

# TRAINING IN DEVELOPMENTAL PEDIATRICS

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The last 15 to 20 years have witnessed widespread community and professional advances in the knowledge, attitudes, and services pertaining to both normal child development and to the entire spectrum of childhood developmental disabilities. The dramatic growth of the child development field, with special emphasis on early identification and intervention for developmental disorders, has been spurred by key implications of developmental psychology research. The importance of the early years of life to subsequent development and behavior; the unexpected competencies of newborns and infants; concepts of maternal-infant bonding, interaction, and attachment; the complex, dynamic transaction between intrinsic genetic, biologic, and neuromaturational factors and extrinsic experiential, environmental factors; the concept of temperament and its continuities and

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interactions over time; and the possibility that early intervention can ameliorate some developmental problems have all profoundly influenced current thinking about child development. Two recent legislative phenomena, the increasing emphasis on deinstitutionalization and the federal mandate (P.L. 94-142, the 1975 Education for All Handicapped Children Act) for an appropriate educational experience in the least restrictive environment for all handicapped children, also profoundly influence current child development practices. Parent sophistication and expectations in this area continue to increase; parental advocacy and support groups concerned with a wide variety of actual or potential handicapping conditions are now available throughout the United States and elsewhere. New professionals from a variety of related developmental disciplines are entering this field and actively participating in the screening, assessment, and management of at-risk and/or developmentally delayed infants and children at ever earlier ages. With this increased interest and activity, it is not surprising that the media have also "discovered" child development, and the public is constantly bombarded by fascinating research findings, recommendations for optimizing development and behavior, and controversial intervention modalities. Within pediatrics, the overlapping subspecialty areas of developmental pediatrics and behavioral pediatrics have arisen in response to these societal changes; an ever increasing number of professional societies, publications, and programs which focus exclusively on child development and behavior attest to the current interest in this broad field.

A second historical trend, occurring simultaneously with the growth of knowledge about child development over the past quarter century, has been the correspondingly dramatic change in the practice of general pediatrics. Practitioners providing primary health care to children today are presented with a very different mixture of clinical problems than previously and, consequently, spend their professional time quite differently than their predecessors. Specifically, pediatricians in previous decades spent the bulk of their time attempting to manage bacterial infectious diseases with frequently devastating complications; providing supportive care for such common viral childhood illnesses as measles, mumps, rubella, and poliomyelitis; and carefully prescribing infant feeding plans and then monitoring for inadequate or inappropriate nutritional status. Various public health improvements, broad-spectrum antibiotics, immunizations, and simplified infant feeding attitudes and practices now prevent or significantly reduce most of these problems, thus radically altering the contemporary pediatrician's daily schedule. Because of these biomedical advances, many primary care pediatricians today find themselves involved less and less with the acute, life-threatening medical diseases for which they have traditionally trained.

In their place, the majority of community pediatricians are now presented with a complex variety of developmental, behavioral, school, adolescent, family, and chronic illness problems (i.e., the "new morbidity" pediatric issues) not commonly encountered by previous practitioners. This has particularly been the case

in recent years as the survival rates for developmentally vulnerable premature/low birthweight and congenitally malformed infants have steadily increased, and as the recognition and understanding of the broad spectrum of school learning and attentional problems experienced by many of these survivors (Bennett, 1984) have increased. Important social changes, such as decreased family size, increased emphasis on the "quality" and total function of the individual child, and the familial issues of alternate family styles, divorce, working mothers, multiple caregivers, and child abuse and neglect have all influenced the types of concerns brought by parents to the pediatrician. As a result, parents today have increasing needs for and expectations of physician competence in these areas. The pediatrician is frequently called upon, and often has the opportunity, if willing, to become an active advocate for the "whole" child in the family, community, and society, and to move out of the traditional, isolated medical role into one of cooperative, interdisciplinary interaction and communication.

Unfortunately, pediatricians and other physicians providing primary health care for children have often been inadequately trained and prepared for these new roles and responsibilities (Bennett, 1982). For a variety of organizational, political, and economic reasons, resident training had not kept pace with the changing nature of pediatric practice over the past quarter century. Because of this undertraining and perceived disinterest, pediatricians have frequently been bypassed by parents and other child development professionals who have come to regard the physician as more obstructive than helpful in the management of developmental and/or behavioral problems. Many practitioners have been forced to learn about developmental and behavioral issues on their own, either through sabbatical fellowship opportunities (Wegmann, 1985) or by the daily accumulation of clinical experiences in an eclectic, on-the-job manner.

The 1978 Task Force on Pediatric Education identified normal and abnormal child development and chronic handicapping conditions as specific deficiency areas in pediatric resident education. This concern was subsequently corroborated by several surveys of primary care pediatricians which indicated perceived training inadequacies in both developmental and behavioral pediatrics (Dworkin, Shonkoff, Leviton, & Levine, 1979; Shonkoff, Dworkin, Leviton, & Levine, 1979). Dworkin et al. (1979) reported that formal training in developmental pediatrics was rated as insufficient by nearly 80% of a sample of New England pediatricians, that residency experience was viewed as highly valuable by only 30%, and that almost 50% rated medical school as having no value in this area. Although clinical experience was listed as a valuable source of knowledge by 99% of the sample, almost two-thirds did not regard it as an adequate substitute for formal training. Two address competently the demands of their patients with developmental disabilities, the pediatricians studied indicated an immediate need for improved training with greater interdisciplinary content at all levels—medical school, residency, and post-graduate education. The authors concluded that

pediatric educators must respond with a more relevant developmental curriculum during the formal training years. The state of the art at this time in developmental pediatrics training is discouragingly summarized by Bax (1979) in an editorial in a major neurodevelopmental journal: "It is sad to realize that more than 20 years after this journal's inception, training (in developmental pediatrics) is still inadequate. It is curious, given the widespread recognition of the need for such training, that programs have been so slow to develop, and it is certain that the patients have been the losers" (p. 561).

In consideration of this historical background, this review will discuss efforts in recent years to address these educational deficiencies and increase both the quantity and quality of training in developmental pediatrics at all levels of medical education. The review will also explore the major impediments to the full achievement of this educational goal. The primary focus of the chapter will be the authors' personal involvement and experiences in curriculum development for pediatric residents (Bennett, Guralnick, Richardson, & Heiser, 1984).

