

How Do Primary Care Physicians Manage Children With Possible Developmental Delays? A National Survey With an Experimental Design

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ABSTRACT. *Objective.* Although early detection and treatment of developmental delays can improve outcome, little is known about factors that influence how primary care physicians manage young children with probable developmental delays. The objective of this study was to describe physician referral practices for children with developmental delays and to test whether the probability of referral is increased by 1) the expression of parental concern; 2) female gender in a child with language delay; 3) disruptive, as opposed to avoidant behaviors; and 4) physician characteristics, including female gender or being a pediatrician.

Methods. A cross-sectional survey was mailed to a national random sample of 800 pediatricians and 800 family practice physicians in primary care practice, using an experimental randomized block design. Recipients randomly received alternative variants of clinical vignettes, which differed only in regard to the variable specific to each of the first 3 hypotheses. Physicians answered questions about the likelihood of referral on a 5-point scale for listed referral options. Hypotheses were tested using multivariable logistic regression modeling. A total of 55% of pediatricians and 43% of family practice physicians returned the survey, for an overall response rate of 49%.

Results. A girl with language delay was 60% more likely to be referred to audiology than a boy (odds ratio: 1.6; 95% confidence interval: 1.1–2.3), and respondents who were female or pediatricians were more likely to refer patients. The expression of parental concern did not increase the probability of referral to diagnostic and treatment services, and avoidant rather than disruptive patient behaviors were associated with an increased probability of referral.

Conclusions. Patient gender and type of behavioral presentation seem to influence referrals to diagnostic and treatment services for young children with probable developmental delays described in clinical vignettes. These findings can guide targeted educational interventions to increase rates of detection and referral for young children with developmental delays. *Pediatrics* 2004;113:

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ABBREVIATIONS. OR, odds ratio; CI, confidence interval.

Developmental disabilities are prevalent disorders that affect an estimated 17% of children under the age of 17 years in the United States.^{1,2} Although some delays in the attainment of milestones in speech, motor, or social-adaptive development may be transient, developmental delays in early childhood are strongly associated with diagnosis of developmental disabilities such as mental retardation, cerebral palsy, speech disorders, autism, and learning disabilities later in childhood.^{3,4} Moreover, there is evidence that early identification and treatment of children with developmental conditions can lead to improved functional outcomes and reduce the risk of secondary behavioral problems.^{5,6}

Primary care physicians are positioned to play a pivotal role in the system of early detection and intervention for young children with developmental delays. How primary care physicians perform in this initial management role and the factors that influence their management decisions are poorly understood. From observational studies, we know that children with isolated motor delays are referred for diagnostic evaluation at a younger age than children with global delays or speech delay.^{7–10} Physicians also seem to be more likely to provide referrals for children with more severe delays¹¹ and for older rather than younger children with delays^{10,11} (despite evidence of benefits from earlier recognition and intervention, and treatment of children with milder signs or symptoms⁵). In addition, developmental conditions seem to be detected at a later age in children whose mother has a lower level of educational achievement.⁹ A study reporting that 50% of a large population-based sample of school-aged children receiving special education services were not identified until the early school years also suggests suboptimal rates of early identification.⁹

The generalizability of previous studies in the field is limited by both the regional nature of the samples and the focus on 1 type of provider (pediatricians connected with one medical center in Texas,¹² pediatricians in Connecticut,¹³ pediatricians in New England,¹⁰ and family practice physicians in Nebraska¹⁴). Studies that have looked at referral patterns from the vantage point of the specialist have gener-

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ally focused on a single medical institution.^{7,8} One study of families in 5 metropolitan centers is a notable exception.⁹ One large study of referrals from primary care for a related topic, psychosocial problems, found that most children were initially managed by their primary care provider, with 16% of children with psychosocial problems referred at the initial visit.¹⁵

To address these gaps in our knowledge, we surveyed a nationally representative sample of primary care pediatricians and family practice physicians, using an experimental design with alternative clinical vignettes. We sought to describe how these physicians manage young children with possible developmental delays and specifically to test the impact of 4 factors on management decisions:

