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The myADHDportal.com Improvement Program: An innovative quality improvement intervention for improving the quality of ADHD care among community-based pediatricians

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Abstract

Though the American Academy of Pediatrics has developed and disseminated clear evidence-based guidelines for ADHD care, community-based pediatricians often have difficulty implementing these guidelines. New strategies are needed to improve the quality of care received by children with ADHD and to improve utilization of the AAP consensus guidelines by pediatricians. An evidence-based quality improvement intervention has been developed that effectively improves the quality of ADHD care delivered by community-based pediatricians. In order to facilitate widespread dissemination of this intervention model, the entire intervention has been modified for online delivery. The intervention is called the myADHDportal.com Improvement Program. The full functionality of this online intervention is described including the collection of online ADHD rating scales from parents and teachers and online communication between parents, teachers, and physicians. In addition, the web portal integrates several innovative quality improvement features including an online wizard for mapping ADHD patient flow, an online report card for monitoring quality of care, and an online wizard for guiding practices through the Plan-Do-Study-Act (PDSA) cycle process. The combination of clinical utility and quality improvement tools facilitates delivery of quality ADHD care and reduces several of the obstacles to implementing AAP-recommended practice behaviors. Initial results with this intervention model are reviewed and goals for dissemination are described.

Keywords

ADHD; quality improvement; internet; guidelines

Attention-Deficit / Hyperactivity Disorder (ADHD) is a prevalent mental disorder that first presents in childhood (DSM-IV, 1994). Accurately diagnosing ADHD requires a comprehensive evaluation that includes objective rating scales completed by parents and teachers and uses DSM criteria to confirm the presence of the ADHD diagnosis (American Academy of Pediatrics, 2011; American Academy of Child and Adolescent Psychiatry, 2007). The most effective treatment for children with ADHD is a multimodal strategy

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combining pharmacotherapy with behavioral strategies (MTA Cooperative Group, 1999). While psychologists are often involved in assessing ADHD as well as delivering behavioral treatments, the majority of children with ADHD are evaluated and treated by primary care physicians - generally pediatricians - rather than by mental health specialists (Zarin, Tanielian, Suarez, & Marcus, 1998; Zito et al., 1999). In fact, ADHD is one of the three most common disorders seen in primary care settings (Leslie, Rappo, Abelson, Sewall, & Jenkins, 2000). This reliance on pediatricians for ADHD care is likely a result of the high prevalence of ADHD and the insufficient number of child mental health professionals currently available in most, but not all, communities (Leslie, Stallone, Weckerly, McDaniel, & Monn, 2006).

In 2000, 2001 and again in 2011, the American Academy of Pediatrics (AAP) published evidence-based guidelines for pediatricians to guide them in providing effective ADHD care (AAP, 2000, 2001, 2011). The guidelines summarize the empirical literature and make recommendations to community-based pediatricians regarding best practice procedures. Assessment recommendations emphasize the importance of collecting parent and teacher rating scales, using DSM-IV criteria as the basis for making an accurate ADHD diagnosis, and evaluating for co-morbid conditions. Indeed, accurately diagnosing ADHD can be accomplished most efficiently using parent and teacher rating scales, thus collection of parent and teacher ratings is essential to the diagnostic process (Pelham, Fabiano, & Massetti, 2005). Treatment guidelines focus on specifying targeted patient outcomes and providing systematic follow-up including the collection of follow-up parent and teacher ratings scales to quantitatively assess response to treatment.

The AAP guidelines have been widely disseminated and their adoption actively promoted. Most pediatricians are familiar with the AAP ADHD guidelines (Rushton, Fant, & Clark, 2004). However, it is evident that the AAP recommendations are not being reliably implemented in the community (Chan, Hopkins, Perrin, Herreras, & Homer, 2005; Epstein et al., 2011; Epstein et al., 2008; Gardner, Kelleher, Pajer, & Camp, 2004; Rushton, et al., 2004). Chan et al. (2005) completed a large nationally representative self-report survey of pediatricians' ADHD-related practice behaviors. The majority of pediatricians surveyed, 87%, were collecting information from both parents and teachers as part of ADHD evaluations and as specified in the AAP guidelines. However, a small minority of physicians reported using DSM criteria to diagnose ADHD. Problems have also been identified in terms of adherence to the treatment portion of the AAP guidelines (Gardner, et al., 2004; Rushton, et al., 2004). For example, Rushton, Fant & Clark (2004) found that only 53% of physicians who prescribed stimulant medications for patients with ADHD self-reported doing routine follow-up visits as recommended by the AAP.

