Resident Research Experience and Career Path Association: A National Survey of Recent Otolaryngology Graduates

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What is This?
Resident Research Experience and Career Path Association: A National Survey of Recent Otolaryngology Graduates

Gerald Zahtz, MD\(^1,2,\)*, Andrea Vambutas, MD\(^1,2,3,\)*, Heather M. Hussey, MPH\(^4\), and Lisa Rosen, ScM\(^3\)

Abstract

Objective. To determine whether the research rotation experience affects the career path of otolaryngology residents.

Study Design/Setting. Two web-based surveys were disseminated by the AAO-HNS; one to current and former resident trainees and the other to current residency program directors.

Subjects and Methods. A web-based survey was disseminated to all AAO-HNS members classified as otolaryngology residents or residency graduates within the last 6 years, regarding their research rotation and its potential influence on their career path. A second web-based survey was delivered simultaneously to program directors to evaluate their perception of the need for research in a training program and their role in the rotation. Chi-square tests for independence as well as multivariate analyses were conducted to determine whether aspects of the resident research rotation related to career path.

Results. The resident survey was completed by 350 respondents (25% response rate), and 39 program directors completed the second survey (37% response rate). Multiple factors were examined, including federal funding of faculty, mentorship, publications prior to residency, success of research project measured by publication or grant submission, and type of research. Multivariate analyses revealed that factors most predictive of academic career path were intellectual satisfaction and presence of a T32 training grant within the program (\(P < .05\)).

Conclusion. The composition and quality of the residency research rotation vary across institutions. Factors that enhance stronger intellectual satisfaction and the presence of a T32 grant, which demonstrates an institution’s commitment to research training, may promote pursuit of a career in academia versus private practice.

Keywords

clinician scientist, residency research, career path, web survey

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The practice of medicine is constantly evolving, a driving force being new scientific discoveries that can be translated into improved clinical outcomes for patients. However, there is a critical need to train clinician scientists to unravel many of the biological mechanisms that result in disease and to use that information to identify new treatments and improve overall care for patients. Despite a clear consensus regarding the importance of training and cultivating clinician scientists across multiple disciplines,\(^1\) fewer physicians are engaging in research, as evidenced by reduced numbers of successful National Institutes of Health (NIH) first and subsequent awards to MDs, compared with PhDs or MD-PhDs.\(^2\) It is clear that the decision to pursue a career path as a clinician scientist is likely influenced during residency training. This study sought to determine whether the residency research experience was a motivating factor in career choice from both recent graduates and program directors. Unlike many previously published studies in this area, all AAO-HNS member residents were queried, rather than subsets such as T32 grant recipients,\(^3\) K-awardees,\(^4\) or those from selected academic institutions.

Recently, the Accreditation Council for Graduate Medical Education (ACGME) recommended that residency training programs shift the focus of postgraduate training toward a

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competency-based approach, and it mandated that residents engage in scholarly activities that include learning the principles of research such as study design, data analysis, and outcome assessment. The scholarly activity may be related to clinical or basic science but should reflect careful planning and mentorship from faculty as well as an adequate facility and protected time for this endeavor. Despite this requirement, there is a lack of uniformity in curricula for research training among academic institutions. Consequently, residents’ research experience is dictated by the availability and enthusiasm of faculty mentors and a commitment from program directors (PDs) to ensure adequate time and resources within individual programs. In an attempt to create consistency across programs, on July 1, 2013, all residency programs were required to incorporate a 3-month research rotation into their curriculum.

The purpose of this study was to determine the impact of participation in research on residents’ decision to pursue a career in academic or private practice and also to determine whether the environment in which the research was conducted influenced the success of the research and residents’ future career goals. Factors used to evaluate the success of research projects included previous success of faculty in securing NIH and other federal research funding, presence of T32 training grants, and publications. A review of the literature revealed that few studies have queried all recent otolaryngology residents regarding their decision to pursue a particular career path.6-8

Methods
This study was approved under exempt status by the institutional review board at the North Shore–LIJ Health System. In November 2012, a survey was sent to all AAO-HNS members classified as otolaryngology residents or residency graduates within the last 6 years through an online Survey Monkey program, regarding their research rotation and its potential influence on their career choices (Appendix 1, available online at www.otojournal.org). Full name, current residency status, and board certification year were extracted from the AAO-HNS iMIS database.

