

Chronic rhinosinusitis assessment using the Adelaide Disease Severity Score

Y NAIDOO, N TAN, D SINGHAL, P J WORMALD

Department of Surgery – Otolaryngology Head and Neck Surgery, University of Adelaide, South Australia, Australia

Abstract

Aim: This study aimed to validate the use of the Adelaide Disease Severity Score for the assessment of chronic rhinosinusitis.

Study design: A prospective cohort study supplying level 2b evidence.

Methods: Forty-eight patients, scheduled for endoscopic sinus surgery for failed management of chronic rhinosinusitis, completed the Sino-Nasal Outcome Test 22 and the Adelaide Disease Severity Score tool (the latter assessing symptoms (i.e. nasal obstruction, rhinorrhoea, post-nasal drip, headache or facial pain, and olfaction) and quality of life). Lund–Mackay computed tomography scores and Lund–Kennedy endoscopic scores were also recorded. The Adelaide Disease Severity Score results were then compared with those of the other three tools to assess correlation.

Results: Mean scores (95 per cent confidence intervals) were 22.31 (21.47–24.15) for the Adelaide Disease Severity Score and 30.6 (27.15–34.05) for the Sino-Nasal Outcome Test 22; there was a statistically significant correlation (Spearman coefficient = 0.45; $p = 0.0015$). A statistically significant correlation was also noted with the Lund–Mackay score ($p = 0.04$) and with the Lund–Kennedy score ($p = 0.03$).

Conclusion: The Adelaide Disease Severity Score is a simple, valid tool for clinical assessment of chronic rhinosinusitis, which correlates well with the Sino-Nasal Outcome Test 22, Lund–Mackay and Lund–Kennedy tools.

Key words: Quality of Life; Outcomes Assessment; Sinusitis; Endoscopic Surgical Procedures

Introduction

Chronic rhinosinusitis is an extremely common clinical condition affecting up to 15 per cent of the population in the UK and Australia. It has a significant impact on patients' quality of life as well as a substantial economic cost to society.

Assessment of chronic rhinosinusitis patients involves clinical history-taking and examination as well as, increasingly, the use of patient-reported scoring systems, disease severity markers and validated outcome measures.

Patient-reported outcome measures are questionnaires completed by patients which give an overview of symptoms at any given time. They can be used during initial assessment or to assess a patient's health status before and after an intervention (e.g. surgery). They can give a useful 'snap-shot' of a patient's subjective clinical condition, as well as an indication of the specific disease burden in that individual patient. The information obtained can be used as an indicator of the treatment outcomes and/or the quality of post-treatment care.¹

Although patient-reported outcome measures are generally not used as fixed criteria when making treatment decisions, the ideal such measure for chronic rhinosinusitis should have the following qualities: (1) simplicity and ease of use; (2) reliable quantification of the patient's disease-specific burden; (3) good correlation with objective assessment of disease severity; (4) reliable response to changes in disease-specific burden after treatment interventions; and (5) enabling categorisation of patients into appropriate treatment arms. For example, the ideal patient-reported outcome measure would classify chronic rhinosinusitis patients into distinct disease 'stages', in a manner analogous to the staging of head and neck cancer patients prior to treatment.

Various rhinology-specific patient-reported outcome measures have been reported and validated in the literature. One of the most popular is the Sino-Nasal Outcome Test 20 questionnaire.² This has been modified to create the Sino-Nasal Outcome Test 22,³ which includes symptoms involving taste, smell and nasal congestion. These two patient-reported outcome measures assess both general and rhinosinusitis-

specific factors. However, the Sino-Nasal Outcome Test has a few shortcomings as a chronic rhinosinusitis assessment tool. Firstly, its length means that it is more difficult to complete at the time of consultation. Secondly, we believe that it is not specific enough to rhinosinusitis (the quality of life subsections often relate to numerous other confounding conditions such as sleep apnoea). Finally, it does not correlate well with objective findings of disease severity.

Therefore, we aimed to produce a simple, reproducible scoring system which could be easily used to directly assess a patient's clinical status, but which correlated appropriately with the Sino-Nasal Outcome Test 22 and with objective assessments of disease severity.

Here, we present the Adelaide Disease Severity Score, a simplified scoring system which addresses the five most significant sino-nasal symptoms identified by the Rhinosinusitis Task Force⁴ as major diagnostic criteria for chronic rhinosinusitis, and which also includes a general quality of life visual analogue scale (VAS)³ (Appendix 1). We also report our assessment of the validity of this simplified scoring system when tested against the Sino-Nasal Outcome Test 22 and against two objective measures of disease severity: the Lund–Mackay computed tomography (CT) score and the Lund–Kennedy endoscopic score.

