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Improving Developmental Screening, Discussion, and Referral in Pediatric Practice

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Abstract

Objective.—Although pediatricians' use of standardized screening tools for identifying developmental delays has increased, only 63% of pediatricians report performing standardized screening as recommended. The purpose of the current quality improvement project was to improve developmental monitoring, screening, and referral for developmental concerns by pediatricians.

Method.—Twenty-eight pediatricians completed an in-person meeting, monthly webinars, and individualized feedback from an Expert Work Group on progress across a 3-month action period.

Results.—Statistically significant increases were observed in rates of autism screening, discussions of screening results with families, and referral following abnormal results. There was no statistically significant change in rates of general developmental screening. Comparing self-report with record review, pediatricians overestimated the extent to which they conducted discussion and referral.

Conclusions.—Universal screening for all children has yet to be achieved. The current project supports that practice-based improvements can be made and delineates some of the routes to success.

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Author Contributions

MAB contributed to the design of the data collection instruments, carried out all elements of analyses, drafted the initial manuscript, and approved the final manuscript as submitted. JZ contributed to the conceptualization and design of the study, training and technical assistance for participants, data collection, critical review and revision of the manuscript, and approved the final manuscript as submitted. CB contributed to the conceptualization and design of the study and data collection instruments, provided technical assistance to participants, reviewed and revised the manuscript, and approved the final manuscript as submitted.TMW contributed to the conceptualization and design of the study, training and technical assistance for participants, data collection, critical review and reviion of the manuscript, and approved the final manuscript as submitted.

Authors' Note

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

Declaration of Conflicting Interests

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Keywords

developmental delay; autism; developmental screening; behavioral pediatrics; quality improvement

Developmental delays and disabilities are common.[1,2] However, a 2002 survey found that less than 25% of pediatricians* performed developmental screening using a validated, standardized screening tool.[3] This rate increased in 2009 (48%) and 2016 (63%)[4] but leaves significant room for improvement.[5]

The American Academy of Pediatrics (AAP) recommends universal screening for developmental delays at 9, 18, and 24 (or 30) months and for autism spectrum disorder (ASD) at 18 and 24 months and developmental surveillance at every well-child visit. The AAP recommends that pediatricians avoid taking a "wait and see" approach in evaluating developmental concerns. Instead, a referral should be made simultaneously for further developmental evaluation and early intervention services when concerning screening results are identified or when the medical provider and/or parent still have concerns.[6]

A handful of quality improvement (QI) projects have been conducted with the goal of improving screening rates for developmental delay in pediatric practices.[7–11] These projects demonstrated 18% to 60% increases in screening rates but had limited reported impact on pediatrician referrals for additional evaluation following abnormal screening results. The goal of the current study was to design a QI project with components to specifically address not only improving screening rates but also discussion of results with families (abbreviated hereafter to "discussion") and referral for further evaluation and early intervention services (abbreviated hereafter to "referral") following abnormal results.

The current project utilized the *Model for Improvement* approach to improve care in practice[12] (participants set aims, established measures, selected changes, tested changes, and implemented changes) by providing participants with comprehensive training, tools, and support to achieve the aforementioned aims. Participants were encouraged to utilize Plan, Do, Study, Act (PDSA) cycles, which focused on incorporating small tests of change to improve patient care.

Methods

Sample Selection

Practicing primary care pediatricians who regularly see at least 10 patients per month for 9-, 18-, and 24- (or 30-) month health supervision visits were eligible to participate. Although group practices were not recruited, individual participating pediatricians were encouraged to share their learned knowledge with practice colleagues. A recruitment letter and application were emailed to pediatricians nationwide via various AAP communication outlets. In addition, Expert Work Group members—a multidisciplinary team with backgrounds in

*The sample included pediatric residents and excluded members sub-boarded in a subspecialty other than Developmental-Behavioral Pediatrics, Family Medicine, Internal Medicine, and other primary care.

pediatric primary care, developmental-behavioral pediatrics, and QI—also distributed the recruitment information to additional professional networks. Participants had the opportunity to receive the American Board of Pediatrics (ABP) Maintenance of Certification (MOC) Part 4 credit at no direct cost.

