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The Impact of Medical Comorbidities on Patient Satisfaction in Chronic Rhinosinusitis

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Abstract

Background: Patient satisfaction has a significant bearing on medical therapy compliance and patient outcomes. The purpose of this study was to (1) describe patient satisfaction, as characterized by the Patient Satisfaction Questionnaire-18 (PSQ-18), in the care of patients with chronic rhinosinusitis (CRS). and (2) analyze the impact of comorbidities on satisfaction using the functional comorbidity index (FCI).

Methods: Patient demographics, disease severity measures, and PSQ-18 scores for patients with CRS presenting to a tertiary rhinology clinic between November 2019 and April 2020 were collected and analyzed. FCI was calculated retrospectively using the electronic medical record; individual comorbidities were tabulated. Spearman's correlations followed by multivariate regression was used to assess the relationship between medical comorbidities and PSQ-18.

Results: Sixty-nine patients met criteria for analysis. There were no significant differences in age, gender, and Sinonasal Outcomes Test-22 scores between CRS patients with (CRSwNP) and without (CRSsNP) nasal polyps. There was no significant difference in the mean FCI for patients with CRSwNP vs CRSsNP (5.1 and 4.3, respectively) ($p=0.843$). Similarly, there was no significant difference in the mean sum PSQ-18 score (78/100 in both) between these cohorts ($p=0.148$). The mean sum PSQ-18 score was not significantly associated with anxiety ($p=0.728$), depression ($p=0.624$), or FCI ($p=0.282$), but was significantly associated with hearing impairment ($p<0.001$).

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Conflicts of Interest/Disclosures:
T.O.S is a consultant for Stryker and Intersect ENT
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Conclusion: Patient satisfaction in the care of CRS is generally high with a diagnosis of comorbid hearing impairment demonstrating a negative association with satisfaction in this cohort.

Keywords

Endoscopic sinus surgery; Chronic Rhinosinusitis; Comorbidities

Introduction:

Patient satisfaction has far reaching significance for health care providers and is one metric by which quality of care is measured. Patients are increasingly utilizing web-based platforms to identify providers with the highest patient satisfaction ratings,[1] and this feedback may also become increasingly pertinent to provider reimbursement.[2]

The impact of patient satisfaction extends beyond physician reimbursement. Patient satisfaction has been correlated with compliance with the medical care plan,[3–5] as well as with likelihood to search for different physicians, initiate legal proceedings, or unenroll from a particular health care system's healthcare plan.[6–8] The Patient Satisfaction Questionnaire Short-Form Instrument (PSQ-18) is a validated instrument that examines not only global patient satisfaction with medical care, but also investigates satisfaction on a more granular scale by focusing on 6 additional subdomains: technical quality of care, interpersonal manner, communication, finance, time spent, and accessibility and convenience of care.[9] Because medical comorbidities can result in worse reported patient satisfaction with healthcare, it is imperative that the link between patient satisfaction and medical comorbidities be further delineated.[10–13]

Various indices have been developed to account for the role of medical comorbidities in patient outcomes.[14] Specifically, the Functional Comorbidity Index (FCI) was developed using 18 distinct comorbidities that have been shown to have the greatest impact on physical function.[15] Since its development, the FCI has been validated in several patient populations,[16,17] including those with chronic rhinosinusitis (CRS).[15] The FCI has also been shown to correlate with disease-specific QOL.[18]

For patients with CRS, the impact of comorbidities on satisfaction is unknown. The purpose of this study was to determine the effect of medical comorbidities on satisfaction in the management of CRS, independent of disease type, disease severity, and disease specific QOL. This investigation sought to identify comorbidities, which, when present, may benefit from additional provider attention or instruction to improve patient satisfaction. This was accomplished by examining comorbidities using the FCI and assessing patient satisfaction using the PSQ-18.

Methods

Institutional Review Board (IRB) approval for this retrospective cohort study was obtained (IRB#1585333) at the University of California Davis Medical Center.

Inclusion and exclusion criteria

Patients diagnosed with CRS, in accordance with criteria defined by the American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS),[19] were retrospectively examined in a single institution study between March 1, 2020 and April 21, 2020. Patients > 18 years of age who presented for new or follow-up care were included for analysis. Participants without confirmed CRS, or with an alternative rhinologic diagnosis were excluded for sample homogeneity. Participants were allowed to have comorbid illnesses, such as deviated septum or allergic rhinitis, as long as the primary purpose of the visit was for CRS related care.