1. Parental concern about a child's developmental status can be a strong predictor of an actual developmental delay, and eliciting parental concern takes less time than using a formal screening instrument.¹⁶⁻¹⁸ Whether primary care physicians consider parental concern when making decisions about referrals for diagnostic and treatment services is unclear. We hypothesized that physicians are more likely to provide referrals for diagnostic and treatment services when a parent expresses a concern about a child's development (in the context of a child with a probable delay) during the course of a preventive care visit.
2. Although there is no evidence for a systematic difference in the acquisition of basic language milestones by gender, beliefs about differences in language development by gender are widely held, with a prevalent stereotype being that boys develop language later than girls.¹⁹ We hypothesized that physicians are more likely to provide referrals for a child with expressive language delay when the child is female. A secondary hypothesis was that the proportion of physicians who provide referrals for diagnostic and treatment services for a child with expressive language delay would increase significantly if the child returned for another preventive care visit and demonstrated persistent delays.
3. Because disruptive behaviors in children have been associated with higher levels of parenting stress than other types of behaviors,^{20,21} these types of behaviors might induce a primary care physician to provide referrals. We hypothesized that physicians are more likely to refer a child with developmental delays with disruptive than avoidant behaviors.
4. In adult primary care, female physicians provide higher levels of screening and preventive care services than do their male colleagues.²²⁻²⁴ We hypothesized that female physicians would also report a higher level of referral for young patients with delays than male physicians. Finally, we hypothesized that pediatricians would provide a higher rate of referral for the children described in clinical vignettes than family practice physicians, who typically see a smaller number of young chil-

dren in their practices and receive less training in early child development.

METHODS

Participants

Study participants were 800 pediatricians and 800 family medicine physicians who practice primary care, who were born after 1935, and who were randomly selected from all practicing US physicians entered in the American Medical Association Physicians' Data File. The file contains demographic information including gender, year of birth, and type of medical residency training. The Human Subjects Committee at the University of Washington approved the conduct of this study.

Study Method

This study consisted of a cross-sectional, self-administered, mailed survey.²⁵ A 5-page questionnaire was developed, pre-tested, and revised for content and clarity by 2 nonphysician laypeople, 2 people with expertise in survey design, 1 developmental pediatrician, and 6 pediatricians in primary care practice. Questionnaires were mailed with first-class stamps and included a cover letter explaining the purpose and voluntary nature of the survey and a prepaid reply envelope. With the first round of the survey, mailed in January 2002, a \$1 bill was included as a token financial incentive to increase the initial rate of response.²⁶ A second mailing was sent to nonrespondents 5 weeks later, with a final mailing sent 2 months later. A prescreening question on the cover page of the survey identified those who were eligible to participate in the survey: physicians who provide primary care services to children 3 years and younger. Physicians who did not meet inclusion criteria were asked to return the survey.

Use of Alternative Clinical Vignettes

The survey questionnaire included 3 fictionalized clinical vignettes describing children who were between 18 and 27 months of age, had likely developmental delays, and presented for preventive care visits. Physician response to clinical vignettes has been validated as a method to obtain information about how physicians practice in the outpatient setting; responses compare favorably to reports provided by professional patients immediately after an outpatient encounter.²⁷

In the current study, the vignettes presented descriptive information on developmental skills and milestones for each child (Figs 1-4). No interpretation of the information was provided, thereby mimicking conditions in practice, where physicians make decisions about children's developmental status on the basis only of clinical data. The 3 basic vignettes described 1) an 18-month-old girl intended to illustrate gross motor delay with mild hypotonia who was just starting to cruise and not yet walking (below the 10th percentile for a 15-month-old on the Denver-II)²⁸; 2) a 20-month-old boy with only 10 single words not used communicatively, difficulty with transitions, and social avoidance, features concerning for an autism spectrum disorder; and 3) a child with

VIGNETTE 1: GROSS MOTOR DELAY

Sara, an 18-month-old girl, is in for a well-child visit. Sara's family just moved to your area. Her previous medical records are not yet available. Her mother states that Sara has always been in good health . . .

- **Version 1 (Parental concern): . . . but she is concerned that Sara is not walking yet.**
- **Version 2 (No parental concern): . . . and has no concerns about her development.**

Sara is pulling to a stand but not yet cruising or walking. She gets into sitting and crawls. She says three words, and is starting to feed herself using a spoon. Sara's growth is normal for age. Her physical exam is remarkable only for mild hypotonia with reflexes 1+ throughout. Based on this information, what action(s), if any, would you take at this visit?

Fig 1. Gross motor delay.

VIGNETTE 2: SOCIAL DELAYS AND BEHAVIORAL ISSUES

Brian, a 20-month-old boy whom you know well, is accompanied by his father and grandmother for well-child care. Brian continues in good health with normal growth. Brian's family reports that he is walking well, and has 10 words. He can occupy himself for an hour at a time, and his grandmother comments: . . .

