

Training Internal Medicine Residents in Difficult Diagnosis: A Novel Diagnostic Second Opinion Clinic Experience

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Journal of Medical Education and Curricular Development
Volume 9: 1–5
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DOI: 10.1177/23821205221091036



ABSTRACT

BACKGROUND: In primary care clinics, time constraints and lack of exposure to highly complex cases may limit the breadth and depth of learning for internal medicine residents. To address these issues, we piloted a novel experience for residents to evaluate patients with puzzling symptoms referred by another clinician.

OBJECTIVE: To increase internal medicine residents' exposure to patients with perplexing presentations and foster a team-based approach to solving diagnostically challenging cases.

METHODS: During the academic year 2020–2021, residents participating in their 2-week primary care “block” rotation were given protected time to evaluate 1–2 patients from the Stanford Consultative Medicine clinic, an internist-led diagnostic second opinion service, and present their patients at the case conference. We assessed the educational value of the program with resident surveys including 5-point Likert scale and open-ended questions.

RESULTS: 21 residents participated in the pilot with a survey response rate of 66.6% (14/21). Both the educational value and overall quality of the experience were rated as 4.8 out of 5 (SD 0.4, range 4–5; 1: “very poor”; 5: “excellent”). Residents learned about new diagnostic tools as well as how to approach complex presentations and diagnostic dilemmas. Residents valued the increased time devoted to patient care, the team-based approach to tackling difficult cases, and the intellectual challenge of these cases. Barriers to implementation include patient case volume, time, and faculty engagement.

CONCLUSIONS: Evaluation of diagnostically challenging cases in a structured format is a highly valuable experience that offers a framework to enhance outpatient training in internal medicine.

KEYWORDS: resident training, diagnosis, complex cases, internal medicine

RECEIVED: January 23, 2022. **ACCEPTED:** March 14, 2022

TYPE: Original Research

FUNDING: The author(s) received no financial support for the research, authorship, and/or publication of this article.

DECLARATION OF CONFLICTING INTERESTS: The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Introduction

There is a push within academic medicine to increase the exposure to ambulatory medicine during internal medicine training.^{1–3} With this push comes a call for innovations on how to maximize learning and education in the ambulatory setting. Though constrained by financial incentives and time limitations, the ambulatory setting offers significant opportunity for intensive educational focus.³ For example, the Ambulatory Diagnostic and Treatment Center (ADTC) model has been in place at the Veterans Affairs (VA) Boston Healthcare System in conjunction with the Boston University Healthcare System for more than 25 years.⁴ This model focuses on care of patients who would benefit from intensive ambulatory management by incorporating outpatient visits lasting 1.5 hours or more paired with 2.5 hours of didactic conferences and time for residents to scrutinize literature and reflect on the process of diagnosis and management.⁴

We recently defined consultative medicine as an emerging specialty for patients with puzzling conditions who typically

suffer long diagnostic journeys in the fragmented and fast-paced modern healthcare system.⁵ In that commentary, we proposed a generalist-led focused diagnostic re-evaluation model that is formed on the foundations of time, team, and technology to tackle some of the most diagnostically challenging cases in medicine which include rare, atypical, novel, and complex conditions. Variations of consultative medicine-type programs have grown around the United States and the world which offer personalized, intensive, and multidisciplinary service to patients with puzzling presentations in the ambulatory and inpatient settings.^{4,6–8} The Stanford Consultative Medicine service started in 2015 and provides second opinions to clinicians encountering patients with diagnostically challenging presentations including rare, unusual, and complex conditions. Studies indicate that second opinions in internal medicine can lead to changes in diagnosis and/or improvement in symptoms for some patients.^{7–9} Though individually uncommon, rare diseases together affect a significant proportion of the population, cumulatively 25 million in the United States



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alone.^{10,11} Medically unexplained symptoms (MUS) in primary care have reported prevalence anywhere between 11% and 60%.^{12,13} Patients suffering from rare diseases or MUS can have prolonged diagnostic journeys, seeing multiple specialists, and undergoing extensive testing without finding relief or answers.⁶ While some patients with MUS may have psychosomatic conditions, there is a subset of patients with likely underrecognized medical disease whose rare, atypical, or complex presentations may challenge standard evaluations.

