

Primary Care Services Promoting Optimal Child Development From Birth to Age 3 Years

Review of the Literature

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Objective: To examine the evidence base for primary health care services promoting the optimal development of typically developing children aged birth to 3 years.

Data Sources: Peer-reviewed publications addressing clinical evaluations of primary care services from the MEDLINE and PsychINFO databases.

Study Selection: Criteria for selection were as follows: (1) publication between 1979 and 1999; (2) evaluation of efficacy or effectiveness of education, intervention, and care coordination services or validation of assessment approaches; (3) services applicable to an office practice setting; (4) target population including children aged birth to 3 years; and (5) publication in English.

Data Extraction: A total of 312 publications were abstracted and reviewed by both of us; 47 were selected for inclusion.

Data Synthesis: Assessments of parental concerns and psychosocial risk factors using validated approaches seem to be more accurate in identifying developmental problems than clinicians' appraisals. In general, study results support the efficacy of (1) primary care educational efforts toward promoting optimal parent-child interaction, parents' understanding of child temperament, book-sharing activities, and approaches to healthy sleep habits and (2) office interventions such as counseling for the management of excessive infant crying and sleep problems.

Conclusions: The literature suggests that many primary care activities promoting the optimal development of children are efficacious. Evaluations of developmental assessment and services in primary care should be expanded in depth and breadth. The implications for clinical practice, training, and health care policy are discussed.

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THE FIRST 3 YEARS of a child's life are increasingly recognized as an important time for brain growth and a window of opportunity to optimize children's development in many ways. Because of heightened professional, parental, and policymaker attention on this developmentally sensitive period, the provision of appropriate developmental services to young children has been the focus of several recent state and national policy initiatives aimed at improving pediatric care.^{1,2} Although the importance of providing appropriate developmental services during this sensitive period is widely recognized, there are significant barriers in realizing the intent of these efforts in the current pediatric practice environment.

The evolution of managed care has imposed new criteria for authorizing and reimbursing services, including evidence of effectiveness, and in many cases, cost-effectiveness, to justify medical neces-

sity.³ In addition to the growing need for a strong evidence base, there are also questions about what constitutes routine developmental services and how they should be provided. Services such as developmental assessment and anticipatory guidance about developmental concerns have historically been bundled together with, and are indistinguishable from, other pri-

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mary pediatric and preventive services. This makes it impossible to target them specifically for quality improvement or augmented service provision strategies apart from other aspects of health supervision. Moreover, some authors^{4,5} have argued that the current recommendations of the American Academy of Pediatrics and the Maternal and Child Health Bureau are neither feasible nor consistent with new evidence emerging about targeting developmental surveillance and monitoring ap-

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METHODS

DEVELOPMENTAL SERVICES TYPOLOGY

A list of developmental services for children during the first 3 years of life was created based on a review of recommendations detailed in health supervision guidelines of the American Academy of Pediatrics⁷ and the Bright Futures Project.¹ Additional service enhancements derived from innovative primary care demonstration programs, such as the Healthy Steps for Young Children Program⁸ and Zero to Three's Developmental Specialist in Pediatric Practice Project,⁹ were added to this list. The various services were grouped into 4 major categories—assessment, education, intervention, and care coordination. Within these major categories, 8 subcategories were defined. Assessment activities include evaluation of information from parents, developmental monitoring (including screening for developmental problems), psychosocial assessment, parent-child observation, and assessments of child behavior. Education services include anticipatory guidance that addresses the parent-infant relationship, child behavior, and various developmental challenges (eg, promoting healthy sleep habits and discipline practices) and parenting education in different formats. Intervention activities include various types of problem-focused counseling in the office setting, as a telephone service, or through home visitation. Care coordination refers to the management of service needs, eg, referrals for diagnostic assessments or other specialists for care, and was not further subdivided.

LITERATURE SEARCH

A list of key words and subject headings was created for each service category. A computerized search of the literature using the MEDLINE and PsychINFO databases between 1979 and 1999 yielded a list of 312 publications, including original research, commentaries, and committee guidelines statements, which were reviewed for additional relevant references. These publications were abstracted and compiled into tabular form under the subject headings of service category,

author and year published, description and purpose of the publication, quality of the evidence (ie, use of a randomized control design), methods, and results. A final list of publications was created based on the following criteria: (1) evaluation of efficacy (tested experimentally under tightly controlled conditions), effectiveness (evaluated in the real-world setting), and cost-effectiveness or validation of assessment approaches; (2) performance in a pediatric office setting, in conjunction with a pediatric practice, or applicable to office practice; (3) the target population included children aged birth to 3 years; and (4) publication in English.

Given that the primary purpose of the review was to examine general health supervision addressing child development, the method used was different from other approaches taken toward the systematic review of clinical trials. This broad topic area encompasses many different clinical activities, each requiring a search unto itself. In many instances, there were few or no studies to examine. On the other hand, some service categories required boundaries to limit the work to a manageable volume. Three decisions were made to limit the scope of the review. First, the concept of developmental surveillance¹⁰ was used to organize the developmental services typology and to narrow the scope of activities to those most relevant to current practice. The process of developmental surveillance emphasizes eliciting and evaluating parents' concerns, monitoring developmental progress, and performing skilled observations.⁹ The routine use of developmental screening tests is considered to be impractical, and, therefore, this clinical activity was excluded from the review. Instead, other aspects of assessment from the typology were targeted. Second, although we intended to examine the effectiveness of office-based, developmentally focused interventions, this service category resulted in a diverse array of clinical interventions. Therefore, 2 common clinical issues, interventions for excessive infant crying and sleep problems, were selected as prototypes for a larger grouping of developmentally focused interventions. Finally, to limit the scope of the review to well-child care, studies addressing biologically high-risk infants and those examining the clinical application of techniques and tools requiring specialized training, eg, newborn neurobehavioral assessment,¹¹ were excluded.