Simultaneously, a survey was sent via email to program directors/chairs of ACGME-accredited otolaryngology programs using a Survey Monkey program (Appendix 2, available online) assessing perceptions of the need for research in a training program and directors’ roles in that effort.

The participants were selected from the AAO-HNS database of current PDs. A follow-up correspondence was sent 2 weeks later. An announcement regarding the survey was included in the AAO-HNS’s section for residents and fellows-in-training newsletter. This survey predated the ACGME research requirement mandate.

The resident survey was distributed to all current residents and to all graduates of residency programs from 2006 to the present who are members of the AAOHNS. We received 350 responses, a 25% response rate. Because of variable participation in research prior to postgraduate year (PGY)-5, all residents in PGY-1 to PGY-4 years of training were excluded, reducing the number of responses to 246 (Table 1). Furthermore, those listing a career path as military were excluded, because participants committed to that decision prior to engaging in research. Similarly, those listing an unsure career path were also excluded. Responses were examined by region to determine whether differences existed (Table 2). Specific questions asked of residents and PDs can be found in Appendices 1 and 2 (available online). For the survey of PDs and chairs, responses were obtained from 39 of 105 program directors (37%). For some individual questions, not all respondents answered all questions. In these cases, the total number of respondents is listed for individual questions.

Responses were tabulated for each question, and statistically significant differences were included where applicable. Statistical significance was evaluated using a chi-square test to determine the association between career path and aspects of the resident research experience (Table 3), with
Table 3. Multivariate Logistic Regression Modeling Academic Career Path (vs Private).\textsuperscript{a,b}

<table>
<thead>
<tr>
<th>Association of Career Path and \ldots</th>
<th>No. of Responses</th>
<th>Percentage Academic</th>
<th>Percentage Private</th>
<th>Univariate Chi-Square</th>
<th>OR (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Federal funding of faculty</td>
<td>243</td>
<td>72</td>
<td>47</td>
<td>&lt;.0001</td>
<td>—</td>
<td>.11</td>
</tr>
<tr>
<td>T32 training grant</td>
<td>244</td>
<td>32</td>
<td>11</td>
<td>&lt;.0001</td>
<td>3.24 (1.51-6.98)</td>
<td>.003</td>
</tr>
<tr>
<td>Publication prior to residency</td>
<td>245</td>
<td>69</td>
<td>57</td>
<td>.33</td>
<td>—</td>
<td>.98</td>
</tr>
<tr>
<td>Success of research project (publication or grant submission)</td>
<td>225</td>
<td>71</td>
<td>53</td>
<td>.006</td>
<td>—</td>
<td>.20</td>
</tr>
<tr>
<td>Intellectual satisfaction (&quot;very satisfying&quot; response)</td>
<td>234</td>
<td>36</td>
<td>7</td>
<td>&lt;.0001</td>
<td>6.70 (2.82-15.92)</td>
<td>.0001</td>
</tr>
<tr>
<td>Engagement in translational research</td>
<td>235</td>
<td>24</td>
<td>11</td>
<td>.009</td>
<td>—</td>
<td>.57</td>
</tr>
<tr>
<td>Engagement in basic science research</td>
<td>235</td>
<td>53</td>
<td>39</td>
<td>.04</td>
<td>—</td>
<td>.91</td>
</tr>
<tr>
<td>Engagement in chart reviews</td>
<td>232</td>
<td>83</td>
<td>77</td>
<td>.26</td>
<td>—</td>
<td>.48</td>
</tr>
<tr>
<td>Engagement in prospective clinical research</td>
<td>235</td>
<td>37</td>
<td>38</td>
<td>.83</td>
<td>—</td>
<td>.54</td>
</tr>
</tbody>
</table>

Abbreviations: CI, confidence interval; OR, odds ratio.
\textsuperscript{a}Variables removed using backward elimination have no OR reported (P value at the time of removal shown). Although federal funding was statistically significant in the univariate model, significance was not reached in the multivariate model (P = .1).
\textsuperscript{b}Boldface indicates significant values. Dashes represent values not calculated.

