COMMENTARY

Improving Access to Tertiary Movement Disorders Subspecialty Care
A Team Model Born From the COVID-19 Crisis

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Abstract

Patient demand continues to outpace growth of the neurology workforce, especially in its subspecialties such as movement disorders. Various strategies have been deployed to address this. The coronavirus disease 2019 pandemic accentuated the mismatch by propelling telemedicine and access demands to the forefront. Previously, we reported improving general neurology access using a physician-advanced practice provider team model. Here, we share our experiences of piloting a similar model in subspecialty care (movement disorders) between September 1 and December 17, 2020. Before the pilot, the wait time to be seen by movement disorders subspecialists exceeded 4 months. Our data show marked improvement in new patient access (23.8% improvement and 214% increase in the number of new patients seen) with excellent patient acceptance. Our approach and the lessons learned may be useful to address access for other neurology subspecialties.

Fifty million people are diagnosed with new neurologic disorders each year in the United States, with only 16,366 neurologists in 2012 to serve their needs.1 The workforce deficit is projected to worsen by 19% in 2025.1 In 2015, an average of 308 per 1,000 Medicare beneficiaries had at least 1 visit for a neurologic condition,2 and the American Academy of Neurology (AAN) acknowledged a shortage of neurologists in 40 states.3 Nationally, the average number of business days patients waited to see a neurologist increased from 28.1 days to 34.8 from 2010 to 2012.4 Smaller academic medical centers,2 such as our institution, experienced even longer wait times than the national average.2 Our general neurology service created a team-based approach to improve outpatient access in 2013. This resulted in a 30-fold improvement in new patient access (an improvement in wait time from 299 days to 10).5

Since the 1990 NIH declaration of the Decade of the Brain, the field of neurology has changed dramatically with improved treatment options. With added public awareness, the demand for subspecialty care is increasing. This is particularly true for relatively uncommon disorders such as Parkinson disease (PD), where there is clear evidence that subspecialty care is associated with better outcomes and quality of life.6,7 This demand is expected to increase further as the population ages and disease prevalence doubles or triples by 2030.8,9 Currently, 40% of patients with PD do not see a neurologist, let alone a movement disorders specialist.10

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To manage limited access, many subspecialty physicians create an ever-evolving list of inclusion/exclusion criteria for new referrals. Criteria used are not transparent to the public and are at times inequitable. Examples of such criteria include insurance requirements, socioeconomic status, geography, or comorbidities. We have implemented a variety of efforts to address access shortage, such as consult-only clinics, eConsults, Project Extension for Community Healthcare Outcomes, walk-in clinics, and telehealth. Each has had some success; however, all have limitations as summarized in Table 1. Arrival of the coronavirus disease 2019 (COVID-19) pandemic adversely affected operations, worsening access. Although we quickly adapted our practice for telemedicine, this put added strain on physicians also struggling with their own family emergencies and social isolation. To preserve our workforce, while increasing access for patients, we implemented a subspecialty iteration of the team-based model, between September 1 and December 17, 2020.

**Description of Our Pilot**

**Overview**

A movement disorders physician joined with 2–4 advanced practice providers (APPs), residents, clinic staff, and a social worker. APPs or residents performed the initial history, data collection, and physical examination. Most patients were seen by an APP rather than a resident, but we did not collect data/differentiate the surveys based on whether a patient was seen by an APP or resident. The physician provided oversight/input related to diagnosis and management. The APP dictated the note and completed medical record tasks.

**Preparation of APPs and Residents**

All team members received uniform training from the movement disorders physician, via didactic lectures, including introduction to, evaluation and treatment of, movement disorders. Evaluation included the Unified Parkinson Disease Rating Scale, a rating tool used to measure the severity and progression of PD. The movement disorders specialist developed a standard package of core evaluation elements based on best practices and the latest research.

A growing literature suggests that PD apart from its motor manifestations also affects a number of nonmotor systems. Our evaluation thus included obtaining orthostatic vital signs and cognitive screening using the Montreal Cognitive Assessment. Nonpharmacologic management options, such as physical therapy, occupational therapy, speech therapy, and social work interventions, were also considered for each patient as appropriate.

