Article Title: Analysis of social media use among Australian and New Zealand otolaryngologists

Running Title: Social media use among otolaryngologists

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ABSTRACT

Introduction: Social media's rapid worldwide growth has permeated surgical practice. To date no study has evaluated social media use amongst Australian and New Zealand otolaryngologists.

Methods: Cross-sectional study of all members of the Australian and New Zealand Societies of Otolaryngology Head and Neck Surgery with comprehensive searches of websites and social media platforms (Facebook, Twitter, LinkedIn, ResearchGate and Instagram).

Results: 498 otolaryngologists were identified with 81.7% working in Australia. 79.1% had some form of online presence - either professional website or activity on ≥ 1 social media platform. 53.0% of otolaryngologists had a professional website and mean number of social media profiles averaged 1.35 per surgeon. LinkedIn was the most widely used social media platform (51.6%). 38.8% of otolaryngologists had Facebook accounts with 11.9% of those 'public' accounts used for business purposes. Otolaryngologists with a research and authorship interest had the highest mean number of social media accounts (1.78) and were more likely to be associated with ResearchGate, LinkedIn and website ownership. Facial plastic surgeons averaged the second highest mean number of social media accounts per surgeon (1.71) and were most active on Facebook, Instagram and YouTube. There was a linear decline in the mean number of social media accounts per surgeon and rate of professional website ownership with increasing years in practice.

Discussion: Social media uptake amongst otolaryngologists appears consistent with colleagues in other surgical specialties. Otolaryngologists with fewer years in practice, and specialty interests in facial plastic surgery and authorship and research are significantly more active on social media.

INTRODUCTION

Since the early 2000s, social media activity has grown rapidly. Facebook was launched in 2004 and has grown to over 1.45 billion active daily users as of 2018, with a 23% increase year-on-year¹. Furthermore over a billion YouTube users watch a billion hours of video daily, generating billions of views². Today, where services are increasingly online and readily available, access to medical resources and information is expected to be the same. As such, social media has facilitated communication between colleagues both locally and internationally and is now breaking down the barrier between patient and clinician. Until now, how this affects otolaryngology head and neck surgery (OHNS) has not been examined. How active are otolaryngologists, and how do they compare to their surgical counterparts?

Social media constitutes a range of user-generated platforms designed to “contribute, receive and explore content” amongst users³. Examples include Facebook, LinkedIn, Twitter, YouTube, ResearchGate

and Instagram, with each one providing a unique niche in the market. They allow users to interact in certain ways including networking, blogging, as well as photo and video sharing.

Every surgical speciality is active to some degree on social media platforms, however few have been extensively investigated⁴⁻⁸. Many of the most influential OHNS journals have adopted social media with a strong Facebook and/or Twitter presence, in an attempt to increase readership and exposure. Overall, it has been proposed that social media is underutilised in OHNS and there is significant potential for furthering education and knowledge distribution⁹.

Given the lack of literature regarding otolaryngologists' engagement with social media, we aimed to assess their online and social media presence. Furthermore, we hypothesised there is a subset of surgeons with particular speciality interests, or of particular age group, to whom social media presence may be more beneficial and utilised.

METHODS

Using the Australian Society of Otolaryngology Head and Neck Surgery (ASOHNS) and the New Zealand Society of Otolaryngology Head and Neck Surgery (NZSOHNS) websites' 'Find a Surgeon' service, all members listed as of 1st January 2018 were identified. Primary state/territory, country, gender, number of years in practice, and specialty interests were recorded. Specialty interests included: facial plastic surgery, head and neck, otology and neurotology, audiology and hearing, rhinology and functional endoscopic sinus surgery (FESS), laryngology and voice, paediatrics, sleep apnoea/snoring, allergy and immunology, medicolegal, authorship and research, and outreach/foreign aid. Number of years in practice was

calculated from attaining a primary medical degree. In correlation with the online registers of practitioners on the Australian Health Practitioner Regulation Agency and New Zealand (NZ) Medical Council websites, surgeons retired from practice, deceased or working outside Australia and New Zealand (ANZ) were excluded from the study. Surgeons found to be a member of both ASOHNS and NZOHNS were recorded once, according to their geographical location.

A comprehensive 'Google' search was performed for each otolaryngologist using their practising name followed by 'ear nose and throat surgeon'. This was to determine whether the surgeon had a private website and if so, whether it was classified as belonging to a single practitioner or as part of a group practice. Private or public hospitals, and academic institutions which listed the surgeon by name were not included.