Results

Resident Responses

We received 350 responses (25% response rate). Due to variable participation in research prior to the PGY-5 year, all PGY-1 through PGY-4 residents were excluded, reducing the number of responses to 246 (Table 1). Of the 246 responding PGY-5 and recent graduates, we queried both their research experience before residency and their residency research experience at their institution. Among respondents, 132 (54%) either were planning for an academic career or were already practicing at an academic institution; the remainder of respondents indicated employment within the private sector.

In terms of experience prior to residency, 171 of the 246 respondents participated in research during medical school and 47% (116) had 1 to 3 publications prior to residency. Interestingly, there was no association between publications prior to residency and academic career path (P = .53, Table 3). Thirty-three trainees had advanced degrees: 19 masters, 10 PhD, 10 MPH, and 4 MBA degrees. The number of PhD respondents (n = 10) was low and therefore most likely did not skew our response rate.

According to resident responders, almost two-thirds (61%) of training programs cited specialized research curriculum. Among respondents, 98% conducted research during residency. As expected, the majority (77%) of research projects were classified as chart reviews. Other types of research reported included prospective clinical research (n = 89), basic science research (n = 111), and translational research (n = 43); many residents reported conducting several types of research.

Interestingly, participation in translational research was the only research type associated with an academic career path (P = .009) (Table 3). Protected time allocated for research was the norm; 61% reported 3 to 6 months of dedicated research time. Only 13% noted less than 3 months, and 10% noted more than 6 months. This 10% likely accounts for the T32 recipients, as only 25 of the 246 survey responders were awarded a T32 training grant, with an additional 30 responders reporting that their program had a T32 training program but they did not participate in it. Presence of a T32 program was strongly associated with an academic career path (P < .0001), as was federal grant support of faculty (P < .0001, Table 3). These factors were the most influential to trainees’ decisions to pursue a career in academics. Not surprisingly, of the 235 responses to how research projects were identified, 53% answered “mentor guiding the resident based on their interest,” whereas 32% had a project on their own. Eighty-seven percent felt that they had the resources necessary to complete the project, and 60% felt that mentorship was the most single important factor. The majority of respondents (64%) did not receive funding for the research project, although among those who received funding (39%) the most common source was institutional support, followed by federal funding and foundation not-for-profit. The single most important factor that impeded progress during the research rotation was lack of mentorship (24%), although time (23%) was nearly equally a factor. Given that the majority of programs reported at...
least 3 months of protected time prior to the 2013 ACGME guidelines, time constraints may become a predominant impediment to residents’ successful completion of research projects. However, it is unclear whether this was a result of overly ambitious research projects, poor time management, or the presence of continued clinical responsibilities. As expected, 84% felt that their PDs were supportive of research in residency and their project.

Of the 234 respondents to this question, 51% felt that the research experience was intellectually satisfying or very satisfying. Intellectual satisfaction was a very strong predictor of career trajectory, as satisfaction was clearly associated with an academic career choice ($P < .0001$, Table 3). We were not able to identify factors that contributed to the lack of intellectual satisfaction. Residents reported several measures of success of the research activity including presentations at national and regional conferences (n = 66%) and publication of their results (n = 62%). Successful completion of the research project and prior publication of manuscripts not related to the research activity were associated with an academic career path ($P = .04$ and $P < .0001$, respectively, Table 3). When asked whether research participation influenced the career path, 54% stated that it had no effect on their decision, while 33% stated that it positively influenced their decision to pursue an academic career.

Notably, of those who elected for a private practice career, the largest factor that affected their decision was financial (59%). Lack of support was more of a factor than lack of interest (34% vs 29%) as a reason not to pursue an academic career. Other cited reasons not to pursue a career in academics were lack of a mentor (27%) and lack of a nurturing environment (11%).