Implementation Procedures

Consistent with the "gold standard" for QI collaboratives, our procedures included the efficient use of experts and peers in the identification and discussion of best practices.[13]

Pre-Implementation.—The project spanned September 2015 to March 2016 (Figure 1). Pre-implementation activities consisted of an orientation webinar, completion of a survey, and a baseline medical record review completed by the pediatricians. These measures are described in further detail below.

Learning Session.—A 3-hour in-person learning session offered participants an opportunity to receive education on developmental surveillance, screening, strategies for communicating results to families, and referral. Resources for choosing validated screening tools were discussed, but no specific screening tools were reviewed or recommended. Other topics included engaging families in surveillance and screening processes, communicating results, having difficult discussions, and strategies for referral, further evaluation, and early intervention as recommended by the AAP's surveillance and screening policy statement. Participants were trained on the Model for Improvement, made plans for implementing PDSA cycles, and reviewed aggregate baseline data from the medical record review. Group discussions provided opportunities to identify and troubleshoot barriers to implementation. During this session, participants were provided with a comprehensive change package of tools, including resources from the AAP, Centers for Disease Control and Prevention's *Learn the Signs. Act Early.* program,[14] Bright Futures, and *Birth to 5: Watch Me Thrive!*[15] A recording of the learning session was made available to participants who could not attend in person.

Action Period.—During the 3-month action period between November 2015 and January 2016, project participants implemented tests of change using project interventions, which they identified as relevant to their practice's screening process. Participants used the validated screening tools of their choice. Participants submitted record review data for the specified health maintenance visits, participated in monthly educational webinars, and submitted monthly progress reports to describe changes made and any tools tested from resources like the change package.

A project leader/QI expert facilitated monthly webinars. Webinars featured an educational component with a presentation related to developmental screening or QI, followed by a discussion of aggregate record review data. Expert Work Group members then facilitated participants' discussions of PDSA cycle results and strategies around improving implementation.

Post-Implementation.—All participants completed a post-implementation survey; most of these participants chose to complete the attestation process for ABP MOC credit, and some had an opportunity to participate in qualitative telephone interviews.

Measures and Data Sources

This project employed the developmental screening measures developed by the National Committee for Quality Assurance and included in the Children's Health Insurance Program Reauthorization Act Core Set as well as developmental screening follow-up measures developed by the Pediatric Quality Measures Program cooperative agreement between the Medical College of Wisconsin and the Agency for Healthcare Research and Quality. The measures included rates of screening for developmental delays, discussion and documentation of screening results, and referral for abnormal screening results. In addition, the Expert Work Group developed similar measures for autism screening.

Medical Record Review.—During the pre-implementation period (baseline), participants submitted record reviews for the first 10 patients seen for a 9-, 18-, and 24- (or 30-) month health supervision visit that month. The second autism screening is recommended at 24 months, but participants had the discretion to conduct the third general developmental screening at the 24-month or 30-month visit. If using a 30-month visit for general developmental screening, providers also submitted the first 10 records for those visits. During the action period, participating pediatricians reviewed the medical records for the first 5 patients seen that month for 9-, 18-, 24- (and 30-) month health supervision visits (up to 20 records total each month). Records were reviewed to determine if target outcomes (screening, discussion, and referral) were performed at these visits. Record review data were entered monthly by participants into the AAP Quality Improvement Data Aggregator (QIDA) system and pediatricians reviewed their own data and aggregate data from all participants using QIDA to determine successes and opportunities for improvement.

Pre- and Post-Implementation Surveys.—Participants responded to items about educational materials related to development available for families, their current processes, including developmental and autism screening tools used and ages screened, discussion of screening results with families, and their processes for referral and training of staff.