Using chart reviews, as opposed to self-report, Epstein et al. (Epstein, Langberg, Lichtenstein, Kolb, & Stark, 2010; Epstein, et al., 2008) demonstrated that implementation of some of the basic AAP recommendations (e. g., using ADHD rating scales to assess for ADHD, using ADHD rating scales to monitor treatment response) is substantially less frequent than what has been reported from pediatrician self-report surveys. For example, a random audit of 511 patient charts across 49 pediatricians at eight practices revealed that pediatricians collect parent and teacher ratings during the ADHD assessment process with 20.0% and 14.5% of their patients respectively. Further, collection of parent and teacher ratings to monitor treatment response rarely, if ever, occurred (Epstein, et al., 2011).

One likely cause of the poor provision of ADHD care is the logistical issue surrounding collection of ADHD rating scales from parents and teachers. Collection of rating scales requires knowledge of appropriate ratings scales to use, time to explain the purpose of collecting rating scales to parents, distribution of rating scales to/from home, coordination of

distributing and collecting rating scales from school, scoring of completed ratings and, finally, interpretation of results. This comprises a complex data management process that typically goes un- or under-reimbursed in pediatric settings. As indicated by our chart review results (Epstein, et al., 2011), physicians tend to forego collection of these ratings and, as a result, quality of ADHD care suffers.

The consequences of poor quality of ADHD care likely impacts child outcomes. Indeed, results from the multisite Multimodal Treatment Study for Children with ADHD (MTA Cooperative Group, 1999) suggest that how stimulant medication treatment is conducted may have a large impact on patient outcomes. In the MTA study, patients were randomly assigned to one of four treatment groups. One of these groups was study-provided medication management using procedures largely consistent with current AAP ADHD guidelines. Children assigned to this group received placebo-controlled titration trials to establish optimal medication and dosages and this was followed by systematic and ongoing monitoring of medication effectiveness. Physicians had contact with parents and teachers on a near-monthly basis to determine if treatment was continuing to be effective. Another randomly assigned group was a community control group. Children assigned to this group were referred back to the community for treatment. Two-thirds of the children in this group received medication from community providers.

In comparing the delivery of medication treatment between the study medication management group and the community-delivered treatment, many differences were noted. Community physicians had less frequent and shorter office visits with their patients compared to those patients seen in the context of the study medication management group. Community physicians were also less likely to implement titration trials to determine an optimum dosage. As a result, medication dosages for children treated in the community were much lower than medication dosages used for children treated in the medication management study arm (18.7 mg/day vs. 32.8 mg; Jensen et al., 2001). Not surprisingly, patient outcomes across the two groups differed. For example, children treated in the study medication management group had superior treatment outcomes across a range of ADHD symptom and functional impairment measures. The likely explanation for this finding is that the collection of frequent standardized rating scales during medication titration to quickly optimize dose, frequent follow-up office visits supplemented with parent and teacher feedback about the child's behavior resulted in optimal medication dosages and improved treatment efficacy.

The impact of physician behaviors on child outcomes was more recently demonstrated as part of a community-based cluster randomized trial in which a randomly assigned group of pediatricians were offered a consultation service that promoted the implementation of AAP treatment guidelines (Epstein et al., 2007). Pediatricians in the consultation group were using standardized ratings to evaluate medication efficacy and ended up making more systematic dose changes than pediatricians randomly assigned to a control group. Results of the study demonstrated that children who were treated by pediatricians who successfully adopted the consultation service had much better patient outcomes than the children treated by pediatricians who did not have access to these services (Epstein, et al., 2007).

Another potential impact of receiving ADHD care from pediatricians is the tendency for pediatricians to rely primarily on pharmacotherapy as the sole modality of treatment (Hoagwood, Jensen, Feil, Vitiello, & Bhatara, 2000). As stated above, the most effective treatment strategy for children with ADHD is a combination of pharmacotherapy and behavioral treatment (MTA Cooperative Group, 1999). Pharmacotherapy alone, while effective at remediating ADHD symptoms, often fails to address important areas of functional impairment such as academic achievement, parent-child relationships and social

functioning (Epstein et al., 2010). In order to address these outcomes, skills need to be taught to children and their families, which usually involves cognitive and behavioral therapies delivered by mental health professionals. Pediatricians must grow accustomed to referring children for these therapies and then be able to work collaboratively with mental health providers (e.g., psychologists) to address the full range of children's symptoms and impairments.