proaches. Additional potential barriers include the inability to separate bills for developmental services, low reimbursement rates, time constraints, lack of training to conduct these services, and insufficient community-based resources to accommodate the needs of children with problems.⁶

Therefore, defining and examining the evidence base for developmental services is important to guide clinical practice and health care policy decisions. This review addresses pediatric services that promote the optimal development of typically developing children from birth to 3 years of age in studies published during the past 2 decades. Our approach uses a typology for categorizing developmental services that includes assessment, education, intervention, and care coordination in an attempt to distinguish or "unbundle" recommended developmental services separate from other health supervision activities. The intent of this review was to provide a framework for conceptualizing pediatric service provision in terms of specific devel-

opmental health care outcomes and to explore whether the current evidence base supports this kind of approach for evaluating health services intended to promote optimal development or prevent developmental morbidity. Although it is our belief that improving the provision of effective developmental services can improve child developmental outcomes, the studies reviewed herein focus on the efficacy and effectiveness of specific services to identify signs and symptoms, educate parents, change behaviors, and connect children with appropriate ongoing care. Furthermore, we believe that these services should lead to better health and developmental outcomes for children; however, we make no attempt to offer this kind of assessment in this review.

RESULTS

Forty-seven articles examining the clinical efficacy or effectiveness of child development services, or examining

the validity of assessment approaches in any form relevant to this typology, were selected from the larger list of abstracted articles according to the inclusion and exclusion criteria. Of these, 30 were controlled clinical trials, including 20 that used a randomized control design. The remainder included cross-validation studies of assessment approaches and one cost-benefit analysis. Except for intervention studies, data were not of the type that permits quantitative analysis. For most categories of the typology, except intervention studies, the literature search yielded few studies that were directly comparable. When a validated measure of methodological quality was applied to the intervention studies,¹² only 5 (2 of infant crying and 3 of sleep problems) were of sufficient quality to consider quantitative analysis. Therefore, only a descriptive analysis is presented, by service category.

ASSESSMENT ACTIVITIES IN PRIMARY CARE

Articles addressing the efficacy of physicians' ability to elicit and address parents' concerns about child development, identify children's risk of developmental disability, evaluate the psychosocial context of development, and characterize children's behavioral characteristics were reviewed.

Evaluating Parents' Concerns About Child Development

Eliciting and evaluating parents' concerns about development and behavior are a central focus in developmental surveillance and can be reliable and accurate indicators of true developmental problems.¹³ Five studies examined the use of a checklist or questionnaire to elicit and evaluate parents' concerns about child development and behavior (**Table 1**). In one study,¹⁴ parents' concerns about child development and behavior were discussed more often (53% vs 30%) when a checklist was used. The use of the checklist also highlighted differences in the topics parents were most concerned about compared with what pediatricians were most likely to discuss (concerns about child behavior and other parenting issues vs general development and appetite, respectively). The remaining studies in this category suggest that parents' concerns about development and behavior may serve as an effective surveillance strategy. The works by Glascoe and colleagues suggest that the number and nature of parents' concerns are correlated with a probability of failing a developmental screening test¹⁵ and having significant behavior problems¹⁶ or true speech and language problems.¹⁷ Parents of children with global developmental delay had concerns about behavior, speech and language, and emotional status more often than concerns about global development.¹⁸

In summary, literature examining the elicitation and evaluation of parents' concerns about their child's development provides important validation for developmental surveillance as a clinical strategy. Results of these studies suggest that structured and systematic approaches to eliciting parents' concerns improve communication at the health visit and seem to be reliable and

fairly accurate in the detection of developmental problems. Given the potential efficiency of this approach (the questionnaires and checklists require <5 minutes to complete), it deserves serious attention as a key strategy for organizing the activities of the health visit.

Assessment for Risk of Developmental Disability

Four studies were reviewed that examined the effectiveness and cost-benefits of efforts to identify children at risk for developmental problems (Table 1). Two studies^{19,20} addressed physicians' effectiveness at identifying developmental problems, both suggesting that relatively few are identified before school entry and that only severe, clinically apparent disabilities are most likely to be identified early by physicians. Two other studies examined issues relevant to the process of developmental screening. In a study²¹ of a large program in Scotland, developmental screening was most accurate when done at ages 9 months and 2 years, with tests of adaptive and neurological function being best for identifying later school and behavior problems. A study²² comparing costs and benefits for screening strategies that elicit parental concerns vs those that use a standardized screening test or a combination of both suggested that all are equivalent with respect to long-term costs and benefits of early detection and intervention. However, short-term costs of screening favor the more efficient strategy of evaluating parental concerns.

In summary, these 4 studies suggest that current community efforts to identify children with developmental problems are not effective. It is unclear from the literature reviewed how much of this deficit is explained by the lack of an efficiently organized service provision effort in the pediatric sector. There have been few validated and recommended assessment options for pediatric providers beyond the use of lengthy developmental screening tests, and little direction has been given about how recommended assessments could be accomplished, particularly in busy, high-volume settings. Taken together, these studies are important in suggesting potential alternative approaches to increase the accuracy of early detection of developmental problems. These approaches range in intensity, cost, and time efficiency, permitting their adaptation to different clinical populations or to time constraints of different practice settings.