Demographics

Information on patient demographic variables, such as age, gender, CRS phenotype [(CRS with Nasal Polyposis (CRSwNP) vs. CRS without Nasal Polyposis (CRSsNP)], type of visit (new consultation vs. follow-up visit), reason for follow-up, history of prior sinus surgery, and duration of prior care were recorded.

SNOT-22

Baseline measures of disease-specific quality of life [Sinonasal Outcomes Test −22 (SNOT-22)] were collected as part of the standard of care and abstracted from the patient's most recent visit. The SNOT-22 is a validated survey developed to evaluate symptom severity in CRS.[20] Individual item scores are measured using patient selected responses on a Likert scale where higher scores indicate worse symptom severity and disease-specific quality of life (score range 0–110).

Functional comorbidity index

The FCI was calculated using individual comorbidity diagnoses listed in the electronic medical record (EMR) for each patient. The FCI is comprised of the following 18 distinct comorbidities: arthritis, osteoperosis, asthma, chronic obstructive pulmonary disease (COPD)/ARDS, angina, congestive heart failure (CHF)/heart disease, heart attack, neurological disease, stroke/transient ischemic attack (TIA), diabetes mellitus I or II, peripheral vascular disease, upper gastrointestinal (GI) disease, depression, anxiety, visual impairment, hearing impairment, degenerative disc disease (DDD), obesity and/or body mass index (BMI) of > 30 kg/m^2. These particular comorbidities were shown to have the greatest impact on the physical function domain of the SF-36 during the validation analysis of the FCI.[15,21] Each comorbidity is assigned a score of "0" if not present or "1" if present.[15,21] The maximum possible score is 18.[15,21]

PSQ-18

The PSQ-18 is a validated tool to measure patient satisfaction in the following seven different domains: general satisfaction, satisfaction with the technical quality of care, satisfaction with the interpersonal manner of the physician, satisfaction with communication, satisfaction with the financial aspects of care, satisfaction with the time spent with doctor, and satisfaction with the accessibility and convenience of care.[9] Each of the 18 questions asks patients to respond on a 5-point Likert scale. Each question maps to a specific

subdomain, with the subdomain score representing a mean value of its component parts (score range 1–5). The PSQ-18 was administered within three weeks of a patient visit, per clinic standard protocol, and was collected as the primary outcome by an independent clinical research coordinator. Patients were informed that their data would be de-identified and that their treating surgeon would not be informed of the results of the survey.

Statistical analysis

Study data was independently reviewed for accuracy through a standardized chart review process and tabulated. Categorical data was analyzed using a combination of Chi square and Fisher's exact test. Pearson's and Spearman's correlations were used to assess correlations between FCI and demographics, measures of disease severity, and PSQ-18. The Wilcoxon sum rank test was used to perform subgroup analysis to test for differences in SNOT and PSQ-18 between new patients, follow-up medical, and follow-up surgical patients. Univariate and multivariate analysis was performed to determine the effect of FCI and individual comorbidities on these outcome measures. The threshold for significance was set at $p < 0.05$. Power analysis indicated that the study is powered at > 80% to detect group differences of 6 points in the mean PSQ-18 score, for a standard deviation of 8 and an alpha of 0.05. Statistical analyses were performed using SAS® software version 9.4 for Windows®.

Results

Demographics

Sixty-nine patients with CRS were divided into two groups: 54 patients with CRSsNP and 15 with CRSwNP. There were no statistically significant differences in the following patient demographic information between these two groups: age (p = 0.622), gender (p = 0.384), type of visit (p = 0.72), or initiation of new therapy at visit (p = 0.892) (Table I).

SNOT-22 scores

There were no significant differences in mean scores for subjective disease specific quality of life (SNOT-22) (p = 0.531) based on polyp status (Table 1). However, subgroup analysis revealed that patients seen for new consultation (median = 45.25, range = 66) and follow up medical care (median = 45.17, range = 60) had a significantly higher SNOT-22 scores compared to those seen for follow up surgical care (median = 29.72, range = 67), p = 0.02).

