

Characterization of Otolaryngology Referrals among Pacific Islanders in the Commonwealth of the Northern Mariana Islands

Steven G. Duncan MD; Rodolfo M. Fernandez-Criado MD; Ajay Narayanan MD; Mary P. Chang MD, MPH; William J. Moss MD

Abstract

The burden of otolaryngology disease in Pacific Islander populations is relatively uncharacterized. A single-institution retrospective review was undertaken at the Commonwealth Healthcare Corporation in Saipan, the only hospital in the Commonwealth of the Northern Mariana Islands. Demographic, diagnostic, and treatment data were compiled from the clinical charts of all patients seen by an otolaryngologist between January 2015 and April 2020. For all Pacific Islanders in the sample (N=674), the average age was 40.2 (SD 22.4) years and ages ranged from 10 months to 89 years. Patients were 50.7% male and 49.3% female. The most common diagnoses affected the ear (40.8%), followed by the oral cavity/pharynx (23.2%), and nose (14.0%). Middle ear disease comprised 41.7% of reported ear disorders; the most common problem was otitis media (19.4%, n=68) followed by tympanic membrane perforation (14.0%, n=49). Head and neck cancers comprised 8.6% of all diagnoses. Most (77.8%) malignant neoplasms were oral cavity carcinomas. The average age at diagnosis for oral cancer was 46.6 years with a 1.8:1 male-to-female predominance. Patients with cancer of the oral cavity (n=56) chewed betel nut at higher rates (94.6%) compared with other adults in the sample (P<.001). Adult patients reported alcohol use, smoking, and chewing betel nut at rates of 26.5%, 39.9%, and 52.2% respectively. Otolaryngology referrals among Pacific Islanders in this sample were dominated by ear disease and included betel nut-related oral cavity disease.

Keywords

betel nut, chronic ear disease, oral cavity cancer, Pacific Islanders

Abbreviations

CSOM = chronic suppurative otitis media

Introduction

Otolaryngology complaints make up roughly 25% of adult and 50% of pediatric primary care visits, representing a large proportion of health care delivered worldwide.¹ Around 14-20% of such patients are referred to otolaryngologists for management.¹⁻² While the epidemiology of otolaryngologic disorders is well established in the continental United States, other areas of the world have no published data on the topic.

Saipan is an island commonwealth of the United States in the Pacific Ocean. The territory belongs to the Northern Marianas, an archipelago of small islands neighboring Guam. The population of Saipan is approximately 50 000 people, most (85%) of

whom are of Asian or Pacific Islander decent.³ Pacific Islanders are defined as individuals whose origin is among the original peoples of the Pacific islands, which does not include Filipino or East Asian ancestry. The largest ethnic group on Saipan represented among Pacific Islanders is the Chamorro (24%) who are indigenous to the island.⁴ Sociocultural, political, and geographic factors contribute to a unique set of conditions that may produce significant differences in the burden of otolaryngologic disease in Saipan compared to the continental United States.⁵

One such cultural factor is the practice of chewing betel nut (also called areca nut). This psychoactive plant is often chewed as betel quid, which contains a combination of the raw nut, betel leaf, slaked lime to improve chemical availability of the alkaloid stimulant, and crushed tobacco from a cigarette.⁶⁻⁷ Betel nut is classified as a definite (Group 1) carcinogen by the World Health Organization and has been known to cause oral and esophageal cancer as well as exert effects on vital organ systems and the microbiome.⁸⁻⁹ The great majority (88%) of Pacific Islanders who use betel nut add tobacco to their chew, which may increase dependence and could synergistically amplify the risk of oral cancer.¹⁰

Otolaryngology disorders have been reported at a higher prevalence in tropical climates.¹¹ In addition to the widespread use of betel nut, the island setting of Saipan confers other potential risks. Swimmers and divers may be exposed to barotrauma and aquatic bacteria that colonize the ear.¹²⁻¹⁴ Frequent beach going may increase exposure to ultraviolet radiation leading to the development of cancerous and precancerous skin lesions on the head and neck.¹⁵ Proximity to the ocean and related dietary habits may predispose to foreign bodies such as retained fish bones, which can become lodged in the esophagus.¹⁶

A general survey of the epidemiology of ear, nose, and throat disorders in the Northern Mariana Islands has not been reported in any available research literature. The purpose of this study is to characterize the overall burden of otolaryngologic disease for Pacific Islanders in the Commonwealth of the Northern Mariana Islands. This information will provide insight into the unique distribution of health challenges experienced by the Saipanese, which may contribute to general knowledge of otolaryngology disorders for Pacific Islanders within Oceania.

