

Conceptualization and Development of a Customizable Neuroradiology Fellowship Curriculum with Emphasis on Academic Career Development

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Research Article

Keywords:

Posted Date: October 11th, 2023

DOI: <https://doi.org/10.21203/rs.3.rs-3362106/v1>

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Additional Declarations: No competing interests reported.

Abstract

Objective

To address unmet needs for a super-specialty concentration during the second year of a two-year neuroradiology fellowship by designing and implementing a longitudinal focused elective course with capstone project for 5 super-specialty tracks within the neuroradiology subspecialty. The objective of this study was to gauge the level of fellowship satisfaction and departmental engagement for this curriculum redesign.

Methods

The new curriculum design was implemented at a single institution with a two-year neuroradiology fellowship. During the second year of the fellowship, 5 focused elective tracks were created and offered to the neuroradiology fellows, including: 1) head and neck imaging, 2) pediatric neuroradiology and fetal imaging, 3) advanced spine procedures, 4) advanced imaging techniques, and 5) medical education. Each track is 11-weeks in duration and includes appointment of a faculty mentor/sponsor, dedicated conference assignments, detailed expectations, and a capstone project. For those electives focused on diagnostic imaging and procedures, a tailored case list, examinations, and/or procedures prioritizing daily exposure to the respective super-specialty is provided. The curriculum was created with the goal of providing targeted educational training, mentorship, and research support to second-year neuroradiology fellows. It was developed with guidance from neuroradiology leadership in conjunction with feedback from current neuroradiology fellows and is supported by radiology department leadership. A survey was administered to our neuroradiology fellows regarding the prospective curriculum redesign to gauge their level of interest and potential engagement.

Results

The majority of neuroradiology fellows (95%) agreed or strongly agreed that a focused super-specialty training program during their second year of fellowship would be beneficial. Specific perceived benefits included: an advantage over other similar training programs (85%), aid in recognition as an early leader in the field (70%), improved fellow marketability (90%), and assistance in launching a career in research (80%).

Conclusion

The implementation of a targeted super-specialty curriculum in the second year of neuroradiology fellowship was found to be highly desirable to current neuroradiology fellows. Follow-up data is necessary to evaluate long-term effects and academic achievement in practice.

INTRODUCTION

There are few remaining two-year neuroradiology fellowships in the United States, with trainees expecting high-yield experiences during their second year curated to their future career plans and goals. To meet this need, away rotations and elective experiences have been more commonly implemented. This practice, however, may lead to fragmented or discontinuous training at the trainee's home institution across the duration of the second year of fellowship. Moreover, the decentralization of training experiences leads to a diminishing number of core neuroradiology fellows working at our home institution. We sought to restructure our second-year neuroradiology curriculum, prioritizing our trainees' desires for super-specialty training in various aspects of neuroradiology, promoting educational and research missions within these super-specialized neuroradiology topics, while optimizing training experience and retaining our fellows on our main campus. This curriculum model aims to provide a framework to advance education and research missions, is inspired by survey-based curriculum development in other areas of medical education and may be adapted to a variety of training programs. [1–2]. The purpose of this study was to evaluate how the proposed curriculum redesign was perceived by our neuroradiology fellows, as well as inform potential iterations for future curriculum development efforts.

METHODS & MATERIALS

Our neuroradiology division performed a survey in 2023 distributed to first and second neuroradiology fellows at our institution in response to prior institutional derived data showing increasing rates of physician and trainee burnout. This was manifested at the fellow level by decreased engagement during routine clinical activities, a sense of limited mentorship and scholarship between neuroradiology faculty and fellows, and decreased participation in research and educational activities.

