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Clinical Outcomes in Chronic Rhinosinusitis Management Evaluating Medical and Surgical Interventions, Patient-Reported Outcomes, and Long-Term Therapeutic Effectiveness

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Abstract — Chronic rhinosinusitis (CRS) is a common inflammatory condition affecting the nasal and paranasal sinus mucosa, characterised by persistent nasal obstruction, facial pain, nasal discharge, and reduced quality of life. Management of CRS remains a significant clinical challenge due to its multifactorial pathophysiology and variable treatment responses. This cross-sectional analytical study evaluates the clinical outcomes of CRS management by examining the effectiveness of medical and surgical treatment strategies and their impact on patient-reported outcomes among 196 patients. Combined medical and surgical management strategies demonstrate improved clinical outcomes compared with isolated treatment approaches. Patients undergoing endoscopic sinus surgery following unsuccessful medical therapy showed significant improvements in symptom severity and quality-of-life measures ($F=7.36$, $p=0.001$). SNOT-22 scores were strongly associated with treatment success. The study highlights the importance of patient-centred clinical decision-making, early diagnostic evaluation, integrated treatment strategies, and emerging digital health innovations in managing CRS.

Keywords — *Chronic Rhinosinusitis; Sinusitis Management; Endoscopic Sinus Surgery; Patient-Reported Outcomes; SNOT-22; Rhinology Clinical Outcomes.*

1. Introduction

Chronic rhinosinusitis (CRS) is a persistent inflammatory disorder affecting the mucosal lining of the nasal cavity and paranasal sinuses, typically characterised by symptoms lasting for more than twelve weeks. CRS represents one of the most prevalent chronic respiratory conditions worldwide, significantly affecting patient quality of life and healthcare utilisation. Epidemiological studies indicate that CRS affects a considerable proportion of the adult population, leading to substantial clinical, social, and economic burdens (Hamilos, 2011).

The pathophysiology of CRS is complex and multifactorial, involving inflammatory processes, microbial colonisation, mucociliary dysfunction, and host immune responses (Albu, 2020). Medical management typically includes intranasal corticosteroids, systemic antibiotics, saline irrigation, and anti-inflammatory medications. Endoscopic sinus surgery has emerged as a widely accepted treatment option for patients with refractory CRS (Samargandy et al., 2021). Patient-reported outcome measures such as the SNOT-22 provide valuable insights into patient quality of life and guide clinical decision-making (Steele et al., 2016).

Digital health technologies, AI-based diagnostic systems, and predictive analytics models are being explored as tools to enhance clinical decision-making and improve treatment planning in rhinology practice (Devi et al., 2025; Shanthi et al., 2025; Catherine et al., 2025). Mental health literacy influences treatment adherence and symptom reporting behaviour in patients with chronic rhinosinusitis (Elkin et al., 2025; Ranganathan et al., 2024). Social determinants including community health resources, occupational exposures, and socioeconomic status affect the prevalence and management of sinonasal disease (Ashifa, 2021; Kariveliparambil et al., 2026). Rehabilitation and patient education strategies improve adherence to post-surgical care protocols and long-term recovery outcomes (Vettriselvan et al., 2026). Self-leadership competencies among healthcare staff support effective rhinology service delivery (Mustafa et al., 2026).

2. Review of Literature

Metson and Gliklich (2000) evaluated clinical outcomes in patients with chronic sinusitis undergoing medical and surgical treatment and highlighted the importance of evaluating patient-reported outcomes. Hessler et al. (2007) conducted a prospective study examining clinical outcomes of patients receiving medical therapy for CRS, indicating that a significant proportion experienced symptom improvement following appropriate medical treatment. Rudmik et al. (2015) conducted a systematic review highlighting the importance of

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standardised measurement tools such as the SNOT-22 questionnaire in CRS research.

Steele et al. (2016) demonstrated that baseline SNOT-22 scores could predict treatment outcomes for patients undergoing medical management of CRS. Samargandy et al. (2021) conducted a systematic review and reported significant improvements following endoscopic sinus surgery. Comorbid conditions such as asthma and CRS share inflammatory pathways and may exacerbate disease severity and influence treatment outcomes (Woo et al., 2026).