Assessment of the Psychosocial Environment

Eight studies that examined the identification of psychosocial risk factors for poor parenting, quality of the home environment for supporting child development, and office assessment of the parent-child relationship were reviewed (Table 1). Studies that addressed the identification of psychosocial risk factors (parental alcohol and substance abuse, maternal depression, lack of social support, domestic violence, housing instability, and parents' own childhood history of abuse) compared the accuracy of questionnaires that were shorter versions of longer research-oriented instruments with clinical judgment. These studies demonstrate that questionnaires identified more problems than did clinical judgment.

Table 1. Studies Evaluating Assessments in Primary Care

Study and Year	Assessment Focus	Purpose	Patient Age, y	Patients, No.	Office Setting	Control Group	Main Findings*
Triggs and Perrin, ¹⁴ 1989	Parental concerns	Evaluated use of a preclinic behavior concerns checklist	1-6	396	Yes	Yes	Use of checklist increased discussion of behavioral concerns (53% vs 30%)
Glascoe et al, ¹⁵ 1989	Parental concerns	Examined the relationship between developmental screening test results and parents' concerns	1-6	100	Yes	No	Type of parental concern is associated with probability of passing or failing developmental screening
Glascoe et al, ¹⁶ 1991	Parental concerns	Examined accuracy of parental concerns in detecting significant behavior problems	2-6½	95	Yes	No	Accuracy of parental concerns in detecting significant behavior problems (sensitivity, 70%; specificity, 73%)
Glascoe, ¹⁷ 1991	Parental concerns	Examined the relationship between parents' concerns and language problems	½-6½	157	Yes	No	Accuracy of parental concerns about speech and language (sensitivity, 72%; specificity, 83%)
Glascoe, ¹⁸ 1994	Parental concerns	Examined the relationship between parents' concerns and developmental delay	½-6½	95	No	No	Accuracy of parental concerns in identifying global delay (sensitivity, 5%-78%; specificity, 47%-99%)
Glascoe and VanDervoort, ¹⁹ 1985	Risk for developmental problems	Examined physicians' effectiveness at identifying developmental problems	0-15	130	No	No	Physicians referred cases of mental retardation at ages similar to other referral sources but referred other disabilities (autism and learning disabilities) significantly later than other referral sources
Palfrey et al, ²⁰ 1987	Risk for developmental problems	Examined how children with special education needs were identified and the role of the medical system in the diagnosis	Not stated	1726	No	No	Only 28.7% of children receiving special education were identified before age 5 y; physicians were most likely to identify high-severity, low-incidence problems in the first 3 y (including severe mental retardation, cerebral palsy, and sensory impairments)
Drillien et al, ²¹ 1988	Risk for developmental problems	Examined the association between screening during infancy and early childhood and later school problems	0-7½	Study 1: 417 Study 2: 570	No	No	Screening was most predictive at 39 wk, 2 y, and 3 y; tests of adaptive and neurological function were most predictive of later school and behavior problems
Glascoe et al, ²² 1997	Risk for developmental problems	Examined the costs and benefits of 4 different assessment strategies in identifying developmental problems	Not stated	408	Yes	No	Long-term costs and benefits of early detection and intervention: no approach was superior Short-term costs to physicians: (1) 2-stage negative approach (most costly) and (2) parents' concerns only (least costly)
Wissow et al, ²³ 1992	Family violence and maternal psychosocial distress	Pediatricians' accuracy of identification	½-14	243	Yes	No	Questionnaires identified intrafamilial violence 2.7 times and maternal distress 8.9 times more often than physicians
Kemper, ²⁴ 1992	Parenting risk factors	Accuracy of clinic questionnaire	Not stated	114	Yes	No	The questionnaire identified more children with psychosocial risk factors for poor parenting than was noted in the medical record in all categories except domestic violence and low social support
Kemper and Babonis, ²⁵ 1992	Maternal depression	Accuracy of clinic questionnaire	Not stated	667	Yes	No	Compared with original questionnaire (sensitivity, 100%; specificity, 88%)
Kemper et al, ²⁶ 1993	Alcohol and other drug abuse	Accuracy of clinic questionnaire	0-72	507	Yes	No	Alcohol abuse (sensitivity, 91%) and drug abuse (sensitivity, 88%)
Kemper et al, ²⁷ 1994	Child abuse risk	Accuracy of clinic questionnaire	Not stated	284	Yes	No	Compared with the parent measure (sensitivity, 92%-95%; specificity, 87%-92%)
Frankenburg and Coons, ²⁹ 1986	Home environment	Concurrent validity of clinic questionnaire	0-36	911	Yes	No	Compared with the HOME Inventory (coperativity, 81.2%; conegativity, 65.7%; and positive predictive value, 77.3%)
Casey et al, ³⁰ 1988	Home environment	Concurrent validity of clinic questionnaire	0-18	76	Yes	No	Significant correlations with the HOME Inventory, parent-child interaction measure, and family income
Casey et al, ³¹ 1993	Mother-infant interaction	Concurrent and predictive validity of office observation	0-36	46	Yes	No	Significant correlations with the HOME Inventory, laboratory ratings of mother-child interaction and measures of development, IQ, language, and behavior at 36 mo

*HOME indicates Home Observation for Measurement of the Environment.