In this study we report our analysis of internal medicine resident experiences in an educational pilot program aiming to combine the educational focus exemplified in the ADTC model with the diagnostic challenge and exposure to rare and complex disease offered by our Consultative Medicine service.

Methods

Rotation structure

Given the learning opportunities offered by the Stanford Consultative Medicine clinic, we piloted a new Consultative Medicine resident experience for the academic year 2020–2021. Residents rotate through 2-week “block” sessions of dedicated primary care clinic in addition to their regularly scheduled continuity clinics. These residents on the 2-week “block” rotation were given dedicated time for intensive evaluation of one patient per week with the Stanford Consultative Medicine group for a total of up to two patients during this block (Supplemental File 1). The resident is introduced to the general approach and evaluation framework for puzzling conditions as described in our recent publication about defining the practice of consultative medicine.⁵ On each day, the residents had four hours of protected time to interview the patient via a video or telephone visit (in the setting of the COVID-19 pandemic), review the electronic health records and any relevant literature, develop a diagnostic workup, and prepare a case presentation for the one-hour Consultative Medicine case conference scheduled on the same day. During the meeting, the residents present their patients to an average 2–3 core Consultative Medicine internist attendings, other trainees, and sometimes more faculty from other specialties. Typical discussions also entail detailed review of prior (often extensive) testing, differential diagnosis, and proposed recommendations such as additional testing, consultations, and/or empiric therapeutic management recommendations as indicated, as well as review of relevant literature and use of digital diagnostic aid tools.

Educational goals

The educational goals of this pilot resident experience with the Consultative Medicine clinic were to increase residents’ exposure to patients with medically undiagnosed symptoms and complex presentations; to teach residents a general framework and methodology to approach these patients; and lastly to

significantly increase the variety and complexity of cases encountered by residents during their primary care ambulatory clinic time (Box 1).

Box 1. Educational objectives.

1. To increase exposure of internal medicine residents to medically undiagnosed symptoms and puzzling presentations
2. To increase the variety and complexity of cases encountered by residents during their primary care clinic time
3. To increase familiarity of internal medicine residents with advanced diagnostic tools and evaluation strategies for common complaints
4. To foster a whole-person and cross-specialty approach to the diagnostic evaluation of patients with perplexing and complex presentations
5. To develop skills in teamwork and multi-disciplinary collaboration in tackling difficult and perplexing diagnostic cases

Survey methods

All the residents that took part in the pilot rotation were sent an email survey approximately two months after the end of the rotation. The survey (supplemental appendix 1) included both open-ended and Likert scale questions focused on overall quality, educational value, complexity and unique aspects of the rotation, as well as questions focused on areas of improvement and criticisms (Supplemental File 2). The participation in the survey was voluntary and confidential. Data was collected anonymously, and no incentives were offered to participants. The study was considered exempt by the Stanford University Institutional Review Board.

Results

During the academic year 2020–2021, a total of 21 internal medicine residents participated in the pilot consultative medicine experience as part of their scheduled 2-week primary care clinic rotation. At the time they took the rotation, 9 were PGY-1, 5 were PGY-2 and 4 were PGY-3 categorical internal medicine residents. Residents in the combined medicine-anesthesia program also took part in the rotation and of these, 2 were PGY-5 s and 1 was PGY-4. Two months after the last residents had taken part in the rotation, an anonymous email survey was sent to all the participants. The response rate to the post-rotation survey was 66.6% (14 of 21). Most of the survey responders were PGY-1 s (35.7%), followed by PGY-2 s (28.6%), PGY-3 s (21.4%) and PGY-5 s (14.3%).

Both the educational value and the overall quality of the rotation were rated as 4.8 out of 5 (SD 0.4, range 4–5) based on a standard 5-point Likert scale, where 1 corresponded to

Table 1. Representative feedback comments from residents.

