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Aging in the United States: Opportunities and Challenges for Otolaryngology-Head and Neck Surgery

Brandon L. Chiu, M.D.¹ and Jayant M. Pinto, M.D., F.A.C.S.^{2,*}

¹Section of Otolaryngology-Head and Neck Surgery, The University of Chicago, Chicago, IL

²Center on Demography and Economics of Aging, The University of Chicago, Chicago, IL

Demographic Trends

Over the past decade, the demographic profile of the United States (US) has been evolving at an increasing rate. From 2005 to 2015, the number of Americans over the age of 65 years, which we will define as the population of older adults, increased by over 12 million people, from 35 million to 47 million according to the US Census Bureau (1). This segment has been growing much faster than the overall population's growth rate; older adults represent over 14% of the population which is up from 12% during that same time period. Similar trends are present in other developed nations. Worldwide, the population of older adults has increased from 524 million in 2010 (7.6%) to 608 million in 2015 (8.3%) (2).

These changes can be largely attributed to the improvement in life expectancy. Life expectancy was 62 years in the 1980s, and now exceeds 70 years worldwide (2). In the US, life expectancy increased from 74 years to over 78 years. Although many factors are responsible for this benefit, advances in health care are some of the main drivers of this change. Examples of such improvements among many, include changes in health behaviors like smoking cessation and decreased alcohol consumption, new technology and imaging modalities making earlier diagnoses possible, and exponential growth in the development of prescription medications. Although the increase in life expectancy in the US is less than the world as a whole, it is anticipated that the US population will continue to grow older over the next few decades. The aging of the baby boomer generation (individuals born after the Second World War in the mid 1940s up to the early 1960s) is driving the first wave of this accelerated demographic shift. They started entering retirement age and can be expected to further increase the population of older adults by an annualized rate of 3% through 2030. As a result, there will be an estimated 74 million older adults in the US in 2030 and these people will comprise about 20% of the total population at that time (3). The purpose of this

*corresponding author: jpinto@surgery.bsd.uchicago.edu, MC1035, Room E103, 5841 South Maryland Avenue, Chicago, IL 60637, 773-702-6727 or 773-702-6809 f.

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article is to raise awareness of this evolving population change among Otolaryngologists, so that we can adapt our practices and prepare to care for our nation's older patients.

Economics of Health Care for the Population of Older Adults

With this clear shift toward an aging US, there will come a concomitant change in the demands for medical and surgical services. Even prior to the influx of the baby boomers, older adults accounted for 26% of all physician office visits and 35% of all hospital stays (4). These figures will continue to rise. This current increase in demand has garnered much attention and has been an area of significant concern among clinicians, policy makers, health administrators, and politicians. In fact, the Congressional Budget Office has already budgeted the cost of Medicare to double over the next decade with payments going from \$692 billion in 2016 to an estimated \$1,402 billion in 2027 (5).

Aging of the US population has been occurring for some time. Even in 2002, considerable shortages in geriatricians were anticipated by the Alliance of Aging Research. At that time, there was already a shortage of 12,000 doctors, with projected deficits in the number of needed clinicians to increase to 28,000 by 2030. More recently, the Association of American Medical Colleges (AAMC) released a report in 2017 stating continued shortfalls in physician supply in response in this growing demand. With a total of around 800,000 physicians in the US as of 2015, the projected shortfall by 2030 is expected to be between 40,800 and 104,900 practitioners (6). These numbers have improved slightly compared to previous years' projections due to a focus on primary care, with increased supply of nurse practitioners and other physician extenders, in addition to other federal government initiatives. Furthermore, other health care services have also responded to this increase in demand. According to the Bureau of Labor Statistics (BLS), 13 of the top 20 fastest growing occupations in the US in 2015 are health care related: home health aides, physician assistants, and physical therapists (7). The supply of surgical subspecialists, however, is not expected to change substantially with shortfalls between 19,800 and 29,000 surgeons expected by 2030 (6).

The Landscape of the Otolaryngology Workforce

Data from 2015 estimated about 11,088 practicing Otolaryngologists in the US. Over the next decade, our specialty is on track to suffer from the same shortfall of overall physicians as described by the AAMC. Current projections have the number of Otolaryngologists only increasing by less than 1,000 individuals (less than 10% growth) through 2025, assuming current trends in training along with the annual attrition being comparable to the overall of 1.7% for all physicians (8). One of the reasons for such sluggish growth is lack of growth in residency training. Between 2013 and 2017, the number of new residency positions went from 292 to 305, an annual growth rate of only 1.1% (9). One potential cause for this slow growth, that is not specific to Otolaryngology, is that there has been a freeze on Medicare support on graduate medical education since 1997 (10). To cope with this slow growth in the number of Otolaryngologists, the field will need to rely on the growth from other mid level care providers like nurse practitioners, physician assistants, and other support staff. BLS data

for nurse practitioners and physician assistants show strong growth at 35% and 30%, respectively; but those numbers are overall and not specific to our field (7).