There is a dire need for new strategies to improve the quality of care received by children with ADHD and to improve utilization of the AAP consensus guidelines by pediatricians (Langberg, Brinkman, Lichtenstein, & Epstein, 2009). A variety of models have been proposed to promote adoption of evidence-based practices (Pace, Chaney, Mullins, & Olson, 1995). One such model is a consultation model (Pace, et al., 1995) which promotes the collaboration between community-based physicians (e.g., pediatricians) and mental health professionals (e.g., psychologists; psychiatrists). A number of consultation models have been reported in the research literature (e.g., Epstein, et al., 2007; Fine & Jewesson, 1989; Guyatt et al., 1990; Larson, Ellsworth, & Oas, 1994; Leslie, Weckerly, Plemmons, Landsverk, & Eastman, 2004; Nikles, Mitchell, Del Mar, Clavarino, & McNairn, 2006; Olson, Rosenbaum, Dosa, & Roizen, 2005). One consultation model specific to improving ADHD care is the San Diego ADHD Project (Leslie, et al., 2004) which provides guideline training, assessment materials, and assistance with collecting and scoring rating scales.

Many of these consultation models have been successful with improving AAP guideline compliance, but their reliance upon outside services and grant funding make sustainability problematic (Leslie, et al., 2006). Specifically the consultation model presents financial barriers to sustainability because outside professionals (e.g., a psychologist for diagnostic purposes or a psychometrist for scoring ratings) are used to implement portions of the AAP guidelines. These consultative features have associated costs which are generally not reimbursable. In previous studies, the consultative costs have been paid by external funding sources (e.g., grants). Unless these extra costs are absorbed by the practices and/or patients, these services have not proven to be sustainable (Leslie, et al., 2004).

An alternative treatment model is a quality improvement model in which the focus of the intervention is to work with practices to develop a system within each practice that will allow the practice to perform the services recommend by the AAP guidelines on their own. Similar quality improvement methods have been used successfully to target the implementation of developmental screenings in pediatric settings (e.g., Schonwald, Huntington, Chan, Risko, & Bridgemohan, 2009). Polaha et al. (2005) describe a similar quality improvement model targeting pediatricians' ADHD assessment practice behaviors. Polaha et al. (2005) reported impressive effectiveness for improving the assessment practices of eight pediatricians at two practices. In particular, pediatricians improved their rates of collecting rating scales during ADHD assessment and these improvements were sustained for up to 3 years. It should be noted, however, that the treatment practices of pediatricians were not addressed by this intervention.

Building upon the quality improvement work of Polaha et al. (2005), investigators at Cincinnati Children's Hospital Medical Center have developed a quality improvement (QI) intervention designed to work with the entire office staff at a pediatric office to modify office systems to promote and support the systematic use of the AAP guidelines. This intervention was initially evaluated through a community-wide intervention trial with 202 physicians from 55 practices in Greater Cincinnati, OH (Epstein, et al., 2008). To begin, pediatricians were informed about the rationale for implementation of the AAP prescribed guidelines for assessing and treating children with ADHD. In office training sessions that followed, office staff worked together to modify their office systems to include systematic

procedures for collecting ADHD rating scales for ADHD diagnostic assessment and treatment monitoring. Physicians and office staff were also taught to use quality improvement strategies to problem-solve systemic glitches and continually improve their customized system. To facilitate the quality improvement process, physician practice behaviors were tracked through chart reviews. Feedback was provided on individual physician's performance and the practice as a whole that then guided continued refinement of the ADHD office systems. The 55 practices that participated in this QI intervention demonstrated significant improvements in a number of AAP recommended practice behaviors at 1-year post-intervention. For example, practices went from obtaining parent and teacher ratings scales for ADHD assessment 50% of the time pre-intervention to nearly 100% of the time 1-year post-intervention. These gains were maintained 2-years post-intervention (Epstein, et al., 2010). Further, children treated by participating physicians demonstrated significant improvement in ADHD symptoms over time that were comparable to treatment outcomes achieved in university-based clinical trials using ADHD medications (Epstein, et al., 2010).

While this intervention model was proven to be effective, there were several limitations that limited its dissemination beyond Greater Cincinnati. Namely, the ADHD Collaborative intervention involved in-office didactic and workshop trainings. Another intervention feature that limited dissemination was the quarterly chart reviews. ADHD Collaborative staff travelled to practices to query patient charts for the presence of targeted ADHD care practices. The inoffice trainings and office-based chart reviews would have made disseminating this intervention model beyond Greater Cincinnati prohibitively expensive.

To directly address these limitations, an alternative method of intervention delivery was developed. Instead of conducting the trainings in-person at pediatric practices, web conferencing was used. Also, in order to negate the need for chart reviews, an ADHD web portal was developed. The ADHD web portal allows pediatricians to collect parent and teacher rating scales online. It automatically scores rating scales in real time and provides pediatricians with reports as well as immediate warnings when side effects occur or a child's behavior deteriorates significantly during treatment. Also, the ADHD web portal prompts physicians to refer the child for adjunctive treatment (e.g., behavioral therapy) if children continue to evidence functional impairment. The ADHD web portal has a communication feature that allows parents, teachers, and physicians to communicate with each other during the assessment and treatment process. It allows physicians to share a child's data with mental health professionals (e.g., psychologists) in order to facilitate collaborative treatment efforts. The ADHD web portal also continually updates information regarding physician practice behavior using a report card format, allowing pediatricians to see how well they are adhering to the AAP guidelines. Finally, a PDSA (Plan-Do-Study-Act; Speroff & O'Connor, 2004) wizard was integrated into the report card so that pediatricians can conduct small tests of change targeting specific under-performing practice behaviors.

