



The complexities of practising equitable Rhinology within resource limitations

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Background: Limited data exist regarding the epidemiology of Rhinologic disease in New Zealand. Resource constraints in New Zealand have led to a considerable proportion of Public Hospital referrals being declined. This cross-sectional study aims to examine the burden of sinonasal disease in the Waikato region and the effect of resource constraints on the provision of equitable care.

Methods: Adult sinonasal referrals to Waikato Public Hospital over 6 months were retrospectively reviewed. Patients whose referral was declined were invited to complete the Short Form-36 (SF-36), and the Sinonasal Outcome Tool (SNOT-22). Over 4 weeks, all new adult sinonasal patients attending for clinic or for surgery were prospectively studied using the same questionnaires.

Results: Of 374 referrals, 110 (29%) were declined. The incidence of referrals was significantly lower among Pacific peoples than Europeans/other ethnicities (IR =0.39, P=0.036). Patients attending for surgery had a significantly more favourable health state than those declined from and those attending for clinic across one and three domains of the SF-36 respectively. There was no significant difference in SNOT-22 score between any of these groups.

Conclusions: There is a pressing need to promote referral of patients from disadvantaged ethnic groups. Substantial unmet need exists for publicly funded sinonasal care in the Waikato. Referral letters are insufficient to accept or decline new referrals equitably. The use of disease specific tools such as the SNOT-22 in the triaging of new referrals is considered prudent.

Keywords: Rhinitis; sinusitis; nasal surgical procedures; health resources; quality of life

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Introduction

Sinonasal disease is known to be highly prevalent and to cause significant morbidity across western societies (1,2). Conditions such as chronic rhinosinusitis (CRS), allergic rhinitis (AR) and nasal septum deviation all contribute considerably to this prevalence.

Few data exist regarding the epidemiology of sinonasal disease in New Zealand although multiple pertinent

risk factors have been evidenced internationally. Damp housing predisposes to both CRS and AR (3,4), and a causal correlation between tobacco smoking and CRS has also been identified (1). For context, 10% of the population reported housing dampness in 2010/11 (5), and 15% were current smokers as of 2017/08 (6). Hence it is probable that New Zealand has a considerable, as yet unquantified, burden of sinonasal disease.

Sinonasal disease exerts a multifold burden on individual health. Sinonasal-specific symptoms such as nasal congestion, rhinorrhoea, and hyposmia cause considerable impairment (1,7). Non-localised corollaries including depression and sleep disturbance often have similarly detrimental impacts (7-9). In appropriately indicated cases, it has been evidenced that surgical intervention is most efficacious in improving sinonasal symptoms and restoring quality of life (10,11). The provision of care for sinonasal disease is, however, increasingly restricted by the funding constraints of public healthcare systems (12). In New Zealand, such constraints necessitate that a notable proportion of new referrals for Public Hospital Otolaryngology (ORL) care are declined at the time of referral, in proportions dictated by local capacity. Referrals are declined mostly on account of morbidity as subjectively reported in the referral letter. At Waikato Public Hospital, the triaging process in which ORL referrals are accepted or declined is performed by the Specialist Otolaryngologists.

This study aims to: (I) gather initial data regarding the burden and distribution of sinonasal disease in the Waikato region of New Zealand and (II) examine the impact of resource constraints on the provision of equitable publicly-funded care.

We present the following article in accordance with the STROBE reporting checklist (available at <http://dx.doi.org/10.21037/ajo-20-72>).

Methods

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). Ethics approval was obtained from The University of Auckland Human Participants Ethics Committee (ref: 022185) and informed consent was taken from all individual participants.

Referral analyses

A list showing all new patient referrals to the ORL Department at Waikato Hospital over a 6-month period (May to October 2018) was retrospectively reviewed. All patients referred primarily for symptoms of sinonasal disease aged 16 years or over at the time of referral were included. Patients referred for epistaxis or acute nasal trauma were excluded. Anonymous demographic data pertaining to age at the time of referral, ethnicity, and sex were collected. In

order to be comparable with projections for the Waikato population, ethnicity was classified using a prioritised ethnicity system (Māori, Pacific peoples, Asians, and other ethnicities) and age banded in 10-year wide groupings. The referral status of each eligible patient was also recorded.