Materials and methods

Study design

This was a prospective cohort study of patients scheduled to undergo endoscopic sinus surgery, following failed medical management of chronic rhinosinusitis, in the tertiary rhinology practice of the senior author (P JW) based at the surgery, otolaryngology and head and neck surgery department of the University of Adelaide, South Australia, Australia. The institution's Human Ethics Committee approved the study, and all patients provided their consent to participate in it.

Forty-eight consecutive patients were included in an 11-month period between November 2007 and October 2008. Patients from interstate or overseas were excluded. All patients met the American Academy of Otolaryngology–Head and Neck Surgery diagnostic criteria for chronic rhinosinusitis.⁴ All patients were treated by the senior author, and received exactly the same medical and surgical management.

Data collection

Pre-operative demographic data were collected for all patients, including age, sex and medical history.

A standardised symptom scoring tool, the Adelaide Symptom Severity Score, was administered as part of clinical history-taking (Appendix 1). The treating surgeon recorded, on a scale of 1 to 5 (with 5 being the most severe), the severity of the following symptoms as reported by the patient: nasal obstruction, rhinorrhoea, post-nasal drip, headache or facial pain, and altered sense of smell. Individual symptom

scores were added to give a total out of 25. A VAS was completed by the patient to indicate their general quality of life on a numerical scale ranging from 0 to 7 (with 0 indicating no effect and 7 indicating maximal effect). The combined symptom score and VAS score were added to give a total out of 32.

In addition to the Adelaide Symptom Severity Score, the Sino-Nasal Outcome Test 22 was also completed by the patient.

During clinical examination, a Lund–Kennedy endoscopic score was calculated.

All patients underwent pre-operative CT scanning, from which a Lund–Mackay CT score was calculated.

Data analysis

Statistical analysis was performed utilising two-tailed Spearman correlation testing for non-parametric data, using the GraphPad Prism version 5.0 software program (GraphPad Software, San Diego, California, USA). Statistical significance was accepted at a *p* value of less than 0.05.

Results

A total of 48 patients fulfilled the criteria for entry into this study. The group consisted of 24 female and 24 male subjects with a median age of 54 years (range, 22–80 years).

Adelaide Disease Severity Score vs Sino-Nasal Outcome Test 22

The mean Adelaide Disease Severity Score was 22.31 (95 per cent confidence interval (CI), 21.47–24.15), while the mean Sino-Nasal Outcome Test 22 score was 30.6 (95 per cent CI, 27.15–34.05). There was a statistically significant correlation between these results, with a Spearman correlation coefficient of 0.45 (*p* = 0.0015) (Figure 1).

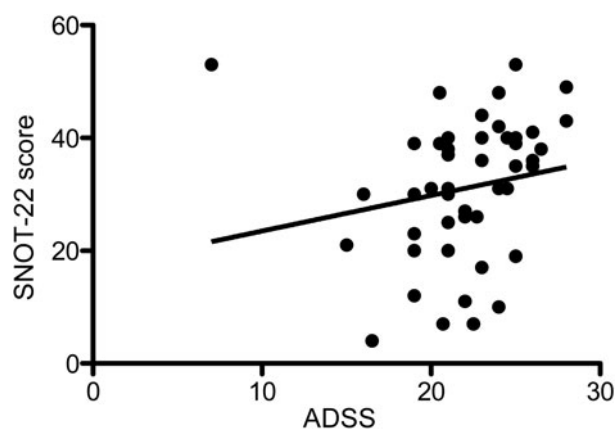


FIG. 1

Association between Adelaide Disease Severity Score (ADSS) and Sino-Nasal Outcome Test 22 (SNOT-22) score.

Adelaide Disease Severity Score and Sino-Nasal Outcome Test 22 results vs Lund–Mackay and Lund–Kennedy scores

There was no statistically significant correlation between the Sino-Nasal Outcome Test 22 scores and either the Lund–Mackay ($p = 0.40$) or the Lund–Kennedy scores ($p = 0.57$). However, there was a statistically significant correlation between the Adelaide Disease Severity Score and both the Lund–Mackay score and the Lund–Kennedy score, with Spearman correlation coefficients of 0.29 ($p = 0.04$) and 0.31 ($p = 0.03$), respectively (Figures 2 and 3).

Discussion

This study demonstrates that the Adelaide Disease Severity Score correlates well with the Sino-Nasal Outcome Test 22, as well as with objective markers of disease severity. To our knowledge, it is the first patient-reported outcome measure to do so. Its use simplifies data gathering in clinical practice while retaining relevance and validity.