A cluster randomized controlled trial (Epstein, et al., 2011) was conducted with the web portal-assisted QI intervention. Forty-nine community-based pediatricians at eight practices participated. Practices were randomly assigned to either receive the intervention immediately or placed on a wait-list to receive the intervention after a 6-month period. The medical charts from a random sampling of ADHD patients from each of the participating pediatricians were examined at baseline and 6-months. Intervention practices participated in a 4-session web conference training including didactic lectures and office flow modification workshops. Practices were then given access to the ADHD web portal for clinical use. Quarterly, physicians evaluated their practice behaviors using an online report card and completed a PDSA cycle to address underperforming areas. Results of the cluster randomized trial demonstrated that pediatricians in the intervention group significantly

improved rates of many AAP-recommended ADHD care practice behaviors as compared to the control group, including collection of parent and teacher rating scales for assessing children with ADHD, use of DSM criteria, and use of teacher rating scales for monitoring treatment response. For example, rates of collection of parent- and teacher- ADHD ratings during assessment increased from 20.0% and 14.5% at baseline respectively to 42.0% (parents) and 36.3% (teachers) after six months of intervention and rates of ratings collection continued to increase when assessed at 15-months post-baseline (70.2% for parent ratings; 50.6% for teacher ratings). Rates of using rating scales to monitor treatment response went from 0% for parents and teachers to 48.2% for parent ratings and 38.7% for teacher ratings. Moreover, the acquisition of parent and teacher rating scales using the ADHD web portal was very efficient. The median time to complete ADHD ratings was two days for parents and three days for teachers.

In addition to being effective at improving most ADHD care processes, the intervention was well accepted by pediatricians who largely expressed high satisfaction with the intervention model and stated that they would recommend it to other pediatricians (Epstein, et al., 2011). In fact, 86% of pediatricians reported that using the ADHD web portal improved the quality of care they provided to their patients and all 26 of 27 pediatricians reported that they would recommend the intervention to their colleagues.

To further enhance the potential for widespread dissemination and to decrease the costs of what is now called the “myADHDportal.com Improvement Program,” the web-conference training at the outset of the intervention has been replaced with a set of online training modules. In addition, an online tool for deriving PDSAs was integrated into the web portal. This new intervention model is currently being used to improve the quality of ADHD care at pediatric practices across the US. The primary purpose of this manuscript is to fully describe this innovative intervention model as it has not been fully described thus far in the literature.

myADHDportal.com Improvement Program

Infrastructure

Pediatric practices or individual pediatricians can sign up for an ADHD web portal account. A practice account includes a single practice administrator account and individual physician accounts. The practice administrator and physicians each create a log-on username and password which allows them to access their accounts.

Registration

Physicians and practice administrators may register patients onto the ADHD web portal by inputting the patient's name, date of birth, parent's name, parent's email, and patient care mode (assessment or treatment). After registering a patient into the web portal, a letter with an activation code is either printed out or emailed to the family that provides instructions to access and login to the portal. Families use the activation code to login and then create their own personal username and password. After logging in, families are prompted to invite the child's teachers to access the web portal to input rating scale information about their child. Teachers are sent an email with login information that allows them to access the online rating scales. The teacher letter contains additional language providing authorization for release of information electronically signed and dated by the parent.

Web portal Components

The web portal components are described below. For a video demonstration of the ADHD web portal's functionality and clinical utility, see <http://research.cchmc.org/adhd/>

a) Online trainings—Online trainings include 4 modules. The first module provides didactic content in the form of slides and voice-over. An overview of the intervention model, the need for systemic changes to accommodate AAP-recommended ADHD patient care, and evidence-based practice behaviors for assessing and treating children with ADHD are presented. Assessment- and treatment-related ADHD care is explained in the context of using the ADHD web portal to facilitate adherence to AAP-recommended practice behaviors. The second module is an audio-only feed that provides step-by-step instructions on how to utilize the web portal.

During the third module, the entire office staff participates in the completion of an online wizard that includes 21 questions regarding ADHD patient office flow in the context of using the ADHD portal to deliver care. See Figure 1. After consulting with their team, the practice inputs answers to each question. Through this exercise, the practice ensures that every individual involved in ADHD patient care knows their role and responsibilities in the delivery of ADHD patient care at that office. At the end of this exercise, an ADHD patient flow is generated. This ADHD patient flow remains resident on the web portal for offices to consult or edit at any time. Alternatively, offices can print out the ADHD patient flow and post copies throughout the practice so everyone is aware of the agreed upon model for ADHD patient flow.