Our division has worked to develop initiatives to address dwindling engagement in these aspects of fellowship training through curating a customizable/personalized approach to neuroradiology education in the second year of fellowship training. The ultimate goal of this curriculum revision was to enable neuroradiology fellows to pursue super-specialty interests within neuroradiology under the direct tutelage of a designated and experienced neuroradiology faculty member, while promoting a scholarly activity during a focused period of time. A total length of 11-weeks was designated for this endeavor for each second-year neuroradiology fellow. Five main categories for super-specialty training were identified as: 1) head and neck imaging, 2) pediatric neuroradiology and fetal imaging, 3) advanced spine procedures (including facet blocks, kyphoplasty/vertebroplasty, bone biopsy, dynamic CT myelography and digital subtraction myelography), 4) advanced imaging (including fMRI, MR spectroscopy, PET, and DTI), and 5) a medical education track. During the 11-week elective, participating neuroradiology fellows are responsible for reading cases and/or performing procedures within the prevue of the aforementioned super-specialties, 4-days per week. The fifth day of the week is designated as an academic/research day spent conducting a longitudinal research project selected by the fellow and faculty mentor in their chosen domain. Additionally, during this 11-week period, the fellow is responsible for being the primary

contact/leader at all multidisciplinary conferences within this domain and will present a biweekly case conference to promote peer-to-peer learning. At the conclusion of the 11-week elective, the fellow presents the results of their super-specialty longitudinal research project to the division. For fellows pursuing the medical education track, the program is adapted to connect the fellow with educational missions within the department of radiology, with additional engagement in educational activities and courses at the hospital level.

An anonymous survey was created in “Google Docs” and distributed to 23 neuroradiology fellows. The survey was designed to assess trainee interest and potential perceived impact this targeted curriculum would have on neuroradiology fellows. This study was exempt from institutional board review.

RESULTS

Twenty of 23 neuroradiology fellows (87%) completed this survey. 95% of responding fellows were interested or strongly interested in pursuing the 11-week subspecialty curriculum (Fig. 1). 85% of fellows felt that this program feature would be an advantage over other training programs, 70% felt that this program would help them become recognized as an early leader in the field, 90% felt that this program would help to improve their marketability when searching for a job, and 80% felt that this program would help them to build a budding research career (Fig. 2). Furthermore, 90% of fellows felt that this program would be attractive to potential fellowship applicants. All responding fellows (100%) felt that having dedicated 1:1 mentoring time with a faculty leader was an important component integral to the success of this program (Fig. 1).

DISCUSSION

The results of this study demonstrate a large majority of our neuroradiology fellows desire to pursue an 11-week block of super-specialty training within the neuroradiology subspecialty. From the fellow's perspective, primary driving motivations for pursuing super-specialty training included perceived advantages in being recognized as an early leader in the subspecialty field and being more desirable in the job market. The most popular super-specialty training topics included head and neck radiology, pediatric neuroradiology, and advanced imaging techniques focusing on functional neuroradiology and brain PET imaging. While augmenting the neuroradiology fellowship experience during the second year of fellowship training with customizable super-specialty training, there is the complementary goal of fostering a career in research and academia through engagement in educational or scientific research via a longitudinal project with dedicated resources, time, and mentorship. This educational framework and structured curriculum elevates the fellowship experience by aligning with institutional fellow survey results and simultaneously touching on key factors for career development as identified in the literature [3–7].

The results of this survey echo those previously published in the literature for other fellowship training programs. As an example, a survey related to job-readiness following pediatric neuroradiology fellowship

identified inadequate training in specific areas of pediatric neuroradiology including fetal imaging, head and neck imaging, and others [8]. Multiple surveys on means to incorporate informatics curricula into radiology education demonstrated that graduates of the program felt more valuable after the subspecialty experience, a greater proportion sought academic careers, and that trainees believed the experience was important to build success as a future leader in radiology [2, 9].