Physicians underestimated substantially the prevalence of intrafamilial violence, maternal psychosocial distress, and associated behavior problems in children compared with use of a questionnaire for this purpose.²³ The use of a clinic questionnaire identified significantly more mothers with potential risk factors for poor parenting compared with review of medical records.²⁴ Shorter versions of this questionnaire for evaluating parental depressive disorders,²⁵ substance abuse,²⁶ and parental history of physical abuse as a child²⁷ compared favorably to the original measures in terms of accuracy.

Two studies used a modification of the HOME Inventory (Home Observation for Measurement of the Environment)²⁸ for pediatric office use to assess the quality of the home environment. The Home Screening Questionnaire for children aged birth to 3 years was highly correlated with the HOME Inventory and was accurate compared with the original inventory.²⁹ The Pediatric Review of Children's Environmental Support and Stimulation, which combines an adaptation of the HOME Inventory with observations of parent-infant interaction, showed significant correlations with measures of parent-child interaction, safety, and family income.³⁰

Only one systematic approach to parent-child observation in office settings has been reported. Pediatric assessments of mother-child interaction correlated significantly with the HOME Inventory, laboratory ratings of mother-child interaction, and measures of development, intelligence, language, and behavior problems.³¹

In summary, the literature on the effectiveness of psychosocial assessment in office settings indicates that the accuracy of identifying psychosocial risk factors can be improved by using questionnaires and that there is also some evidence supporting the validity of home environment and parent-child assessments. Although these studies are essentially examinations of efficacy, they should provide a strong incentive for further investigations of this aspect of pediatric care. Better psychosocial assessment tools and procedures could facilitate the pediatric provider's ability to monitor and refer common and debilitating psychosocial problems, from maternal depression to family violence. Pediatric health care supervision could be a more effective entry point for "2-generation" family interventions, eg, referrals to an Early Head Start program or to family literacy programs.

Assessment of Child Behavior

We found no assessment approaches to behavioral problems specific for the first 3 years of life in the published literature, reflecting the absence of a universally accepted diagnostic classification scheme for behavioral problems in this age group.³² Behavior problem checklists standardized for children beginning in the third year of life^{33,34} have not been examined in terms of their effectiveness in pediatric practice. Instead, approaches to temperament assessment have been used to address behavioral concerns in infants and younger children.^{35,36} Both American Academy of Pediatrics and Bright Futures health supervision guidelines recommend the discussion of infant temperament as part of routine well-child care. We believe that the context for the use of temperament as-

essment is better suited to anticipatory guidance in helping parents understand their child's individuality.

EFFECTIVENESS OF ANTICIPATORY GUIDANCE

Until recently, few studies have examined the effectiveness of anticipatory guidance in terms of child developmental outcomes, perhaps because of the bundling of developmental services with all other health promotion services. Twenty studies were found that address the provision of anticipatory guidance relevant to promoting optimal child development (**Table 2**).

In an important study with first-time mothers, Chamberlin et al³⁷ reported that the strongest predictor of child development outcome was the mother's reported use of positive contact with her child and that physicians' teaching efforts toward increasing parents' positive contact contributed a small amount to this prediction. Teaching efforts affected mothers' knowledge of child development and feelings of being supported; however, neither was related to children's developmental status. In a 1-year follow-up of this study,³⁸ physicians' teaching efforts were no longer related to mothers' use of positive contact with their children, although the latter was still the strongest predictor of child development outcome. Physicians' efforts to encourage these kinds of behavior were minimal compared with discussions about stage-related behavior, individual differences, and common behavior problems. A similar conclusion was reached in another study³⁹ in which discussions about developmental stages relevant to anticipatory guidance topics were not effective in terms of measures of mother-infant interaction, perceptions and attitudes, and satisfaction with pediatric care.

Parent Education to Enhance Parent-Child Interaction

Given the importance of these findings, it is surprising that only 3 studies were found in the literature that examine interventions to enhance mother-infant interaction (Table 2). Only one of these was conducted in an office-based setting; however, the other 2 approaches are accessible to the average pediatric practice in terms of their feasibility. In all 3 studies, effective interventions were demonstrated. Mothers receiving discussions during well-child care visits about infant social development to encourage sensitive and responsive interactions with their infants and to increase their own sense of effectiveness demonstrated more favorable interactive behavior with their infants, who later were more advanced on measures of vocal behavior.⁴⁰ In a second study,⁴¹ mothers receiving a skill-training program designed to teach the competencies of newborns demonstrated higher quality behavioral interaction. In a third study,⁴² a 15-minute videotape intervention was effective in enhancing mealtime communication and attitudes in black adolescent mothers.

Temperament-Based Anticipatory Guidance

An understanding of the child's behavioral individuality is important in encouraging positive contact be-