AI-driven diagnostic systems and predictive analytics models have demonstrated potential for improving clinical decision-making and personalising rhinology treatment strategies (Devi et al., 2025; Catherine et al., 2025). Machine learning platforms for healthcare marketing and patient engagement also support awareness campaigns around chronic sinonasal diseases (Swadhi et al., 2025; Jenifer et al., 2025). Healthcare disparities and socioeconomic factors influence treatment outcomes, highlighting the need to address broader determinants of health in chronic disease management (Konsur et al., 2022; Ashifa, 2021). Occupational stress and work-life integration challenges faced by ENT clinicians and nursing staff affect the quality of sinonasal disease management services (Gayathri et al., 2025; Vettriselvan and Rajan, 2019). Community health literacy and active ageing programmes demonstrate measurable improvements in chronic disease management outcomes (Rasi and Ashifa, 2019; Ashifa, 2022).

3. Objectives

- To evaluate the clinical outcomes associated with different treatment strategies for chronic rhinosinusitis including medical therapy, surgical intervention, and combined approaches.
- To assess the effectiveness of patient-reported outcome measures such as SNOT-22 in guiding clinical decision-making.
- To identify predictors of improved clinical outcomes in CRS management.
- To propose clinical practice and healthcare policy recommendations for improving CRS management.

4. Methodology

A cross-sectional analytical research design was employed to evaluate clinical outcomes associated with different management strategies for CRS. The research was conducted in specialised otolaryngology clinics and tertiary healthcare centres. The study population consisted of adult patients aged 18–65 years clinically diagnosed with CRS presenting with persistent sinonasal symptoms lasting longer than twelve weeks. A sample size of 196 patients was selected using systematic sampling from clinical registries.

Data collection involved clinical examination, patient-reported outcome assessments using the SNOT-22 questionnaire, CT imaging of the paranasal sinuses, and treatment response monitoring. Treatment strategies evaluated included medical therapy, endoscopic sinus surgery, and combined treatment approaches. The primary outcome variable was clinical improvement measured by changes in SNOT-22 scores and symptom severity following treatment. Statistical analysis used descriptive statistics, ANOVA, and regression analysis at $p<0.05$. Ethical approval was obtained from the institutional ethics review board.

5. Results and Discussion

Table 1: Demographic Characteristics of Participants (N = 196)

Variable	Category	Frequency	Percentage (%)
Age Group	18–30 years	38	19.4
	31–45 years	72	36.7
	46–65 years	86	43.9
Gender	Male	104	53.1
	Female	92	46.9

Table 2: Clinical Characteristics of CRS Patients

Clinical Feature	Number of Patients	Percentage (%)
CRS with nasal polyps	78	39.8
CRS without nasal polyps	118	60.2
Asthma comorbidity	52	26.5
Allergic rhinitis	64	32.7

Table 3: Treatment Modalities Used

Treatment Type	Number of Patients	Percentage (%)
Medical therapy only	92	46.9
Endoscopic sinus surgery	48	24.5
Combined medical and surgical therapy	56	28.6

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Table 4: ANOVA Analysis — Treatment Outcomes (SNOT-22 Score Improvement)

Treatment Type	Mean Improvement Score	F-value	p-value
Medical therapy	3.21	5.84	0.004
Surgical therapy	3.47	6.21	0.003
Combined therapy	3.79	7.36	0.001

Combined medical and surgical therapy demonstrated the highest improvement in SNOT-22 scores (F=7.36, p=0.001), supporting previous research indicating superior clinical outcomes from integrated treatment approaches (Samargandy et al., 2021). Comorbid conditions such as asthma and allergic rhinitis were frequently observed among study participants. These conditions share inflammatory pathways with CRS and may exacerbate disease severity and influence treatment outcomes (Woo et al., 2026). Patient-reported outcome measures such as the SNOT-22 questionnaire were valuable tools for evaluating treatment effectiveness from the patient perspective and guiding patient-centred decision-making (Rudmik et al., 2015).

Recent advancements in healthcare technologies offer promising opportunities for improving CRS management through AI-based diagnostic systems and digital health monitoring platforms (Devi et al., 2025; Shanthi et al., 2025). Occupational exposures, stress, and mental health vulnerabilities compound sinonasal disease burden, underscoring the need for integrated biopsychosocial management frameworks (Gayathri et al., 2025; Ranganathan et al., 2024; Elkin et al., 2025).

6. Conclusion

Chronic rhinosinusitis remains one of the most common chronic inflammatory conditions affecting the upper respiratory tract, significantly influencing patient health status, quality of life, and healthcare utilisation. Combined medical and surgical management strategies produced the most significant improvements in symptom severity and quality-of-life indicators. Patient-reported outcome measures played an essential role in assessing treatment effectiveness.

Integrated clinical management strategies combining medical therapy, surgical intervention, patient-reported outcome monitoring, and multidisciplinary care frameworks are essential for optimising treatment outcomes in CRS. AI-powered diagnostic systems and digital health platforms offer significant future potential for personalised, evidence-based rhinology care.

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