## A CURRICULUM IN DEVELOPMENTAL PEDIATRICS

### Curriculum Development

Because of the recognized training deficiencies in developmental pediatrics, a conference on pediatric education and the needs of young exceptional children was held in Washington, D.C., in June, 1978. As an outgrowth of this meeting of pediatric child development educators, a national Task Force on Developmental Pediatrics was convened in 1979 to produce a curriculum for pediatric residents pertaining to the identification, assessment, and management of children with atypical development. Major goals for a curriculum in developmental pediatrics were felt to be: (1) to define and describe the body of knowledge and experiences, within the broad field of pediatrics, specifically dealing with the different types and severities of childhood developmental disorders and their numerous specific etiologies; accordingly, the Task Force identified the central focus of developmental pediatrics as the recognition and long-term care of children with chronic central nervous system handicapping conditions, frequently adversely affecting multiple brain and/or sensory functions, particularly learning and behavior; (2) to assure a complete, consistent developmental pediatrics experience for pediatric residents in widely varying residency programs by clearly outlining expected competencies; (3) to enhance, within pediatric departments, the development of formal rotations in developmental pediatrics and expand upon existing informal experiences; and (4) to describe a clinical rotation in educational terms, with specific goals and objectives, as an experiment in resident education. Task Force members agreed that a sound, basic foundation in normal child development was necessary to all interest areas within the broad

field of pediatrics, particularly to the area of developmental pediatrics. Therefore, it was an implicit assumption that fundamental child development concepts and principles, to be effectively learned and reinforced, must be intimately and continuously woven into the fabric of the entire three years of pediatric residency training, rather than isolated as a separate, independent experience or rotation. The content area of the proposed comprehensive curriculum included a full spectrum of information about developmental disabilities.

To obtain the necessary contemporary perspective from the field, an initial survey of all 239 accredited pediatric residency training programs in the United States was conducted (Guralnick, Richardson, & Heiser, 1982). This study focused on issues related to four general areas: (1) the amount of time devoted to studying developmentally disabled children; (2) perceived priorities of specified content areas within the field of handicapping conditions; (3) principal barriers to implementation of a curriculum in developmental pediatrics; and (4) principal resources useful in implementing or expanding curricula in this area. While several programs indicated that they provided extensive structured training in developmental pediatrics, most training sites offered, at best, only loosely organized experiences, and apparently had little capability to provide systematic exposure to children having a range of developmental handicaps. The survey confirmed the consistent lack of a formal curriculum, or even educational objectives, in this or any other area of pediatrics. Additionally, follow-up contacts with some of the programs which did not respond to the initial survey revealed that in most instances the lack of response could be attributed to the absence of relevant training. Survey respondents identified a formidable array of impediments to curriculum implementation in developmental pediatrics: lack of faculty time (70%), lack of trained faculty (54%), lack of faculty interest (43%), lack of resident time (74%), lack of resident interest (68%), and lack of a defined, comprehensive curriculum (65%). Other concerns focused on the limited resources allocated to clinics serving disabled children, and on a perception of the "soft," non-scientific, nature of developmental pediatrics, compounded by the lack of clear field definition and identity. A fundamental problem was that, in fact, only relatively few residency programs had faculty trained specifically and sufficiently in the field of developmental pediatrics. However, respondents overwhelmingly (over 70%) indicated that they would welcome and utilize materials outlining curriculum goals and objectives, annotated bibliographies, audiovisual materials, and measures to evaluate curriculum effectiveness. Many departmental chairmen and residency program directors acknowledged that this was a seriously underemphasized area, but requested clarification as to its scope, content, and uniqueness.

During a two-year period (1979 to 1981), the Task Force developed, revised, and finalized a structured curriculum in developmental pediatrics. The curriculum, although comprehensive in nature, set limited goals for the competencies residents would be expected to demonstrate at the completion of a one-month

rotation or its equivalent over a more extended period of time. The content and learning activities outlined in the curriculum were designed to provide pediatric residents with the minimum knowledge and clinical skills necessary for them to serve developmentally disabled children and their families in a general pediatric practice. Essentially, it was anticipated that the structured, curriculum-based training experience would enable residents to reliably identify children who are not following normal patterns of development; to work effectively with parents and with the community of developmental professionals in order to establish a thorough assessment of the child, family, and related environment; to determine the most appropriate services to optimize the child's development; and to retain responsibility for the ongoing medical needs of the child as well as for overall case coordination in many instances.

The curriculum which eventually evolved from the two-year deliberation and revision process provided a detailed planning guide for faculty to structure a formal rotation in developmental pediatrics and to suggest alternative strategies for conveying the critical knowledge and clinical skills across programs. As such, it was neither a self-instructional textbook for residents, nor a cookbook for faculty to utilize in the same step-by-step manner in very different residency programs. It was clearly not intended to be a shortcut to residency training in developmental pediatrics; to the contrary, conscientious use of the curriculum requires a considerable investment of faculty time and effort in order to make the content maximally effective within a wide range of individual training programs.

The final curriculum content was organized into ten interrelated units. A major concern of the Task Force was to devise a format which could be used to present this extensive body of information in a flexible but consistent manner. The structure selected presents the underlying principles which guided the construction of each curriculum unit, while at the same time providing sufficient detail to clearly describe how such principles can be translated into a coherent training program. Specifically, each of the ten major units of the curriculum was similarly organized and included a rationale, several broad goals, specific educational objectives, and matched learning activities to meet these individual objectives. Several different learning activities were suggested whenever possible: (1) didactic content outlines for lectures which could be incorporated within the core rotation or during other structured training activities; (2) model clinical experiences with associated protocols; and (3) independent study through updated, annotated supplementary readings. In addition, new educational materials such as video-assisted case vignettes and written case studies were developed to supplement clinical experiences, particularly in settings where children with certain types of developmental disabilities were not available.

The ten curriculum units included an introductory unit covering basic principles of normal child development and developmental screening, followed by nine units concerning children with abnormal development: attitudes about disabling conditions, knowledge of developmental disorders, prevention capabilities, developmental diagnosis and assessment, interdisciplinary process

and team functioning, family issues, short- and long-term management, community services and resources, and controversial research issues.