Table 2. Studies Evaluating the Effectiveness of Anticipatory Guidance

Study and Year	Education Target	Patient Age, mo	Patients, No.	Randomized Control	Effect
Chamberlin et al, ³⁷ 1979	Child development and mothers' knowledge of child behavior and development	0-18	371	No	Child development knowledge: yes Feelings of being supported: yes Child development outcome: no
Chamberlin and Szumowski, ³⁸ 1980	Child development and mothers' concerns, behavior, and knowledge	0-30	371	No	Child development knowledge: yes Feelings of being supported: yes Child development outcome: no
Dworkin et al, ³⁹ 1987	Mothers' knowledge, perceptions, and satisfaction; family adaptation	½-6	83	No	No
Casey and Whitt, ⁴⁰ 1980	Mother-infant relationship	0-6	32	Yes	Yes
Bristor et al, ⁴¹ 1984	Mother-infant interaction	0-1	42	No	Yes
Black and Teti, ⁴² 1997	Mother-infant interaction	4-13	59	Yes	Yes
Little, ⁴³ 1983	Perceptions of infant temperament	6-8	79	No	Yes
Cameron and Rice, ⁴⁴ 1986	Perceptions of infant temperament	4-12	602	Yes	Yes
Wolfson et al, ⁴⁷ 1992	Sleep habits	0-2	60	Yes	Yes
Adair et al, ⁴⁸ 1992	Sleep habits	4-9	292	No	Yes
Pinilla and Birch, ⁴⁶ 1993	Sleep habits	0-2	26	Yes	Yes
Sege et al, ⁴⁹ 1997	Discipline practices	14-72	559	No	Yes (for parents who had never used "time-out")
Needlman et al, ⁵⁰ 1991	Book sharing	6-60	79	No	Yes
High et al, ⁵¹ 1998	Book sharing	12-38	151	No	Yes
Golova et al, ⁵² 1999	Book sharing	5-24	135	Yes	Yes
Osborn and Woolley, ⁵⁴ 1981	Group well-child care	0-6	78	No	Efficiency: no Attendance: yes Utilization of health services: no
Dodds et al, ⁵⁵ 1993	Group well-child care	2-12	31	No	Anticipatory guidance discussion content: yes Parenting issues: no
Rice and Slater, ⁵³ 1997	Group well-child care	0-10	50	No	Knowledge of child development: no Perceived support: no Maternal depression: no
Taylor et al, ⁵⁶ 1997	Group well-child care	4-15	114	Yes	Mother-child interaction: no Child development: no
Taylor and Kemper, ⁵⁷ 1998	Group well-child care	4-15	213	Yes	Maternal sense of competence, social isolation, and social support: no

tween parents and their children. In this regard, physicians are encouraged to discuss the child's temperament as a way of imparting an understanding of this individuality to the parent and promoting an optimal "fit" between them. Despite an expansive literature addressing child temperament, only 2 studies have examined the clinical use of temperament assessments in pediatric primary care (Table 2). Both studies^{43,44} report that most parents find temperament information helpful and influential in their approach to parenting. In the first year, temperament-based anticipatory guidance materials for parents were most helpful for parents with challenging ("high-energy") infants.⁴⁴ One study⁴⁴ recruited participants from a large health maintenance organization, suggesting the feasibility of routine temperament-based anticipatory guidance in the child's first year. This has strategic importance in light of the relationship between infant temperament and later behavior problems.⁴⁵

Other Office-Based Educational Activities

During the past decade, studies have examined more focused educational activities addressing specific developmental topics that fall within the larger domain of anticipatory guidance. These services include efforts to

promote healthy sleep habits, effective discipline, and children's cognitive development by encouraging book-sharing activities (Table 2). Preventive counseling sessions and written instructions were effective in promoting better infant sleep patterns⁴⁶ and in reducing stress and increasing parents' confidence⁴⁷ during the first 2 months of life. Written anticipatory guidance about sleep practices was effective in reducing night waking during infancy,⁴⁸ as was written information promoting the use of "time-out" for parents who had never tried it.⁴⁹ A pediatric book distribution program for promoting early literacy was effective in increasing book-sharing activities with children, particularly in poor ethnic minority families,^{50,51} and was associated with higher receptive language development.⁵²

Although not a specific educational activity per se, group well-child care was as effective as traditional care⁵³ and seemed to promote more discussions of personal issues,⁵⁴ parenting, and child behavioral concerns.⁵⁵ However, such benefits do not seem to extend completely to higher risk populations.^{56,57}

In summary, anticipatory guidance seems to be effective during the first 3 years of life, when teaching efforts are directed toward increasing positive contact between parent and child. Efficacy was demonstrated for efforts to enhance the quality of mother-child interac-

Table 3. Studies Evaluating Interventions for Behavioral Problems

Study and Year	Target	Intervention	Patient Age, mo	Patients, No.	Office Setting	Randomized Control	Effect
Taubman, ⁶² 1988	Excessive crying	Counseling vs diet manipulation	0-3	20	Yes	Yes	Yes (counseling > diet intervention group)
Taubman, ⁶¹ 1984	Excessive crying	Counseling to reduce stimulation	0-3	60	Yes	Yes	Yes
McKenzie, ⁶³ 1991	Excessive crying	Counseling to reduce stimulation	1-3	42	No	Yes	Yes
Parkin et al, ⁶⁵ 1993	Excessive crying	Counseling vs car ride simulation vs reassurance	1-2½	38	Yes	Yes	No
Wolke et al, ⁶⁴ 1994	Excessive crying	Counseling vs emotional support vs no treatment	1-5	92	No	No	Yes (counseling > empathy alone and control)
Richman, ⁶⁷ 1985	Night waking	Medication	12-24	22	No	Yes	No
Rickert and Johnson, ⁷⁰ 1988	Night waking	Counseling vs scheduled awakenings	6-54	33	No	Yes	Yes (systematic ignoring > scheduled awakenings > controls)
Adams and Rickert, ⁷¹ 1989	Settling problems	Counseling: graduated extinction vs positive routines vs control	18-48	36	No	Yes	Yes (graduated extinction and positive routines > controls)
Seymour et al, ⁷⁴ 1989	Night waking and settling problems	Counseling and written information vs written information vs control	9-60	45	No	Yes	Yes (both interventions > controls)
Scott and Richards, ⁷⁵ 1990	Night waking	Counseling and written information vs written information vs control	5-18	120	No	Yes	No
Simonoff and Stores, ⁶⁸ 1987	Night waking	Medication	12-36	20	No	Yes	Yes (medication > placebo)
Weir and Dinnick, ⁷³ 1988	Night waking and settling problems	Counseling	4-54	51	No	No	No
France et al, ⁶⁹ 1991	Night waking	Counseling plus medication vs counseling alone vs control	7-27	35	No	Yes	Yes (combined > counseling > control)
Reid et al, ⁷² 1999	Night waking and settling problems	Counseling: standard vs graduated ignoring vs control	16-48	49		Yes	Yes (both counseling > control)