- *Version 1 (Avoidant):* . . . "He's easy, almost too easy for a child his age. He doesn't seem to need anything from us.
- *Version 2 (Disruptive):* . . . "He's easy if you let him do his own thing. But if you try to dress him or take him to the store, he has a tantrum, so I can't take him anywhere.

And he doesn't look at me like my other grandchildren do." His father believes Brian's behavior will improve "when he learns to use his words to tell us what he wants, instead of just repeating them back to us." His physical exam is normal. Based on this information, what action(s) would you take at this visit?

Fig 2. Social delays and behavioral issues.

VIGNETTE 3, TIME 1: EXPRESSIVE LANGUAGE DELAY IN AN 18 MONTH OLD

- *Version 1 (Female) or Version 2 (Male):* You are seeing an 18-month-old girl/boy, Alex, for a well-child visit. She/he is an established patient in your practice, in good health and growing well. She/he is walking well, drinking from a cup, and saying "mama" and "dada" (not yet specifically for each parent), and has no other words. Her/his parents are not concerned about her/his development. Based on this information, what action(s), if any, would you take at this visit?

Fig 3. Time 1: expressive language delay in an 18-month-old.

VIGNETTE 3, TIME 2: EXPRESSIVE LANGUAGE DELAY IN A 27 MONTH OLD

- *Version 1 (Female) or Version 2 (Male), with the child's gender kept the same within a given questionnaire:* Alex returns for her/his two-year well-child visit at 27 months. None of what you had recommended above occurred, but Alex continues to be in good health. She/He has occasional temper tantrums, which her/his parents appear to be managing appropriately. She/he is starting to walk up stairs, to feed herself/himself with a spoon, and uses 5 words. She/He is not yet combining words together. Based on this information, what action(s), if any, would you take at this visit?

Fig 4. Time 2: expressive language delay in a 27-month-old.

expressive language delay, described at an initial visit (time 1) when 18 months of age as saying "mama" and "dada," not yet specific for each parent, and with no other words (below the 10th percentile for a 10-month-old on the Denver-II,²⁸) and at a follow-up visit (time 2) when 27 months of age, at which none of the recommendations made by the physician at the 18-month visit had been followed, and the child continued to have expressive language delay with only 5 single words and no 2-word combinations (below the 10th percentile for an 18-month-old child on the Denver-II²⁸).

A number of possible actions that a physician might consider were listed after each vignette, and the physicians were asked to comment on the likelihood of their taking the action (from "very unlikely" to "very likely" on a 5-point Likert scale). Examples of possible actions included referring the child to early intervention services, audiology, or a specialist. The questionnaire also asked physicians about characteristics of their practices, including the

number of children aged 3 years and younger seen by the physician in a typical week, the practice's primary affiliation, the percentage of children insured by public programs such as Medicaid, the ethnic distribution of patients in the practice; the size of the community (urban, suburban, or rural), and the number of years the physician has been in practice.

Method of Hypothesis Testing: Randomized Block Design

Hypotheses were tested using a randomized split-block design of alternative versions of the basic clinical vignettes, which has been used successfully in other studies.^{14,29} Two alternative versions of each vignette were developed, which differed only by 1 experimental factor: in vignette 1, the expression of parental concern (present or absent); in vignette 2, the presence of avoidant versus disruptive behaviors; and in vignette 3, the child's gender (male or female). The different vignette versions were then assembled into 8 survey versions, which covered all possible combinations of the vignettes. Survey subjects were divided into 8 groups, on the basis of medical specialty (pediatrics or family practice), age (<40 and 40+ years), and gender. Versions of the survey were randomly assigned, using a random-digit table, within each of these 8 groups, to avoid confounding by important physician characteristics.

Intensity of Physician Referrals

To summarize physicians' actions in response to the clinical vignettes, we constructed a scale of the intensity with which the respondents indicated that their next action would include referrals. The intensity scale consisted of an ordered ranking of the number of referral interventions that the physician indicated that he or she was "likely" or "very likely" to make, based on information presented in the vignette. The scale ranged from 0 (lowest number of referrals: the physician did not report that he or she was likely to make any of the listed referrals) to 3 (highest number of referrals: the physician reported that he or she was likely to make a referral to each of the 3 listed resources). The scale was used to describe variation in practice style between physicians.

Response Rate

The overall response rate for the survey was 49.3%, with a higher response rate among pediatricians (55.3%; 427 replies among 772 potential responders) than family practice physicians (43.3%; 331 replies among 764 potential responders; $P < .001$). Of the 800 surveys mailed to pediatricians who were potential participants at the beginning of the study, 28 surveys were returned by the post office as undeliverable, 86 pediatricians returned the survey indicating that they were not eligible to participate because they do not provide primary care services to children under 3 years of age, and 341 were eligible to participate and completed the survey. Of the 800 family practice physicians contacted, 36 surveys were returned by the post office as undeliverable, 132 physicians indicated that they were not eligible to participate, and 199 were eligible to participate and completed the survey.