Individual platform searches on Facebook, Twitter, LinkedIn, YouTube, ResearchGate and Instagram were conducted for each otolaryngologist by full name. A profile was deemed as belonging to a surgeon only if the name matched fully and the profile identified as belonging to an otolaryngologist, or if there was a verifiable photo of the surgeon. Facebook profiles were categorised as 'public' (open to viewing by anyone) or 'private' (accessible only to 'friends' of the surgeon), and whether they were for professional or personal use. Twitter profiles were analysed for number of 'tweets', 'followers' and the number of accounts each otolaryngologist was 'following'. Number of videos per YouTube account was noted, as well as number of LinkedIn posts and connections to other users. Since LinkedIn accounts with more than 500 connections are displayed as '>500', those profiles were regarded as having 500 connections. ResearchGate profiles were analysed for the number of 'followers' and the number of people the surgeon was 'following'. 'Public' Instagram accounts were also recorded using the same methods.

Data was analysed using RStudio (Boston, MA, USA) using Pearson's method with chi-square and t-tests to calculate p-values. A p -value <0.05 indicated statistical significance.

RESULTS

Across ANZ, there was a total of 498 practising otolaryngologists. 433 (86.9%) were male and 407 (81.7%) were Australian with every Australian state and territory represented based on each otolaryngologist's primary state of practice (Table S1).

264 (53.0%) surgeons had a professional website, of which just over half (50.8%) were 'group practice' websites. Australian surgeons were statistically more likely to be associated with a private business website compared with their NZ colleagues (56.3% vs 38.5%, $p=0.002$). Otolaryngologists who were 10-19 years following their primary medical degree were most likely to have a website (76.1%), with a steady decline in website ownership noted with increasing years in practice (Table 1).

When analysing information conveyed on professional websites, 95.1% websites displayed a surgeon biography, 85.3% listed conditions treated, and 60.3% displayed informative online videos or downloadable factsheets for patients. 40.7% listed useful links for patients and clinicians and 19% had a specific page for referring doctors with information for general practitioners and/or an online patient referral form.

The social media activity rate for surgeons with a professional website is displayed in Table 2. Of note, 62.9% of surgeons with a professional website also had a LinkedIn account. Furthermore, for

surgeons with a professional website who were also active on at least one social media portal, 22.8% had a clear clickable link on their professional website to their social media platform(s). The remainder were kept separate and hence social media accounts were only accessible via conventional search engines.

When analysing specialty interests, eight were more likely to be associated with surgeons who had a website. The statistical significance was greatest with facial plastic surgery ($p=0.006$), authorship and research ($p<0.001$), head and neck ($p<0.001$), rhinology & FESS ($p<0.001$), and paediatrics ($p<0.001$).

The mean number of social media profiles per surgeon was 1.35; there was no statistical difference when comparing by country ($p=0.174$) or gender ($p=0.640$). Average number of social media profiles was highest amongst otolaryngologists with specialty interests in authorship and research (1.78, $p=0.006$), facial plastic surgery (1.71, $p=0.003$), and allergy and immunology (1.71, $p=0.038$) (Table 3). Younger surgeons were also statistically more likely to be engaged in social media (Table S2) and there was a clear trend identified whereby the mean number of social media accounts steadily declined with increasing years in practice (Figure 1). Ten otolaryngologists (2.0%) had an account with five forms of social media, and one surgeon had a presence on all six analysed social media portals.

LinkedIn was the most widely used social media platform with 257 (51.6%) otolaryngologists having an identifiable account. Whilst profile rate was high, active engagement was low with only 13 (5.1%) surgeons having posted content. There was an average of 167.49 connections per surgeon and 12.8% of otolaryngologists had >500 connections. Those with a specialty interest in laryngology and voice, allergy and immunology, and research and authorship were statistically most likely to be associated with LinkedIn.

Facebook was used by 193 (38.8%) surgeons, the majority of which (81.4%) were 'private'. 23 (11.9%) of the total Facebook accounts identified were 'public' and used for business purposes, while another 13 (6.7%) were 'public' personal accounts. Specialists in facial plastic surgery and rhinology were statistically most likely to have a Facebook account (51.6%, $p=0.005$ and 43.1%, $p=0.034$ respectively).