Geriatric Otolaryngology

As aging occurs, it is commonly associated with increased susceptibility to diseases and in turn an increased demand for medical and surgical services. Many biological mechanisms underlie this impairment in physiology, including oxidative stress, protein and lipid deposits on various cell types, dysregulation or mutations of DNA, increased inflammatory markers, the mortality of somatic stem cells, decreased response and cell signaling in the immune system, among many others. Ultimately, over time, many organ systems begin to function less efficiently compared to organs of younger ages (11). This decline becomes clinically evident through routine medical testing, but with older adults, they are also assessed for cognitive abilities along with self-care capacity through activities and instrumental activities of daily living (ADLs and IADLs).

Frailty is a marker for potential adverse health outcomes, and depending on various definitions, approximately 15% of older adults in the US are considered frail (12). One definition by Fried considers a phenotypic frailty as three or more of the following: unintentional weight loss (10 pounds in past year), self-reported exhaustion, weakness (grip strength), slow walking speed, and low physical activity. Frailty independently predicts falls, worsening mobility or ADLs, hospitalization, and death (13). Another model recreated by Rockwood relies on the accumulative effect of 36 deficits ranging from medical diagnosis to cognitive impairments to emotional states. This theory states that more deficits corresponded with increased frailty and decreased survival probability (14). More specifically related to surgical outcomes, Makary found that frailty independently predicts for postoperative complications, length of stay in the hospital, and discharges to skilled facilities (15).

Aging is associated with sensory loss across a number of modalities, and this is an area which will have an enormous impact in Otolaryngology given that olfaction, taste, and hearing fall within its purview. Epidemiologic studies in the late 1990s in Beaver Dam, WI examined the prevalence of specific sensory losses. Smell impairment (tested with the San Diego Odor Identification Test [SDOIT]) rose dramatically with age and had a predominance in males. Over 40% of men in their 70s had smell impairment, while women had over 20%. These numbers jumped to 69% and 59% in men and women, respectively, over the age of 80 years. In the National Health and Nutrition Examination Survey, self-reported taste problems were less than 2% for older adults (16) though prevalence studies using objective testing in other datasets show that this is also common. In Beaver Dam, over 3,000 participants were assessed for hearing loss, which is defined by an average loss of greater than 25 dB on audiometry testing in a sound booth across frequencies between 500 and 4,000 Hz. They found hearing loss in 43.8%, 66.0%, and 90.0% in the age groups 60 to 69 years, 70 to 79 years, and 80 years or greater, respectively (17). Higher numbers were found in males across all age ranges. The National Health and Nutritional Examination Surveys (NHANES) from the 2000s yielded slightly lower but similar prevalence of hearing loss of 26.8%, 55.1%, and 79.1% for the same age groups as above (18). Given this high prevalence, Pinto et. al used data from the National Social Life, Health, and Aging Project

(NSHAP) to assess the burden on individuals between the ages of 62 and 90 years. They also found that men reported more hearing loss than women, which is consistent with the results above. Furthermore, despite the fact that 13% of participants used hearing aids, there was significant burden with 20% having frustration talking to family members and 42% having trouble with whispered words (19).

Given these physical and sensory changes in older adults, there are specific disease processes in Otolaryngology that will be affected with the demographics shift going forward. The following are a few clinical problems. Presbycusis is highly prevalent as described above and usually affects the higher frequencies of sound. Some of the major physiologic causes of this age-related change include atrophic changes in the basal turn of the cochlea and reduction of neurons (20). However, there are additionally many other reasons for hearing loss with aging including medication side effect, noise exposure, and vascular disease, to name a few. Balance issues also affect older adults. While ataxia and falls are multifactorial, patients are often under the care of an Otolaryngologist to assess vestibular function. Similar to that of the auditory system, the vestibular system also suffers from loss of hair cells, particularly in the ampulla, along with significant neuronal loss (21). Presbylarynx is evident with a change in vocal quality with aging: males may experience an increased pitch while females may experience a lower pitched and tremulous voice. Several changes can be found within the larynx such as atrophy of the laryngeal muscles, ossification of the cartilages, decreased collagen and elastin fibers, and edema or polypoid degeneration on the vocal cords (22). Swallowing disorders can pose a serious health risk for older adults. With aging, there is a decline in sensory discrimination in the oral cavity, pharynx, and supraglottis, which may be a contributing factor to dysphagia and potential aspiration (23). This can lead to significant morbidity as respiratory infections are known to be the leading infectious cause for hospitalizations from nursing homes (24). As the population of older adults increases, estimates of head and neck cancer in this population will rise proportionally. Studies have shown that this type of cancer will increase from 19,000 cases in 2010 for people over 65 years to 31,000 cases in 2030 (25). Another process that will need to be addressed is the aging face, as skin will inevitably change due to years of gravity, ultraviolet sun damage, and contraction of facial musculature, among other factors. There has already been a focus on the safety of cosmetic surgery in older adults and early studies have shown comparably low complications to that of younger patients (26).