The fourth and final training module is a didactic slide show with voiceover that focuses on quality improvement methods and billing and coding for ADHD services. In the quality improvement section of this module, pediatricians are taught about how to access and read the online report card. They also learn how to use the online PDSA wizard (see below) to create PDSAs and how to use the online report card to evaluate the success of each PDSA. In the billing and coding portion of this training, physicians are taught how to effectively bill for ADHD services.

b) Collection and reporting for rating scale data—The ADHD portal includes a platform whereby parents, teachers, and pediatricians all mutually input information about the target child, after which information is scored, interpreted, and formatted in a report style that is helpful to the pediatrician in his/her assessment and treatment of patients with ADHD.

Depending on the patient care mode that the pediatrician has selected (i.e., assessment or treatment), the parent (s) and teacher (s) will be asked to complete questionnaires and rating scales about the child's behavior. After a physician registers a child on the web portal for assessment, the parent and teacher will each receive email messages with links to the web portal requesting them to complete an online version of the initial Vanderbilt Parent and Teacher Rating Scales (Wolraich, Feurer, Hannah, Baumgaertel, & Pinnock, 1998). Once these are completed, computer algorithms score and interpret these rating scales and then format this information in report form for the pediatrician. Reports contain tabular information regarding the number of ADHD symptoms endorsed, total symptom score, comorbidity screening criteria, and areas of impairment. Further, there are algorithm-generated textual passages that provide guidance to the physician regarding diagnostic presentation and recommendations for further assessment and/or treatment. For example, if the child has a profile consistent with an ADHD diagnosis, the pediatrician is encouraged to confirm that DSM-IV criteria are met, and if so recommendations are generated that guide the pediatrician to consider multimodal treatment including pharmacotherapy combined with behavioral treatment. Additionally, if comorbidities (e.g., depression, anxiety, learning disorders) are indicated from parent and/or teacher responses, pediatricians are encouraged to refer to mental health professionals for further assessment. If the web portal is being used for treatment, physicians select a treatment modality (e.g., medication) and a monitoring

schedule for a specific patient. For example, the pediatrician may input that the patient is being prescribed 18 mg of methylphenidate and rating scales are desired monthly. This information is inputted into the web portal. Thereafter, parents and teachers will receive emails at the designated time point (i.e., monthly in this scenario) alerting them to complete the Vanderbilt Parent and Teacher Rating Scales (Wolraich, et al., 1998) and the Pittsburgh Side Effects Rating Scale (Pelham, 1993). The email to parents and teachers includes a link to the web portal to complete these scales. When parent or teacher information is inputted into the web portal, computerized algorithms score and interpret this information and a report is produced. See Figure 2. Pediatricians are immediately alerted via email if there appears to be any exacerbation of side effects or deterioration in ADHD symptoms. Otherwise, the updated report remains resident in the web portal and may be accessed by the pediatrician at the time of the patient's next scheduled visit. Computerized algorithms generate report recommendations for modifying treatment or adding additional modalities of treatment if treatment is not effective or if domains of impairments remain problematic. Reports may be printed or saved electronically in a variety of formats in order to attach to electronic medical records.

c) Communication among physicians, parents, teachers—Another feature offered by the web portal is the ability for pediatricians, parents, and teachers to use the software to communicate with each other via a messaging service that conceals the physicians actual email address. Each member of this triad can contact another member of the triad by simply identifying a recipient. Pediatricians may also share patient information resident in the web portal with other mental health professionals so multiple providers can collaborate to improve a child's outcomes.

d) Report card—A key component of any quality improvement intervention is continuous monitoring of behavior with feedback. The ADHD portal includes a module accessible through the pediatrician page that displays each pediatrician's adherence with many of the prescribed AAP practice behaviors. See Figure 3. Outcomes that are tracked include the following: 1) Number of patients registered on the web portal; 2) Percentage of ADHD assessment patients for whom parent rating scales were collected; 3) Percentage of ADHD assessment patients for whom teacher rating scales were collected; 4) Percentage of ADHD assessment patients who met DSM-IV ADHD criteria; 5) For newly medicated patients, length of time to receiving first parent rating scale; 6) For newly medicated patients, length of time to receive first teacher rating scale; 7) For ongoing patients, length of time between last two sets of parent rating scales; 8) For ongoing patients, length of time between last to sets of teacher rating scales; 9) Average percent reduction in ADHD total symptom score as rated by parent; 10) Average percent reduction in ADHD total symptom score as rated by teacher; 11) Percentage of patients with no parent-reported functional impairment; 12) Percentage of patients with no teacher-reported functional impairment.

