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MEDICAL EDUCATION

Autism Education in Residency Training Programs

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Autism spectrum disorder (ASD) is a neurodevelopmental disability characterized by deficits in social communication and the presence of restricted and repetitive behaviors. The term ASD describes a behavioral phenotype that varies considerably from person to person and results from heterogeneous etiologies. In recent years, there has been much attention focused on ASD by the medical community, media, and general public, in large part due to the steadily increasing prevalence rates [1]. The most recent data published by the Centers for Disease Control and Prevention (CDC) in 2014 estimate that approximately 1 out of 68 children in the US has an ASD [1]. Although there is ongoing debate regarding the factors contributing to this increase, there is clearly a need for more health care professionals who are knowledgeable about ASD. Pediatric primary care clinicians, in particular, play a critical role in the identification and treatment of children with ASD and must be appropriately trained in the care of such children.

Recent studies exploring parent and clinician experiences of primary care for children with ASD have revealed dissatisfaction on both sides. Parents of children with ASD have reported poor access to a medical home, delayed referrals for evaluations, inadequate counseling about treatment options, lack of clinician knowledge regarding community supports and services, and limited confidence in their physician's ability to provide a high level of care [2, 3]. In surveys, practicing pediatricians have indicated the inadequacy of training in developmental and behavioral pediatrics (DBP) during their residency years [5, 6] and pediatric primary care clinicians have reported feeling ill-prepared to meet the needs of their ASD patients in particular and express a desire for further ASD education and training [2-4]. In a more recent study conducted by this author and colleagues (described further below), the majority of pediatric residents surveyed reported that ASD education was important to their careers, but more than half described the quality of their autism training to date to be "fair" or "poor" [7].

The Autism Case Training Curriculum

"Autism Case Training (ACT): A Developmental-Behavioral Pediatrics Curriculum" was designed by faculty and fellows from DBP programs with the purpose of educating future clinicians on the fundamental components of identifying, diagnosing, and managing ASD through real-life scenarios [8]. It has undergone internal and external peer review and extensive piloting and been endorsed by the American Academy of Pediatrics (AAP) [9]. This curriculum was developed as part of a collaboration between

the CDC and the Health Resources and Services Administration's Maternal Child Health Bureau (MCHB).

The ACT curriculum is designed to be highly user-friendly. It consists of seven case-based modules with associated teaching tools, including a facilitator guide and PowerPoint presentations. The facilitator guide includes specific goals and learning objectives for each module, a detailed case, suggested discussion questions and prompts, content for use in answering questions, and relevant handouts. There is an extensive video library available that includes clips illustrating specific teaching concepts—for instance, distinguishing between typical and atypical play in children. There is also a series of videos depicting discussions between experienced clinicians and simulated patients that are particularly useful in teaching communication skills. The seven modules are: Early Warning Signs of Autism, Screening for Autism, Communicating Concerns: Screening and Diagnosis Results, Making an Autism Diagnosis, Early Intervention and Education, Treatments for Autism, and Autism-Specific Anticipatory Guidance. All curriculum materials, including the videos, are available on the CDC website and can be downloaded free of charge [8]. There is also a shorter, self-guided module that can be completed to earn continuing education credit [10].

Evaluating the ACT

Following publication of the curriculum in 2011, we conducted a study at pediatric residency programs across the US to evaluate its implementation and short-term efficacy [7]. Curriculum modules were mailed to 33 training programs; 26 sites returned the study forms. The facilitators, who were either faculty or fellows in DBP, were expected to facilitate one teaching session at their institutions using an ACT module and to return the study forms to the investigators.

Participants. Data were obtained from 191 learners. Of these, 114 were pediatric or medicine-pediatric residents, who were the focus of the study. (The remainder were primarily medical students.) The median number of learners present during a session was 4, with a range of 1-30.

Method. One of the seven curriculum modules was randomly selected and mailed to the participating facilitator along with pre- and posttests and a facilitator evaluation form. Pretests were completed immediately before the teaching sessions, 68 percent of which were conducted during the DBP rotation; the rest took place at other times, such as during general house staff conferences. The duration of the sessions ranged from 20-90 minutes, with a mean of 60 minutes. Immediately after the teaching session, learners completed the posttests. Facilitators then completed the evaluation form and returned the materials to the investigators.

Materials. Pretests included multiple-choice questions regarding learner demographics, baseline attitudes towards ASD education (as reported above), and knowledge-based, module-specific multiple-choice questions. Posttests included the same knowledge-based questions. After the module, participants were asked to retrospectively self-assess their perceived knowledge and proficiency related to the module goals and objectives both before and after the session using Likert-style ratings.

Results. The data were analyzed using *F* and *t* tests. Average pretest scores did not vary by year in training ($p = .38$) or how residents rated the quality of their training to date ($p = .64$) [7]. The mean score on the knowledge-based pretests for all modules was 58.6 percent and the mean score on the posttest was 75.3 percent; the average gain was 16.7 percent ($p < .001$).

Self-assessments of residents' knowledge and proficiency were measured on a 4-point Likert scale (1 = poor, 4 = excellent). On the premodule assessment, average ratings did not vary significantly by year of training ($p = .32$) or career plans ($p = .12$). The mean premodule assessment score was 2.26 and the mean postmodule assessment score was 3.08, with an improvement in mean scores of 0.82 ($p < .001$). The majority of study facilitators (97 percent) reported that the learners were "engaged or very engaged" during the teaching sessions [11]. And "ninety-four percent of residents rated the session as useful or very useful to their training" [12].

Overall, we found the curriculum to be well received, able to be implemented with a wide range of learners and varied session durations, and associated with some positive short-term changes in knowledge and self-perceived competence. An unexpected, and concerning, finding was that performance on the pretest knowledge-based questions, as well as the self-assessments of competence, did not improve with training year. This finding speaks to the inadequacy of autism education in residency.

The study's primary limitation was that it only assessed short-term changes in knowledge and perceived competence following a single, brief teaching session. Furthermore, due to sample size limitations, we were unable to conduct analyses to determine if particular modules or session characteristics affected outcomes.

The Future of Autism Education

Pediatric primary care clinicians have made it clear that there is a need for improved education in residency training about ASD and other developmental and behavioral disorders. The development of teaching tools such as the ACT curriculum and a variety of other excellent resources (e.g., the AAP Autism Tool Kit and the Autism Speaks/Autism Treatment Network tool kits) is one important step towards better preparing the physicians who will care for children with ASD [13, 14]. However, these resources will only be effective if adequate time is devoted to teaching residents about developmental

and behavioral disorders during training. In 1997, the Accreditation Council for Graduate Medical Education (ACGME) mandated a one-month rotation in DBP, although in most programs residents typically spend less than a month on the rotation due to vacation days, on-call duties, and work-hour restrictions [15]. In 2013, new ACGME requirements specified that the experience in DBP should consist of one education unit, defined as 32 half-days, which can be completed in a block rotation or longitudinally [16]. It is unknown how this new requirement is currently being implemented and adhered to in training programs.

Improving autism education in the face of limited time and competing priorities in training requires a strong commitment on the part of graduate medical education leadership both nationally and locally. Faculty time must be appropriately supported for teaching during the DBP rotation and in other settings, such as resident continuity clinics. Innovative approaches to the DBP educational requirement, such as longitudinal structuring, should be explored. Finally, it should be noted that efforts to improve autism education should not be limited to pediatric residency training. To ensure high quality care for people with ASD across the lifespan, we must also consider continuing education for practicing pediatric clinicians, autism education during medical school, and training for internal medicine residents and adult primary care clinicians.

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