Continued Growth in Demand of Otolaryngology Services

Given the need for practitioners to care for this growing number of older patients and the large number of conditions for these patients that fall under our specialty, we anticipate large increases in the demand for Otolaryngologists with expertise in caring for older adults. Many leaders in the field are cognizant of this reality and have focused on geriatric care as evident by the formation of the American Society of Geriatric Otolaryngology a decade ago (27), along with new textbooks (11, 28, 29) and an emerging literature in recent years. When looking at the number of publications found on PubMed regarding Geriatric Otolaryngology, there has been an increase from 7 in 2011 to 88 in 2016 (Figure 1). While the anticipated demographic change in the patient landscape is well known, the specific breakdown of geriatric patients and needed services in Otolaryngology have had little attention in

literature. Creighton et. al sought to find out the exact characteristics of the population of older adults in a large group practice in Georgia. Between the years 2004 and 2010, they found that the portion of their patients over the age of 65 years jumped from 14.3% to 17.9%. Given the ongoing retirement of the baby boomers, this portion of their practice is estimated to grow to 29.8% by 2030. Another distinguishing characteristic with regard to these visits from patients over 65 years of age is that the vast majority, at 73%, are focused on otology complaints. In fact, the top five diagnoses in this age group were otology related (30).

In order to address this deficit in knowledge, Bhattacharyya et. al analyzed Medicare claims made in 2012. Among the 8450 Otolaryngologists who submitted claims, there were 13.2 million total services, which yields an average of 1,567 services billed per provider in that year. The three most popular in office procedures excluding allergy services were the following: removing impacted cerumen performed 700,000 times; diagnostic laryngoscopy performed 550,000 times; and nasal endoscopy performed 400,000 times. (31). Given the Census Bureau's expected 3% annualized growth rate of older adults, the total number of services billed could be approximately 22.7 million with cerumen removal performed over 1.2 million times a year by 2030. Removing wax, which one may consider relatively simple, may require a major effort, since the Otolaryngology workforce is only growing by around 1%. While Medicare claims do not portray the true clinical and logistical demand of caring for older adults, they at least provide an idea of what these patients will need in the future.

Workforce Solutions for the Demographics of the Future

While there is no clear single solution to optimize Otolaryngology services for this shift in demographics, several opportunities exist. The most straightforward option would be to increase the number of training positions for Otolaryngologists, but experts have expressed concern given the lack of government support as evident in the Medicare freeze in graduate medical training funds since 1997. There has been a push to increase medical school enrollment as evident in a 3.5% increase seen in 2015 (8). However, there has been no parallel increase in Otolaryngology residency positions. Despite this discrepancy, it must be considered that changes to education and training will require years to realize given the time that is required to train new Otolaryngologists.

Changing how specialists treat patients is another method to better serve the population of older adults. Over the past two decades, this has been an initiative of the American Geriatrics Society (AGS). The AGS created the Geriatrics for Specialists Initiative that is "designed to increase awareness of and knowledge in the care of older adults" in specialties such as Otolaryngology (32). There is an eleven-specialty collaboration, including Otolaryngology, to create specialty specific geriatric curriculum material, board certification focusing on aging, focus on best practice guidelines and quality metrics for older adults, along with other goals (33). The society has also created awards such as the Jahnigen Scholars and now called the Grants for Early Medical/Surgical Specialists' Transition to Aging Research (GEMSSTAR). Recipients have championed significant research for older adults, and from 2002 to 2014, they had received over 134 million dollars of funding from federal and private sources. 5% of these scholars were in the field of Otolaryngology (34).

Another solution would be to focus on specialty training for advance practice clinicians, like nurse practitioners and physician assistants. According to a study of US data from 2008 and 2009, only 6.3% of ambulatory Otolaryngology patients had appointments with advance practice clinicians. There is definitely room to grow this area of practice, as only 0.2% of all nurse practitioners and 0.9% of all physician assistants work in Otolaryngology practices. As a comparison, 1.2% of all physicians are Otolaryngologists (35).

This demographic shift yields a unique and exciting opportunity to provide both expedient and cost-efficient care to a growing patient population. Ultimately, whether it is through changes to practices or the workforce or a combination of both, the hope is that it will be sufficient to absorb some of the inevitable strain that the population of older adults will place on the field of Otolaryngology in the coming years.

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Key Points

- The number of Americans over the age of 65 has been growing much faster than the overall population's growth rate.
- These changes can be largely attributed to the improvement in life expectancy.
- This demographic shift yields a unique and exciting opportunity to provide both expedient and cost-efficient care to a growing patient population.

Figure 1.
The number of publications found on PubMed by year with advanced search of geriatric and its synonyms along with otolaryngology and its synonyms.