tion using methods accessible to most pediatricians. Temperament-based counseling seems particularly helpful to parents with challenging infants, but its potential role in preventive mental health remains to be addressed. The literature also suggests that anticipatory guidance can be effective when it is targeted to specific issues such as sleep habits, discipline, and promoting children's learning. On the other hand, this literature suggests that efforts to increase parents' knowledge of child development may do so without necessarily having any impact on child development outcomes. Finally, several studies suggested that group well-child care is at least as good as traditional well-child care in providing basic services in certain settings and seems to encourage the process and content of health visits in favor of nonmedical issues.

PROBLEM-FOCUSED DEVELOPMENTAL INTERVENTION

Excessive Infant Crying

Of the many approaches to the management of colic or excessive crying during infancy, the view that excessive crying represents a temperament-environment mismatch has had the most consistent support in the pediatric literature.⁵⁸ The treatment of excessive crying or infant colic has been the subject of other reviews.^{59,60} We do not intend to replicate these reviews or to address the dispute surrounding the role of cow's milk protein al-

lergy in this phenomenon. Instead, we focus more narrowly on the evidence relevant to developmental services, in this case the efficacy of behavioral or counseling interventions. Five controlled studies examined the effectiveness of counseling approaches to helping parents manage the "colicky" or "fussy" infant (**Table 3**). Four of the studies⁶¹⁻⁶⁴ supported the temperament-environment mismatch hypothesis, demonstrating the efficacy of counseling parents to use specific strategies to help calm fussy infants. In one study,⁶⁵ counseling regarding specific management techniques was no more effective than reassurance from a pediatrician or use of a vibratory stimulus.

Sleep Problems

Night waking and difficulties settling to sleep are also common concerns for parents of infants and toddlers.⁶⁶ Nine controlled studies were identified that examined common clinical approaches to the management of sleep problems, including behavioral strategies and medications (Table 3). Studies evaluating the effectiveness of treatment with medication for children with settling and night waking problems suggested that it was either minimally effective or effective under limited circumstances in the short term and no more effective than behavioral approaches in the long term.⁶⁷⁻⁶⁹ The adverse effects of medication use were particularly troubling to some parents.⁶⁷

Behavioral approaches to sleep disturbances were effective in general. Extinction techniques (letting the child “cry it out”), “positive” bedtime routines (activities are given praise and encouragement), and scheduled awakenings were all effective in treating night waking and crying or tantrums at bedtime.⁷⁰⁻⁷² Behavioral modification techniques, however, may not be useful for children with particularly severe sleep problems.⁷³ The effectiveness of using written information in the management of sleep problems is uncertain, with 2 studies^{74,75} showing different outcomes with respect to reducing night waking.

In summary, the literature addressing interventions for fussy infants and poor sleepers demonstrates efficacious behavioral counseling approaches that are accessible to most pediatricians in office settings. Efficacy was demonstrated for different behavioral approaches to sleep problems. Again, the potential effectiveness across different pediatric settings is implied and remains to be demonstrated. The role of medication therapy to manage common sleep problems is unclear, although the degree to which it is currently prescribed for sleep problems in this age group probably is not warranted.⁶⁶

CARE COORDINATION AND MONITORING PRACTICES

Coordinating and monitoring the service needs of children with developmental and behavioral concerns is a necessary aspect of care, although it has received little attention in the literature. Follow-up for office interventions and monitoring of referrals to other specialists and services are included in this category. No studies were found that addressed this issue in primary care pediatrics.

COMMENT

In this article, we reviewed 2 decades of pediatric literature investigating primary care activities to promote optimal child development in the first 3 years of life. We approached this issue from a service provision perspective by specifying a continuum of services for promoting healthy development unbundled from the larger group of activities that comprise well-child care. Our approach differs from that of others in the child development literature by asking whether these activities are effective health services for accomplishing their specific assessment, education, or intervention goals instead of asking if these activities are important within a specific domain of development, eg, for improving cognitive development or language development.

This perspective is based on the premise that health services in primary care should address the needs of the developing neurological system, taking into account our clearer understanding of the role of experience and brain development.⁷⁶ The pediatric leadership has responded to this in concept by developing health supervision guidelines for children based on a science of child development.¹ At the same time, the need for these services is growing from the consumer’s standpoint. Parents of young

children from birth to 3 years of age want these services and view pediatricians as resources for them.⁴

WHAT HAVE WE LEARNED ABOUT THE EFFECTIVENESS OF DEVELOPMENTAL SERVICES?