The knowledge unit is subdivided according to the major neurodevelopmental disabling conditions, i.e., motor disabilities (particularly cerebral palsy), mental retardation, communication disorders, autism, learning disorders both with and without attentional deficits, and hearing and/or visual sensory impairments.

The diagnosis and assessment unit, primarily clinical in nature, introduces, by means of suggested evaluation forms and checklists, a uniform approach to the child less than six years of age with delayed or deviant development. It also provides a practical method of conducting a preliminary functional assessment of the older child with school problems. The organization of the ten curriculum units is summarized in Table 1. Figure 1 demonstrates the conceptual relationship between the primarily informational parts of the curriculum, i.e., the developmental foundation, and the clinical application of this knowledge base.

*Table 1. Organization of Developmental Pediatrics Curriculum*

| <i>Units</i>                            | <i>Goals</i>                                                                                                                                                                                                                                        | <i>Primary Learning Activities</i>                                                                                         |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| 1. Development and screening            | Patterns of development; environmental influences; developmental screening                                                                                                                                                                          | Well baby clinic; high-risk follow-up clinic; lectures on developmental processes, stages, and theories                    |
| 2. Attitudes                            | Public acceptance of handicapped children; sensitive and appropriate interactions; ethical issues                                                                                                                                                   | Clinical observations of faculty interacting with handicapped children and their families; discussion of ethical issues    |
| 3. Knowledge of handicapping conditions | Common definitions and classifications; presentation, natural history, and associated developmental problems; etiologic considerations, including incidence, clinical manifestation, severity level, and prognosis of major developmental disorders | Lecture series on major developmental disorders; application in clinical setting                                           |
| 4. Prevention                           | Prenatal diagnosis and newborn screening; perinatal prevention, perinatal intensive care controversies; postnatal and other environmental influences, bacterial and viral infections, socioeconomic status factor                                   | Genetics clinic; high-risk follow-up clinic; content discussions on prevention strategies at various developmental periods |

*(continued)*

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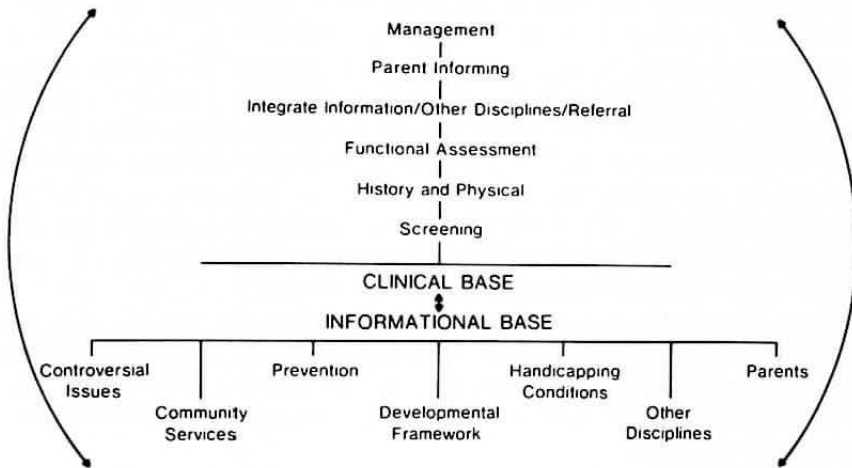
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| <i>Units</i>                            | <i>Goals</i>                                                                                                                                                                                                                                        | <i>Primary Learning Activities</i>                                                                                         |
|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| 1. Development and screening            | Patterns of development; environmental influences; developmental screening                                                                                                                                                                          | Well baby clinic; high-risk follow-up clinic; lectures on developmental processes, stages, and theories                    |
| 2. Attitudes                            | Public acceptance of handicapped children; sensitive and appropriate interactions; ethical issues                                                                                                                                                   | Clinical observations of faculty interacting with handicapped children and their families; discussion of ethical issues    |
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| 4. Prevention                           | Prenatal diagnosis and newborn screening; perinatal prevention, perinatal intensive care controversies; postnatal and other environmental influences, bacterial and viral infections, socioeconomic status factor                                   | Genetics clinic; high-risk follow-up clinic; content discussions on prevention strategies at various developmental periods |

(continued)



Figure 1. Interrelationship of Curriculum Components. (Based on Bennett et al, 1984)



mended pediatric developmental assessment approach for the major types of disabling conditions.

This curriculum attempts to identify and describe the basic knowledge, skills, and attitudes of developmental pediatrics to be acquired during a pediatric residency either as a block rotation or longitudinally during a period of three years. Even though the Task Force felt a one- to two-month core rotation to be the preferred mode for learning this information, the curriculum was intended to be flexible enough to permit individualized application within the structural, financial, and faculty constraints of a variety of residency programs.

### Curriculum Implementation

Experimental field testing of individual units occurred throughout the curriculum development years at the eight initial pediatric sites represented on the Task Force. Actual implementation of the entire curriculum was conducted in seven of these residency programs during the academic year 1981–1982. To be included in the full implementation, each residency program was required to identify a faculty member who held primary responsibility for the developmental pediatrics rotation. As Zebal and Friedman (1984) note, pediatric role models who demonstrate interest and competence in an area are necessary in order to establish the credibility of a rotation within the many other competing areas of training.

Additional criteria for implementation related to the availability of resources sufficient to carry out the main objectives of the curriculum. These included the existence of a minimal level of appropriate clinical experiences to enable resi-

dents to be directly involved with children who have a variety of major neurodevelopmental disabling conditions; the availability of professional staff from other medical and non-medical specialties who could demonstrate an interdisciplinary approach to serving these children; and sufficient resident and faculty time (at least 160 hours, i.e., one month) that could be devoted to a rotation in developmental pediatrics. Within these major guidelines, the pediatric faculty at each implementation site determined other important organizational factors, such as scheduling of the training during the three years of residency, mandatory or elective status of the rotation, and availability of additional, supplementary learning experiences, such as more intensely focused electives for residents with special interests. Of the seven residency programs which participated in the initial curriculum implementation, five had mandatory rotations, while two were elective. Five of the programs had one-month rotations; the other two programs had rotations of two months duration. Most pediatric residents (75%) in these programs participated in the rotation during the second year of training. The remainder (25%) of the residents participated as either first- (12.5%) or third-year (12.5%) residents.