PSQ-18 scores

There was no difference in PSQ-18 patient satisfaction scores between patients with CRSsNP (mean total sum score = 78) and those with CRSwNP (mean total sum score = 78) groups (p = 0.148) (Table II). Further analysis based on the following individual PSQ-18 subdomains also did not reveal any statistically significant differences in mean scores between the two groups: general satisfaction (p = 0.559), satisfaction with the technical quality of care (p = 0.159), satisfaction with the interpersonal manner of the physician (0 = 0.208), satisfaction with communication (p = 0.919), satisfaction with the financial aspects of care (p = 0.301), satisfaction with the time spent with doctor (p = 0.922), and satisfaction with the accessibility and convenience of care (p = 0.776). Further, subgroup

analysis did not reveal any difference in mean PSQ-18 score among patients being seen for new consultation or in follow up for medical or surgical care (p=0.29).

Patient comorbidities in CRSsNP and CRSwNP

The mean FCI was 4.9 among all CRS patients (table III). Mean FCI in CRSsNP and CRSwNP was 5.1 and 4.3, respectively. FCI did not differ significantly between CRSsNP and CRSwNP (p=0.843). The most common individual comorbidities were upper GI disease (71%), arthritis (53.6%), anxiety (56.5%), depression (45%), DDD (50.7%), CHF or heart disease (40.6%), obesity and/or BMI > 30 kg/m^2 (37.7%), asthma (31.9%). Asthma was significantly more prevalent in patients with CRSwNP (60%) compared to patients with CRSsNP (24%) (p=0.008). Conversely, DDD was found more commonly in patients with CRSsNP (57.4%) compared to those with CRSwNP (26.7%) (p=0.035). There was no difference in the distribution of any other individual comorbidity across patients with CRSsNP and CRSwNP.

The Impact of Comorbidities on Patient Satisfaction

Univariate analysis demonstrated that the total comorbidities, as calculated by the FCI, were not associated with patient satisfaction, as measured by the PSQ-18. Neither mean sum total PSQ-18 (p=0.282), nor any of the following PSQ-18 mean subdomain scores correlated with FCI: general satisfaction (p=0.306), technical quality (p=0.753), interpersonal manner (p=0.136), communication (p=0.619), financial aspects (p=0.126), time spent with doctor (p=0.327), and accessibility and convenience (p=0.218) (Table IV). Neither depression nor anxiety correlated with patient satisfaction (Table V). Hearing impairment was significantly associated with a lower mean sum total PSQ-18 score (p<0.001), as well as a lower score in the following PSQ-18 subdomains: general satisfaction (p=0.007), interpersonal manner (p=0.007), financial aspects (p=0.003), time spend with doctor (p=0.004), and accessibility (p<0.001) (Table V). Multivariate regression analysis confirmed that patients with hearing impairment demonstrated poorer satisfaction with care (p=0.002), while depression (p=0.277), anxiety (p=0.257), FCI (0.990) and age (0.398) had no impact on patient satisfaction (Table VI).

Discussion

Implications of patient satisfaction, and its role in determining provider reimbursement and physician reviews, has added an extra layer of complexity to this nuanced outcome measure. These observations, along with the knowledge that patient satisfaction can reinforce compliance, have made it essential that healthcare providers acknowledge the importance of satisfaction and work to optimize it. In the present study, our group examined the impact of medical comorbidities on patient satisfaction in CRS care. We chose to study 18 medical comorbidities shown to have the greatest impact on physical function using a validated tool, the FCI.[21] Although the total number of comorbidities associated with the FCI did not impact patient satisfaction, the presence of otologic disorders causing hearing impairment was significantly and robustly associated with poorer satisfaction. The remaining 17 comorbidities comprising the FCI, including depression and anxiety, had no impact on patient satisfaction.

Several investigations in the non-otolaryngologic literature have analyzed the impact of medical comorbidities on satisfaction. The data has demonstrated a significant association between medical multimorbidity and patient satisfaction with care,[22] as well as between musculoskeletal comorbidities and patient satisfaction in hip pathology.[23] Other authors have demonstrated a negative association between self-identified depression/anxiety and satisfaction.[10–13] The majority of these patient satisfaction studies lack validated outcomes measures and instead rely on self-diagnosis and author derived Likert scales.[5–8]

Overall, differences in the methodology between the aforementioned studies and the present study may explain the contradictory lack of association between mental health and patient satisfaction found herein. For example, in the present study, the questionnaire used to assess patient satisfaction was both validated and more comprehensive. Only patients with diagnoses made by medical providers were included. We also examined several domains of patient satisfaction, rather than focusing solely on communication, as was done in prior studies. Finally, the prior studies did not examine CRS.

