This is the last of a 3-part series exploring the past, present, and future of the field of child neurology. The previous 2 articles explored development of the field and the current state of training and practice trends. This article addresses future challenges facing the clinical, educational, and research aspects of child neurology.

**TRAINING FOR TOMORROW OR YESTERDAY?** Child neurology training in the United States occupies an unusual position between pediatrics and adult neurology. The 5 years of training hybridizes pediatric subspecialist training (3 years of general pediatrics and 3 years of fellowship) and adult neurology training (1 year of general medicine and 3 years of neurology). As discussed in the previous article in this series, this 5-year pathway is a historic artifact; child neurology grew directly out of adult neurology training by adding 1 year.

After completion of training, child neurology residents are board eligible in both pediatrics and adult neurology with “special qualification in child neurology,” although most will never practice pediatrics or adult neurology. Consider this: Over each of the past 5 years, an average of 6 physicians who have trained in child neurology and are board eligible in pediatrics have received initial certification annually. Only 10 physicians on average have obtained recertification annually (personal communication, Ying Du, PhD, January 2010). This trend likely will not reverse given the time and monetary resources required for Maintenance of Certification.

We argue that our current 5-year training is a product of yesterday’s thinking and devotes excessive time preparing clinical child neurologists for a multispecialty future in which they will never practice.

We propose, using the current 4-year adult neurology residency training as a model, shortening child neurology training to 4 years (table). A single general pediatric year would have to be planned carefully in the context of academic and workforce needs and should include appropriate pediatric and neonatal intensive care exposure. Additional child neurology experience in the 4-year model could be gained by reducing adult neurology training from the current 1 year to 3 months, parallel to adult neurology residents’ child neurology rotation. This would allow for additional training in more relevant areas such as child psychiatry, genetics, metabolic disorders, rehabilitation, palliative care, and neuroradiology. We acknowledge the value of adult neurology training in localization and neuroanatomy as well as exposure to long-term disease progression. The resulting shortened training period should provide high-impact educational and clinical exposure for the child neurology trainee.

Shortening the training period to 4 years would also encourage better preparation for future academic and clinical practice. A flexible 4- plus 2-year training program would allow those interested in academics to remain residents for a total of 6 years, with the last 2 years allowing for training in statistics or laboratory...
experience in neurosciences. The current effort to increase the number of residents going into academics has been the American Board of Psychiatry and Neurology–certified research pathway, which eliminates the second year of pediatrics training, replacing it with training in basic science research in the fifth year. The outcomes of this program were examined from 1992 until 2004.3 There were 38 residents accepted into the program, with 28 completing the training. The program has been productive in terms of publications. However, only 22 residents, approximately 2 per year, remained in academic medicine. So, the overall impact of this program has been miniscule.

Child neurology training months spent on adult neurology expose residents to high-prevalence adult conditions such as stroke and Alzheimer disease, at the expense of focusing on child neurology. The additional 9 months of child neurology training in our proposed training model would provide exposure to basic science and translational research. It might even inspire more child neurologists to become academic neurologists or collaborative researchers.

For child neurologists desiring subspecialty training, an additional 1 to 2 years of training would allow for certification in neurophysiology, epilepsy surgery, neuromuscular diseases, headache, movement disorders, and other areas. These decisions could occur during the 4 years of clinical training, as clinical interests and research mentorships mature.

### THE FUTURE OF THE CLINICAL FIELD IN CHILD NEUROLOGY

Long waiting lists for new child neurology visits around the country led to various efforts to estimate future workforce needs. The American Academy of Neurology published a report in 2000 revealing a 20% deficiency of child neurologists until 2020.4 A more recent survey found similar results.5 In addition, a survey of child neurology residents found that they foresaw themselves seeing fewer patients than current practitioners.5 Other challenges include geographic disparity in child neurology care and the difficulties for international medical graduates finding employment in the United States.

The shortage of child neurologists poses unique challenges for both outpatient and hospital settings. As mounting financial pressures penalize private practitioners for leaving their busy practice to round at the hospital, hospital systems have been forced to aggressively attract child neurologists. This has encouraged hospitals either to directly employ child neurologists or to offer incentives for covering the hospital, including directorships and pay-for-call. The outpatient setting has inherent difficulties of high patient volumes, negotiations with managed care, and the uncertainty of the impact of the recent healthcare reform bill. Many practices have turned toward midlevel providers such as nurse practitioners and physician assistants. Their use is likely to accelerate based on current demands for clinical care.