Various rhinology-specific patient-reported outcome measures have been described and validated in the literature. In 1995, Piccirillo *et al.*⁵ reported the use of a 31-item rhinosinusitis outcome measure which contained both general and rhinosinusitis-specific questions. This was subsequently condensed into the Sino-Nasal Outcome Test,² which contained 20 questions on nose, sinus and general topics, and which was validated as a disease-specific, health-related quality of life measure for rhinosinusitis. This questionnaire was altered to address two additional factors which were felt to be extremely important in quality of life reporting by chronic rhinosinusitis patients – nasal obstruction and loss of sense of taste and smell – thus producing the Sino-Nasal Outcome Test 22.³ Both versions of the Sino-Nasal Outcome Test are well established methods of patient assessment in cases of chronic rhinosinusitis,^{6,7} as well as septoplasty,⁸ asthma and chronic obstructive pulmonary disease

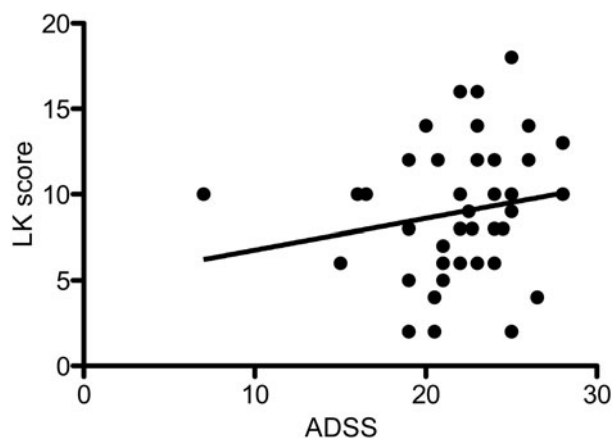


FIG. 2

Association between Adelaide Disease Severity Score (ADSS) and Lund–Kennedy endoscopy (LK) score.

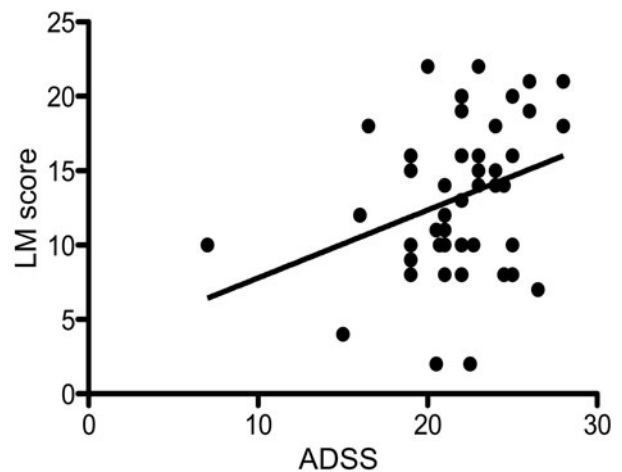


FIG. 3

Association between Adelaide Disease Severity Score (ADSS) and Lund–Mackay computed tomography (LM) score.

(COPD),⁹ Wegener's granulomatosis and other vasculitides,^{10,11} and nasal tip surgery.¹² International translations of the Sino-Nasal Outcome Tests have been used in Denmark,¹³ the Czech Republic¹⁴ and Japan.¹⁵ Other variant sino-nasal outcome questionnaires include the Sino-Nasal Assessment Questionnaire,¹⁶ the Sino-Nasal Outcome Test 16,¹⁷ the Rhinosinusitis Symptom Inventory¹⁸ and the Rhinosinusitis Symptom Utility Index.¹⁹

Despite broad interest in using the Sino-Nasal Outcome Test 20 and 22, it is well recognised that results do not correlate well with clinically meaningful parameters.²⁰ Although some have attempted to make the Sino-Nasal Outcome Test more clinically relevant (e.g. by weighting certain questions), we suggest the Adelaide Disease Severity Score as an alternative scoring system which is specific to chronic rhinosinusitis symptoms alone and which includes a single, overall quality of life score.

The Adelaide Disease Severity Score is a simplified scoring system which includes the five most significant sino-nasal criteria, corresponding to the major diagnostic criteria defined by the Rhinosinusitis Task Force,⁴ along with a VAS for general quality of life. Headache and facial pain are combined into a single measure, as patients can find it difficult to differentiate between these two symptoms. The five symptoms addressed by the Adelaide Disease Severity Score are the most important symptoms indicating prevalence and severity in patients undergoing endoscopic sinus surgery for chronic rhinosinusitis.²¹ The two remaining major criteria of the Rhinosinusitis Task Force – purulence and fever – were excluded, as purulence in the nasal cavity is an examination finding while fever pertains to acute rhinosinusitis only. Because of its simplicity, the Adelaide Disease Severity Score facilitates compliance and reduces patient misunderstanding during questionnaire completion.