In the multivariate analysis, only those respondents who answered every question were included (n = 220). Results indicated that T32 training grant funding within a program ($P < .003$) and intellectual satisfaction ($P < .0001$) were significantly associated with career path. Specifically, survey respondents from programs with T32 funding had greater odds of selecting an academic career path (compared with private) (odds ratio 3.24; 95% confidence interval, 1.51-6.98). Additionally, the odds of selecting an academic career path were 6.70 times greater among intellectually satisfied respondents, compared with those who were not satisfied (95% confidence interval, 2.82-15.92). The remaining variables were deemed nonsignificant and were removed from the final model using backward elimination; however, we noticed a potential trend between federal funding and academic career path ($P = .1$). The univariate results are retained due to missing data. Approximately 10% of responses were excluded from the multivariate model due to case-wise deletion. Missing data are spread across several variables and subjects, which increases the number of responses dropped when multiple variables are included in an analysis together. Although the univariate results do not account for potential confounding variables, a larger proportion of the sample is retained.

### Program Director Responses

Responses were obtained from 37% of program directors (n = 39) without bias for geographic distribution. Forty-seven percent of programs had 4 to 6 months for the research rotation, whereas 0 to 3 months was the response for 39.5% of all programs. Almost half (46%) of all programs reported that 10% to 19% of their faculty had PhDs, whereas 31% reported that less than 10% of the faculty had PhDs within their departments. Federal grant support for the faculty in these departments was present in 30 of 39 responding programs (73%), representing a clear bias of academically minded PDs responding to this questionnaire. This percentage was almost identical to the number of academic-bound trainees reporting federal grant support of faculty (74%, or 98/133) and clearly disparate from the number of private practice-bound trainees reporting government grant support of faculty from their training program (46%). Fifteen PDs said that their research requirement for graduation was simply completion of the rotation, whereas 17 PDs (44%) required a manuscript submission as well.

This inverted response in PDs compared with residents regarding requirements for graduation (17 PDs required manuscript submission, compared with 18% of residents citing manuscript preparation) highlights the apparent bias in the type of PDs responding to this questionnaire.

In defining the role of PDs in facilitating and ensuring the completion of the written scholarly activity, almost all agreed that they had to ensure compliance with participation and facilitate mentor training relationships or provide feedback regarding the quality of the scholarly activity. Nearly half of the PDs felt that it was necessary to allocate funds. Twenty respondents cited direct oversight of the project, while 18 felt that it was appropriate to delegate research training to a research director/mentor with oversight by committee. The majority (89%) of the PDs agreed that the residents self-identify projects and mentors guide them based on their interest. In reviewing the prior 5 years 26.3% of PDs felt that 11% to 20% of their residents’ career paths were influenced by their research, 23.7% felt that it was less than 10%, and 36% noted greater than 20%.

Funding for resident research was inconsistent across PD responders. Given that the large number of PDs responding were from programs with federal grant support, it is likely that the trainees who did not receive financial support from the residency program received support for materials directly from the investigator with whom they were working. In support of this hypothesis, only 2 of the programs that stated they did not allocate funds toward research did not have federal grant support. The majority (87%, or 34/39) of responding PDs reported that their trainees submitted CORE or other grants, with highly variable success rates (Table 4), representing a bias in the type of PDs (more academically inclined) responding to this question.

Consistent with the hypothesis that the PDs who responded to this questionnaire were from programs heavily invested in research and the training of academic otolaryngologists, 77% of PDs disagreed that the research activity detracted from the resident case volume, 97% felt that it was helpful for rounded
education, and 95% felt that it was essential for the future development of otolaryngology as a specialty. Similarly, a dissenting minority of PDs (13%) stated that research rotations detract from the resident case volume and clinical training.

**Discussion**

Presently, there is no clear consensus as to the components required for research rotations in otolaryngology. This lack of consensus likely stems from the fact that definitions of scholarly research activity vary from case reports and clinical reviews of the literature to basic or translational research projects. Fortunately, the majority of PDs defined major success of the trainees’ research effort as publication of results, although the content of the publication and the research methods used to identify that content were highly variable.