### ATTRACTION GOOD MEDICAL STUDENTS INTO CLINICAL AND ACADEMIC NEUROLOGY

In light of the shortage of child neurologists, the recruitment of medical students is essential. In 2002, a survey of 77 child neurology residents examined their path toward a career choice and future plans.5 They found that their choice to enter child neurology residency was most influenced by the presence of a

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**Table** Proposed alternative pathways for child neurology training

<table>
<thead>
<tr>
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<th>Current traditional 5-y pathway</th>
<th>Current 5-y research pathway</th>
<th>Proposed 4-y clinical pathway</th>
<th>Proposed 5- to 6-y research/academic pathway</th>
</tr>
</thead>
<tbody>
<tr>
<td>General pediatrics</td>
<td>2 y</td>
<td>1 y</td>
<td>1 y</td>
<td>1 y</td>
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<tr>
<td>Adult neurology</td>
<td>1 y</td>
<td>1 y</td>
<td>3 mo*</td>
<td>3 mo*</td>
</tr>
<tr>
<td>Child neurology</td>
<td>2 y</td>
<td>2 y</td>
<td>2 y 9 mo</td>
<td>2 y 9 mo</td>
</tr>
<tr>
<td>Research</td>
<td>Variable</td>
<td>1 y</td>
<td>Variable</td>
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* To parallel current adult neurology training.
A mentor and occurred during the third and fourth years of medical school. However, earlier and more frequent exposure to child neurology was also cited as a way to attract students to the field. Given these data, child neurology departments should support participation of their faculty in undergraduate and preclinical neuroscience programs and mentoring of early-stage students in both clinical and academic child neurology.

Simplifying the match process and optimizing the training curriculum may help to attract more students into the field. Currently, medical students must enter 2 separate and confusing match processes (the San Francisco match for child neurology and the National Resident Matching Program for pediatrics) and schedule 2 separate sets of interviews. This is because currently, individual programs elect to provide either 3 years of neurology training (pediatrics training may or may not be done at the same institution) or, alternatively, 5 years of combined pediatrics and child neurology training. Combined programs may provide better opportunity for social support as well as clinical and research mentorship. It is also worth considering whether the current amount of adult neurology training deters medical students who would like to focus solely on the management of pediatric patients.

A few economic and demographic trends may play a role. Apparently, financial pressures are drawing more talent away from law and finance into medicine (www.thecrimson.com/article.aspx?ref=528363). This creates an opportunity for increased child neurology recruitment. Reimbursement patterns, however, may work against us. In the current system, although child neurology training is longer than for adult neurology, salaries are lower. This is due to care provided for uninsured families and financial strains associated with neurologic disabilities in the absence of universal health care, and also because Medicaid reimbursement is lower than Medicare. Lobbying for and obtaining fairer reimbursement for services and medical student loan forgiveness for entering a field with a critical workforce shortage may increase salaries and recruitment.

**CONCLUSION** Child neurology training must evolve to meet future workforce and scientific challenges. We advocate a systematic reconsideration of current recruitment and training practices to meet the challenges ahead with the ultimate goal of improving patient outcomes.

**DISCLOSURE**
Dr. Ridel serves on the editorial board for the Resident and Fellow Section of Neurology. Dr. Gilbert serves on the editorial board of the American Academy of Pediatrics PREP Self Assessment and the medical advisory board for the Tourette Syndrome Association; has received honoraria for speaking and educational activities from the American Academy of Neurology, the Movement Disorder Society, the Tourette Syndrome Association, the American Academy of Pediatrics, and the Ohio Association of School Psychologists; and receives research support from the NIH [NIMH R01 MH078160 (Co-investigator), NIMH R01 MH08185 (Co-investigator), and NINDS NS056276 (Co-investigator)], Cincinnati Children’s Hospital Research Foundation, the University of Cincinnati, and the Tourette Syndrome Association.

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**REFERENCES**