

Background and Objectives

Traditionally, medical education has focused on learning from textbooks, medical journals, and the experience of attending physicians within each institution. In the past few decades however, technological advances have begun to change the field of medical education. Studies have shown that a majority of medical students prefer online modalities as their primary source of information.^{1,2} Many providers are concerned that currently available medical apps may not be based on validated or peer-reviewed information as 65-86% of medical apps had no medical expert involved during their development.^{3,4,5}

We sought to address this problem by utilizing a new app centered on collaborative learning through a peer network (PN). This type of learning has shown positive influences on various educational processes, including communication, engagement, as well as knowledge management and access.⁶ The objective of our study was to assess the impact of an app, called PulseQD, on resident education within our Otolaryngology – Head & Neck Surgery department.

Methods

A prospective cohort study was conducted within our academic Otolaryngology – Head & Neck Surgery department. All faculty attendings and residents were asked to participate in the study. A survey was given prior to the beginning of the academic year to establish baseline attitudes towards online methods of learning and also use of peer networks and/or social media.

A mobile application, PulseQD, was implemented within the department that allows for sharing of medical literature and the ability to ask clinical and boards-style questions through peer networks. Surveys were given at the end of the academic year to evaluate changes in these attitudes. All data was de-identified and participants were ensured that participation in, or responses to, these surveys in no way affect residency evaluations.

	Residents (n = 20)	Faculty (n = 13)	Total (n = 33)	p-value
Use of any PN*	20 (100%)	11 (84.6%)	31 (94%)	0.07
Daily use of PN	17 (85%)	5 (38.5%)	22 (66.7%)	0.0056
PN for mainly personal use	20 (100%)	10 (77%)	30 (91%)	0.0242
PN for medical information	4 (20%)	5 (38.5%)	9 (27.3%)	0.2446
PN for professional use	5 (25%)	7 (54%)	12 (36.4%)	0.0923
Smartphone access of PN	17 (85%)	7 (54%)	24 (72.7%)	0.0496
Weekly use of online medical information**	18 (90%)	8 (61.5%)	26 (78.8%)	0.0507
Primary source for medical education is professional colleagues	4 (20%)	2 (15.4%)	6 (18.2%)	0.737
Primary source for medical education is journals	8 (40%)	1 (7.7%)	9 (27.3%)	0.0417
Primary source for medical education is textbooks	10 (50%)	0 (0%)	10 (30.3%)	0.0023
Primary source for medical education is websites/apps	5 (25%)	3 (23.1%)	8 (24.2%)	0.8998
Primary source for research advances are professional colleagues	6 (30%)	0 (0%)	6 (18.2%)	0.029
Primary source for research advances are journals	10 (50%)	11 (84.6%)	21 (63.6%)	0.0434
Primary source for research advances are websites/apps	4 (20%)	1 (7.7%)	5 (15.2%)	0.3353
Primary source for research advances are meetings	0 (0%)	1 (7.7%)	1 (3%)	0.2078

*Most commonly Facebook, Wikipedia, YouTube, Instagram, and Yelp

**Most commonly UpToDate, Medscape, and Epocrates

Table 1. Pre-survey results. PN – Peer Networks and/or Social Media. Attitudes towards online methods of learning and also use of peer networks.

Results

A total of 20 residents and 13 faculty members were included in the study. There was a 100% response rate and follow-up rate. 75.8% of the department used an online source of medical information at least once a week, most commonly UpToDate, Epocrates and Medscape, but only 24.2% would consider it a main source of medical education. (Table 1) Residents however turned to online sources of medical information significantly more than faculty (90% and 54% respectively, $p=0.0179$). Furthermore residents were more likely to use peer networks and/or social media daily over faculty (85% and 38.5% respectively, $p=0.0056$) and preferred smartphones to access these apps (85% and 54% respectively, $p=0.0496$). Residents listed journals and textbooks as their primary sources of medical education, while faculty cited websites as their source of continuing medical education. Faculty were more likely than residents to turn to journals for the latest advances in research (84.6% and 50%, $p=0.0434$)

After implementation of PulseQD there was a significant change in departmental attitudes towards online sources of learning. (Table 2) Residents and faculty felt that PulseQD offered a valuable perspective on clinically relevant medical information ($p=0.0003$), was an excellent way to test clinical and medical knowledge ($p=0.0001$), and improved the sharing and discussing of medical knowledge ($p<0.0001$). Furthermore, PulseQD was shown to provide useful and pertinent medical information ($p<0.0001$). After implementation of the app, there was a significant increase in the time spent reading medical literature from ≤ 1 to >1 and ≤ 3 ($p=0.0438$). In a sub-group analysis, residents felt that PulseQD improved their understanding and knowledge base of Otolaryngology.

	Pre-PulseQD	Post-PulseQD	p-value
Apps offer a valuable perspective on clinically relevant medical information ^a	3	2	0.0003
Apps are a great way to test my clinical and medical knowledge ^a	3	2	0.0001
Apps provides useful medical information ^a	3	2	0.0001
Apps provide new pertinent medical information ^a	3	2	<0.0001
PulseQD has improved the sharing and discussing of medical knowledge ^a	3	2	<0.0001
Hours spent reading medical literature	≤ 1	>1 and ≤ 3	0.0438
Apps can improve understanding and knowledge base ^b	3	2	0.0927
Apps improve my medical decision making ^b	3	3	0.6389
Apps are useful for patient care ^b	3	3	0.7329

Resident Sub-group analysis

Apps can improve understanding and knowledge base ^b	3	2	0.002
Apps improve my medical decision making ^b	3	3	0.3887
Apps are useful for patient care ^b	3	3	0.2849

^a1-strongly agree, 2-agree, 3-neutral, 4-disagree, 5-strongly disagree

^b1-all of the time, 2-most of the time, 3-some of the time, 4-little of the time, 5-none of the time

Table 2. Survey after implementation of PulseQD.

Discussion

There are clear differences between resident and faculty use of online sources of medical information. Residents frequently search for medical knowledge online or with the help of smartphones, while faculty depend on traditional journals. Overall the implementation of PulseQD was well received and the entire department felt that the app was a worthwhile way to attain medical knowledge. In particular, residents endorsed an improved understanding and knowledge base after using PulseQD.

Conclusions

Web and mobile based apps have tremendous potential for improving resident education in Otolaryngology. However, faculty engagement in this educational evolution is critical. As further limitations on time continue to increase in residency training, apps that improve connectedness and efficiency will be crucial to the development of the field.

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