Pediatrician Interviews.—Some participants were invited to participate in optional interviews with the goal of recruiting 10 participants from diverse settings and experiences with the project. Participants were selected based on their engagement throughout the project, practice setting, as well as their interest in participating in the interview. Four primary themes were assessed in the 30-minute phone interviews: impact of the project on practice transformation, challenges to implementation, general QI, and sustaining change.

Analysis

Results are presented within the 3 major themes of this project: screening, discussion, and referral. Based on sample sizes, quantitative survey data are presented using frequency statistics, and medical record data were analyzed using χ^2 tests. Statistically significant differences were those with P value <.05. Qualitative data were analyzed using a grounded

theory approach. In brief, a researcher first read each item and developed ideas for themes. Second, that researcher developed a coding scheme based on these themes. Finally, each was coded using this scheme. Codes were not mutually exclusive, and multiple codes could have been assigned to each response.

Results

Description of Participating Pediatricians

Thirty-two pediatricians from 25 practices applied, and all were selected for participation and completed the online pre-implementation survey. Twenty-eight (88%) of these remained active throughout the project and participated in the learning session as well as the post-implementation survey. Participation in the webinars decreased over time: 28 participated in the first, 25 in the second, and 18 in the third. Four of the 10 selected pediatricians participated in an optional post-implementation interview. Participants represented a variety of practice sizes, locations, and types (Table 1).

Screening

Based on record review, participants conducted developmental screening for 88.1% (n = 616 records) of children aged 9, 18, and 24 (or 30) months at baseline (Figure 2). This rate decreased across the implementation period and ended at 85.3% (n = 387 records) of children at month 3, although the difference between baseline and month 3 was not statistically significant.

Similar rates were seen for ASD screening. At baseline, participants conducted ASD screening for 82.8% (n = 383 records) of children at ages 18 and 24 months (Figure 3). This rate increased slightly across the implementation period and remained high in the last month (91.5%; n = 270 records). The increase in screening rate from baseline to month 3 was statistically significant.

Across 4 months of record review, the rate of abnormal developmental screens ranged from 12.5% to 14.1%; the rate of abnormal ASD screens ranged from 3.8% to 5.5%. There were no statistically significant differences in these rates across time.

Participants' self-reported screening practices varied slightly from the chart data. At pre-implementation, 81% of pediatricians reported routinely conducting developmental screening at every recommended health supervision visit; 89% reported similarly at post-implementation.

Most reported using the Ages and States Questionnaires or the Ages and Stages Questionnaires Third Edition for developmental screening and the Modified Checklist for Autism in Toddlers or the Modified Checklist for Autism in Toddlers, Revised with Follow-up for autism screening (Figure 4).

In interviews, pediatricians reported that they were using a screening tool before the project but either switched to a new tool, a new version of a tool, or began screening more reliably because of the project. For example, one pediatrician described that since the project, nurses

now coordinate completion of the tool before the pediatrician visit so the pediatrician can spend more time discussing results.

Discussing Results With Families

Based on medical record review, participants engaged in discussions of developmental screening results with 76.8% (n = 538 records) of families on the same day of the screening at baseline (Figure 2). This rate increased across the implementation period (92.8% at final; n = 333 records). Similar rates were seen for ASD screening: at baseline, participants engaged in discussions of ASD screening results for 72.0% (n= 332 records) of families (Figure 3). This rate increased slightly across the implementation period and remained high in the last month (92.1%; n = 253 records). The increases in discussion rate from baseline to the final month was statistically significant for both developmental and autism screening.

Participants' beliefs of the frequency of their discussions (based on pre- and post-implementation surveys) varied slightly from record review. At pre-implementation, 88% of pediatricians reported that they routinely discussed both normal and abnormal screening results with families, and most (75%) of them reported documenting this discussion. At post-implementation, all (100%) participants reported routinely discussing normal and abnormal results, and most of them (96%) reported documenting this discussion.

