Tools such as the EuroQol-5-Dimensions-5-Levels (EQ-5D-5L) and the Visual Analog Scale (VAS) are widely used to assess HUI in CRS patients. This study aimed to determine the overall HUI of Vietnamese patients with CRS and identify factors influencing it. **Materials and Methods:** A cross-sectional study was conducted at Hue University of Medicine and Pharmacy Hospital from January 2024 to December 2024. Patients with a diagnosis of primary CRS were recruited. Clinical data and HUI measurements were collected, and regression models were used to predict the HUI of CRS patients. **Results:** A total of 51 patients were enrolled. The overall HUI, as assessed by EQ-5D-5L and VAS, was 0.75 ± 0.15 and 0.73 ± 0.14, respectively. No significant difference was found between the two methods in measuring HUI. Multivariable linear regression revealed that each unit increase in the 22-item Sinonasal Outcome Test (SNOT-22) score reduced the HUI by 0.003, while each unit increase in the VAS score for overall symptoms resulted in a 0.02 decrease in the HUI. **Conclusions:** The overall HUI for CRS patients ranged between 0.73 and 0.75. Higher SNOT-22 and VAS for overall symptoms scores were associated with lower HUI, highlighting their negative impact on health utility.

Keywords*: chronic rhinosinusitis, EQ-5D-5L, health utility index, quality of life, SNOT-22*

1. INTRODUCTION

Chronic rhinosinusitis (CRS) is a long-lasting inflammatory condition of the nasal passages that significantly affects patients' health-related quality of life (HRQL), not only through physical symptoms such as breathing difficulties, discomfort, and a diminished sense of smell but also through its impact on mental health, daily functioning, and overall well-being. While tools like the SNOT-22 effectively measure symptoms, they fall short of capturing the broader HRQL impact, particularly using standardized tools like EuroQoL Five Dimension tool (EQ-5D-5L), which are essential for guiding clinical and policy decisions [1]. These discomforts can be demonstrated by CRS-specific patient-reported outcome measures (PROMs) using the 22-item Sino-Nasal Outcome Test (SNOT-22) [2]. Although this tool helps assess CRS symptoms, it does not evaluate overall HRQL, restricting comparisons between CRS and other chronic illnesses. Generic HRQL assessment tools enable comparisons of disease states regarding functional impact and the societal burden each condition imposes. Examples of these tools include the EQ-5D-3L/5L [3], the Short Form 36 (SF-36) and its abbreviated versions, the SF-12 and SF-6D [4].

The EQ-5D-5L is a widely recognized tool for assessing HRQL, providing a Health Utility Index (HUI) that represents the overall health perception of patients. Policymakers often utilize the HUI to compare the impacts of different diseases on HRQL and to inform healthcare policy decisions [5]. Lange et al. reported health utility findings from the trans-European GALEN study, revealing that CRS patients had a lower HRQL, as measured by the EQ-5D-3L, compared to individuals without CRS [6]. In a recent study, the value generated by the EQ-5D for CRS patients, compared to the general population, was similar to that of other chronic conditions like mild asthma and migraine [7]. Additionally, a recent large-scale UK epidemiological study demonstrated that individuals with CRS had reduced quality of life as measured by the SF-36, with notably lower scores in the mental health and emotional domains [8].

This study aimed to evaluate the EQ-5D-5L health utility measures in a Vietnamese population with CRS. Furthermore, it explored potential factors influencing the HUI within this CRS cohort.

2. MATERIALS AND METHODS

A cross-sectional study of patients with a confirmed diagnosis of CRS was conducted at the Department of Otolaryngology, Hue University of Medicine and Pharmacy Hospital. The study was

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ethically approved by the Hue University of Medicine and Pharmacy Ethic Committee (ref H2024/591). All patients provided informed consent by willingly completing the questionnaires and taking part in the interview.

Participants

Adult patients (aged ≥ 18 years) were enrolled if they were diagnosed with primary CRS based on the criteria outlined in the European Position Paper on Rhinosinusitis and Nasal Polyps 2020 (EPOS 2020) [9]. Exclusion criteria included the presence of nasal neoplasms, history of trauma, immunodeficiency, invasive fungal sinusitis, prior head or neck radiation exposure, inability to communicate in Vietnamese, or cognitive impairments.

Clinical characteristics and demographic data were recorded, including gender, age, education level (categorized as < 12^{th} grade and ≥ 12^{th} grade), and smoking. Other collected information included the presence of comorbidities (airway diseases such as allergic rhinitis or asthma, aspirin-exacerbated respiratory disease), duration of CRS, disease phenotype (CRS with nasal polyps and CRS without nasal polyps), and polyps size using Lildholdt's scale [10].