The implementation process for the curriculum, which was generally the same at each site, was coordinated by the rotation director, and individually tailored to local practices and resources. The director (1) reviewed curriculum goals and objectives to obtain an overview of the content; (2) identified available faculty with necessary expertise, existing clinical experiences, and other learning activities (e.g., clinics, lecture series, journal clubs, grand rounds) that are currently part of the residency program; (3) matched existing experiences and resources with curriculum goals and objectives; (4) added new activities and faculty involvement as needed to address deficiencies; and (5) shared these changes in the developmental pediatrics residency experience with the residency training program director and the departmental chairman. Some training programs have the resources to use the curriculum quite completely and literally; others will be required to creatively match the core curricular content to their local realities.

This complex and time-consuming curriculum implementation process was designed to provide information on several feasibility issues critical to broader, potentially national, dissemination. First, it was intended to assess whether the content described in the curriculum could be taught within a defined period of time by faculty who had access to widely different resources. In addition, it was designed to evaluate the utility of the curriculum in overcoming perceived political constraints, e.g., departmental and resident resistance. Finally, it was intended to provide a mechanism for evaluating the effectiveness of the curriculum in different programs at both an objective and subjective level. These factors were essential to establish the credibility necessary to interest new sites in the use of this curriculum.

## Curriculum Evaluation

To address important questions regarding the value and potential usefulness of the curriculum nationwide, initial evaluation data were obtained on a total of 64 residents from eleven pediatric training programs (the seven original sites plus four new sites) which completed full implementation during 1982–1983 (Bennett et al., 1984). Two general types of evaluation were undertaken to measure the effects of a curriculum-based developmental pediatrics rotation. The first evaluation strategy was subjective in nature and consisted of ratings by both residents and their supervising pediatric faculty. These ratings were intended to document the effectiveness of the curriculum in changing residents' attitudes, knowledge, and clinical skills, and to critique individual aspects of the rotation. Information was gathered from residents by means of a Resident Feedback Questionnaire (RFQ)—a brief questionnaire completed by all residents at the end of their rotation. As can be seen in Figure 2, the primary section of the RFQ consisted of

Figure 2. Resident Feedback Questionnaire

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Your residency program is currently participating in a national project associated with your recently completed rotation in developmental pediatrics. Please assist us in evaluating this effort by answering the following questions.

I. Overview

1. How important do you feel the knowledge and clinical skills of this rotation will be to your anticipated pediatric career?  
Not at All: 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 :Critical
2. Were the experiences you had during the rotation systematically organized, coherent, and consistent?  
Totally 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 :Totally  
Frag- Coherent  
mented: and Con-  
sistent

II. Knowledge

1. Please use the scale below to rate your current knowledge of the classification, incidence, etiology, presentation, natural history, and associated developmental problems of the major types of childhood handicapping conditions (mental retardation, learning disorders,

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(continued)

Figure 2. (Continued)

motor handicaps, communication disorders, sensory handicaps, and autism).

- 1—Extremely poor knowledge
- 2—Poor knowledge
- 3—Slightly below average knowledge
- 4—Average knowledge
- 5—Slightly above average knowledge
- 6—Good knowledge
- 7—Extremely good knowledge

Extremely 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 :Extremely  
Poor: Good

2. How much of this knowledge did you acquire as part of this rotation in developmental pediatrics?  
% learned in this rotation 0 . 25 . 50 . 75 . 100%

### III. Clinical Skills

Assume you are in general practice and are asked to perform a comprehensive pediatric developmental assessment of a child with handicaps or suspected of having a handicapping condition. Please use the scale below to rate how competent you would feel in carrying out the following clinical activities in your office. In addition, please estimate the percentage of your estimated skill level which you feel you obtained during the Developmental Pediatrics rotation. For example, if you were evaluating a Cardiology rotation you might rate your ability to identify a diastolic heart murmur as 5 and attribute 75% of your skill from participation in that rotation.

- 1—Extremely poor skills
- 2—Poor skills
- 3—Slightly below average skills
- 4—Average skills
- 5—Slightly above average skills
- 6—Good skills
- 7—Extremely good skills

1. Routine developmental screening on all children at regular intervals.  
Extremely 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 :Extremely  
Poor: Good  
% learned in this rotation 0 . 25 . 50 . 75 . 100%

2. Comprehensive history and search for contributing factors (etiology) on child with suspected developmental problems.  
Extremely 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 :Extremely  
Poor: Good  
% learned in this rotation 0 . 25 . 50 . 75 . 100%
3. Physical and neurological examinations and appropriate laboratory investigations of children with suspected developmental problems.  
Extremely 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 :Extremely  
Poor: Good  
% learned in this rotation 0 . 25 . 50 . 75 . 100%
4. Vision and hearing preliminary assessment to determine if additional evaluations are needed.  
Extremely 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 :Extremely  
Poor: Good  
% learned in this rotation 0 . 25 . 50 . 75 . 100%
5. Preliminary assessment of current motor, language, and socioemotional functioning to determine if additional evaluations are needed.  
Extremely 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 :Extremely  
Poor: Good  
% learned in this rotation 0 . 25 . 50 . 75 . 100%
6. Integration of clinical findings from your pediatric developmental assessment into comprehensive report which identifies any medical diagnoses; etiology, if known; functional areas of concern; and subsequent actions to be taken.  
Extremely 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 :Extremely  
Poor: Good  
% learned in this rotation 0 . 25 . 50 . 75 . 100%
7. Working with other medical and nonmedical specialists as part of both assessment and ongoing treatment process.  
Extremely 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 :Extremely  
Poor: Good  
% learned in this rotation 0 . 25 . 50 . 75 . 100%
8. Communicating with parents to discuss preliminary diagnostic information and ability to manage parents' emotional reactions to that information.  
Extremely 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 :Extremely  
Poor: Good  
% learned in this rotation 0 . 25 . 50 . 75 . 100%

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*(continued)*

Figure 2. (Continued)

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9. Management skills for children with handicapping conditions (medication use, behavioral programming, family counseling, and genetic counseling).  
 Extremely 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 :Extremely  
 Poor: Good  
 % learned in this rotation 0 . 25 . 50 . 75 . 100%
10. Accessing services for handicapped children in community where the resident plans to locate his/her practice.  
 Extremely 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 :Extremely  
 Poor: Good  
 % learned in this rotation 0 . 25 . 50 . 75 . 100%
11. Demonstrating appropriate attitudes and comfortable clinical approach to handicapped children and their families.  
 Extremely 1 . . . 2 . . . 3 . . . 4 . . . 5 . . . 6 . . . 7 :Extremely  
 Poor: Good  
 % learned in this rotation 0 . 25 . 50 . 75 . 100%
- 

self-reports of their perceived clinical competence in eleven areas specifically emphasized within the curriculum. Residents used a 7-point rating scale ranging from 1 (extremely poor skills) to 7 (extremely good skills) to subjectively evaluate their ability to perform the clinical activities required in comprehensive developmental screening, assessment, and management. Residents were also asked to estimate the percentage of their rated skill levels that could be directly attributed to their participation in the developmental pediatrics rotation.