During interviews, participants reported that as a result of the project, they were more reliably reviewing results with families and more often discussing all results. One pediatrician reported that this project changed the way she/he addressed normal screens with families. In the past, her/his explanation to parents would be implicit or skipped if results were normal; since this project, she/he makes it a point to be explicit about the screening tool and the child's results.

Referral for Further Evaluation and Early Intervention Services

Data from medical record reviews revealed that at baseline, 57.4% (n = 101 records) of children received a referral within 7 days of an abnormal developmental screen (Figure 2). In the final month of implementation this rate increased to 95.6% (n = 45 records). Similar changes were seen for referral for abnormal autism screening results (26.1% at baseline to 92.9% at final month). The increases in referral rate from baseline to the final month was statistically significant for both developmental and autism screening.

Based on pre-implementation surveys, 97% of pediatricians reported referring families to at least one type of therapy service (eg, speech, physical, or occupational therapy). Many (91%) pediatricians reported that they refer patients/families with an abnormal developmental screening result to the local early intervention program (Part C of the Individuals with Disabilities Education Act) or a developmental-behavioral pediatrician (66%). Post-implementation, 89% reported referring families to therapy services, 86% reported referring to early intervention, and 82% reported referring to a developmental-behavioral pediatrician. (Physicians were given list of possible referral types to choose from and could select more than one.)

At both pre- and post-implementation, approximately 68% of pediatricians reported that children who received an abnormal developmental screen were able to get timely follow-up care.

Three of the 4 interviewed pediatricians reported that the project did not significantly change *how* referrals were made. However, these pediatricians reported making referrals earlier and more consistently. One pediatrician reported that referrals were one of the major components to her/his practice change. She/he reported that she/he began calling in referrals (as opposed to completing forms for early intervention services), and she/he educated parents on expectations, equipping them to follow through.

Three of the pediatricians interviewed reported that the project changed the way they follow-up with referrals. Referrals after developmental screening were viewed by participants to be different from referrals for other conditions. One pediatrician reported that she/he rarely received feedback for referrals following developmental screening and would now push harder to receive feedback. Another pediatrician noted that she/he started emphasizing self-referrals but requested that families come back sooner for an additional visit. In contrast, another pediatrician reported that she/he did not follow-up with referrals often, as she/he perceived that families would be upset if they were contacted too frequently. Most pediatricians reported that the project helped them better understand how the early intervention system works.

Discussion

The goals of the QI initiative were to improve and promote screening, discussion following screening, and referral by pediatricians for early intervention and further evaluation for developmental delay and autism. Participating pediatricians were able to improve ASD screening rates, discussion of normal and abnormal developmental and autism screening results, and referral for abnormal screening results in a wide variety of pediatric primary care settings.

There were no, however, significant improvements in rates of developmental screening. In the current study, participants had a relatively high rate of general developmental screening (88%) at baseline compared with the national average (63%), which may explain why increases were not detected. Additionally, some providers transitioned to a newer version or to a validated developmental screening tool during the project, which took time and may have caused the apparent, but not statistically significant, *decrease* in developmental screening. As a comparison, the rates of autism screening did show statistically significant improvement. In contrast to changes seen for developmental screening, fewer practices changed the autism screening tool used during the project. Rather than focusing on implementing and learning a new tool, they may have focused on fine-tuning their processes for autism screening.

Increases in screening and discussion are consistent with previous literature.[7,8,10] A novel and important finding of the current study, however, is the significant improvement observed with initiation of a referral in a timely manner after an abnormal screen. From baseline to

the end of the action period, referral increased 38% for developmental delay and 67% for abnormal autism screen. Interestingly, at baseline, 97% of pediatricians reported making at least one referral for an abnormal screen to their state's early intervention services, a specialist, and/or specific therapies. It may be that pediatricians were making these referrals previously but after a longer period. While it is difficult to ascertain with the available data, it appears that practices may have had somewhat different processes for referrals for developmental services than for other types of medical concerns. Three of 4 of those interviewed said that while referral processes did not change significantly, they now make quicker referrals, better understand their state's early intervention process, and educate families on expectations more often.