e) PDSA wizard—Every 3 months, pediatricians receive an email prompt encouraging them to examine their report card and identify practice behaviors that require improvement. Physicians can create small tests of change also known as Plan-Do-Study-Act (PDSA) cycles to target deficient practice behaviors. A PDSA wizard is integrated into the web portal and accessible from the practice account's report card. See Figure 4. The PDSA wizard guides the physician through a series of questions to determine which ADHD care practice to target and then provides the physician a list of possible PDSAs to target that practice behavior. The list of suggested PDSAs was derived from successful PDSAs found to be effective by physicians in our prior QI research. After formulating a PDSA, the report card is annotated with the PDSA so that physicians can monitor whether the executed PDSA was effective or whether revisions are necessary.

Current Use

To date, the intervention is being used by over 300 physicians across the US. Physicians have thus far registered over 14,000 patients on the web portal. Most of the users are local and are utilizing the intervention in the context of research studies. However, physicians across the nation have signed up to use our intervention for a monthly fee. Based upon our conversations with physicians when inquiring about adopting our intervention, the two primary reasons for inquiry are 1) a motivation to improve and simplify ADHD care at their practice; or 2) to earn 20 American Medical Association (AMA) Physician's Recognition Award Category 1 continuing medical education credits and 25 part 4b American Board of Pediatrics Maintenance of Certification (MOC) credits per licensure cycle.

Case Study

The myADHDportal.com Improvement Program has been adopted in a wide range of practices including urban, suburban, and rural settings as well as practices serving a range of patients across socioeconomic strata. Implementation of the intervention across practices has been largely customized to each practice's needs and requirements. To date, we have seen a wide range of implementation methods across practices. We present a case study of one practice as a model of how this intervention can be implemented successfully.

Community Pediatrics (pseudonym) is a suburban practice located in a southern state that primarily serves patients with private insurance (i.e., only 1.5% of patients at practice receive Medicaid benefits). The practice consists of three pediatricians along with three nurse practitioners and eight support staff. They decided to implement this intervention at their practice to improve the quality of ADHD care delivered at their practice and to earn MOC credits. In order to earn MOC credits, physicians are required to perform a baseline audit of ten ADHD patient charts and record whether specific ADHD practice behaviors were implemented with those patients. Results of this baseline audit showed that the ADHD assessment practices were outstanding with rates of collection of parent- and teacher-ADHD ratings as part of the ADHD diagnostic process at 100%. However, collection of parent- and teacher- ADHD ratings to assess side effects and treatment response was less rigorous. For example, parent- and teacher- ADHD ratings were collected for the first time over three months (107.5 [sd=101.4] days) after prescribing medication.

Community Pediatrics registered to begin using the myADHDportal.com Improvement Program in September, 2010. All of the physicians and an identified ADHD champion completed the four online training sessions. In completing their office flow, they realized that they would be able to use the ADHD portal to reduce the number of ADHD office visits throughout the year. Up front, they informed all of their families that the typical number of ADHD follow-up visits per year would be two visits. In place of office visits, they informed parents that they would be using the online acquisition of periodic rating scales, communication system, and telephone calls to monitor treatment, make medication adjustments and to field general questions from parents.

Community Pediatrics registered their first patient on the ADHD web portal in October, 2010. The web portal was queried regarding their provision of ADHD care during their first year of use. In that first year of using the ADHD web portal, they registered 146 patients on the web portal. See Figure 5. Twenty-eight of these patients were registered only for an ADHD assessment, 95 patients were registered only for ADHD treatment, and 23 patients were registered for ADHD assessment and then transferred to ADHD treatment. Of those registered, the majority of patients (75.3%) activated their accounts and utilized the web portal for online rating scale entry.

In the initial year, they performed six PDSA cycles using the online PDSA wizard. As displayed in Table 1, most of their PDSAs occurred during the initial adoption of the ADHD web portal. Moreover, all of the PDSAs focused on the timing and success of collecting of parent and teacher ratings scales during assessment and treatment.

In that initial year of use, there were substantial improvements in ADHD treatment. For example, physicians obtained ADHD behavioral and side effect ratings from parents (30.5 [sd=27.8] days) and teachers (22.3 [sd=23.1] days) after initiating medication considerably sooner than pre-intervention (107.5 days).

Conclusion

The myADHDportal.com Improvement Program is an evidence-based intervention that improves the quality of ADHD care delivered by community-based pediatricians. The intervention model appears to be effective, disseminable, and beneficial to pediatricians (e.g., MOC credits). It should be noted that though this software was developed for pediatricians, the system can easily be used by mental health professionals to collect parent and teacher ratings during the ADHD assessment process or to monitor treatment outcomes of psychosocial treatment.