Vietnamese EQ-5D-5L questionnaire

The Vietnamese version of the EQ-5D-5L questionnaire (authorized by the EuroQol Group) assesses health across five dimensions: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Patients rated each dimension on a five-point scale, where 1 indicates no limitations and 5 represents the most severe problems. The EQ-5D-5L can be translated into HUI using the Vietnamese value set established by Mai et al. [11].

Additionally, the Visual Analog Scale (VAS), a component of the EQ-5D-5L, required patients to evaluate their overall health by marking a point on a scale from 0 (worst imaginable health) to 100 (best imaginable health). This score reflects patients' perception of their current health state and can be converted into a HUI ranging from 0 to 1.00.

SNOT-22 questionnaire

SNOT-22 questionnaire consists of 22 items related to CRS, each scored on a scale from 0 to 5, resulting in a total score range of 0 to 110, with higher scores indicating more severe symptoms [2]. It assesses the severity of symptoms experienced by patients over the past weeks due to CRS.

Visual Analog Scale of nasal symptoms

Patients rated their sinonasal condition by using scale from 0 (best imaginable health) to 100 (worst imaginable health). This scale reflects how patients perceive their current health condition, specifically evaluating the severity of symptoms such as nasal congestion, nasal discharge, olfactory disturbances, severe facial pain, sleep disorders, and overall sinonasal symptoms.

Data processing and analysis:

Statistical analyses were conducted using STATA software (Stata 18 for Windows, StataCorp LP, College Station, TX, USA). Ordinal variables were summarized with absolute frequencies and percentages, accompanied by 95% confidence intervals (95% CI). The Chi-square test or Fisher's exact test were applied to examine the relationship between ordinal variables. To compare the means of a normally or abnormally distributed interval dependent variable between two independent groups, the unpaired t-test or Wilcoxon-Mann-Whitney test was used. A one-way analysis of variance (ANOVA) was employed to assess the relationship between a categorical independent variable (with two or more categories) and a normally distributed interval dependent variable. The Bonferroni test was applied for multiple comparison corrections. Pearson correlation analysis was used to examine the relationship between clinical-related scores and HUI from each method. Univariable and multivariable logistic regression analyses were performed using variables with a p-value < 0.05 from univariate analysis. Statistical significance was set at a p-value of less than 0.05 for all tests.

3. RESULTS

Patient characteristics

We enrolled 51 patients with a mean age of 45.19 years (± 15.49), with 50.9% being male. The majority (64.7%) reported experiencing allergic rhinitis in addition to CRS. Asthma history was present in 6 patients (11.8%), while none reported aspirin-exacerbated respiratory disease. Additionally, 70.4% had been dealing with CRS for over a year, and 27.5% were smokers. 29 (56.9%) and 22 (43.1%) patients were diagnosed as CRSwNP and CRSsNP, respectively. The mean patient-reported scores were 43.41 ± 22.65 on SNOT-22 and 6.68 ± 2.69 on VAS of overall symptoms. The VAS scores of nasal obstruction, rhinorrhea, facial pain and smell were 5.94 ± 2.81, 5.28 ± 3.00, 3.66 ± 3.50, 6.01 ± 3.70, respectively. According to Lildholdt's polyp size scale, 22 patients (43.1%) were classified as grade 0, 2 patients (3.9%) as grade 1, 12 patients (23.5%) as grade 2, and 15 patients (29.5%) as grade 3 (Table 1).

Table 1. Study sample characteristics

Characteristics (N = 51)	Results
Age (year), mean (SD)	45.19 (15.49)
Male, n (%)	26 (50.9)
Education, n (%)	
< 12th grade	15 (29.4)
≥ 12th grade	36 (70.6)
Comorbid, n (%)	
Allergic rhinitis	33 (64.7)
Asthma	6 (11.8)
Aspirin-exacerbated respiratory disease	0 (0.0)
Disease duration, n (%)	
≥ 1 year	40 (70.4)
Smoking, n (%)	
Yes	14 (27.5)
CRS phenotype, n (%)	
CRSsNP	22 (43.1)
CRSwNP	29 (56.9)
SNOT-22, mean (SD)	43.41 (22.65)
VAS nasal obstruction, mean (SD)	5.94 (2.81)
VAS rhinorrhea, mean (SD)	5.28 (3.00)
VAS facial pain, mean (SD)	3.66 (3.50)
VAS smell, mean (SD)	6.01 (3.70)
VAS overall symptoms, mean (SD)	6.68 (2.69)
Lildholdt' polyp grading, n (%)	
0	22 (43.1)
1	2 (3.9)
2	12 (23.5)
3	15 (29.5)

Abbreviation: SD, standard deviation; CRSsNP, chronic rhinosinusitis without nasal polyps; CRSwNP, chronic rhinosinusitis with nasal polyps; SNOT-22, 22-item Sino-Nasal Outcome Test; VAS, Visual Analog Scale.