What has become apparent from this study is that the micro-environment of a training program may be associated with the type of otolaryngologist who develops in that program. Programs with faculty who successfully obtain federal research grants or have T32 training programs are more likely to train academic otolaryngologists. As anticipated, intellectual satisfaction in research appears to be higher in those who elect academic careers in otolaryngology. Given that the number of publications prior to entering residency did not appear to correspond with future career path, one would argue against a selection bias for resident applicants interested in research. It is possible that quality of publications (not necessarily quantity) may enable residents to have a competitive advantage in successfully matching in a residency program that has significant research emphasis. This survey resulted in a 25% response rate (350/1406). When compared with other surveys distributed by the AAO-HNS, this rate is typical. We understand that in gathering data from voluntary surveys, there can be an inherent bias due to the people who complete them. However, nearly half of respondents of this survey indicated current employment in the private sector or a desire to seek employment within the private sector compared with 62% of the members of the AAO-HNS who report themselves in private practice, which would imply no response bias (American Academy of Otolaryngology, L. Cadow, personal communication, December 11, 2013).

It is more likely that early, individual training and mentoring in research design and successful grant and manuscript writing may contribute to the career path of otolaryngology trainees. Similarly, if the trainees’ mentors do not have experience and success in research endeavors, it is less likely that the trainee will be successful in this area. Given that otolaryngology residency programs are highly competitive, all trainees should be intellectually capable of pursuing careers in academic medicine and engaging in research. As such, development of a structured research rotation with dedicated faculty and a core curriculum in biostatistics and research methodology in a rigorous, competency-based approach with similar expectations in all otolaryngology training programs may decrease the disparity between trainees’ research experiences between programs. If disininterest in an academic career had been the reason for pursuit of private practice, we would have anticipated 100% to cite this reason rather than only 29% of responding trainees. One of the most noted reasons for failure of the research project was lack of mentorship, although there was no major difference in this perception between those entering academics compared with those entering private practice (20% of those entering academics and 24% entering private practice). Salary differences are clearly a motivating force in almost 60% electing careers in private practice, but given the potential changes in health care with the Affordable Care Act and programs of loan forgiveness instituted by NIH designed to encourage clinician-scientists,9 salary differences between academics and private practice may narrow significantly in the coming years. These pressures are counterbalanced by the fiscal constraints of the National Institute on Deafness and Other Communication Disorders (NIDCD). Although members of the NIDCD workshop acknowledge that T32 programs are beneficial for academic training programs and promote collaborations between faculty and research trainees, they note that only 32% of T32 recipients applied for individual research grants (R01 or R03) compared with 47% of individual F32 fellowship awardees (NIDCD 2012 workshop).

The research rotation, for many trainees, represents one of the few opportunities for independent intellectual pursuits during their otolaryngology training period. The experience across programs is highly variable, which largely influences the career path of the trainee. Providing trainees with access to successful research mentors and adequate support will enhance their potential to derive intellectual satisfaction and to step into

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**Table 4. Reported Resident Grant Submissions and Funding by Residency Program.**

<table>
<thead>
<tr>
<th>Grants Submitted</th>
<th>0%</th>
<th>1%-20%</th>
<th>21%-50%</th>
<th>51%-75%</th>
<th>76%-100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1-5</td>
<td>8</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>6-10</td>
<td>0</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>11-15</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>15 or more</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

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a mentorship role for the next generation of otolaryngology trainees.

Acknowledgments

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Author Contributions

Gerald Zahtz, acquisition of data, data analysis, drafting of manuscript, final approval; Andrea Vambutas, acquisition of data, data analysis, drafting of manuscript, final approval; Heather M. Hussey, acquisition of data, critical revision of manuscript, final approval; Lisa Rosen, analysis and interpretation of data, critical revision of manuscript, final approval.

Disclosures

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Supplemental Material

Additional supporting information may be found at www.otojournal.org/supplemental

References