Among pediatricians in the sample, respondents were similar to nonrespondents with respect to gender and age distribution. For family practice physicians, female physicians were relatively overrepresented among the respondents (35.2% of family practice physician respondents were female, compared with 23.0% of the nonrespondents in this group; $P < .001$); the age distribution for family practice physician respondents and nonrespondents was similar.

Sample Characteristics

Pediatricians were more likely to be female and older than family practice physicians (Table 1). Pediatricians were more likely to see a greater number of young patients per week, to practice in a suburban or urban location, and to be located geographically in the Northeast or the South compared with family practice physicians.

Statistical Analysis

Simple proportions of demographic characteristics and mean values of respondents' point estimates of proportions were calculated. Logistic regression procedures were used to obtain odds

TABLE 1. Characteristics of Respondents and Their Practices

| | All Respondents (N = 540; %) | Pediatricians (N = 341; %) | Family Practitioners (N = 199; %) | Comparison (χ^2 P Value) |
|---|---------------------------------|-------------------------------|--------------------------------------|-----------------------------------|
| Physician characteristics | | | | |
| Gender | | | | |
| Male | 54.3 | 50.2 | 61.3 | .012 |
| Female | 45.7 | 49.8 | 38.7 | |
| Age | | | | |
| <40 y | 32.6 | 30.8 | 35.7 | .015 |
| 40–49 y | 36.5 | 33.7 | 41.2 | |
| 50+ y | 30.9 | 35.5 | 23.1 | |
| Years in practice | | | | |
| 0–9 y | 40.8 | 38.5 | 44.8 | .11 |
| 10–19 y | 29.8 | 30.0 | 29.4 | |
| 20 y or more | 29.4 | 31.5 | 25.8 | |
| Practice characteristics | | | | |
| No. of 0- to 3-year-old patients per week | | | | |
| 0–19 | 34.0 | 9.2 | 76.8 | <.0001 |
| 20–39 | 24.0 | 26.0 | 20.6 | |
| 40 or more | 42.0 | 64.8 | 2.6 | |
| Community type | | | | |
| Urban | 29.7 | 34.4 | 21.4 | <.0001 |
| Suburban | 44.6 | 51.5 | 32.6 | |
| Rural | 24.2 | 13.5 | 42.9 | |
| Other | 1.5 | 0.6 | 3.1 | |
| Region of US | | | | |
| Northeast | 20.2 | 23.5 | 14.6 | .004 |
| Midwest | 26.1 | 21.1 | 34.7 | |
| South | 29.6 | 31.7 | 26.1 | |
| West | 22.0 | 21.7 | 22.6 | |
| Other | 2.1 | 2.0 | 2.0 | |
| Primary practice affiliation | | | | |
| None | 34.6 | 36.7 | 35.4 | .05 |
| Health maintenance organization | 10.3 | 10.7 | 10.4 | |
| Academic medical center | 15.5 | 9.2 | 13.2 | |
| Community hospital | 26.4 | 32.1 | 28.5 | |
| Other | 4.4 | 7.2 | 5.4 | |
| More than one | 8.8 | 4.1 | 7.1 | |
| Patient characteristics | | | | |
| Nonwhite race/ethnicity | | | | |
| <10% of patients | 14.4 | 9.2 | 23.3 | .0001 |
| 10–20% | 19.8 | 19.9 | 19.7 | |
| 21–50% | 33.2 | 35.0 | 30.1 | |
| >50% | 32.6 | 35.9 | 26.9 | |
| Medicaid coverage | | | | |
| <10% of patients | 30.9 | 27.0 | 37.7 | .021 |
| 10–30% | 32.0 | 35.3 | 26.2 | |
| >30% | 37.2 | 37.7 | 36.1 | |

ratios (ORs) for the likelihood of performing listed actions in response to the case vignettes, while adjusting for potential confounding factors. We performed all statistical analyses with Stata 7.0 software.³⁰

RESULTS

Does Expression of Parental Concern Influence Referral Decisions?