The results of this evaluation for the eleven clinical skill areas are summarized in Table 2. As is shown, residents generally felt that they had adequate clinical skills in all areas (overall mean = 5.24) and that most of these specific abilities (overall mean percentage = 56.6) could be attributed to the rotation. The residents perceived their areas of relative strength as developmental history and etiologic formulation (5.69), communicating with parents (5.63), and attitudes/clinical approach (5.61). In contrast, areas of relative weakness were felt to be utilizing community services (4.29) and management (4.45). Areas of greatest gain directly attributable to the rotation were felt by the residents to be interdisciplinary working with other professionals (66.3%), and integration and synthesis of all findings (64.1%). In only one clinical skill area, vision and hearing screening (41.3%) did the residents attribute less than 50 percent of their competence to the rotation. Even though residents still felt most insecure about

**Table 2.** Residents and Matched Faculty Subjective Clinical Skills Ratings Plus Percent of These Skills Attributed to Rotation

| <i>Clinical Skill Area</i>                       | <i>Mean Resident Rating (n=64)</i> | <i>% Attributed Mean</i> | <i>Mean Faculty Rating (n=64)</i> |
|--------------------------------------------------|------------------------------------|--------------------------|-----------------------------------|
| 1. Developmental screening                       | 5.56                               | 55.2                     | 5.45                              |
| 2. History and etiology                          | 5.69                               | 56.8                     | 5.58                              |
| 3. Physical and neurologic examination           | 5.35                               | 50.0                     | 5.59                              |
| 4. Vision and hearing screening                  | 4.96                               | 41.3                     | 5.07                              |
| 5. Motor, language and socioemotional assessment | 5.42                               | 62.9                     | 5.52                              |
| 6. Integration of findings                       | 5.07                               | 64.1                     | 5.67                              |
| 7. Working with other professionals              | 5.57                               | 66.3                     | 5.82                              |
| 8. Communicating with parents                    | 5.63                               | 51.8                     | 5.56                              |
| 9. Management                                    | 4.45                               | 54.2                     | 5.10                              |
| 10. Community services                           | 4.29                               | 60.0                     | 5.13                              |
| 11. Attitudes/clinical approach                  | 5.61                               | 60.5                     | 5.89                              |
| Total                                            | 5.24                               | 56.6                     | 5.49                              |

Source: Reprinted with permission from Bennett et al., 1984

utilizing community services, it was rated as one of the largest (60.0%) clinical growth areas. Independent ratings of residents' clinical skills for the same eleven areas carried out by the attending faculty members with primary responsibility for resident supervision during the rotation (overall mean = 5.49) closely corresponded to residents' self-perceptions.

The self-report questionnaire (RFQ) also asked residents to rate on a 7-point scale their cumulative knowledge of the classification, incidence, etiologies, presentation, natural history, and associated problems of the major developmental disorders described in the curriculum, and to estimate again the amount of this knowledge that could be directly attributed to the rotation. Additionally, residents were asked to evaluate on a similar set of scales the extent to which the rotation was consistently and systematically organized and the importance of the knowledge and clinical skills contained within the rotation in relation to their anticipated pediatric career. Knowledge received a mean rating of 4.66, with 62.1% of this developmental pediatrics factual information being attributed to the rotation. The curriculum-based developmental pediatrics rotation was also judged to be well-organized by the residents, receiving a mean rating of 5.29. Overall, the highest mean resident rating (5.95) was obtained for the residents' perception of the rotation's importance and usefulness to their anticipated pediatric career. Resident ratings revealed no significant differences between resi-

dents oriented to primary care and those entering subspecialties on any area of the RFQ.

The second principal component of the curriculum evaluation was an objective test designed to assess both the resident's knowledge and clinical decision-making processes. A set of four clinically-oriented Evaluation Case Study questions was created and revised by means of extensive field testing at the individual sites. These four cases, involving four different developmental disorders, consisted of: (1) a 3-year-old with Down syndrome, (2) a 2-year-old with the spastic diplegia type of cerebral palsy, (3) a 7-year-old with school learning and attention problems, and (4) a 3-year-old, born ten weeks prematurely, with substantial language delay. Each test vignette consisted of a relevant clinical history followed by four to six serial subquestions about that case. At various steps within each question, residents were given additional clinical information and requested to make specific judgments. These Evaluation Case Study questions were designed to assess knowledge of the essential components of the curriculum, and emphasized developmental screening, assessment, and management strategies rather than only factual recall. Residents had a maximum of two hours to complete the four cases, did not have reference materials available, and were asked to answer each sub-question as specifically as possible.

The experimental design used for this objective part of the curriculum evaluation procedure was well-suited to minimize any threats to internal validity while remaining compatible with residency rotation schedules (Richardson & Guralnick, 1978). Specifically, since residents in each program participated in the rotation on a monthly basis for the most part, residents at each of the eleven sites were assigned to either a post-rotation (experimental) or to a pre-rotation (control) group. Following the completion of the rotation at the end of a month, the Evaluation Case Study questions were administered only to those residents assigned to the experimental group. At the same time, however, the Evaluation Case Study questions were administered to those residents assigned to the control group who were scheduled to begin the rotation for the *following* month. This formed the basis for the primary comparisons. That is, through random assignment of residents and by alternating participation in experimental and control groups within and across sites, this procedure had the effect of randomizing all possible confounding variables, including resident experiences and self-selection factors, yet not interfering with rotation schedules. Accordingly, any differences found between the experimental and control groups could be attributed directly to participation in the developmental pediatrics rotation. The experimental design allowed the reliable examination of differences between residents in the same program and across different programs, and between those who had participated in the curriculum and those who had not but were scheduled to participate at a later time.