Although a wide range of topics was selected for review, the resulting literature base was not extensive owing to relatively stringent methodological criteria being used for selection. Nevertheless, there is reason to be optimistic because this literature was compelling in identifying promising approaches toward promoting optimal child development in health care settings, in raising important issues relevant to provision of developmental services in pediatric practice, and in suggesting avenues for future work.

ASSESSMENT IN CLINICAL PRACTICE

The available evidence suggests that assessment of developmental issues might benefit from the wider use of structured, validated approaches. This pertains to addressing parents’ concerns about development and behavior as much as other areas. In addition to facilitating discussion of these concerns, systematic assessment of parents’ concerns can play a role in identifying children with developmental problems, replacing or supplementing longer and more costly developmental screening assessment using instruments such as the Denver II screening test. One drawback to this approach is that it may not be tailored with enough sensitivity to the needs of parents during the child’s first 3 years, when child-rearing concerns are high priorities. Still, it merits more attention as a strategy for improving developmental surveillance and may help improve the current low rate of identification of children with developmental problems before school entry.

There are other implications for structuring care through the targeted use of specific assessment instruments that focus on a particular developmental domain. For example, it seems that a temperament assessment timed for 4-month health visits may provide useful information for parents and pediatricians. Although the potential efficacy of a temperament assessment is suggested in the studies that were reviewed, the feasibility and effectiveness of such assessment strategies in real-world settings has not been evaluated. Introducing such a routine assessment may require that the 4-month visit last a little longer, requiring modification in front and back office administration procedures and further training of pediatricians and office personnel, as well as other practice modifications to accommodate such a change in routine procedures.

There are other concerns about adding standardized assessment to the periodic developmental surveillance process. In addition to increased staff time and paperwork, structured assessments may interfere with listening to parents and may lead clinicians to forsake the use of clinical observation skills. Use of structured instruments must be integrated with the clinical interview, stressing basic communication skills and skilled ob-

ervation honed by experience. Other problems include accurately interpreting the information obtained and having adequate or appropriate places to refer children and/or families once a problem is discovered. Indeed, greater use of validated instruments to assess developmental progress, the psychosocial context of development, and children's temperament represents a significant technological advance in pediatric practice. How practices should be restructured to use these new effective tools and techniques and how communities respond to an increase in service needs are critical questions. One possibility is to pay attention to the timing of assessment insofar as more extensive assessment at less frequent intervals or at particular office visits may be more efficient than a more cursory and less sensitive assessment at every visit.

DEVELOPMENTAL EDUCATION IN CLINICAL PRACTICE

The studies reviewed highlight several important issues relevant to promoting optimal development in clinical practice, ie, what is largely considered anticipatory guidance. Studies demonstrated that physicians' teaching efforts can be effective in promoting healthy development. Advising parents about social interaction with infants, temperament, healthy sleep habits, children's learning, and the use of discipline were all efficacious to some degree. However, the only direct examination of physicians' teaching efforts from 2 decades ago suggested that these activities are not part of practicing physicians' repertoires. The recent Commonwealth Survey of Parents suggests that little has changed in this regard and that the needs of most parents for help and advice with child-rearing concerns are not being met.^{4,5} Part of the reason may be that physicians' teaching efforts emphasize general development instead of more specific topics. Furthermore, activities that do impact later development, ie, efforts to promote more positive and harmonious social relationships and cognitively stimulating experiences between parents and their children in the first 3 years of life, are not within the pediatric clinical repertoire. This literature suggests that pediatric anticipatory guidance requires restructuring to meet the demand for these activities and to affect later development.

PRIMARY CARE INTERVENTIONS FOR DEVELOPMENTAL AND BEHAVIORAL PROBLEMS

The literature demonstrated that counseling and behavioral interventions for excessive infant crying behavior and night waking and settling disturbances are efficacious. The review also highlighted the limitations of medications, which are widely prescribed, in treating infant sleep disturbances.⁶⁶ The effectiveness of these interventions in pediatric settings remains to be explored, and many questions are raised, eg, regarding feasibility and time costs. There are also boundary issues between other behavioral subspecialties (eg, developmental-behavioral pediatrics, psychology, and psychiatry) that have not been defined, primarily for the management of severe sleep problems. Health service pathways that ad-

dress evaluation and management of developmental and behavior problems and referral criteria to other subspecialists are needed.

COORDINATION OF CARE AND MONITORING OF SERVICES

This aspect of care has been neglected in the literature, although it represents a constant logistical aggravation for many practices and a source of frustration for parents. Pediatricians report that they are less likely to conduct psychosocial assessments if there is not a reliable network of family support services to refer the families that are identified as needing care.⁷⁷ Confronting an overwhelming and fragmented service network for early intervention, special education, and social services requires a staff with both broad and local knowledge of the service system and a commitment to advocacy. Pediatric providers cannot be expected to assess families for maternal depression if there is no place to send that mother for treatment. Primary care practices expecting to provide the full range of developmental services would benefit from information about effective practices and the costs of addressing this aspect of care.

IMPLICATIONS FOR CLINICAL PRACTICE

Although the evidence base for developmental services has expanded since 1979,⁷⁸ it is still composed primarily of efficacy studies that demonstrate the validity of interventions or procedures in controlled situations. Therefore, we can only note the potential of these services for effectiveness in actual practice. The question still remains whether a difference in the care of children can be made if pediatricians provide developmental services more often and more effectively. It is also unclear whether pediatricians will be able to implement these innovative practices. A recent national survey⁶ of selected, developmentally oriented pediatric practices suggests that few practices actually provide formal developmental or psychosocial assessments. At present, there seems to be a variety of barriers to the effective provision of these services, including training and expertise, adequate reimbursement, and availability of appropriate referral services to address discovered needs, among other organizational constraints.