In Fig 1, an 18-month-old girl presented with probable gross motor delay, with experimental variation

of parental concern about the child's development. Physician responses to the vignette are presented in Table 2. Across both versions of the vignette, one third of physicians indicated that they would refer the child to physical therapy on the basis of the information presented, and two thirds would refer to early intervention services in the community. Approximately 60% of physicians reported that they would refer the child to a medical specialist for ad-

TABLE 2. Physician Actions by Presence of Parental Concern (Vignette of Gross Motor Delay in an 18-Month-Old Child)

| Action Likely or Very Likely | Whole Group (N = 540; %) | Parental Concern | | OR (95% CI) |
|--------------------------------------|-----------------------------|---------------------------|-------------------------------|------------------|
| | | Concerned (N = 264; %) | Not Concerned (N = 276; %) | |
| Bring patient back early | 70.0 | 72.4 | 67.8 | 1.24 (0.86–1.80) |
| Do more screening now | 59.3 | 56.8 | 61.6 | 0.82 (0.58–1.16) |
| Refer to physical therapy | 34.8 | 32.2 | 37.3 | 0.80 (0.56–1.16) |
| Refer to early intervention services | 67.0 | 67.0 | 67.0 | 1.00 (0.70–1.43) |
| Refer to medical specialist | 59.4 | 58.7 | 60.1 | 0.94 (0.67–1.33) |
| Any referral | 87.0 | 87.5 | 86.6 | 0.92 (0.56–1.53) |

TABLE 3. Intensity of Physician Referral to Diagnostic and Treatment Services in Response to the 3 Clinical Vignettes

| Intensity of Physician Response* | Clinical Vignette (% of Physicians Providing Referrals in Each Category) | | | | |
|----------------------------------|--|-------------------|------------|-----------|-----------|
| | Gross Motor | Social/Behavioral | | Speech | |
| | | Avoidant | Disruptive | 18 Months | 27 Months |
| All 3 referral actions | 18.1 | 31.4 | 25.2 | 12.2 | 36.3 |
| 2 of 3 | 38.0 | 32.5 | 27.0 | 32.8 | 41.7 |
| 1 of 3 | 30.9 | 22.1 | 25.5 | 30.6 | 15.7 |
| 0 of 3 | 13.0 | 14.0 | 22.3 | 24.4 | 6.3 |

* For gross motor vignette, possible referral actions were physical therapy, early intervention, or referral to a medical specialist. For social/behavioral and speech vignettes, possible referral actions were audiology, early intervention, or a medical specialist/psychologist.

ditional evaluation. Eighty-seven percent of physicians reported that they would likely provide 1 or more of the possible referrals on the basis of information presented in the vignette (Table 3). The hypothesis for this vignette was not substantiated, as the presence of parental concern was not associated with an increased likelihood of any of the individual potential actions or referrals (Table 2) or with the overall number of physician referrals in response to the vignette ($P = .41$; Table 3).

Are Children With Disruptive Behavior More Likely to Be Referred?

Figure 2 depicts a 20-month-old boy who presented with either avoidant or disruptive behavior. Physician responses to the vignette are presented in Table 4. Overall, half of physicians indicated that they would refer the child for audiometry to rule out a hearing loss, half would refer the child to early intervention services, and two thirds would refer to a medical specialist or psychologist. Eighty-one percent of physicians reported that they would likely take 1 or more of the possible referral actions (Table 3). Contrary to the underlying vignette hypothesis, compared with a child with disruptive behaviors, a child with avoidant behaviors was more likely to be referred to audiology (OR: 1.66; 95% confidence interval [CI]: 1.18–2.33) or to a medical specialist or psychologist (OR: 1.57; 95% CI: 1.10–2.26; Table 4). The presence of avoidant behaviors compared with disruptive behaviors was significantly associated with a more intense pattern of referral to services ($P = .004$; Table 3). For the child with avoidant behavior, 14% of physicians made no referrals in response to the vignette, whereas when the child

presented with disruptive behaviors, 23% of physicians were not likely to provide a referral (Table 3).

Are Young Girls With Expressive Language Delay More Likely to Be Referred Than Boys?

Figure 3 (time 1) describes an 18-month-old child with expressive language delay, with experimental variation the child's gender. Physician responses to the vignette are summarized in Table 5. Overall, ~70% of physicians indicated that they would refer the child for audiometry, ~40% would refer the child to early intervention services; and 20% would refer the child to a medical specialist or psychologist. On the basis of the information presented in the vignette, 76% of physicians reported that they would be likely to take 1 or more of possible referral actions (Table 3). Therefore, 24% of physicians did not report that they would be likely to refer the child to any of the possible diagnostic or treatment services on the basis of information contained in the vignette.