**Preparation of Patients and Modification of Typical Encounters**

All patients received an introductory letter explaining our team approach (see eAppendix, links.lww.com/CPJ/A328). Accompanying the introductory letter was a form that we asked patients to fill out, identifying patients’ goals for their

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**Table 1 Strategies Deployed to Improve Outpatient Neurology Access**

<table>
<thead>
<tr>
<th>Models</th>
<th>Description</th>
<th>Advantages</th>
<th>Limitations</th>
</tr>
</thead>
</table>
| Consult-only visits     | The patient seen once or twice to establish diagnosis and initiate treatment. The patient is returned to the referring physician for ongoing care. | • Improve access for new cases  
• Reduce unneeded tests and therapy  
• Reduce emergency department visits  
• Higher relative financial yield for the health system | • No ongoing care for patients with chronic and progressive disorders  
• No guidance/consult for referring providers  
• Some referring providers do not follow through on recommendations |
| eConsult                | Asynchronous electronic consult for straightforward clinical question | • Efficient response to question  
• Less health care system expense  
• Improves access for others by not taking up appointment slots | • Limited/no reimbursement  
• Potential for error due to limited details  
• Technology limits its expansion outside the primary health network |
| Telehealth visit        | Video (or phone) patient visit                                               | • No space or staff constraints  
• Convenient for patients with disabilities, limited transportation, or longer distance  
• Conducive for family members and care coordination | • Dependent on wireless capacity  
• Dependent on cognitive ability of patients and family to participate  
• Lacks personal touch  
• Limited neurologic examination  
• Higher demands and burnout for providers |
| Walk-in clinic          | Patients are allowed to visit without an appointment, often without prescreening | • Improves access  
• Promotes equality  
• Equalizer between patient types | • Hard to manage daily demand and capacity  
• Not feasible for patients with significant physical, mental, or transportation limits  
• Does not address ongoing care  
• Patients may walk-in to the wrong clinic |
| Project Extension for Community Healthcare Outcomes | Knowledge-sharing networks led by expert specialist teams mentoring multiple primary medical providers | • Extends the reach of subspecialists well beyond their geographical loci  
• Enhances the training of primary care providers  
• May lead to reduced need for subspecialists for select conditions | • Not covered by traditional health care funding  
• Requires adequate available and willing primary providers who can then meet the patient demand and subspecialty knowledge. |
visit. To enhance transparency and data accuracy, all APPs and learners presented each case to the subspecialty physician in front of the patient and their family members. To enhance communication, an individualized printed take-home plan was provided to patients.

Pilot Evaluation
Access was measured by lead time derived from scheduling software (defined as the number of days from appointment scheduling to visit date). Satisfaction with this approach was assessed using anonymous surveys of patients, team members, and neurology faculty.

At the end of the 3.5-month pilot, new patient lead time improved from baseline 42 days to 32 (a 23.8% improvement). Also of interest was the impact on lead time for the entire movement disorders division, which went from baseline 59.3 days to 51.5 (a 13.2% improvement). The number of new patients evaluated by the team physician increased by 214% (from an average of 3.9 to 12.3 per month).

During the pilot, the team evaluated 117 patients. Seventy-one (61%) patients returned anonymous satisfaction surveys. Sixty-eight (96%) of these patients reported satisfaction with the visit, and 100% reported that they would recommend this service to others (Table 2). The 2 most important reasons cited were "physician is very knowledgeable" and "key concerns for today were answered." All care delivery team members responding to the anonymous survey reported satisfaction with the team model approach (Table 3). Similarly, all respondents were likely or highly likely to recommend this model to a patient or family member.

To explore whether and how this model is conducive to the research and education missions, we asked patients whether they wanted to learn about opportunities to participate in research. Of 58 patients asked, 17 (29.3%) expressed interest.

Eight residents participated in this model and filled out the survey. All expressed satisfaction with their experience.

Discussion
Our pilot, born during the COVID-19 crisis, suggests that the APP-physician team model improves subspecialty care access, with high patient and team member satisfaction. This model also creates a new platform for APP knowledge development, potential opportunity to engage patients in research and enhance learner training. The model may prove useful for other academic health centers. We share lessons learned from implementing this pilot.

Given the current construct of our health care system, we will never achieve an adequate number of subspecialty physicians in all geographic regions. To explore whether and how this model is conducive to the research and education missions, we asked patients whether they wanted to learn about opportunities to participate in research. Of 58 patients asked, 17 (29.3%) expressed interest.

Of interest, in our data, neither patients nor team members rated access as the most important driver for their choice of our service. There are a number of potential explanations for

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**Table 2** Satisfaction Surveys: From Patients and Care Team