One drawback of the Sino-Nasal Outcome Test 22 is that questions relating to falling asleep, waking at night,

lack of sleep and tiredness can easily be related to other clinical conditions, including obstructive sleep apnoea, COPD, heart failure and depression. Patients completing the questionnaire are often puzzled by these questions: many are confused about whether or not they should attempt to differentiate between rhinosinusitis and other conditions as the cause of their symptoms, and/or find they are unable to do so.

The use of all major and minor Rhinosinusitis Task Force symptoms has been reported in the pre- and post-surgical assessment of patients undergoing endoscopic sinus surgery.¹⁸ However, our study shows that assessment of only major symptoms plus quality of life (via a VAS) can generate a valid score that correlates well with Sino-Nasal Outcome Test 22 results.

The lack of correlation between the Sino-Nasal Outcome Test 22 results and both the Lund–Mackay score or the Lund–Kennedy score has been noted in a number of studies.^{6,22} However, the present study found a statistically significant correlation between the Adelaide Disease Severity Score and these two objective measures of disease severity (i.e. the Lund–Mackay score and the Lund–Kennedy score). This may be due to the individual questions being more heavily weighted to chronic rhinosinusitis specific symptoms. Thus, the Adelaide Disease Severity Score may give a better indication of rhinological disease status at a particular point in time.

The results of our study suggest that the Adelaide Disease Severity Score satisfies most of the criteria of the ideal patient-reported outcome measure. It is simple to use but despite this retains the validity of the Sino-Nasal Outcome Test 22 with regards to measuring disease-specific burden. As the Sino-Nasal Outcome Test 22 has been validated for use both before and after treatment, we propose that the Adelaide Disease Severity Score will also correlate with Sino-Nasal Outcome Test 22 results following intervention. The Adelaide Disease Severity Score also correlates well with objective findings of disease severity, in contrast to the more complex Sino-Nasal Outcome Test 22.

Further work is required to assess whether the Adelaide Disease Severity Score can successfully ‘stage’ chronic rhinosinusitis. This would assist the physician to tailor management to suit the patient’s individual level of disease.

- **The Adelaide Disease Severity Score is a simplified tool assessing chronic rhinosinusitis symptoms and quality of life**
- **It correlates well with the Sino-Nasal Outcome Test 22 and the Lund–Mackay and Lund–Kennedy scores**
- **These tools could potentially enable ‘staging’ of chronic rhinosinusitis, assisting treatment decisions**

The strengths of our study are as follows: (1) there were no confounding surgical or medical factors; (2) this was a prospective cohort of consecutive, unselected patients operated upon within the study period; and (3) all patients were treated by the senior author and received identical medical and surgical management.

Conclusion

Patient-reported questionnaires are an important part of assessment and outcome reporting. This study demonstrates that the Adelaide Disease Severity Score correlates well with Sino-Nasal Outcome Test 22 results and with the Lund–Mackay CT score and the Lund–Kennedy endoscopy score. The Adelaide Disease Severity Score can therefore be confidently used as a valid method of clinical assessment both before and after treatment.

Further work is required to ascertain whether the Adelaide Disease Severity Score can successfully ‘stage’ chronic rhinosinusitis (similarly to head and neck cancer staging prior to treatment), either on its own or in conjunction with other indicators. Such a facility would optimise patient care by enabling the physician to tailor management based on the individual patient’s disease stage.

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APPENDIX 1	
ADELAIDE SYMPTOM SEVERITY SCORE	
<i>Symptoms*</i>	
Nasal obstruction	1 2 3 4 5
Rhinorrhoea	1 2 3 4 5
Post-nasal drip	1 2 3 4 5
Headache or facial pain	1 2 3 4 5
Sense of smell	1 2 3 4 5
<i>Quality of life</i> [†]	
How do your symptoms affect your quality of life?	0———7
*1 = no symptoms, 2 = mild, 3 = moderate, 4 = severe, 5 = extreme. [†] 0 = no effect; 7 = maximal effect.	

Address for correspondence:

Dr Yuresh Naidoo, Department of Surgery – Otolaryngology Head and Neck Surgery,
The Queen Elizabeth Hospital,
28 Woodville Road, Woodville, South Australia, Australia 5011

Fax: +61 08 82227419

E-mail: yuresh@med.usyd.edu.au

Dr Y Naidoo takes responsibility for the integrity of the content of the paper

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