Health utility indexes

The overall mean HUS, as measured by EQ-5D-5L and EQ-VAS, were 0.75 ± 0.15 and 0.73 ± 0.14. There was no statistically significant difference between these two methods (p = 0.43) (Figure 1).

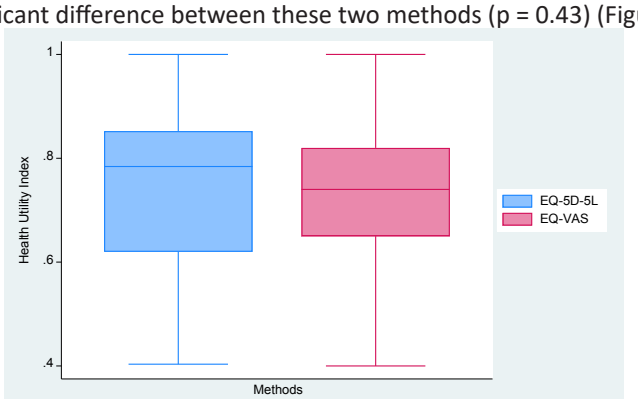

Figure 1. Overall medians and interquartile ranges of Health Utility Scores (HUS) by methods. EQ-5D-5L, Euroqol-5-dimensions-5-levels; VAS, Visual Analog Scale

Correlation analyses

Pearson correlation analyses revealed the negative correlations between SNOT-22 ($r = -0.58$, $p < 0.01$) and VAS of overall symptoms scores ($r = -0.57$, $p < 0.01$) and HUI measured by EQ-5D-5L (Figure 2). On contrast, there was no significant correlation between these two scores and HUI measured by EQ-VAS.

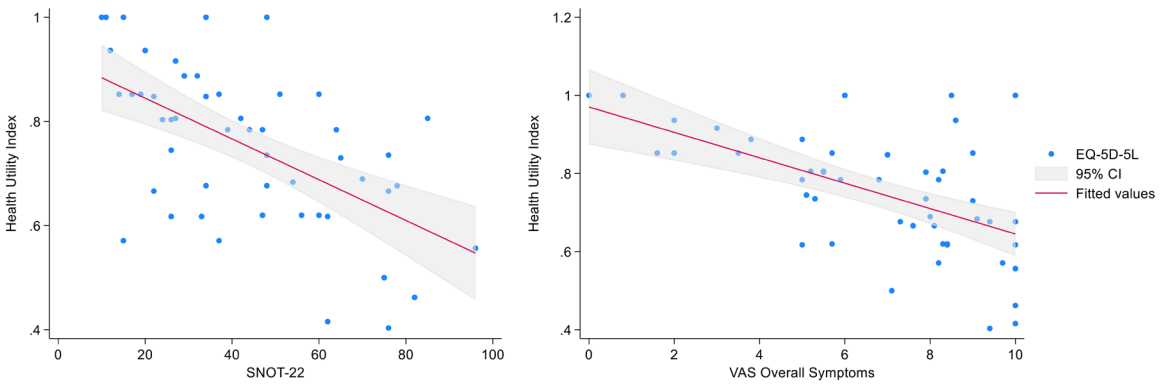

Figure 2. Two-way linear prediction plots for EQ-5D-5L HUI using SNOT-22 and VAS overall symptoms scores.

Multivariable regression analysis

Multivariable linear regression revealed that each unit increase in SNOT-22 score reduced the EQ-5D-5L HUI by 0.003 ($p < 0.01$), while each unit increase in the VAS score for overall symptoms resulted in a 0.02 decrease in the HUI ($p < 0.01$).