We plan to disseminate the myADHDportal.com Improvement Program to pediatricians and mental health providers nationwide. Indeed, nationwide adoption of such a model has the potential to not only improve the quality of ADHD care but may also decrease disparities in quality of ADHD care that exist across socioeconomic and geographical settings (Bussing, Zima, Gary, & Garvan, 2003).

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ADHD Office Flow Wizard

The screenshot shows a web-based wizard interface. On the left is a vertical navigation menu with a blue background and white text. It contains the following links: Introduction, Assessment | Q1, Q2, Q3, Q4, Q5, Q6, Q7, Treatment | Q8, Q9, Q10, Q11, Q12, Q13, Q14, Q15, Q16, Q17, Q18, Q19, Q20, and Q21. The main content area is white and displays three questions. The first question is 'Q3: For patients where ADHD was raised during the office visit, when will these patients be registered on the web portal?' with two radio button options: 'While they are at their office visit.' (selected) and 'At a later time.'. The second question is 'Who will be responsible for registering the patient during their office visit?' with two radio button options: 'Physician(s)' (selected) and 'Other staff member(s)'. The third question is 'Will parents be emailed their web portal registration information or will this be printed out and handed to them?' with two radio button options: 'Emailed to parent' (selected) and 'Printed out and handed to parent'. At the bottom right of the main content area are two blue buttons labeled 'Previous' and 'Next'.

Figure 1. ADHD Office Flow Wizard. During initial training, the staff at each practice complete a set of 21 questions that identifies each staff member's roles and responsibilities during ADHD patient flow that will ensure evidence-based delivery of ADHD care.

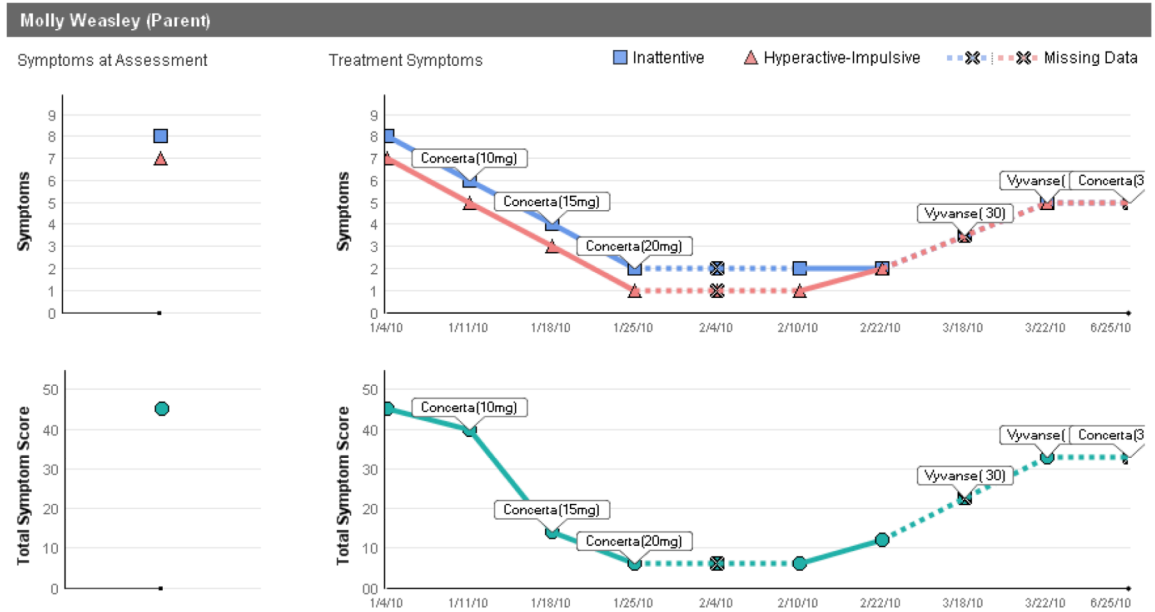


Figure 2. Patient Treatment Chart: Parents and teachers complete ADHD rating scales during treatment to inform the physician regarding each child's treatment response. Ratings are scored using computerized algorithms and then summarized online using line charts annotated with treatment changes over time.

Report Card:

This report is an inventory of your ADHD patients enrolled in the myADHDportal program. The graphs provide details about participation and performance data of patients, parents and teachers.