<table>
<thead>
<tr>
<th>Questions</th>
<th>Total answers to question</th>
<th>Very satisfied</th>
<th>Satisfied</th>
<th>Neutral</th>
<th>Unsatisfied</th>
<th>Very unsatisfied</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient's survey at exit from our clinic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall satisfaction with your visit</td>
<td>70</td>
<td>59 (84)</td>
<td>9 (13)</td>
<td>2 (3)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did we address your key concerns?</td>
<td>70</td>
<td>61 (87)</td>
<td>7 (10)</td>
<td>2 (3)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Would you recommend our service to other patients?</td>
<td>71</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>71 (100)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Access team, staff, and colleagues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are you satisfied with team model approach?</td>
<td>26</td>
<td>12 (46)</td>
<td>14 (54)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are you satisfied with your role in the team?</td>
<td>24</td>
<td>14 (58)</td>
<td>10 (42)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are you satisfied with your interaction with patients?</td>
<td>25</td>
<td>14 (56)</td>
<td>10 (40)</td>
<td>1 (4)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Would you recommend our service to a friend or loved one</td>
<td>26</td>
<td>20 (77)</td>
<td>6 (23)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
this: patients value physician expertise over ease of access, some respondents may have not been aware of long wait times to access movement disorders programs, some respondents may not appreciate the potential improved clinical care provided by a movement disorders program, and some respondents may not experience any sense of urgency to access care given the chronic nature of most movement disorders. These explanations need to be further explored.

APPs are a growing force in health care. According to the 2019 American Academy of Physician Assistants Salary Survey, there were more than 140,000 physician assistants (PAs) in the United States. Only 1% of these were in Neurology. In 2015, the AAN advocated partnering with APPs, and the estimated supply of PAs in neurology is expected to increase by 87% in 2025 compared with 2013 (the neurology workforce is projected to have 1,630 PAs in 2025 compared with the 870 in 2013). APPs are often trained in a model focusing on core areas such as primary care, cardiology, and general surgery. Most neurology APPs rely on on-the-job training. This pilot’s collaborative team approach is an innovative example of APP training, which upgrades their neurology subspecialty expertise and skills, while empowering them to deliver subspecialty care. There is opportunity to publish best practice models of APP training in subspecialty care.

In the last part of our pilot, we also obtained preliminary data on how the research and education missions were perceived by patients and care team members. Our care team perceived research more positively than patients. Only 29.3% of patients expressed a desire to learn about research opportunities, suggesting that enhanced communication is needed about the value of research to patients and the community. The presence of a resident did not negatively affect patients’ recommendation of our service. The care team seemed to have more of a negative impression of trainee presence. Because education is a vital mission, there is an urgent need to identify strategies to understand this negative perception of trainees by health care providers.

### Table 3 Determinants of the Satisfaction and Recommendation for Our Services From Patients and Care Team

<table>
<thead>
<tr>
<th>Questions to patients: How important are the following in your decision to choose or recommend our service?</th>
<th>Number (percentage of) reporting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time spent with the physician</td>
<td>Total answers</td>
</tr>
<tr>
<td>Key concerns were answered</td>
<td>48</td>
</tr>
<tr>
<td>Ability to access care in timely fashion</td>
<td>45</td>
</tr>
<tr>
<td>My physician is very knowledgeable</td>
<td>15</td>
</tr>
<tr>
<td>Access to research opportunities</td>
<td>39</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Questions to patients about the doctor in training</th>
<th>Total N answered</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does having a doctor in training as part of your care team affect your experience with us?</td>
<td>29</td>
<td>17 (59)</td>
<td>12 (41)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Questions to access team and colleagues: How important are the following in your decision to choose or recommend our service?</th>
<th>Total answers</th>
<th>Very positive</th>
<th>Positive</th>
<th>Neutral</th>
<th>Negative</th>
<th>Very negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ability to access care in a timely fashion</td>
<td>25</td>
<td>9 (36)</td>
<td>12 (48)</td>
<td>2 (8)</td>
<td>2 (8)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>The physician is an expert in the field and research</td>
<td>26</td>
<td>23 (88)</td>
<td>3 (12)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>The presence of APPs</td>
<td>23</td>
<td>14 (61)</td>
<td>7 (31)</td>
<td>1 (4)</td>
<td>1 (4)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>The presence of medical students</td>
<td>23</td>
<td>5 (22)</td>
<td>8 (35)</td>
<td>9 (39)</td>
<td>1 (4)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>The presence of residents</td>
<td>23</td>
<td>7 (30)</td>
<td>11 (48)</td>
<td>5 (22)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Access to research opportunities</td>
<td>23</td>
<td>14 (61)</td>
<td>6 (26)</td>
<td>3 (13)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

Abbreviation: APP = advanced practice provider.
There is a need for more in-depth assessment of this team model approach as we move forward. Further understanding is needed as to whether this model affects outcome measures such as treatment adherence, disease complications, emergency department visits, or hospitalizations. Additional understanding is needed for optimal team training, physician to APP ratio, and barriers to integrating research and education into this model. There is also opportunity to share best practices on how to implement clinical pathways (checklists) to deliver optimal care.17

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Appendix Authors

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Drafting/revision of the manuscript for content, including medical writing for content</td>
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References
12. Penn State Health. Outpatient neurology clinic team improves patient access—Penn State Hershey Medical Center. YouTube, Clinic creator Stephen Ross, February 14, 2014. youtube.com/watch?v=9w4PbUXA6TP.

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