We aim to continue to study the perceived impact of this curriculum redesign with main outcome measures directed at job marketability, selection for careers in research and academia, and overall satisfaction with the second year of neuroradiology fellowship. The ability to retain second year neuroradiology fellows at our home institution, rather than a decentralized approach with rotations at other institutions or off-site centers, is particularly desirable for promoting a sense of community and collegiality amongst our trainees and staff, increasing our own neuroradiology division's clinical productivity, and in providing trainee research projects with options for longitudinal continuation and collaboration at our own institution. Understanding potential and perceived deficits in the neuroradiology fellowship curriculum provides an opportunity to develop new means of super-specialty training to address the evolving ambitions and unmet needs of our trainees.

Declarations

Ethics approval and consent to participate: This study was exempt from the MGH institutional IRB. Requirements for informed consent was waived by the IRB.

Consent for publication: Not applicable

Availability of data and materials: The dataset used and analyzed in this study are available from the corresponding author on reasonable request.

Conflict of Interest: The authors have no conflict of interest.

Funding: There was no funding for this study.

Author's contributions: Both Karen Buch and Brooks Applewhite created the survey design, interpreted and analyzed the data. Both authors wrote and revised the manuscript.

References

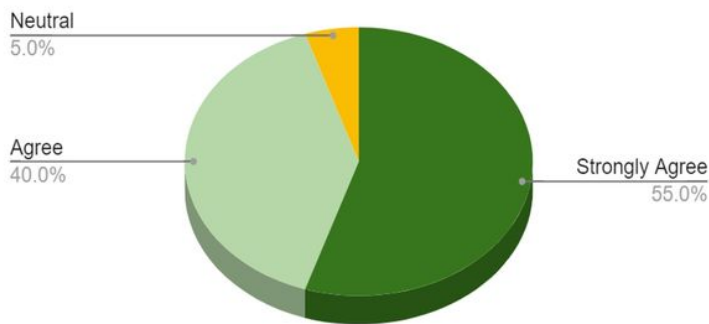
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Figures

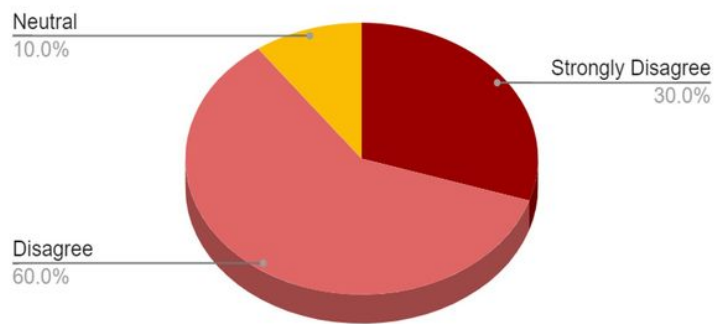
1A

I would be interested in pursuing neuroradiology super-specialty training during my second-year.

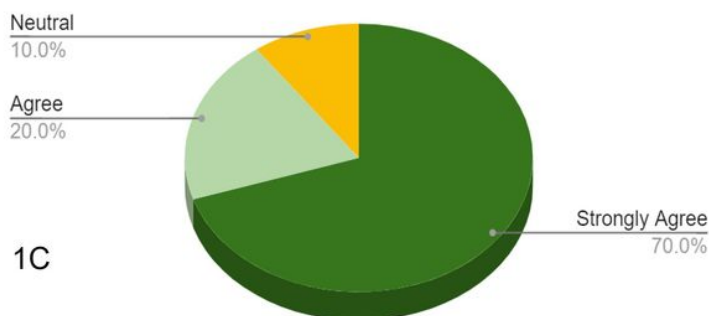


1B

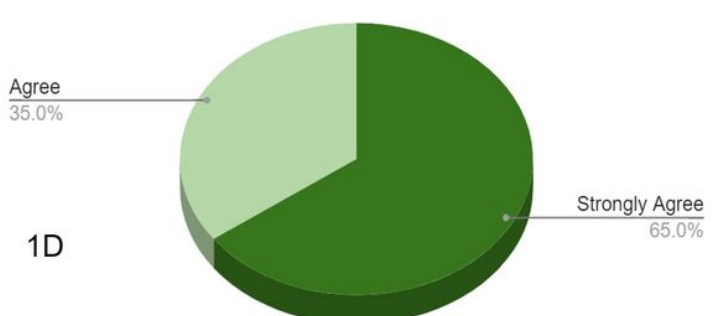
I do not see any advantage to offering super-specialty training during my second year of neuroradiology fellowship.