Limitations and Lessons Learned

There were limitations to the project. Pediatricians who agreed to participate were likely to have an interest in and value developmental screening, contributing to their high rates of screening at baseline. The relatively small sample of pediatricians and pediatric practices was also a limiting factor. Screening data were documented by the physicians and/or staff within the practice, thereby allowing for possible variations in data collection consistency that may have biased results.

However, there are several lessons from the current QI project that may be helpful when planning future developmental screening projects, including the following:

Pediatricians may not be aware of the importance of using a validated screening tool or know whether their screening tool is validated. Education on available, validated screening tools remains important as we found examples of physicians' beliefs that they were screening appropriately despite the fact that their screening was being completed without validated tools. There may still be challenges with some pediatricians' acceptance of the importance of developmental and autism screening. Several participants reported that they were having trouble getting "buy-in" from other providers in their practice related to developmental screening. Additional input from those project participants who identified this concern reported that this was due to the colleague's belief that simply asking families a few questions related to development was sufficient versus utilization of a formal validated screening tool. However, without use of a formal screening tool, less obvious developmental concerns or delays can be missed.[6]

At least one pediatrician from each practice completed the project, but broader practice involvement was not required. While some participants were able to engage other providers and staff in the project, a team-based approach would likely be better suited for future projects to ensure practice-wide success.

In-person learning sessions can be valuable as a means to provide participants with an opportunity to meet to discuss current practices, barriers, and propose solutions. However, such an opportunity can be challenging for participants to accommodate due to practice schedules, financial limitations, and other constraints. The project requirements were relaxed slightly in order to enable participants to attend the learning session virtually or via archived recording. The recorded monthly webinars were only made available to participants who

notified project staff of a conflict in advance to encourage real-time participation in project-related activities.

This study extends the literature by addressing improved general developmental and autism screening rates, discussion of results with families, and referral for further evaluation and early intervention services following abnormal results. Rates of developmental and autism screening have been steadily improving since the AAP introduced recommendations over 10 years ago. Universal screening for all children has yet to be achieved, but this project supports that practice-based improvements can be made, delineates some of the routes to improvements, and highlights continued challenges. Supporting providers and families in the referral processes is important in order to ensure children with development delays are not only identified but also receive further evaluation and early intervention services. Additional research is needed to improve pediatricians' timely referral rates for abnormal screens and ultimate follow through with families.

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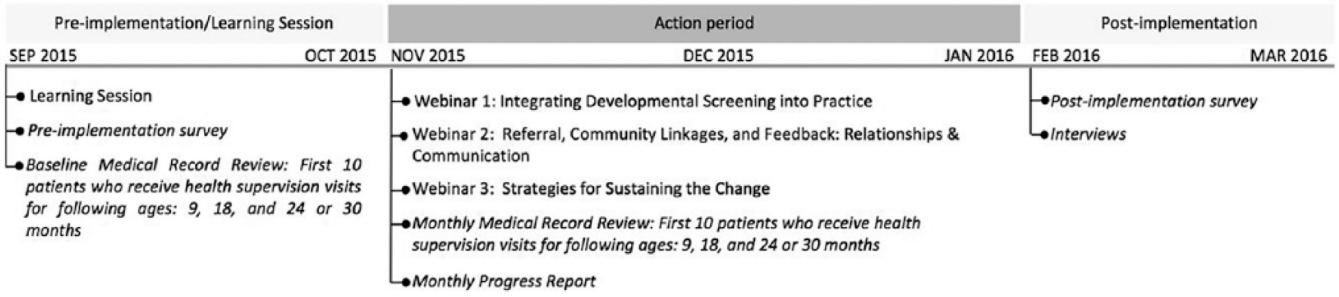

Figure 1.
Implementation schedule. Data collection components in italics.