Participant recruitment

Three study groups were defined. The first consisted of all included patients who had their referral to the ORL Department over the 6-month period declined. The second consisted of all those accepted to the Outpatient Clinic who attended over a 4-week period between December 2018 and January 2019. The third consisted of all patients who underwent sinonasal surgery over the same 4-week period. Patients declined from clinic were invited to participate in the study via mail. The other two groups were invited in person on their arrival to the Outpatient Clinic or Day of Surgery Admission respectively.

Quality of life measures

Patients within each of the three groups were invited to complete two quality of life surveys: the generic Medical Outcomes Study Short Form 36 and the disease-specific 22-item Sinonasal Outcome Tool (SNOT-22). These were both administered as written questionnaires.

For scoring, the items of the SF-36 were divided between eight health domains. A score for each domain was calculated on a scale from 0 to 100, as per the SF-36 guidelines (13), with a higher score equivalent to a more favourable health state. For the SNOT-22, each item was scored on a scale of 0 to 5 by participants, with a higher score equivalent to greater symptom severity. A total SNOT-22 score was calculated cumulatively with the range of possible scores extending from 0 to 110.

Statistical analyses

Missing data values were handled as per the scoring guidelines for each quality of life survey.

Mean overall SF-36 and total SNOT-22 scores were analysed with linear models assuming a normal distribution. Incidence counts were analysed with a generalised linear model assuming Poisson distribution with the natural logarithm as link. The logarithm of the population counts was used as an offset in the models for incidence. Residuals were checked for assumptions of the analysis. Calculations

Table 1 Sinonasal disease referral incidence per 100,000 among the Waikato population by prioritised ethnicity, age, and sex, 2018/19

Variable	Level	Total number of referrals	Corrected projected number in Waikato population	Incidence (per 100.000)	Incidence lower 95 (per 100.000)	Incidence upper 95 (per 100.000)	Incidence ratio (IR)	IR lower 95	IR upper 95	P value
Ethnicity	European or other	274	276,528	99.1	88.0	111.5		Reference		
	Asian	34	35,064	97.0	69.3	135.7	0.98	0.69	1.40	0.905
	Māori	58	69,230	83.8	64.8	108.4	0.85	0.64	1.12	0.246
	Pacific	5	12,762	39.2	16.3	94.1	0.40	0.16	0.96	0.040
Age	15–19 years	18	30,264	59.5	37.5	94.4		Reference		
	20–24 years	27	37,800	71.4	49.0	104.2	1.20	0.66	2.18	0.547
	25–29 years	27	36,740	73.5	50.4	107.2	1.24	0.68	2.24	0.487
	30–34 years	33	31,290	105.5	75.0	148.3	1.77	1.00	3.15	0.051
	35–39 years	20	28,970	69.0	44.5	107.0	1.16	0.61	2.19	0.646
	40–44 years	31	29,110	106.5	74.9	151.4	1.79	1.00	3.20	0.049
	45–49 years	26	32,410	80.2	54.6	117.8	1.35	0.74	2.46	0.329
	50–54 years	34	31,370	108.4	77.4	151.7	1.82	1.03	3.23	0.040
	55–59 years	40	31,730	126.1	92.5	171.9	2.12	1.22	3.70	0.008
	60–64 years	20	27,700	72.2	46.6	111.9	1.21	0.64	2.29	0.551
	65–69 years	39	24,110	161.8	118.2	221.4	2.72	1.56	4.75	0.000
	70–74 years	31	20,320	152.6	107.3	216.9	2.57	1.44	4.58	0.001
	75–79 years	13	14,350	90.6	52.6	156.0	1.52	0.75	3.11	0.248
80–84 years	10	9,110	109.8	59.1	204.0	1.85	0.85	4.00	0.120	
85 years and over	5	8,310	60.2	25.0	144.6	1.01	0.38	2.72	0.982	
Sex	Female	192	203,174	94.5	82.0	108.9		Reference		
	Male	182	190,410	95.6	82.7	110.5	1.01	0.83	1.24	0.912

were carried out using R (14).

Results

Referral incidence

In total there were 374 eligible new patients referred to the ORL Department over the 6 months period, 110 of whom were declined (29%). The incidence of referrals among Pacific peoples was significantly lower than that among those of European/other ethnicity (IR =0.40; P=0.040) (Table 1). Relative to those aged 16–19, the incidence of referrals was significantly higher across a multitude of age classes: 40–44 years (IR =1.79; P=0.049),

50–54 years (IR =1.82; P=0.040), 55–59 years (IR =2.12; P=0.008), 65–69 years (IR =2.72; P<0.001) and 70–74 years (IR =2.57; P=0.001). There was no significant difference in the incidence of referrals between sexes (IR =1.01; P=0.912).