As hypothesized, we found a statistically significant association between the child's gender and physicians' referral to audiology in response to the vignette. A female child with expressive language delay at 18 months of age was more likely to be referred for audiometry than a male patient (OR: 1.57; 95% CI: 1.08–2.28; Table 5). However, there was no statistically significant association between the child's gender and other possible physician actions, and there was no association between the child's gender in the vignette at 18 months of age and the overall intensity of physician referral response ($P = .37$; Table 3).

TABLE 4. Physician Actions by Type of Behavioral Presentation (Vignette of Behavioral and Social Delays in a 20-Month-Old Boy)

| Action Likely or Very Likely | Whole Group ($N = 540$; %) | Behavioral Presentation | | OR (95% CI) |
|---|---------------------------------|------------------------------|--------------------------------|-------------------|
| | | Avoidant ($N = 258$; %) | Disruptive ($N = 282$; %) | |
| Bring patient back early | 62.0 | 60.8 | 63.1 | 0.91 (0.64–1.29) |
| Do more screening now | 58.3 | 60.6 | 55.8 | 0.82 (0.58–1.16) |
| Refer to early intervention services | 51.5 | 53.5 | 49.6 | 1.17 (0.83–1.64) |
| Refer to audiology | 49.6 | 56.2 | 43.6 | 1.66* (1.18–2.33) |
| Refer to medical specialist or psychologist | 66.5 | 71.7 | 61.7 | 1.57† (1.10–2.26) |
| Any referral | 81.7 | 86.0 | 77.7 | 1.77‡ (1.13–2.79) |

* $P = .004$.

† $P = .014$.

‡ $P = .012$.

TABLE 5. Physician Actions by Patient Gender (Vignette of Speech Delay in an 18-Month-Old Child)

| Action Likely or Very Likely | Whole Group (at 18 Months) (<i>N</i> = 540; %) | Child Gender (at 18 Months) | | Whole Group | |
|---|---|--------------------------------|------------------------------|-------------------------------|-----------------------------------|
| | | Female (<i>N</i> = 280; %) | Male (<i>N</i> = 260; %) | At 18 Months (OR [95% CI]) | At 27 Months (<i>N</i> = 540) |
| Bring patient back early | 67.8 | 69.6 | 65.8 | 1.19 (0.83–1.71) | 70.6 |
| Do more screening now | 44.1 | 45.4 | 42.7 | 1.11 (0.79–1.57) | 49.6 |
| Refer to early intervention services | 41.3 | 41.8 | 40.8 | 1.04 (0.74–1.47) | 70.9 |
| Refer to audiology | 71.3 | 75.7 | 66.5 | 1.57* (1.08–2.28) | 87.2 |
| Refer to medical specialist or psychologist | 20.2 | 18.9 | 21.5 | 0.85 (0.56–1.30) | 49.8 |
| Any referral | 75.6 | 77.9 | 73.1 | 1.30 (0.87–1.92) | 93.7 |

* *P* = .019.

Does the Probability of Physician Referral Increase If the Child Continues to Have Expressive Language Delays?

Figure 4 (time 2) described the same child in Fig 3, who returned for a preventive care visit at 27 months of age. The gender of the child was consistent with that at 18 months. Physician responses to the vignette are summarized in the right-hand column of Table 5. Seventy percent of physicians indicated that they would be likely to refer the child to early intervention services; 87% of physicians would refer the child for audiometry, and half of physicians would refer the child to a medical specialist for additional evaluation. Overall, 94% of physicians reported that they would likely take 1 or more of the possible referral actions (Table 3). Therefore, for a 27-month-old child with expressive language delay, only 6% of physicians did not report that they would be likely to refer to any of the possible diagnostic or treatment services, compared with 24% of physicians for the same child at 18 months.

Contrary to our primary hypothesis for this vignette, we found no association between the child's gender and physician referral patterns when the child presented at an older age. In agreement with our secondary hypothesis, there was a significant increase in the proportion of physicians who provided each individual referral and in the number of referrals made (*P* < .001). For the 18-month-old child with expressive language delay, 55% of physicians provided 1 or fewer referrals, whereas by 27 months, 78% of physicians provided 2 or more referrals.

Does Physician Gender or Specialty Training Influence Referral Practices?

Self-reported intensity of referrals varied by physician gender. After controlling for physician age, training, and community size, female physicians were more likely to report a higher intensity of patient referral than male physicians for 2 of the 3 vignettes (Behavior vignette: OR: 1.65; 95% CI: 1.02–2.66; Language delay vignette at 18 months: OR: 2.14; 95% CI: 1.37–3.34). The self-reported intensity of referral in response to the clinical vignettes did not vary significantly by physician age, after controlling for physician gender, training, and community size.