The challenge for improving the quality of pediatric health care is to institute the most effective service package(s) and processes for providing those services. We suggest 2 major barriers to reaching these goals. First, the typology highlights the wide array of potential activities that can be provided as developmental services. A major challenge is to organize these developmental services into a practical strategy that can be provided effectively and, at the same time, integrate other health priorities, eg, nutrition and safety counseling. This must be done in a time-efficient manner that makes sense within the constraints of today's busy practices. Although more recommended activities have been added to the list of services to be provided at a routine health supervision visit, little has been done to provide an organizational and provision framework that would permit the effective and ef-

ficient provision of all these services. Other than more general guidelines by the American Academy of Pediatrics and the Maternal and Child Health Bureau, no overall strategy exists, to our knowledge, and what actually happens in practice is anyone's guess. We believe that an individualized approach to parents' needs and concerns is in order, ie, one based on an assessment of parents' knowledge, resources, attitudes, and capabilities that would enable the physician to provide services selectively from a broader array of potential services suggested by the overall typology.⁷⁹

IMPLICATIONS FOR PHYSICIAN TRAINING

A second challenge is bridging the gap between the knowledge and skills required in providing these services and the limited training that many clinicians receive. The clinical skills required to determine children's and parents' developmental and psychosocial needs, or the most appropriate intervention for bringing about and maintaining a change in parents' behaviors, have not been the major focus of either pediatric or family medicine training. Data from a recent study⁷⁶ of pediatric practices highlighted that many pediatricians report the need for additional training to appropriately address parents' psychosocial concerns. Defining these knowledge and skill criteria is a necessary first step for evaluating effectiveness because they enable a more accurate determination of the intensity or adequacy of service. The outcome of this process has direct implications for physician training.

A critical focus in training then must be the definition of competencies in developmental and behavioral pediatrics. The Future of Pediatrics Education II⁸⁰ has reaffirmed the emphasis of the original task force on training in child development and behavioral pediatrics in its recommendations. The Society for Behavioral Pediatrics has released comprehensive curriculum guidelines for residency training in developmental and behavioral pediatrics.⁸¹ For many training programs, incorporating those guidelines and recommendations creates significant challenges. One question is how residency training should be restructured so that the appropriate learning environment is created for residents. The tension created by this issue is all too apparent in today's academic settings, which remain focused on acute care and oriented toward the disease model. Another question pertains to the teaching and clinical practice roles to be played by developmental-behavioral and general pediatricians now that developmental and behavioral pediatrics has moved closer to subspecialization. Defining and controlling a market share is critical to the survival of a medical subspecialty,⁸² adding further complexity to the boundary issues raised in the "Primary Care Interventions for Developmental and Behavioral Problems" subsection. These factors will affect how training programs are structured and operated.

POLICY IMPLICATIONS

Although the existing literature suggests potential for the effectiveness of several types of developmental ser-

vices, policy questions remain. Who should be responsible for the provision of developmental and behavioral assessments; for the provision of health education and developmental promotion; and for the payment of home-based, practice-based, and community-based interventions? The boundary that designates where pediatric care ends and community-based early intervention services begin is not well defined and is blurred in many communities. This boundary is often determined by the availability of other funding mechanisms, including local and state maternal and child health funds, Individuals with Disabilities Education Act funding, and other early childhood programs. In addition, because provision of developmental and behavioral assessments can result in identification of a range of developmental and behavioral problems, questions arise regarding payment for treatment and intervention programs. Because a large proportion of children most at risk for adverse developmental outcomes are also children covered by the Medicaid program (Title XIX) and the State Child Health Insurance Program (Title XXI), these 2 governmental programs potentially have a major role in determining what services are provided and how they are paid for.

Therefore, although there are many convincing arguments for providing optimal developmental support to families with young children, there are a variety of unsettled issues regarding what services are most effective, how these services should be provided, and who should bear the burden of payment. At the same time, there is heightened public awareness of the importance of early childhood development and of the need to act in the direction of providing support and services to families. Future evaluation in this area should expand the depth and breadth of topics investigated, involve practicing physicians to a greater extent, and address important methodological details.

SUMMARY

In this review, we examined the evidence for the effectiveness of pediatric health services to promote optimal child development using a new organizational typology of the various types of activities that physicians provide in general health supervision. Our approach was to conceptualize these activities as an evidence-based service system that has relevance to today's clinical practice orientation. Such an approach is necessary to develop appropriate service provision models and systems for reimbursement and to evaluate quality of care.

The review suggests that effective and efficient approaches to providing developmental services exist, although most of the literature remains limited to studies of efficacy. Nevertheless, important advances in the knowledge base have been made with respect to assessment, education, and intervention in this service area. Although the literature supported the efficacy of many approaches to the provision of services in these areas, several challenges remain in effectively implementing these services on a wide scale. Issues related to organizing service provision packages, defining assessment and treatment pathways, determining professional boundaries and

What This Study Adds

The first 3 years of a child's life are increasingly recognized as a window of opportunity to optimize children's development. Little is known about the effectiveness of primary health care activities intended to do so. This study defines and examines the evidence base for services promoting child development in the first 3 years of life with a systematic review of the literature from the past 2 decades. The findings have implications for clinical practice, physician training, and health care policy decisions.

role responsibilities in the larger community, and implications for training and health care policy must be addressed.

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