Quality of life scores

A total of 21 patients (19%) declined from clinic, 29 (100%) attending clinic, and 9 (100%) attending theatre completed and returned at least one of the questionnaires.

Overall, sinonasal patients reported significantly more disability than the wider New Zealand population across all

eight domains of the SF-36 [as per quality of life data from the 2006/07 New Zealand Health Survey (15)] (*Table 2*). Patients declined from clinic reported a significantly less favourable health state than those attending theatre in the social functioning domain of the SF-36 ($P=0.011$). Patients accepted to clinic reported a significantly less favourable health state than those attending theatre across three domains: social functioning ($P=0.027$), physical function ($P=0.029$), and role limitation—physical ($P=0.014$).

There was no significant difference in SNOT-22 score between patients declined from clinic (52.6; 95% CI =42.6–62.7), patients accepted to clinic (51.1; 95% CI =42.2–60.0) and patients attending theatre (58.9; 95% CI =42.2–75.6). The average of all three study groups was, however, significantly above that of a 2016 South Carolina control population (16.4 ± 15.2) (16).

Conclusions

Epidemiologic findings

The epidemiologic data elucidate a substantial local disease burden that appears unequally distributed with respect to both ethnicity and age. In existing international data, the incidence of sinonasal disease has been disparately high among socio-economically deprived ethnic groups, most likely as a consequence of disparate living conditions and access to healthcare (17). Conversely, Māori and Pacific peoples, the two ethnic groups of lowest average socio-economic status in New Zealand (18), experienced the lowest incidence of outpatient referrals over this study period. Inequitable barriers to primary healthcare access seemingly impeded a relatively high proportion of these individuals obtaining outpatient referrals (analogous to exclusion from this sample). Hence any true ethnic disparities in incidence may have been masked by sampling limitation and further investigation in this area is warranted.

The questionnaire data corroborate existing evidence that sinonasal disease and its sequelae have a profound detrimental impact on quality of life.

Allocation of care and clinical applicability

Interestingly, patients attending theatre had a favourable general health state relative to both groups of patients referred to clinic yet the SNOT-22 scores of all three study groups exhibited no significant disparity. This incongruity is most feasibly a consequence of the SF-

36, as a holistic measure of health status, being subject to relatively substantive bias by dispositional optimism (19). This subjectivity was likely exacerbated in patients awaiting surgery due to perceived impending health improvements. Consequently, the specific symptom reporting of the SNOT-22 appears to be the more pertinent of the two measures in this context. The approximate equivalence of SNOT-22 score across all three study groups is alarming given that it is a reliable predictor of post-surgical improvement in the context of CRS (10). This equivalence hence evidences a substantial presently unmet need for publicly funded surgical care.

The lack of a significant difference in both health status and symptom severity between patients accepted to clinic and those declined also points toward an underprovision of care. Further, it is also likely indicative of inadequacies in current referrals from primary care causing an inequitable distribution of secondary and tertiary resources. This would be in line with a 2009 Irish audit which found that general practitioners were not providing Ear Nose and Throat referrals competently (20). The Waikato Public Hospital ORL Department has begun developing a procedure for incorporating use of the SNOT-22 into triage processes with the intention of mitigating inequities in referral acceptance. Although this does not negate the importance of specialist examination and investigation, the existing triage procedures are evidently allocating this with considerable inefficiency.

Limitations

The predominant limitation of this study is the non-uniformity of survey method. The response rate of patients sent mail surveys was 19% (in comparison to the 100% response rate among theatre patients recruited in person) and hence established a risk of sample non-representation.

Future directions

There is a particular need to promote referral of patients from disadvantaged ethnic groups for sinonasal care. This should involve addressing upstream factors regarding inequities in access to and referral from primary care. There appears to be a holistic under-provision of publicly funded care. Alternative methods of outpatient referral screening are nonetheless requisite to ensure access to this is more equitable. The disease-specific SNOT-22 would figure to be a practical and generalisable tool to assist with triaging of

Table 2 SF-36 scores among Waikato patients with sinonasal disease by referral status, 2018/19