Methods

This study is a retrospective chart review of all Pacific Islander patients seen by an otolaryngologist from January 2015 to April 2020 at the Commonwealth Healthcare Corporation, including both outpatient referrals and inpatient consultations. The Commonwealth Healthcare Corporation functions as the only hospital on Saipan, as well as a primary care and imaging center. The facility also provides care to individuals referred from neighboring islands in the Commonwealth including Tinian and Rota where there is no hospital. Patients were excluded on the basis of insufficient or absent chart information. Data from non-Pacific Islander patients were excluded.

All patient charts were accessed securely through the electronic medical record system maintained by the hospital. This sample effectively represents all otolaryngology patients recorded in the electronic medical record system since it was introduced. Assessed data included age, sex, race, health risk factors (drinking, smoking, and chewing history), insurance coverage, all assigned diagnoses with associated International Classification of Disease codes, and treatment plans. Diagnostic modifiers (eg, acute, chronic, and recurrent) were noted along with relevant labs, imaging studies, culture results, and pathology reports.

All data were collected into a spreadsheet and frequencies were calculated using Microsoft Excel for Office 365 (Microsoft Corporation, Redmond, WA). Additional statistical analysis of the data was performed using GNU PSPP software version 1.2.0-g0fb4db (Free Software Foundation, Boston, MA). Chi-square tests and bivariate correlations were used to evaluate associations between demographic characteristics and risk factors drawn from the recorded social history.

The study was approved by the Internal Review Board at the University of Texas Southwestern Medical Center in Dallas, Texas under IRB#STU-2018-0220.

Results

A total of 1110 patients were seen by an otolaryngologist from 2015 through 2020, with recorded visits comprising approximately 2150 individual appointments. Sixty of those patients were excluded for missing or insufficient chart information. A total of 674 patients identified as Pacific Islanders (65.3%) and were included for analysis, while the remaining 376 were excluded (287 Asian, 38 White, 24 Native American or Alaskan, 1 Black or African American, 8 mixed race, and 18 without racial information). For the included population, 859 diagnoses were recorded. Twenty-one percent or 143 Pacific Islander patients were seen for multiple diagnoses. Eighteen diagnoses were not related to otolaryngology and were not included in the presented tables.

The sample was balanced by sex with 342 males (50.7%) and 332 females (49.3%). The average age was 40.2 (SD 22.4) years and ages ranged from 10 months to 89 years. There were 518 adult patients (76.9%) ages 18 and up and 156 pediatric patients (23.2%). Of those 18 year and up, there were 243 men (46.9%) and 275 women (53.1%).

While most patients in the sample had some form of insurance, 183 patients were uninsured (27.2%). A total of 239 patients had private insurance (35.5%), 143 patients had Medicaid (21.2%), 27 patients had Medicare (4.0%), and 82 patients had multiple insurance plans (12.2%). Older age was positively correlated with having insurance ($r=0.2, P<.001$). Demographic information is presented in **Table 1**.

Among adult patients with recorded social history, alcohol use was disclosed by 126 patients (26.5%). Current or former smoking was recorded for 201 patients (39.9% ever, 23.8% current). Betel nut chewing with or without smokeless tobacco and slaked lime/crushed coral was practiced by 252 patients (52.2% ever, 34.8% current). Men were significantly more likely to engage with all 3 risk factors ($P<.001$). More men reported smoking (48.9%) and chewing betel nut and (64.0%) compared to only 32.1% and 41.9% of women respectively. Patients engaged in 1 risk behavior (drinking, chewing, or smoking) were more likely to be engaged in all others ($P<.001$). Among pediatric patients, 54 children (39.7% of those with available data, $n=136$) had a smoker in their home or another source of regular exposure to second-hand smoke.

The relative distribution of all patient diagnoses within the sample is represented in **Figure 1**. Patients most commonly sought care for ear disease, followed by disorders of the oral cavity. A complete breakdown of disorders by anatomic region is provided in **Table 2**.