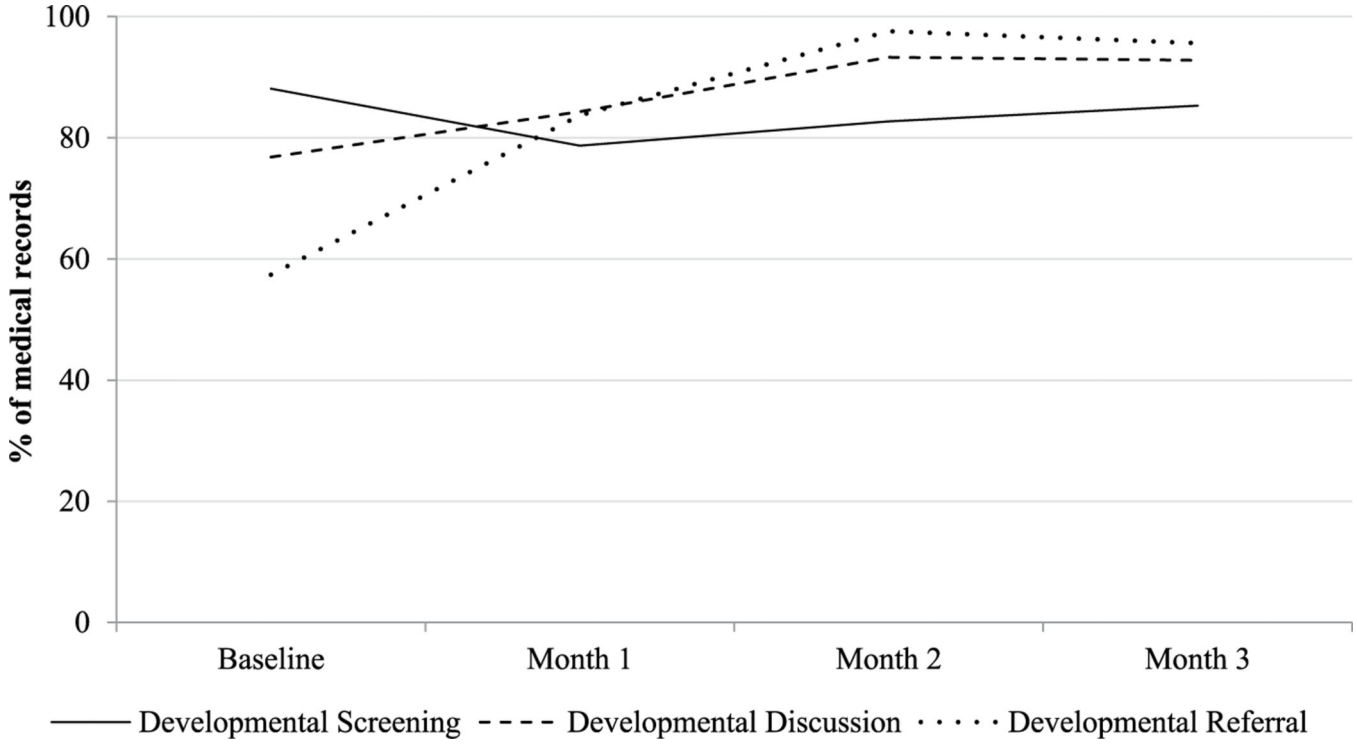

Figure 2.

Rates of developmental screening, discussion, and referral, derived from medical record review. For discussion and referral, there was a statistically significant difference between baseline and month 3, all *P* values <.05.