114 (22.9%) surgeons had a ResearchGate profile with an average of 36.97 followers per account. Each otolaryngologist followed an average of 21.89 other ResearchGate accounts with an average of 2196.5 reads and 167.63 citations. Of those surgeons with a ResearchGate profile, 51.7% had a speciality interest in authorship and research, and this association was statistically significant ($p<0.001$).

Twitter uptake was relatively low with 65 (13.1%) otolaryngologists identified with a Twitter account. However, those with an account were quite active, averaging 1100.34 tweets. Each surgeon was following an average of 194.06 Twitter accounts and had an average of 277.94 followers. Of note, four surgeons had over 1000 followers with the highest recorded followers being 7175.

30 otolaryngologists, accounting for 6% of the cohort, had a YouTube presence, appearing in online videos by name or hosting their own channel. YouTube users had an average of 15.03 videos with a maximum of 136 videos noted for one surgeon. YouTube videos were used for communication with patients or displaying surgical techniques. 13 (43.3%) YouTube users had a speciality interest in facial plastic surgery, which was the only specialty interest to have a statistically significant association ($p<0.001$). In addition, otolaryngologists with 20–29 years in practice were most represented, comprising 17 of the 30 users (51.6%), which was statistically significant ($p=0.002$). This was over double the next highest age bracket, with surgeons 30–39 years in practice representing 23.3% of YouTube users.

Public Instagram accounts were identified for 12 otolaryngologists, accounting for 2.4% of the study population. 83.3% were male and all practiced in Australia. These surgeons were very active with an average of 432.92 posts and 1351 followers. Surgeons with an interest in facial plastic surgery were statistically most likely to have an Instagram account (83.3%, $p<0.001$).

104 (20.9%) otolaryngologists across ANZ had no online presence, neither a social media account nor a professional website.

DISCUSSION

Social media has become an integral part of society and the medical profession is not exempt. Surgeons' use of social media is multifaceted and can be targeted towards educational and commercial purposes, as well as improving professional communication amongst colleagues. The potential benefits and harms of medical engagement with social media has been studied^{10,11} leading to many medical regulatory bodies publishing guidelines on responsible social media use¹²⁻¹⁴. In 2013 Mabvuure *et al*⁶ reported a 46% rise in the uptake of social media amongst UK plastic surgeons over a two-year period, reflecting its rapid growth and suggesting that this trend is likely to continue.

Our study findings suggest that the majority of ANZ otolaryngologists actively engage in social media, with 66% active on one or more social media accounts. This rate is comparable to ANZ colorectal surgeons (68%)⁷, urologists (70%)⁵, and the Australian medical community in general (74%)¹⁵. 79.1% of ANZ otolaryngologists had some form of online presence - either a professional website or activity on at least one social media platform. Our calculated mean number of social media accounts was 1.35 per surgeon, which was comparable with other surgical specialties^{5,7}.

Analysis of otolaryngologists' subspecialty interests showed that the average number of social media accounts was highest amongst specialists in facial plastic surgery, allergy and immunology, and authorship and research. The association between specialty interest and social media use has not been previously reported. As expected, surgeons with an authorship and research interest demonstrated the strongest association with academically focused platforms such as ResearchGate and LinkedIn. This was in contrast to facial plastic surgeons, who were most active on Facebook, Instagram and YouTube. These sites traditionally have a high uptake amongst the general public, and their use among facial plastic surgeons may reflect a slant towards branding and profile promotion. Personal branding has been previously described as a motive for engaging with social media amongst physicians internationally^{6,10,16}.

Our data revealed that surgeons earlier in their professional career (10-19 years from obtaining their primary medical degree) had the highest average number of social media profiles per surgeon and the highest rate of professional website ownership. Furthermore, we observed a linear decline in both of these measures with increasing years in practice (Table 1, Figure 1). Our findings reflect Oyewumi *et al.* who showed that Canadian OHNS residents and surgeons <39 years of age were more likely to engage with social media⁹, as well as Radojcic *et al.* who reported that ANZ colorectal surgeons who had been practicing for 10-19 years were most active on social media portals⁷. There are two possible reasons for this. Firstly, in general younger people are more likely to engage with social media. Secondly, surgeons are now able to use social media as an avenue for advertisement¹⁷ and perhaps those earlier in their career are more likely to do so in order to assist with expansion of their patient base. In contrast, older surgeons more established in their practice may not feel they need to rely on these resources for referrals.