CATEGORY	VERBATIM COMMENTS FROM HOUSESTAFF
<i>Increased time for patient care</i>	<p>“Being able to spend a whole morning reviewing one patient’s medical story and having the chance to speak with them. It was a deep dive into one patient’s experience and felt like a much more thorough engagement than other clinic experiences “</p> <p>“Additional time to deep-dive on a patient’s presentation”</p> <p>“Opportunity to think about a complex differential and take a deep dive into a complex patient’s history”</p>
<i>Intellectual challenge</i>	<p>“Taking a deep dive into someone’s long and complex medical history is extremely challenging; you’re relying on the documentation of others and imaging/lab work/results from many different medical facilities. It was a good experience to go back so many years through this patient’s care and understand, as best as I could, what had been done for her along the way”</p>
<i>Complexity of the cases</i>	<p>“Even though we tend to deal with rather complex patients at our outpatient continuity clinic, we almost never have to manage patients that have already seen a PCP or multiple specialists for their problems and are looking for a second opinion. I think that these kinds of encounters really push your diagnostic and clinical reasoning skills to the limit”</p> <p>“Very infrequently do we get to review the chart of someone who has undergone a thorough workup already. It is invaluable to see how others have thought about a complex problem in the past and what sorts of questions arise as each new piece of data comes in”</p> <p>“Opportunity to think about a complex differential and take a deep dive into a complex patient’s history”</p>
<i>Team-based approach to patient care</i>	<p>“I learned how the consultative medicine team approaches these cases, meets with and presents the patient, brainstorm, and comes up with concrete recommendations for the patient to take as a part of their diagnostic journey. I also learned about some of the pathology that was relevant to the patient I met with”</p> <p>“The cases presentations and discussions with the rest of the Consultative Medicine team were particularly useful and enjoyable. It was very interesting to see how different physicians try to approach a complex case”</p>
<i>Suggestions for improvement</i>	<p>“Longer discussion time per patient”</p> <p>“In person visits and monthly follow-up to see how the case develops”</p> <p>“Compendium of prior cases for learners to review”</p>

“very poor” and 5 corresponded to “excellent”. The overall difficulty of the cases encountered during the consultative medicine experience, compared to the cases that residents

encounter during their regular primary care clinic, was rated as 4.6 (SD 0.5) based on a standard 5-point Likert scale, where 1 corresponded to “much easier” and 5 corresponded to “much harder” (Supplemental File 2). Examples of cases seen by the residents in Consultative Medicine included: (1) patient with unexplained dyspnea, dizziness, and paresthesia despite evaluation by appropriate specialists; (2) patient with chronic fatigue, cognitive issues, gastrointestinal symptoms, musculoskeletal pain who had seen multiple specialists with query of unifying diagnosis; (3) patient with episodic generalized weakness, altered mental status, and chest pain with unrevealing prior workup; (4) patient with fluctuating cytopenias, weight loss, fatigue, and edema with unrevealing hematologic evaluation; (5) patient with undiagnosed neurologic symptoms, multiple vitamin deficiencies, and chronic leukocytosis. Patients often had more than 3 primary symptoms or concerns, though there were also cases of singular chief complaints that eluded diagnosis for years. Many patients had more than 5 comorbidities or diagnoses per chart and had been seen by multiple specialists for their concerns. Sometimes, patient records spanned across decades and across multiple institutions where they sought second or third opinions. In the residents’ own primary care continuity clinics, there is typically a range of low-complexity patients to high-complexity patients with multi-comorbidities often seen at academic medical centers.

Representative resident comments from open-ended questions are shown in Table 1. They reported an increased level of confidence and proficiency in reviewing, summarizing, and presenting a complex medical history. Residents became familiar with a general framework to approach complex presentations and diagnostic dilemmas, which includes incorporating basic physiology knowledge and the review of primary literature into diagnostic reasoning and use of a multidisciplinary approach that draws knowledge from specialties outside of internal medicine to elaborate alternative diagnostic algorithms and therapeutic interventions. As a result, residents reported learning about diagnostic tools and therapeutic interventions that they do not commonly use either during their regular primary care clinic encounters or during their inpatient rotations. One of the residents’ most highly rated aspects of the consultative medicine experience was the increased time available for reviewing the patient’s chart, interviewing patients, and literature search compared to their regular primary care clinic. Survey responders also appreciated the intellectual challenge of these complex undiagnosed cases, as well as taking part in the team-based and often multidisciplinary case discussions with the Consultative Medicine attendings. One aspect of the rotation that was frustrating for some of the survey responders was not always being able to obtain a clear diagnosis for the cases despite the increased amount of time and resources dedicated to the patients during this experience.