Demographic Characteristic	Number (n)	Percentage (%)
Gender		
Male	342	50.7
Female	332	49.3
Age		
< 18 years	156	23.2
> 18 years	518	76.9
Insurance		
Private	239	35.5
Medicaid	143	21.2
Medicare	27	4.0
Multiple	82	12.2
Uninsured	183	27.12

A total of 303 patients were diagnosed with a disorder of the ear (87 pediatric and 216 adult patients, see **Figure 1**). The average age at diagnosis for pediatric and adult patients with ear disorders was 6.7 (SD 4.2) and 47.1 (SD 17.9) years, respectively (35.6 [SD 23.8] years overall). Forty-seven (15.5%) of these patients were assessed for more than one ear-related diagnosis. The most frequent complaint was hearing loss (n=69). Otitis media was the most common diagnosis (n=68) and 63.2% of cases were classified as chronic or recurrent. Forty-nine patients were evaluated for a diagnosis of tympanic membrane perforation. Ear complaints represented 51.0% of all pediatric complaints.

A total of 72 head and neck cancers were found (8.6% of all diagnoses). Most of these were localized to the oral cavity region (77.8% of cancers found in the sampled population) and 36 (64.3%) of these occurred in men which yielded a 1.8:1 male-to-female predominance. The average age at diagnosis for oral cancer was 46.6 years (95% CI, 43.4 to 49.7) and ranged from 28 and 78 years. Patients with oral cavity carcinomas

(n=56) were found to have a higher rate of smoking (52.7%) and chewing betel nut (92.9%) compared with other adults in the sample ($P<.001$). There was a non-significant trend toward higher rates of drinking in this sub-group (32.1%). Twenty-nine of 30 patients with non-cancerous leukoplakia of the oral cavity (96.7%) reported chewing betel quid.

Cases of oral cavity carcinoma were most commonly diagnosed at an advanced stage. For those cases with staging available (n=42), 9 (21.4%) were diagnosed at stage I, 6 (14.3%) at stage II, 7 (16.7%) at stage III, and 20 (47.6%) at stage IV. Of the most advanced cases, 11 patients were categorized as stage IVA and 3 patients were categorized as stage IVB; 6 patients were not assigned a letter designation. For the 38 patients that had a documented oral cavity subsite, the most common site was the tongue (n=17), followed by the buccal mucosa (n=13), lip or oral commissure (n=5), floor of the mouth (n=2), and hard palate (n=1).