Sixty-four pediatric residents completed the objective Evaluation Case Study questions. Group comparisons of mean scores and ranges for both the overall test



*Table 3. Objective Evaluation Case Study Results by Individual Case for Experimental and Control Residents*

|                                     | <i>Possible Score</i> | <i>Control (Pre-rotation) n=32</i> |           |                      |                      | <i>Experimental (Post-rotation) n=32</i> |           |                      |                      |
|-------------------------------------|-----------------------|------------------------------------|-----------|----------------------|----------------------|------------------------------------------|-----------|----------------------|----------------------|
|                                     |                       | <i>Mean Score</i>                  | <i>sd</i> | <i>Minimum Score</i> | <i>Maximum Score</i> | <i>Mean Score</i>                        | <i>sd</i> | <i>Minimum Score</i> | <i>Maximum Score</i> |
| Case I<br>(Down Syndrome)           | 80                    | 36.9                               | 10.6      | 19                   | 60                   | 46.9                                     | 9.0       | 25                   | 62                   |
| Case II<br>(Cerebral Palsy)         | 74                    | 30.8                               | 16.4      | 0                    | 53                   | 45.7                                     | 10.7      | 25                   | 72                   |
| Case III<br>(School Problems)       | 69                    | 25.2                               | 11.2      | 4                    | 54                   | 40.6                                     | 9.1       | 23                   | 62                   |
| Case IV<br>(Communication Disorder) | 47                    | 21.0                               | 10.6      | 0                    | 37                   | 31.1                                     | 6.6       | 18                   | 43                   |
| TOTAL:                              | 270                   | 113.9*                             | 39.9      | 37                   | 189                  | 164.3*                                   | 25.6      | 115                  | 228                  |

\*p < .005

Source: Reprinted with permission from Bennett et al., 1984.

and also for the four individual cases are shown in Table 3. As can be seen, residents in the post-rotation (experimental) group outperformed residents in the pre-rotation (control) group on each of the cases and earned a significantly ( $p < .005$ ) higher mean total score (164.3 v 113.9).

There continue to exist, of course, substantial impediments to the effective implementation of a developmental pediatrics educational curriculum in diverse residency programs, and all participating sites encountered these barriers to some degree. Shortage of appropriate patients, faculty, and clinical settings, inability to "capture" residents for periods of time when they are relatively free from night call stress and other programmatic distractions, faculty fatigue due to constant preceptorship demands and repetitive lectures, departmental apathy, and discriminatory funding priorities were the common problems encountered. However, despite the inevitable difficulties inherent in curriculum implementation, the combined evaluation results suggest the efficacy and acceptance of structured curricula in pediatric resident education. Initial evaluation data from eleven pediatric sites indicate that this approach is both feasible and effective on a national scale in enhancing the developmental pediatrics skills of residents in programs with great geographic, philosophical, and organizational diversity. Upon completion of such a rotation, residents clearly demonstrated a greater appreciation of the professional challenges involved in serving developmentally disabled children. Phillips et al. (1983) recently discussed the interpretation problems with both subjective and objective types of evaluation for training in behavioral pediatrics. They emphasize ". . . the difficulty of documenting the effect of training, in any subject area, with regard to outcome measures that are both reliable and valid" (p. 411). Nevertheless, residents' self-reported confidence and competence, faculty ratings of the same skills, and scores on objective case questions specifically matched to the curriculum all strongly support the educational value of curriculum-based, formal developmental pediatrics rotations.

### Curriculum Dissemination

Having demonstrated the effectiveness of the curriculum, the next step in this developmental pediatrics project was to recruit new programs. Because of their leadership roles in the field, Task Force members were able to identify many potential sites which might be interested in establishing or expanding their developmental pediatrics rotation. In addition, Task Force members made several national presentations regarding the curriculum and corresponding training issues at various professional meetings which generated requests for further information and, often, eventual participation. Full participation in the training project involved local preparations for curriculum implementation; attendance by both existing and new training sites at a several-day conference, where critical issues of developmental pediatrics training were thoroughly discussed; and ongoing

collaboration in gathering curriculum evaluation data. To date, more than 30 additional pediatric residency programs in the United States have participated in this dissemination process, and many more programs, both nationally and internationally, have requested the curriculum itself along with other information. Outcome data from new site participants, the result of both subjective and objective measures, and similar to that obtained from the initial sites, have recently confirmed that new training programs implement the curriculum effectively, and suggesting once again the curriculum's potential value to more than 200 widely varying accredited pediatric residency programs nationwide (Guralnick, et al. in preparation). The Task Force is currently in the process of contacting all participating residents several years after the completion of their training, in order to assess the long-term impact of a structured, comprehensive experience in developmental pediatrics.

## **OTHER TRAINING EFFORTS FOR PEDIATRIC RESIDENTS**

In addition to the national training plan just described, a number of individual programs have reported their experiences and models for training pediatric residents in developmental pediatrics. Wolraich (1979) at the University of Iowa, Bennett (1980) at the University of Washington, and Cohen and Diamond (1984) at the Albert Einstein College of Medicine all have described successful developmental pediatrics training programs which incorporate a formal block rotation, structured goals and objectives, and some type of evaluation strategy. These documented training experiences assisted the curriculum Task Force in the creation of its final product.

## **DEVELOPMENTAL PEDIATRICS TRAINING FOR MEDICAL STUDENTS**

If in the past training in developmental pediatrics has been perceived as deficient at the residency level, it has been recognized to be even less sufficient during the four years of medical school education, when competition for curricular time is particularly intense, with "non-core" subjects often futilely struggling for formal inclusion. Nevertheless, many have argued that the ideal time to introduce physicians to the needs of patients with chronic disabling conditions is, in fact, very early in their medical education. Ideally, then, all subsequent developmental experiences at higher levels of training could amplify this knowledge gained early in the student's education, rather than constitute an introduction to this field.