Table 2. Univariable and multivariable regression of EQ-5D-5L Health Utility Index

Independent variables	Univariable regression		Multivariable regression	
	Coefficient	p	Coefficient	p
Age	0.003	0.07	NA	NA
Gender, male	0.05	0.30	NA	NA
Education, ≥ 12th grade	-0.05	0.32	NA	NA
Allergic rhinitis	-0.03	0.49	NA	NA
Asthma	0.12	0.07	NA	NA
Smoking	0.02	0.67	NA	NA
CRS phenotype, CRSwNP	0.003	0.95	NA	NA
SNOT-22	-0.004	<0.01	-0.003	0.01
VAS overall symptoms	-0.03	<0.01	-0.02	0.01
Lildholdt's polyp grading				
0	ref			
1	0.15	0.90	NA	NA
2	-0.04	0.47	NA	NA
3	0.04	0.49	NA	NA

Abbreviation: CRSwNP, chronic rhinosinusitis with nasal polyps; SNOT-22, 22-item Sino-Nasal Outcome Test; VAS, Visual Analog Scale.

4. DISCUSSION

The overall HUS for 51 CRS patients ranged from around 0.73 to 0.75, with no statistically significant difference observed between the two methods. Multiple regression analyses showed a significant relationship between the SNOT-22 and VAS scores for overall symptoms and disease status with HUI measured by EQ-5D-5L. As the SNOT-22 score increased, a slight reduction in HUI was predicted.

This study found an HUI of 0.75 using the EQ-5D-5L among patients with various disease states. In Asia, a Korean study using the EQ-5D-3L reported

an HUS of 0.94, although it is worthy to note that this version had a higher ceiling effect compared to the EQ-5D-5L [12]. A Chinese study evaluated individual dimensions of QoL with the EQ-5D-5L but did not report the overall converted score [13]. A recent study found an HUI of 0.75 for Thai patients scheduled for ESS, which significantly improved to 0.96 six months post-surgery [14]. Early US study with the EQ-5D-5L reported different results, showing a higher HUI of 0.86 for general CRS patients and 0.81 for those scheduled for ESS [7, 15].

Besides EQ-5D-5L questionnaire and VAS, there are two others direct methods to estimate the HUI, including time trade-off (TTO), standard gamble (SG). TTO and SG are utility scores related to economics that involve choice or preference-based components. TTO involves trading off lifespan, where patients agree to a shorter life to avoid an undesirable disease, with the shortened lifespan being a certain outcome. Patients with high loss aversion (regarding longevity) may have a higher HUI [16]. In contrast, in SG, patients with a higher tolerance for risk may show lower HUI [17]. In addition to clinical severity and socioeconomic factors, personal preferences related to risk and loss can influence the HUS obtained through these two methods. However, both TTO and SG require time-consuming interviews, making them challenging to use in daily practice. Therefore, we did not use in this study.

The HUI scores obtained from two different approaches showed no statistical variations, suggesting that the overall HUI for CRS ranged approximately between 0.73 and 0.75. Although no statistically significant difference was observed between the HUI measured by EQ-5D-5L and VAS, only the SNOT-22 and VAS of overall symptoms were identified as predictors for estimating EQ-5D-5L HUI. These findings suggested that EQ-5D-5L is a preferable tool to assess HUI with the records of SNOT-22 or VAS of overall symptoms scores even though it is an indirect method. Both the VAS and EQ-5D-5L are simple and straightforward to administer, needing little explanation for respondents. Most patients were able to complete them on their own without requiring further assistance.

It is important to note that the presence or size of polyps did not significantly impact the HUI. Both CRS with and without nasal polyps can affect HRQL, so appropriate interventions should be applied for both conditions. This also explains why patient-reported outcomes are chosen as the critical outcomes for assessing the efficacy of CRS treatments, while polyp size is only considered a surrogate outcome [18]. Other studies showed that age and other comorbidities did not influence HUI, indicating the difference in pathophysiology between these diseases and CRS, especially in allergic rhinitis

In other studies, patients with higher levels of education achieved higher HUI scores. Higher education may contribute to better disease understanding, coping mechanisms, and acceptance. However, this finding was not observed in our study. A larger-scale study is needed to reassess this issue, as our study was limited to a small group of patients.

The study has several limitations, including an uneven sample size distribution across categories, such as the uncontrolled symptom group and the comorbidities related to mental illness group. This discrepancy may explain the inconsistencies in significance observed between categories in the models. Self-reported data on socioeconomic factors, such as income levels, were not reported, and for sensitive data, interviews could provide more reliable results. There was a lack of EPOS categorization of CRS regarding disease control, as uncontrolled conditions may lead to lower HUI assessments by EQ-5D-5L and VAS. Last but not least, the sample size of our study was modest, which may have been insufficient to fully represent the true impact of CRS on HRQL.

5. CONCLUSION

The overall HUI for CRS patients ranged between 0.73 and 0.75. Higher SNOT-22 and VAS for overall symptoms scores were associated with lower HUI, highlighting their negative impact on health utility.

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