Discussion

Achieving educational aims

In this study we describe what to our knowledge is the first diagnostic second opinion clinical experience for internal medicine residents housed within an academic medical center. Patient cases from the diagnostic clinic enhance resident exposure to medically undiagnosed symptoms and complex multi-system presentations and teaches alternative diagnostic tools and strategies for common complaints. Other diagnostic second opinion and intensive outpatient care models^{4,7,8} have served as inspiration for the experience created here. However, ours is the first to combine a highly complex patient base with structured teaching and opportunity for internal medicine residents to develop high level diagnostic skills. Additionally, their intellectual contributions were part of a team-based approach to these challenging cases. In some cases, the residents were integral to solving the diagnostic puzzle, demonstrating that this type of experience is not only beneficial to the trainee but also to the patients who have an additional team member scrutinizing their case.

Based on survey responses, the rotation was overall of substantial educational value for the residents who participated in this one-year pilot. Specifically, residents appreciated the increased time available for each patient encounter to review, think and dive deeper into the case, as well as the higher complexity of patients compared to their regular primary care clinic population. Our rotation experience honed their skills in synthesis of complex data and critical thinking from a holistic perspective, which is key for growth in the practice of internal medicine. Additionally, the residents learned about advanced diagnostic evaluations performed by (sub)specialists during chart review and the power of leveraging team-based collective intellect to tackle challenging problems. Despite our best efforts, sometimes a clear diagnosis is still not achieved, and this serves as an important learning opportunity for residents in their maturation as real-world practitioners facing medical uncertainty and coming to terms with the unknown.

Limitations

This is a pilot study limited by sample size and survey methodology including response rate, and potential bias in recall given time interval between experience and survey assessment. We also recognize that it may be difficult to implement all aspects of the consultative medicine experience at other institutions, especially for residency programs that are based at smaller community clinics and organizations that may not have formal diagnostic second opinion clinics. While a formal second opinion clinic enhances a structured format and case flow for difficult diagnosis evaluation, it is not necessary towards augmenting resident training in difficult diagnosis. Alternative strategies include allowing additional dedicated time for residents

during their standard primary care clinic experiences to investigate some of the more challenging and perplexing cases, perhaps curated in advance, and having a forum for case-based discussion with other trainees and faculty. The bulk of the educational value comes from the time to review carefully, to think deeply, and to learn an approach to difficult diagnosis. Other barriers to implementation include protected time scarcity in busy outpatient practices and consistent, ideally multi-disciplinary faculty engagement in case conferences.

Future directions

Our pilot program was well-received by residents, so we aim to expand this rotation to residents from other ambulatory clinics and rotations. Future studies are needed with larger samples to better understand the impact of this type of program on resident education in difficult diagnosis. Based on the constructive feedback received from residents about areas of improvement (Table 1), we seek to further expand the time for resident case analysis and for team-based case discussion as resources allow. Additionally, we plan to create a compendium of common case archetypes that will serve as a reference source for further learning. This pilot year focused on teaching an approach to the evaluation of a diagnostic second opinion case, and future curricular development will include areas such as refining skills in communicating medical uncertainty and counseling of patients who remain undiagnosed despite prolonged diagnostic journeys. This rotation model could also be expanded to residency training programs in other specialties that often evaluate patients with puzzling symptoms.

Conclusion

As diagnostic second opinion programs evolve and grow, they serve as a valuable opportunity to enrich internal medicine ambulatory education by exposing residents to perplexing patient cases. Tackling diagnostically challenging cases helps hone clinical reasoning and investigative skills and pushes trainees to think outside the box as they face medical uncertainty and gain real-world experience with the practice of medicine.

Acknowledgements

We thank the Stanford Internal Medicine clinic managers and staff and participating faculty for helping to facilitate this pilot program for the residents.

Data Availability

Survey data available upon reasonable request to the corresponding author.

Ethical Approval

Not applicable, because this article does not contain any studies with human or animal subjects.

Informed Consent

Not applicable, because this article does not contain any studies with human or animal subjects.

Trial Registration

Not applicable, because this article does not contain any clinical trials.

Supplemental material

Supplemental material for this article is available online.

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