After controlling for physician age, gender, and the size of the community, pediatricians were 3 times more likely than family practice physicians to report a more intense pattern of referral to diagnostic and treatment services than family practice physicians in

response to the motor delay vignette (OR: 3.14; 95% CI: 1.78–5.54) and twice as likely for the speech delay vignette at 18 months (OR: 2.39; 95% CI: 1.54–3.73). There was no statistically significant association between physician type and intensity of physician referral for the behavioral vignette or for the language delay vignette at 27 months.

Overall, physician characteristics associated with a “watch and wait” attitude (not providing any of the possible referrals in response to the clinical vignettes) were being a family physician (compared with a pediatrician) or being male. As an example, in the vignette of the child with expressive language delay, pediatricians were half as likely as family physicians to provide no referral (OR: 0.41; 95% CI: 0.27–0.61), and female physicians were half as likely as male physicians to provide no referral (OR: 0.46; 95% CI: 0.30–0.70). Other factors, including physician age, community size, and volume of patients insured by Medicaid or other public insurance, were not significant predictors of a “watch and wait” approach in our model.

DISCUSSION

We used an experimental design to test the influence of 3 specific factors (child gender, type of behavioral presentation, and presence of parental concern) on initial management and referral patterns for children with suspected developmental delays by physicians in primary care practice. To our knowledge, this is the first study to examine physician referral behaviors in the area of developmental delay that combines this method with a national sample of both pediatricians and family practice physicians.

In the current study, a female child with expressive language delay was 60% more likely to be referred to audiology, which is the principal initial referral that physicians should provide for such a patient. This corroborates our initial hypothesis that boys with expressive language delay would not be referred as readily as girls. However, this finding is of some concern, because mental retardation and autism spectrum disorders, which are associated with language delay and hearing loss, are actually more prevalent in boys.^{31–33} Notably, almost 30% of physicians overall did not refer an 18-month-old child with expressive language delay to audiology, a crucial step to rule out a hearing loss as the cause of the delay. When the same child presented with continued expressive language delay at 27 months, referrals to audiology increased, although slightly

>10% of physicians continued to indicate that they were not likely to refer the child to audiology at 27 months. It is possible that the physicians who did not refer to audiology believed that hearing testing would be conducted through the specialist to whom they referred, or in the early intervention program.

Two of our a priori hypotheses were not substantiated. First, the presence of avoidant behaviors in the child described in the behavior and social delay vignette was associated with a higher intensity of physician referral response than if disruptive behaviors were present. Physicians may have recognized a potential autism spectrum disorder in the child with avoidant behaviors, whereas the child with disruptive behaviors might have been deemed a less typical presentation of this disorder. Our findings may be indirect evidence that physicians are aware of the broad publicity that has been given to the identification of early childhood autism^{34,35} and hence are primed to recognize these behaviors among their young patients.

Second and perhaps more important, the presence of parental concern did not influence the management of a child with suspected gross motor delays. Physicians in primary care practice may not be aware of studies that have shown that parental concern about a child's development can be a reliable indicator of developmental delays^{16,36} and therefore are not using the presence of parental concern as an indication for referral to diagnostic and treatment services. Previous studies of parental concerns, particularly in the area of child psychosocial functioning, have shown that parental disclosure of concerns increases the likelihood of identification of child psychosocial problems by physicians. We might have found a positive result had we tested the hypothesis of the effect of parental concern using a vignette of a child with a behavioral problem rather than a delay in gross motor development.^{37,38} Another explanation for our findings might be that parental concern was presented too subtly in the text of the clinical vignette, rather than headlined as a chief complaint.

After controlling for differences in age, training, and community size, female physicians were more likely than their male counterparts to respond to the clinical vignettes by providing a referral. This result was not unexpected: in the literature on preventive screening for adult patients, female physicians have been shown to provide a higher level of screening, delivery of preventive services,^{22,24} and referrals to specialists^{39,40} than their male counterparts. The pattern seen in the care of adult patients seems to carry over into the care of pediatric patients in the current study.

The overall rates of referral of young children with probable developmental delays described in the current study seem generally consistent with referral patterns described in previous studies in this area. One study asked physicians whether they would provide referral for children in the clinical vignettes "at some point," rather than asking about referrals at the current visit.¹⁰ Eighty-eight percent of the pediatricians in that sample would refer a child who was cruising but not yet walking by 2 years of age. Forty-

three percent of pediatricians indicated that they would refer a child who "speaks in single words but not 3-word sentences" by 2.5 years of age, and 91% would refer the child by 3 years of age.