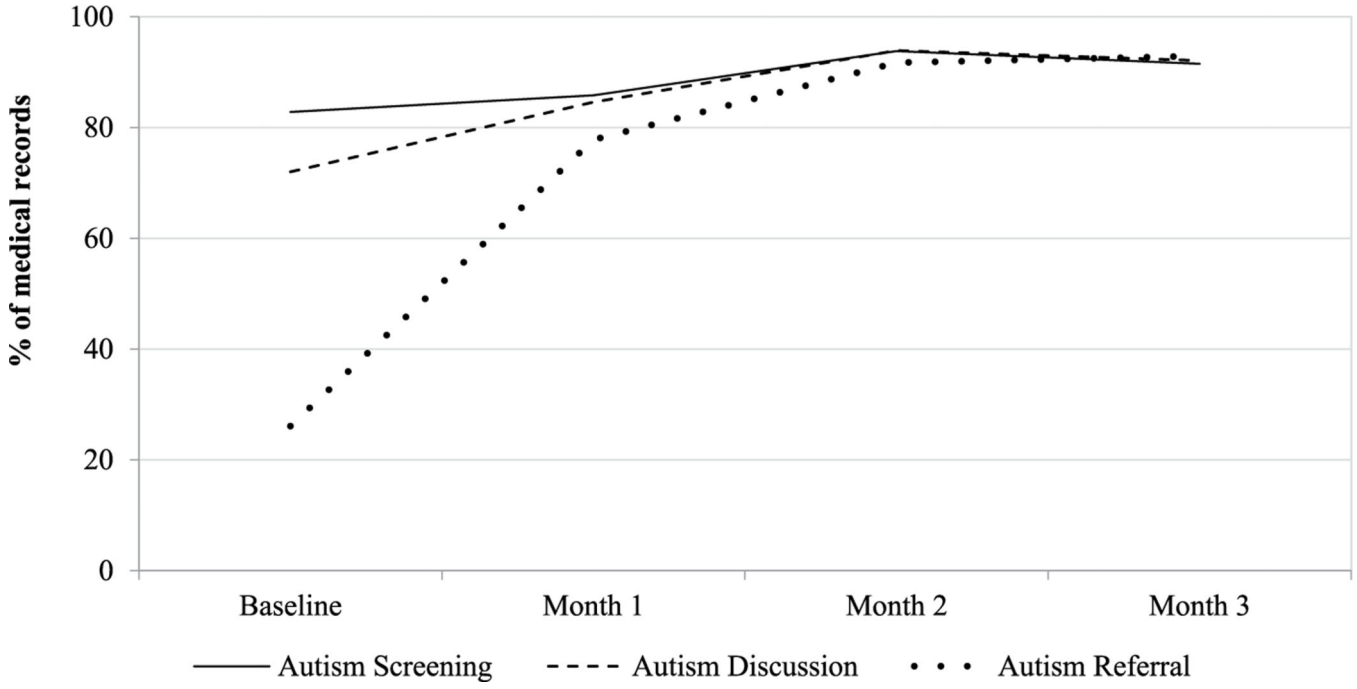

Figure 3.

Rates of autism screening, discussion, and referral, derived from medical record review. For screening, discussion, and referral, there was a statistically significant difference between baseline and month 3, all *P* values <.05. However, caution should be used when interpreting changes in referral rates as the sample sizes for months 1 to 3 is <30 per month.