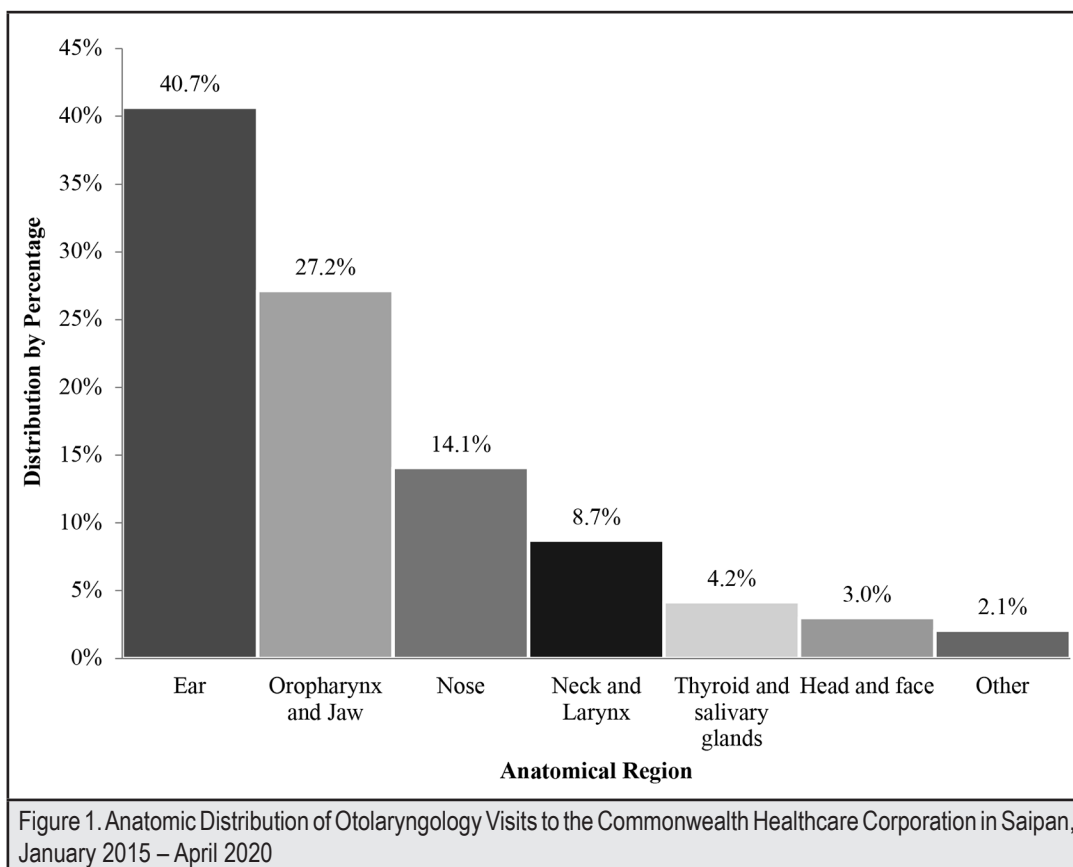


Table 2. Classification of Otolaryngologic Diagnoses by Anatomic Region in Saipan, January 2015 – April 2020			
Disease	Number (n)	Category Percent (%)	Total Percent (%)
Disorders of the Ear	350		41.6
Mass lesions	14	4.0	
Otitis externa	35	10.0	
Otitis media	68	19.4	
Cerumen impaction	13	3.7	
Tympanic membrane perforation	49	14.0	
Otalgia	8	2.3	
Dysfunction of eustachian tube	16	4.6	
Dizziness and vertigo	35	10.0	
Hearing loss	69	19.7	
Tinnitus and hyperacusis	12	3.4	
Mastoiditis/mastoidectomy cavity	4	1.1	
Foreign body in ear	12	3.4	
Other disorders of the ear	15	4.3	
Disorders of the Nose and Sinonasal Cavity	120		14.3
Mass lesions	21	17.5	
Malignant tumors	6	5.0	
Allergic rhinitis	33	27.5	
Sinusitis	18	15.0	
Epistaxis	19	15.8	
Other disorders of the nose	29	24.2	
Disorders of the Oral Cavity, Oropharynx, Esophagus and Jaw	235		27.9
Oral mass lesions	117	49.8	
Squamous cell carcinoma	47	20.0	
Other malignant tumors	10	4.3	
Pharyngitis	11	4.7	
Tonsillitis	11	4.7	
Oral or peritonsillar abscess	6	2.6	
Hypertrophic tonsils and adenoids	24	10.2	
Dysphagia	19	8.1	
Odynophagia	4	1.7	
Globus or other sensation	13	5.3	
Other disorders of oral cavity/oropharynx/jaw	30	25.0	
Disorders of the Neck, Larynx, and Accessory Glands	109		13.0
Laryngeal mass	9	8.3	
Neck mass	16	14.7	
Thyroid neoplasm	24	22.0	
Parotid neoplasm	4	3.7	
Dysphonia and vocal cord dysfunction	15	13.8	
Sleep apnea and snoring	21	19.3	
Other disorders of the neck region	20	18.4	

Disease	Number (n)	Category Percent (%)	Total Percent (%)
Disorders of the Face, Head, and Orbital Region	27		3.2
Facial mass	8	29.6	
Malignant tumors	2	7.4	
Headache	4	14.8	
Trigeminal neuralgia, atypical facial pain	2	7.4	
Abscess and cellulitis	6	22.2	
Epiphora	1	3.7	
Orbital bone fracture	1	3.7	
Other disorders of the head	5	18.5	

Discussion

Otolaryngologic diseases in the Asia-Pacific region are known to differ by location and by ethnicity, highlighting a need for disease prevalence studies to characterize the burden of disease within diverse ethnic populations.¹⁷ Pacific Islanders in the Northern Mariana Islands appear to have higher rates of oral cavity cancer and chronic ear disease when compared to other regions in the world.¹⁸⁻¹⁹ Ethnocultural and racial disparities in conjunction with an increased prevalence of risk factor behaviors (eg, alcohol, tobacco, and betel quid use) are possible mediators of these encountered differences. While every region cannot be presented herein, specific comparisons can provide context and highlight unique features of the otolaryngology burden of disease on Saipan.