In a follow-up to the original study conducted 15 years later, 100% of physicians indicated that they would refer the child who was cruising but not yet walking by 2 years of age.¹³ Eighty-three percent of physicians indicated that they would refer the child who was speaking in single words but not 3-word sentences, by 2.5 years of age. The use of individual interviews in these 2 studies may have biased results of the study toward higher rates of referral, however, because of the social desirability of providing such an action in response to direct questioning. Social desirability bias may be less of an issue in mailed surveys, such as our study, where greater anonymity is preserved.

This study has several limitations that warrant comment. First, the response rate to the current survey, slightly <50% of subjects contacted, limits the generalizability of our descriptive results. This response rate, however, is consistent with average response rates of physicians to surveys, which is 54% of those contacted.⁴¹ Furthermore, because physicians who have a specific interest in developmental issues in young children may be more likely to respond to the survey than those with less interest in the subject, our descriptive findings may be biased toward a higher reported intensity of referral for children with delays. Of note, our experimental findings regarding the testing of the original hypotheses are much less susceptible to respondent-versus-non-respondent bias, because the decision of physicians to participate in the study is not likely to be based on the randomized version of the survey received. In addition, the use of a representative national sample of physicians in both pediatrics and family practice strengthens the inferential validity of our findings.

The second main limitation stems from the survey study design, which presents respondents with a fixed set of possible answers, restricting findings to those areas that were included in the survey. Unlike a personal interview or direct observation of physicians in practice, however, a survey design permits contact with a large number of potential participants in a more cost-effective manner. Although there is evidence from methodologic studies that clinical vignettes can be a valid way to measure how physicians practice,²⁷ we cannot determine the extent to which the physicians' responses to the vignettes in this survey reflect their actions when faced with similar clinical situations. In addition, it is possible that by listing possible referral options in response to the clinical vignettes, we prompted physicians to indicate referrals that they might not otherwise have made. This is a limitation of any research that uses a written survey method and might have led to an artificial increase in the number of referrals reported.

The most important implications of this study regard potential ways to improve the timely referral of young children with delays for early intervention services. To this end, increasing awareness among physicians that parental concern regarding a child's

development is nearly sufficient justification for additional evaluation and referral could be of immediate benefit. In particular, the literature supports the use of parental concern to detect problems in the area of child speech development and behavioral or psychosocial problems.^{16,36-38} Although there is no single best response to the vignettes, we are also concerned about the response of those physicians who indicated that they would be unlikely to provide any referrals in response to the vignettes. These physicians may be pursuing a conscientious "watch and wait" approach, yet so doing risks potential diminished benefit from early intervention services. Physicians who currently report the lowest likelihood of referral might be a group to target with educational or other interventions to promote early detection and intervention. Office-based quality improvement approaches, currently being used to increase rates of other preventive services from primary care, would seem to be a logical starting point.^{42,43} These approaches incorporate methods that have been proved effective in increasing rates of delivery of preventive care services, such as continuous quality improvement, academic detailing, and adult learning theory, and involve office staff at all levels in identifying areas for improvement and implementing solutions.⁴²

On the basis of the results of this and other studies, male physicians and family practice physicians might benefit most from targeted educational interventions in this area. Although early intervention services for children with delays have been shown to improve outcome⁵ and are mandated by federal law in the United States for children who qualify,⁴⁴ children must obviously be referred to these services to benefit. More broadly, the variation in management decisions found in this study underscores the need for better guidance and a more standardized approach to young children with suspected developmental delays for physicians in primary care practice. Best practices for identification and referrals for young children with developmental delays at different ages must be defined and used to develop means to measure how well a physician, practice, or health care system performs in this area as we seek to optimize the outcomes of children with developmental delays and disabilities.

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EXERCISE CONTESTS IN 18TH-CENTURY ENGLAND

“The best of the athletes had coaches who controlled their diets and their sweats and purges. They issued directions on breathing and gave the athletes precise training schedules. They advised against drinking much water, saying that beer was best, even for women and children. For events lasting for hours or days, athletes often drank brandy mixed with water. Vegetables were frowned on because they were too watery, and cheese and butter were forbidden because . . . it was thought that they ‘went rancid in the stomach.’ The coaches put camphorated oil in their mouths for a few minutes to bring it to body temperature, [and] then spat it onto the athlete and rubbed it in. Training theories were shared among those who worked with runners, boxers, racehorses, and cocks.”

Kolata G. *Ultimate Fitness.* Farrar Straus Giroux; 2003

Submitted by Student