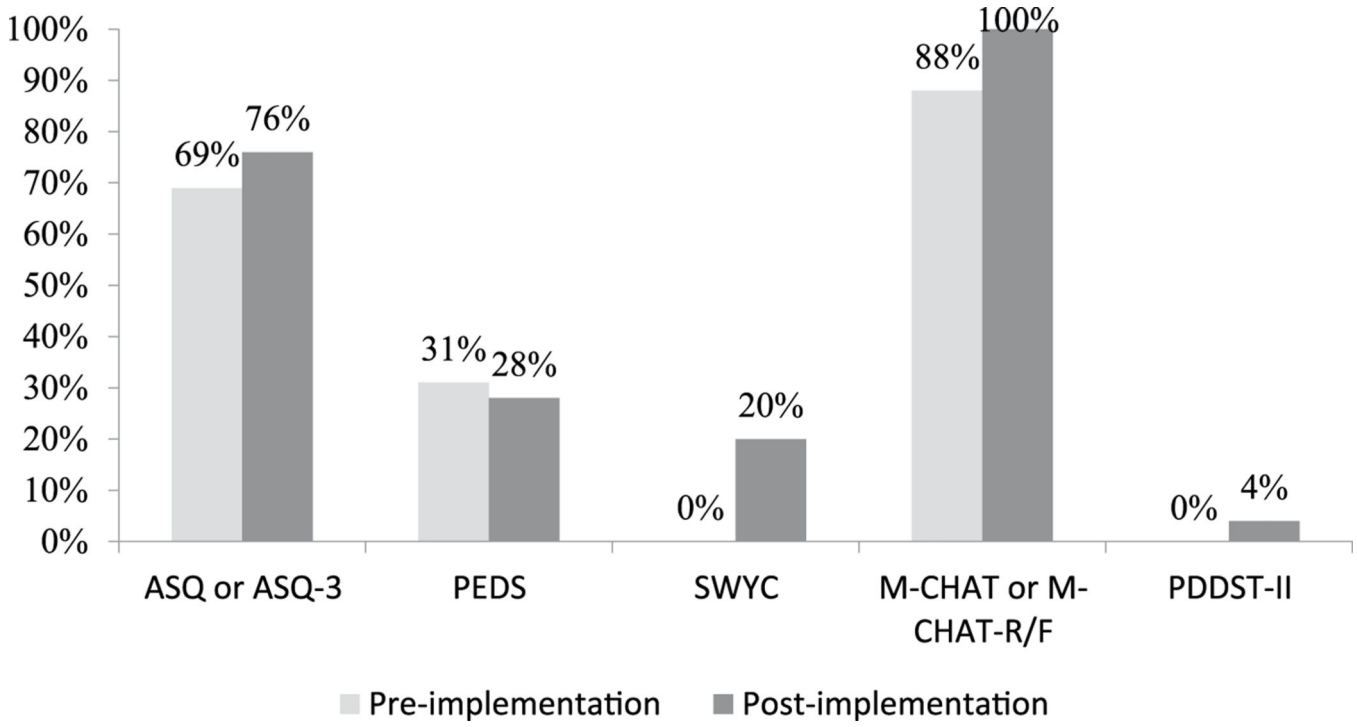

Figure 4.

Physician self-reports of standardized screening tool(s) used. Participants could report using more than one tool. Abbreviations: ASQ, Ages and Stages Questionnaire; ASQ-3, Ages and Stages Questionnaire, Third Edition; PEDS, Parents' Evaluation of Developmental Status; SWYC, Survey of Wellbeing of Young Children; M-CHAT, Modified Checklist for Autism in Toddlers; M-CHAT-R/F, Modified Checklist for Autism in Toddlers–Revised with Follow-up; PDDST-II, Pervasive Developmental Disorder Screening Test-II. Two (6%) pediatricians also reported using a portion of the Denver Developmental Screening Test (DDST), which is not a valid tool for developmental screening.

Table 1.

Demographic Characteristics of Sampled Pediatric Practices (N = 25).

Characteristics	n (%)
Practice size	
Small (1–3 physicians)	8 (32%)
Medium (4–6 physicians)	9 (36%)
Large (≥7 physicians)	8 (32%)
Practice location	
Urban	11 (44%)
Suburban	11 (44%)
Rural	3 (12%)
Practice type	
Independent practice	15 (60%)
Hospital-affiliated	5 (20%)
Affiliated with university or medical school	3 (12%)
Federally qualified health center	1 (4%)
Military-based clinic	1 (4%)