Offering super-specialty training to neuroradiology fellows would make the program more attractive to potential applicants.



Dedicated mentoring time with an expert in each proposed neuroradiology super-specialty is needed to offer high-quality training.



1C

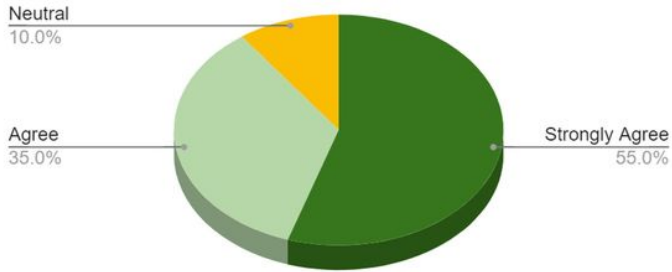
1D

Figure 1

Survey results of neuroradiology fellows regarding level of interest and perceived advantages in developing a super-specialized curriculum during the second year of fellowship.

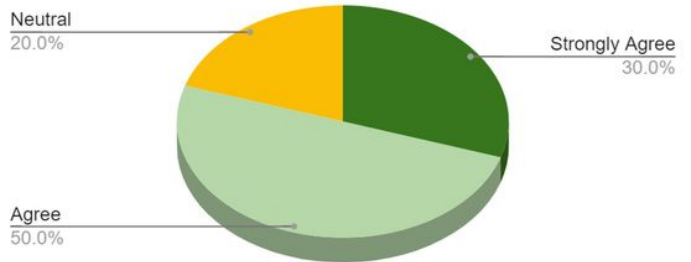
2A

Super-specialty training would give me an advantage over neuroradiology fellow graduates at other institutions.

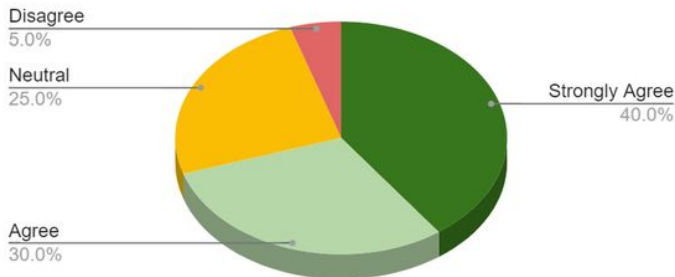


2B

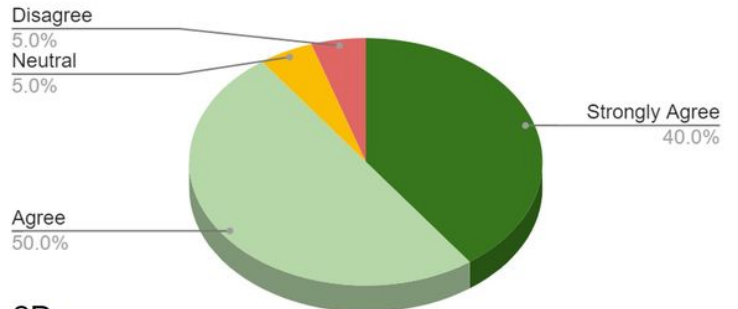
Neuroradiology super-specialty training would help foster a research career in this area.



Neuroradiology super-specialty training would help me to be recognized as an early leader/expert in this field.



Neuroradiology super-specialty training would improve my marketability.



2C

2D

Figure 2

Survey results for neuroradiology related to perceived advantages related to career interests including marketability, development of a research career, and becoming recognized as an early leader in the field of neuroradiology.