Domain	Type	SF-36			Pairwise comparison P values				
		Estimate	Lower 95	Upper 95	Clinic	Declined	Theatre	Overall	NZHS
Physical function	Clinic	57.62	47.64	67.61	1.000	0.073	0.029	0.175	0.000
	Declined	71.21	59.75	82.68	0.073	1.000	0.408	0.437	0.011
	Theatre	80.00	62.08	97.92	0.029	0.408	1.000	0.145	0.517
	Overall	65.96	58.94	72.99	0.175	0.437	0.145	1.000	0.000
	NZHS	85.80	85.40	86.30	0.000	0.011	0.517	0.000	1.000
Role limitation: physical	Clinic	41.96	26.52	57.41	1.000	0.077	0.014	0.154	0.000
	Declined	62.50	45.07	79.93	0.077	1.000	0.263	0.498	0.008
	Theatre	80.56	53.31	107.80	0.014	0.263	1.000	0.088	0.711
	Overall	55.51	44.65	66.37	0.154	0.498	0.088	1.000	0.000
	NZHS	85.60	85.10	86.10	0.000	0.008	0.711	0.000	1.000
Role limitation: emotional	Clinic	59.52	43.87	75.18	1.000	0.262	0.166	0.384	0.000
	Declined	72.73	55.06	90.39	0.262	1.000	0.593	0.634	0.018
	Theatre	81.48	53.86	109.10	0.166	0.593	1.000	0.355	0.379
	Overall	67.80	57.21	78.39	0.384	0.634	0.355	1.000	0.000
	NZHS	93.60	93.30	93.90	0.000	0.018	0.379	0.000	1.000
Vitality	Clinic	43.16	35.50	50.83	1.000	0.858	0.221	0.820	0.000
	Declined	42.12	33.32	50.92	0.858	1.000	0.191	0.682	0.000
	Theatre	52.78	39.02	66.54	0.221	0.191	1.000	0.245	0.106
	Overall	44.22	39.01	49.43	0.820	0.682	0.245	1.000	0.000
	NZHS	63.90	63.50	64.40	0.000	0.000	0.106	0.000	1.000
Mental health	Clinic	69.93	62.45	77.42	1.000	0.663	0.429	1.000	0.001
	Declined	67.45	58.86	76.05	0.663	1.000	0.283	0.621	0.001
	Theatre	76.00	62.56	89.44	0.429	0.283	1.000	0.399	0.356
	Overall	69.93	64.88	74.99	1.000	0.621	0.399	1.000	0.000
	NZHS	82.20	81.90	82.60	0.001	0.001	0.356	0.000	1.000
Social functioning	Clinic	68.10	58.96	77.25	1.000	0.575	0.027	0.764	0.000
	Declined	64.20	53.70	74.70	0.575	1.000	0.011	0.367	0.000
	Theatre	88.89	72.47	105.31	0.027	0.011	1.000	0.031	0.943
	Overall	69.79	63.33	76.26	0.764	0.367	0.031	1.000	0.000
	NZHS	88.30	87.80	88.80	0.000	0.000	0.943	0.000	1.000

Table 2 (continued)

Table 2 (continued)

Domain	Type	SF-36			Pairwise comparison P values				
		Estimate	Lower 95	Upper 95	Clinic	Declined	Theatre	Overall	NZHS
Bodily pain	Clinic	51.89	41.80	61.99	1.000	0.540	0.145	0.513	0.000
	Declined	56.55	45.15	67.94	0.540	1.000	0.332	0.923	0.001
	Theatre	66.78	48.97	84.59	0.145	0.332	1.000	0.254	0.344
	Overall	55.90	49.08	62.71	0.513	0.923	0.254	1.000	0.000
	NZHS	75.20	74.70	75.80	0.000	0.001	0.344	0.000	1.000
General health Perceptions	Clinic	51.45	41.93	60.97	1.000	0.981	0.251	0.780	0.000
	Declined	51.27	40.34	62.20	0.981	1.000	0.261	0.778	0.000
	Theatre	62.67	45.58	79.75	0.251	0.261	1.000	0.294	0.169
	Overall	53.07	46.62	59.52	0.780	0.778	0.294	1.000	0.000
	NZHS	74.40	73.90	75.00	0.000	0.000	0.169	0.000	1.000

Clinic: patients accepted to attend the outpatient clinic; Declined: patients declined from the outpatient clinic; Theatre: patients attending for sinonasal surgery; Overall: all study participants; NZHS: New Zealand population—as per the 2006/07 New Zealand Health Survey (15).

patients referred to outpatient clinics for sinonasal care.

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Footnote

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Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). Ethics approval was obtained from The University of Auckland Human Participants Ethics Committee (ref: 022185) and informed consent was taken from all individual participants.

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