The present study found a significant and robust negative relationship between hearing impairment and patient satisfaction. In order to understand this observation, it is important to note that a diagnosis of “hearing impairment” included patients with subjective complaints of hearing loss and/or objective findings on an audiogram and were assigned an otologic related ICD10 diagnosis code. While these data warrant further investigation, this finding may be best interpreted through the strong association between CRS and Eustachian tube dysfunction (ETD), with prevalence ranging from 43% to 60% in CRS patients.[24–27] ETD can result in symptoms of aural fullness and hearing loss and has been shown to negatively impact quality of life in CRS.[25] It is possible that due to the low QOL, these patients also experienced a concomitant drop in satisfaction. Since satisfaction has been shown to directly correlate with patient compliance,[3,4] elucidating the mechanism driving lower satisfaction in CRS patients with hearing impairment may allow providers to intervene, improve satisfaction, and impact compliance.

There are limitations to this study that should be considered. The retrospective nature of the study may lend itself to selection bias. Although care was taken to cross-reference medical diagnoses with healthcare provider notes to ensure diagnoses were accurate and current, the assignment of comorbidities was by EMR chart review and thus based on recorded medical diagnoses, which may be erroneous. If a comorbidity was not documented in the medical chart, it was not included as a part of the FCI calculation. The comorbidities comprising the FCI are not inherently life-threatening and may be overlooked by both the patient and a treating physician, which may falsely lower the FCI.[15] This study was performed at a tertiary rhinology academic center and the findings, including severity of disease, complexity of comorbidities, and decision to proceed with surgical intervention, may not be generalizable to non-academic settings.

Conclusion:

Hearing impairment was significantly and negatively associated with patient satisfaction in patients with CRS. By identifying a patient population with lower satisfaction scores,

targeted strategies may be implemented to improve these scores, which, in turn, may improve patient satisfaction.

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Table I:

Demographic Information based on polyp status

	All patients (n=69)	CRSsNP (n=54)	CRSwNP (n=15)	P value
Age; years	57.2	57.9	54.7	0.622
Gender; males (%)	44%	41%	53%	0.384
Type of visit				0.720
New patient consultation	21	17	4	
Follow-up visits	48	37	11	
History of prior sinus surgery	39	26	13	**0.008**
SNOT-22 score; median	38.5	37	41	.531

Table II:

Comparison of PSQ-18 score by CRS phenotype.

	CRSsNP (n=54)	CRSwNP (n=15)	P value
PSQ-18 by mean subdomain scores			
General satisfaction	4.49	4.47	.559
Technical quality	4.40	4.57	.159
Interpersonal manner	4.74	4.70	.208
Communication	4.59	4.57	.919
Financial aspects	4.32	4.00	.301
Time spent with doctor	4.44	4.47	.922
Accessibility and convenience	3.88	3.88	.776
PSQ-18 mean sum total score	78	78	.148

Table III:

Functional comorbidity index.

Medical Comorbidity	Total Patients (n=69)	CRSsNP (n=54)	CRSwNP (n=15)	P-value
1. Arthritis	37 (53.6%)	31 (57.4%)	6 (40.0%)	.232
2. Osteoporosis	5 (7.2%)	5 (9.3%)	0 (0.0%)	.221
3. Asthma	22 (31.9%)	13 (24.1%)	9 (60%)	**.008**
4. COPD, ARDS	8 (11.6%)	5 (9.3%)	3 (20.0%)	.250
5. Angina	6 (8.7%)	5 (9.3%)	1 (6.7%)	.753
6. CHF or heart disease	28 (40.6%)	23 (42.6%)	5 (33.3%)	.518
7. Heart attack	6 (8.7%)	5 (9.3%)	1 (6.7%)	.753
8. Neurological disease	7 (10.1%)	6(11.1%)	1 (6.7%)	.614
9. Stroke or TIA	2 (2.9%)	2 (3.7%)	0 (0.0%)	.449
10. Diabetes type I or II	10 (14.5%)	6(11.1%)	4 (26.7%)	.130
11. Peripheral vascular disease	2 (2.9%)	2 (3.7%)	0 (0.0%)	.449
12. Upper GI disease	49 (71%)	40 (74.1%)	9 (60.0%)	.288
13. Depression	31 (45%)	26(48.1%)	5 (33.3%)	.308
14. Anxiety	39 (56.5%)	32 (59.3%)	7 (46.7%)	.384
15. Visual impairment	12 (17.4%)	10 (18.5%)	2 (13.3%)	.639
16. Hearing impairment	13 (18.8%)	10 (18.5%)	3 (20.0%)	.897
17. Degenerative disc disease	35 (50.7%)	31 (57.4%)	4 (26.7%)	**.035**
18. Obesity and/or BMI of > 30 kg/m^2	26 (37.7%)	21 (38.9%)	5 (33.3%)	.694
Mean FCI	4.9	5.1	4.3	.843