In 1978, Willer and colleagues (1980) surveyed 64 United States medical schools concerning whether courses or clinical experience specific to mental

retardation were available to undergraduate medical students. As was true with the discouraging results of the pediatric residency program survey described earlier, almost half (47%) of these medical schools provided only minimal coursework on the topic of mental retardation, and offered inadequate clinical experience. Medical schools which did offer acceptable educational experiences were generally the schools with better reputations, particularly those schools with a federally-funded university-affiliated facility. The authors concluded that there are widespread, substantial deficiencies in medical education about mental retardation, as well as about all other forms of chronic disability. These findings are consistent with the findings of several similar surveys of medical schools in Great Britain (Holt & Huntley, 1973; Pilkington, 1977).

Willer et al. (1980) suggested that a potential solution to this dilemma is a required, not elective, multidisciplinary course in chronic disabilities that focuses on psychological as well as physical problems. Such a course should include a clinical component that would involve more than a single visit to a state institution. As a rationale for inclusion in the medical school curriculum, they emphasized: "There is a finite number of content areas that can be covered during the medical school years, but the frequency of contact between physicians and the chronically disabled [patient] dictates that more attention be paid to this topic area" (p. 594).

Several model programs which teach medical students about children with developmental disabilities have been described. Not surprisingly, these program descriptions tend to come from institutions which also assume leadership for training in developmental pediatrics at other levels of medical education, e.g., residency and fellowship training. The most structured and comprehensive of these programs is the medical student curriculum described by Gottlieb and Zinkus (1980) at the University of Tennessee Center for the Health Sciences, described as being dedicated to providing a quality teaching curriculum and to developing positive professional attitudes toward the care and treatment of disabled children and their families. Each year, all 200 medical students are introduced to developmental pediatrics through a teaching module which is part of the pediatric third-year core clinical curriculum. This mandatory experience exposes students to the diverse ramifications of chronic handicapping disorders of childhood (e.g., mental retardation, neurologic handicaps, developmental delays, learning disabilities, behavioral/emotional disorders) through several educational modalities, including: didactic presentations, clinical experiences, conference groups, and self-study programs. A medically-oriented interdisciplinary faculty participates in the teaching program. With regard to clinical experience, two student teaching models are utilized depending on the individual case, i.e., a private practice oriented model designed to simulate experiences as encountered in a primary care office setting, or an academically oriented model providing a more in-depth diagnostic assessment experience for the medical student. An additional elective block rotation is available for an expanded training for in-

terested medical students. Gottlieb and Zinkus stress that this program's philosophy is to incorporate developmental pediatrics into the general training of physicians, thereby de-emphasizing the exceptional or unusual nature of these problems and, hopefully, helping the medical student develop enthusiasm for this phase of child care. Finally, and of no less importance, the program is designed to introduce medical students to the interdisciplinary approach to comprehensive health care services early in their training, in order to foster better understanding and communication among health and developmental specialists.

Other noteworthy program descriptions for medical students include that by Retish (1980) at the University of Iowa and that by Cohen and Diamond (1984) at the Albert Einstein College of Medicine. Both of these discuss the advantages and problems associated with such a training effort. Both emphasize the desirability of student exposure to developmentally disabled children and adults even *prior* to medical school. In particular, Cohen and Diamond articulate the difficulty of introducing mental retardation and related issues as a direct part of the basic science curriculum during the first two years of medical training, yet note the potential importance of such timing because of the well-recognized and unfortunate attitudinal transition during medical education from an early openness and receptivity to humanitarian issues to a later attitude which is more hardened, skeptical, and more difficult to interest in progressive philosophies of care for the patient with developmental disabilities.

## FELLOWSHIP TRAINING IN DEVELOPMENTAL PEDIATRICS

While a number of model fellowship training programs in developmental disabilities in the United States have excellent track records for producing qualified, competent developmental pediatricians for full-time clinical, teaching, and/or research careers, these select programs do not come close to meeting current needs for developmental subspecialists. Even though numbers are lacking to precisely quantify the present shortage, developmental positions remain available across this country in a variety of administrative, academic, hospital-based, health department, health maintenance organization, and independent practice settings. This need attests to the increased recognition of the broad spectrum of childhood developmental disorders.

Fellowship programs with long histories of contributions to this expanding field include: Albert Einstein College of Medicine, Boston Children's Hospital, University of Colorado Health Sciences Center, the University of Iowa, Johns Hopkins University, the University of North Carolina, and the University of Washington. The John F. Kennedy Institute of the Johns Hopkins University School of Medicine is the largest of these training programs, and has been described by Capute and Accardo (1980). This structured, comprehensive devel-

opmental disabilities program requires two to three years following completion of a three-year approved residency in pediatrics. In broadest outline, the program includes: (1) six months of inpatient service, (2) six months of outpatient service, (3) four months of child neurology, and (4) four-month rotations on two of the following—child psychiatry, perinatology, EEG laboratory, a genetics and biochemical elective, and other appropriate training experiences. The optional third year may be used to obtain an M.P.H. degree or to pursue specialized research interests. The fellows become expert in the evaluation and management of disabled children by learning to use the tools, techniques, and methodologies employed by the various medical and non-medical disciplines in patient management, i.e., the so-called transdisciplinary approach. The program is fully integrated into the general medical education system and employs a structured hierarchy of trainers with residents teaching medical students, fellows teaching residents, and faculty teaching fellows. The clearly stated long-range goal of the fellowship experience is to produce leaders, teachers, and advocates in the field of chronic disabling conditions.

The other enumerated fellowship training programs in developmental pediatrics operate with similar objectives, utilize basically similar materials and methodologies, and attempt to produce full-time developmentalists. While the degree of curriculum rigidity or flexibility, the specific orientation to the interdisciplinary process, and the availability or reliance on an extensive inpatient experience will vary from program to program, all of these established training programs can take pride in the very high percentage (often 100%) of graduates who have remained as workers in the field, many in key leadership positions. It would appear that the fellows' initial interests, supported by the tangible training activities, and the intangibles of setting and of the professional role models who influenced their career choice, have combined to produce the kind of positive, hopeful results that fulfill the goals and objectives of these programs.

## POST-TRAINING CONTINUING EDUCATION OF PHYSICIANS IN DEVELOPMENTAL PEDIATRICS

Since, as documented by numerous surveys and questionnaires, many primary care physicians emerge from their formal medical education inadequately prepared in developmental pediatrics, a number of post-training continuing education experiences have been created to directly address this perceived deficiency. These experiences vary from intensive "mini-residencies" of one week or longer, to several-day, facilitated videotape instructional courses, to traditional continuing medical education programs. The most widely disseminated and best described of these strategies is the videotape course by Frankenburg and Cohrs (1980) entitled *Pediatric Developmental Diagnosis*.