When analysing individual social media platforms, LinkedIn had the highest uptake amongst otolaryngologists. As a more professionally-orientated social media platform, the strengths of LinkedIn include the potential for expanding professional networks, keeping up-to-date with new knowledge and developments within the specialty, and advertising skills and expertise to a public audience. These factors likely play a role in the platform's popularity.

Whilst Twitter is often viewed as a method for conveying personal opinion and rhetoric in the general community, it has also emerged as a tool for surgeons, facilitating effective academic surgical exchange. Logghe *et al.* described Twitter as enabling surgeons to advance the core values outlined by the Association for Academic Surgery¹⁸. Amongst our population, although the uptake of Twitter was low in absolute numbers, the activity level amongst individual users was high.

The notion of 'vlogging' and uploading photo images is a more recent phenomenon becoming increasingly prevalent in the world of social media. Otolaryngologists demonstrated a modest, but active engagement with video/photo-related platforms such as YouTube and Instagram. It should be noted that surgeons' use of these sites exposes some important potential pitfalls. One example is that the publication of potentially identifiable images and information conveyed through these platforms raises the issue of maintaining patient confidentiality. Confidentiality has previously been highlighted as a potential negative for social media in the medical profession¹⁹ and issues such as this are key aspects of existing guidelines for social media use in the healthcare setting^{12-14,20}.

This study presents an accurate snapshot of publicly available online content relating to ANZ otolaryngologists. Strengths of the study include its reproducibility and lack of recall or selection bias. There

is potential for a follow-up study to assess otolaryngologists' engagement with social media in the future. Our study has some limitations. We relied on the accuracy of national otolaryngology society websites and were unable to account for surgeons who were not listed on these databases. Social media accounts under alias or maiden names may have been omitted, and it must be noted that some surgeons may have websites and social media accounts that are managed by a third party. Finally, some surgeons may have privacy settings in place prohibiting publicly searchable details and preventing inclusion of websites and social media accounts pertaining to them.

In conclusion, our study demonstrated that social media uptake amongst otolaryngologists appears consistent with their colleagues in other surgical specialties. Otolaryngologists with fewer years in practice, and specialty interests in facial plastic surgery and authorship and research are significantly more active on social media. Whilst otolaryngologists must be cognizant of potential harms relating to social media use in the medical profession, they are likely to continue to benefit from improved access to professional networks and surgical academic exchange through the use of these platforms. In the coming years it will be critical to observe and manage the use of this evolving and versatile technology in otolaryngology, surgery in general and the broader medical community.

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Table 1: Percentage of surgeons with websites based on years in practice

Years in Practice	Total number of surgeons	Number of surgeons with website	Percentage of surgeons with website
10-19	109	83	76.1%
20-29	157	96	61.1%
30-39	117	61	52.1%
40-49	70	19	27.1%
50-59	39	5	12.8%
60+	6	0	0

Table 2: Social media activity for surgeons with professional websites ($n = 264$)

Social Media Account	Number of surgeons	Percentage
Facebook	122	46.2%
Twitter	51	19.3%
LinkedIn	166	62.9%
ResearchGate	70	26.5%
YouTube	27	10.2%
Instagram	11	4.2%

Table 3: Number and mean social media accounts for otolaryngologists by area of specialty interest

Area of Specialty Interest	Number of social media accounts							Mean number of social media accounts	Total number of otolaryngologists	<i>p</i> -value
	0	1	2	3	4	5	6			
Facial Plastics	24	21	26	6	6	7	1	1.71	91	0.003
Head & Neck	53	46	40	14	12	4	0	1.40	169	0.548
Otology & Neurotology	48	30	41	17	2	1	0	1.27	139	0.398
Audiology & Hearing	29	19	27	15	1	1	0	1.38	92	0.697

Rhinology & FESS	87	59	65	32	17	7	0	1.45	267	0.051
Laryngology & Voice	34	27	31	18	12	2	0	1.62	124	0.005
Paediatrics	71	65	55	26	13	4	0	1.39	234	0.549
Sleep Apnoea/ Snoring	54	32	40	22	11	3	0	1.46	162	0.193
Allergy & Immunology	11	12	15	8	4	1	0	1.71	51	0.038
Medicolegal	6	10	12	1	0	0	0	0.95	39	0.047
Authorship & Research	15	8	18	13	6	0	0	1.78	60	0.006
Outreach/ Foreign Aid	18	9	14	10	2	2	0	1.55	55	0.278

Figure Legend:

Figure 1: Average number of social media accounts per surgeon as related to years in practice. (n =total number of surgeons)

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