COPD, chronic obstructive pulmonary disease; ARDS, acute respiratory distress syndrome; CHF, congestive heart failure; TIA, transient ischemic attack; GI, gastrointestinal, BMI, body mass index

Table IV:

Univariate analysis of FCI and clinical predictors.

Clinical Predictor	Functional Comorbidity Index (FCI)	P-Value
PSQ-18 by mean subdomain score		
General satisfaction	.125	.306
Technical quality	.038	.753
Interpersonal manner	.181	.136
Communication	−.061	.619
Financial aspects	.186	.126
Time spent with doctor	.120	.327
Accessibility and convenience	.150	.218
PSQ-18 mean sum total score	.131	.282
Duration of care (median months)	.122	.319
History of surgery	.121	.318

Table V:

Univariate analysis of individual comorbidities and PSQ-18 in all patients.

Medical Comorbidity	Mean total PSQ-18	General satisfaction	Technical Quality	Interpersonal manner	Communication	Financial	Time spent w/ MD	Accessibility/ Convenience
1. Arthritis	.181	.158	.917	**.038**	.676	**.015**	.248	.078
2. Osteoporosis	.783	.748	.963	.337	.610	.501	.653	.453
3. Asthma	.265	.191	.292	.672	.153	.704	.710	.262
4. COPD, ARDS	.724	.521	.711	.588	.118	.655	.425	.513
5. Angina	.195	.263	.298	.339	.224	.053	.216	.949
6. CHF or heart disease	.813	.855	.975	.475	.442	.805	.837	.248
7. Heart attack	.440	.874	.991	.904	.751	.691	.806	**.029**
8. Neurological disease	.945	.588	.408	.416	.835	.781	**.012**	.481
9. Stroke or TIA	.535	.702	.479	.165	.594	.603	.475	.803
10. Diabetes type I or II	.742	.578	.938	.636	.735	.154	.573	.219
11. Peripheral vascular disease	.500	.954	.899	.254	.753	.853	.940	.094
12. Upper GI disease	.382	.591	.915	.553	.994	.192	.637	.198
13. Depression	.624	.772	.398	.365	.879	.652	.785	.572
14. Anxiety	.728	.596	.695	.578	.467	.816	.430	.270
15. Visual impairment	.160	.716	.211	.816	.576	.420	.278	.247
16 Hearing impairment	**.000**	**.007**	.117	**.007**	.143	**.003**	**.004**	**.000**
17. Degenerative disc disease	.690	.300	.932	.213	.853	.092	.419	.839
18. Obesity and/or BMI > 30 kg/m^2	.435	.333	.478	.147	.643	.318	.390	.902

Spearman's R Correlation Coefficients and Chi-Square/Fisher's Exact Test. COPD, chronic obstructive pulmonary disease; ARDS, acute respiratory distress syndrome; CHF, congestive heart failure; TIA, transient ischemic attack; GI, gastrointestinal, BMI, body mass index

Table VI:

Multivariate Regression Analysis: Clinical predictors independently influencing the mean sum total PSQ-18.

	Model Fit R	R^2	Model F-Statistic	P-Value	Predictor Variable P-Value	
Multivariate Regression model	.436	.190	2.955	.019	Age	**.398**
					Depression	.277
					FCI	.990
					Anxiety	.257
					Hearing Impairment	**.002**