This course, primarily intended for practicing physicians but also appropriate

for residents and fellows, attempts to train physicians to consider the differential diagnosis of developmental problems and to perform the necessary basic diagnostic evaluations. The current training program includes semi-tutorial classroom instruction which utilizes teaching videotapes, printed outlines, and summaries, and is ideally designed to be used by 8 to 15 students at one time. During this time, students are expected to practice what they have learned, and there is time for individual case review. The classroom instruction, under the guidance of a developmental pediatrician preceptor, takes approximately 20 hours; the material to be studied is divided into three parts. The first, a discussion of screening, attempts to motivate physicians to undertake developmental screening to identify children requiring a diagnostic evaluation. The second part, which focuses on diagnosis, is designed to teach the physician a protocol to be followed in the evaluation of children who are suspected to have a developmental problem. The final segment of the videotape training program is designed to teach physicians how to plan and implement the most effective treatment for developmentally delayed children. Included in this portion of the program are descriptions of educational planning and public health nursing referrals. In addition, lessons in this segment shows physicians how to synthesize the diverse findings of experts from many disciplines into a comprehensive treatment plan, and how to sensitively impart diagnostic and treatment information to the parents of a disabled child so that intervention will be most effective. Besides the videocassette, each of the almost 20 lessons includes a printed outline and videoscript, a bibliography of additional reading, a set of examination questions, and a form for the student's evaluation of the lesson. This short-term, intensive training program has proven to have very high national appeal for students, who see it as a way of filling a gap in their training, learning to provide more comprehensive service to their patients, and earning continuing education credits in a convenient manner.

The American Academy of Pediatrics has developed and field tested a 16-hour continuing education videotape program for primary care physicians entitled: "New Directions in Care for the Handicapped Child" (Powers & Healy, 1982). This program, tutored by local developmental pediatrician-special educator teams, was specifically designed to familiarize practitioners with the school and community services available to developmentally disabled children and their families, and to facilitate physician-educator interaction.

## **FUTURE DIRECTIONS IN DEVELOPMENTAL PEDIATRICS TRAINING**

While we have documented substantial improvements in developmental training at all levels of medical education, much remains to be accomplished. Significant impediments and controversies persist. The often limited resources and status accorded to developmentally oriented faculty and training efforts within major

pediatric training programs belie earnest statements of commitment to change. In part, this institutional skepticism reflects concern about the "soft" nature of the field, as well as concerns about the field's ability to develop and evaluate its diagnostic and treatment approaches in a manner similar to that of other fields of pediatrics. Issues of scientific credibility are perhaps most apparent in the area of early intervention, where controversy is likely to continue for some time to come (Guralnick & Bennett, in press).

Moreover, institutional change is slow at both national and local levels. The long-term political impact of the Developmental Pediatrics Task Force's contacts with key professional organizations, such as The American Academy of Pediatrics, The Study Group on Pediatric Education, and The Ambulatory Pediatric Association, has yet to be realized. Even within an individual residency program, considerable effort must be exerted to reach no more than the interim goal of establishing an elective training experience in developmental pediatrics. The fact remains that such changes may be more dependent upon local personalities than on the inherent value of the training program itself. As Weinberger and Oski (1984) discouragingly noted in their survey of pediatric residency programs, very few substantial content changes in the areas of chronic handicapping conditions and "new morbidity" conditions (e.g., learning/behavioral problems) have been made in the five years since the report of the Task Force on Pediatric Education, despite the prestige of this body.

Another unresolved dilemma concerns the overlap in training (and field definition) between developmental and behavioral pediatrics. During their work on curriculum issues, the Developmental Pediatrics Task Force believed it was particularly necessary and worthwhile to clarify distinctions between these simultaneously expanding fields, and to suggest content boundaries. While acknowledging the close linkages and interactions of the two fields, it was believed that, clinically and educationally, too often the terms were loosely applied in an interchangeable manner that obscured real differences in training, orientation, and purpose. Additionally, it was felt that this imprecision impeded accurate interdisciplinary communication and confused those outside of these fields. While this controversial position was supported by some observers (Cohen, 1985), others interpreted it as disruptive and counterproductive (Parmelee, 1985). Nevertheless, it was the Task Force's firm conviction that pediatric residents should have adequate experience in both areas, and, ideally, much more interaction and exchange at the fellowship level should occur among developmental pediatrics, behavioral pediatrics, child neurology, and child psychiatry.

Certainly, training in behavioral pediatrics has also made great strides, particularly because of the incentive provided by the W. T. Grant Foundation through its initial funding of eleven pediatric residency training programs across the country (Friedman, Phillips, & Parrish, 1983). Each of these residency programs was free to establish its own behavioral pediatrics training in accordance with local resources, and few specific guidelines in terms of content or instructional



materials were provided. As expected, considerable variability exists across these sites, and the quality of the programs and level of sophistication ranges widely. In fact, evaluation has tended to occur on a program-by-program basis, with perhaps the most systematic approach being adopted at the University of Maryland School of Medicine for their block rotation (Phillips et al., 1983). Accordingly, a recent plea has been made to more clearly and precisely identify the curriculum content, teaching methods, and evaluation methods unique to behavioral pediatrics (Korsch, 1985).

The creation of a national Task Force of experts in developmental pediatrics, medical education, curriculum development, and evaluation was critical to support and sustain the overall training effort which has been analyzed in this chapter. An unanticipated, but most welcome, side benefit of this project has been the establishment of an ongoing network of pediatric educators with a common interest. This network, which has expanded as new sites have been added, continues to be an important vehicle for sharing and disseminating new training ideas, for mutual support in dealing with training obstacles, and for building a constituency within the pediatric community to lobby for mandatory rotations for pediatric residents that focus on developmental issues and problems. This constituency might extend even to other medical specialties, as is seen in the recent interest in disability issues by family practitioners (Fischler, 1983). Ultimately, it is the energy and durability of this network of developmental pediatricians, committed to improving training in this area, that will be necessary to maintain the momentum established in recent years and to provide future direction and national advocacy for comprehensive, high quality developmental pediatrics training at all levels of medical education.

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