The high burden of ear disease in Saipan is dissimilar to epidemiological studies conducted in Malaysia and Nigeria where nasal complaints (especially allergic rhinitis and sinusitis) dominated over all other otolaryngologic complaints.²⁰⁻²¹ An emergency otolaryngology clinic in Brazil had a higher rate of otologic complaints than Saipan: 62.3% overall (n=26,584).²² These numbers are helpful for comparison, although they may represent unequal management of diseases by primary care physicians rather than a difference in the true prevalence of conditions.

In Saipan, men were more likely to chew betel nut than women. Chewing habits consistently vary by sex in other regions; in east Asia, men are more likely to chew, but in southeast Asia the practice is more common among women. The sex-independent prevalence of current betel nut chewing in Saipan's Pacific Islander population (34.8%) was found to be higher than in Taiwan, mainland China, Sri Lanka, Malaysia, and Indonesia, and was exceeded only by Nepal (40.7%).²³

In Taiwan, an East Asian island nation in the West Pacific, most cases of oral cancer were diagnosed in the sixth decade of life and were associated with betel nut chewing. Although this population had a slightly younger age distribution, the most common subsites within the oral cavity were the same: tongue and buccal mucosa.²⁴ Squamous cell carcinoma of the buccal mucosa is rare in North America, suggesting that oral cancer may have a unique predilection for the tongue and buccal mucosa in betel nut chewers who damage these areas where corrosive quid rests within the oral cavity.²⁵ A study of head and neck cancers in Europe showed laryngeal carcinoma to be most common, which was heavily outweighed by oral cavity carcinoma in this population. The percentage of patients presenting with stage IV disease on Saipan was also twice that of Europe.²⁶

The global annual incidence of chronic suppurative otitis media (CSOM) is 4.8%, and an estimated half of cases cause preventable hearing impairment.¹⁹ The prevalence of CSOM has been previously reported as relatively high in the Pacific Islands: 4% in Micronesia compared to <1% in the continental United States.²⁷ This population of otolaryngology patients seems to fit expected trends; otologic diseases were the most prevalent condition that was managed by an otolaryngologist. Chronic and recurrent otitis media were frequently encountered (63.2% of otitis media, 5.1% of all diagnoses), which falls roughly in line with outside estimates.

Limitations

This study was limited by use of retrospective data and associated biases. Certain data points were not always recorded for every patient, such as substance-related risk factors in the social history. Because the Commonwealth Healthcare Corporation is the only hospital complex in the Northern Mariana Islands, the results are likely very representative of otolaryngologic complaints among Pacific Islanders in the region. However, the possibility remains that some patients were seen at other clinics.

Conclusion

The otolaryngology burden of disease on the island of Saipan is unique from other areas in the world. Among Pacific Islanders, the rate of oral cavity carcinoma is far higher than in the general population of the United States. Ethnocultural factors likely mediate this difference, especially the practice of chewing betel quid. Patients frequently suffer from clinically advanced disease at presentation, and subsites within the oral cavity are similar to those found in regions where betel nut is chewed. Chronic middle ear disease and associated hearing impairment are also highly prevalent on the island. This study lends support to the growing body of literature characterizing exceptionally high rates of ear disease in Oceania.¹⁹ More studies are needed to determine which specific variables (geographic, genetic, behavioral, social, etc) underpin the pervasiveness of ear disease among Pacific Islanders and to what extent. A robust understanding of the epidemiological distribution of disease among minority populations is essential to guide health care planning and public health interventions. The Pacific Islander population of Saipan may benefit from campaigns aimed at instituting health screening and betel quid cessation.

Conflict of Interest

None of the authors identify a conflict of interest.

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Authors' Affiliations:

- University of Texas Southwestern Medical School, Dallas, TX (SGD, RMF, AN, MPC)
- Commonwealth Health Center, Saipan, Northern Mariana Islands (WJM)

Corresponding Author:

William J. Moss MD; Division of Otolaryngology-Head & Neck Surgery, Department of Surgery, Commonwealth Health Center, 1 Hinemlu Rd., Garapan, Saipan, CNMI, 96950; email: billy.moss85@gmail.com

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