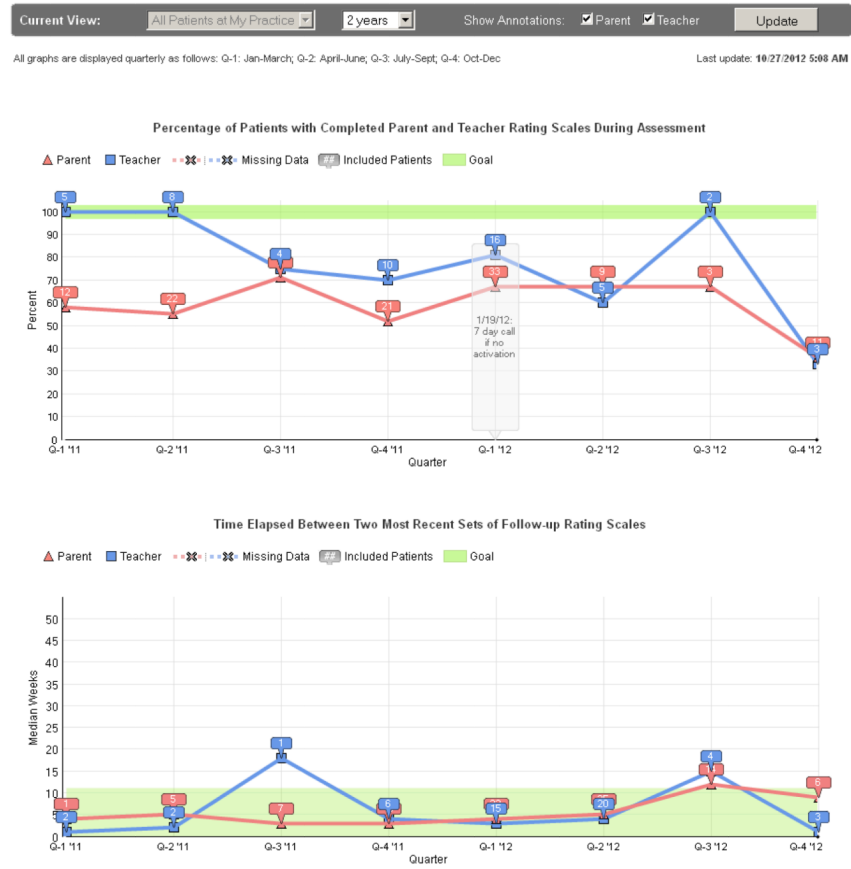


Figure 3. Physician Report Card: Physician's delivery of ADHD care is monitored by the web portal and performance across 12 different pediatrician practice behaviors are charted over time. Physicians periodically check their report card to identify practice behaviors that require targeted improvement.

Report Card

This report is an inventory of your ADHD patients enrolled in the myADHDportal program. The graphs provide details about participation and performance data of patients, parents and teachers.

Current View: All Patients at My Practice | 2 years | Show Annotations: Parent Teacher | Test of Change | Update

Share 'Test of Change' PDSA Annotations with Your Physicians [+ Create new Test of Change](#)

Date: 10/29/2012

Measure to Improve: Average Time to Obtaining First Set of Parent Follow-up Rating Scales Since Beginning Treatment

Problem: Parents not completing forms.

Reason: Parents not motivated or forgetting to complete forms.

Test of Change: Please select a test

- Please select a test
- Create office process to not allow scheduling of ADHD follow-up visit or medication refills until parent rating scales are complete
- Create office process for contacting parent if have not filled out rating scale within 7 days.
- Create office process for including reminder to complete rating scale in appointment reminder script
- Create office process for having rating scales filled out in office on day of office follow-up appointment.
- Custom...

Edit Delete	09/04/12	Enter all pts on portal	Test of Change: Create office process to ensure new ADHD patients use the office new wizard to create process whereby the physician or ADHD Champion ensures that the treatment module is engaged each time a newly diagnosed patient is started on medication.
Edit Delete	09/04/12	7 day call if not responsive	Measure to Improve: Average Time to Obtaining First Set of Parent Follow-up Rating Scales Since Beginning Treatment Test of Change: Create office process for contacting parent if have not filled out rating scale within 7 days.
Edit Delete	06/04/12	Set portal for 7-14 fu	Measure to Improve: Average Time to Obtaining First Set of Parent Follow-up Rating Scales Since Beginning Treatment Test of Change: Create office policy for setting period length on all medication start-ups at 7-14 days.
Edit Delete	06/04/12	7 day call if no activation	Measure to Improve: Percentage of Patients with Completed Parent Rating Scales During Assessment Test of Change: Create office process for contacting parent if have not activated their account within 7 days.
Edit Delete	02/20/12		Measure to Improve: Test of Change:

1 2 3 4

Update Annotations

Figure 4. Plan-Do-Study-Act Wizard: Physician's and their staff use the PDSA wizard to derive tests of change targeting deficient ADHD care behaviors. The PDSA wizard contains dropdown menus with populated choices for potential PDSAs. Alternatively, practices can derive their own custom PDSAs.

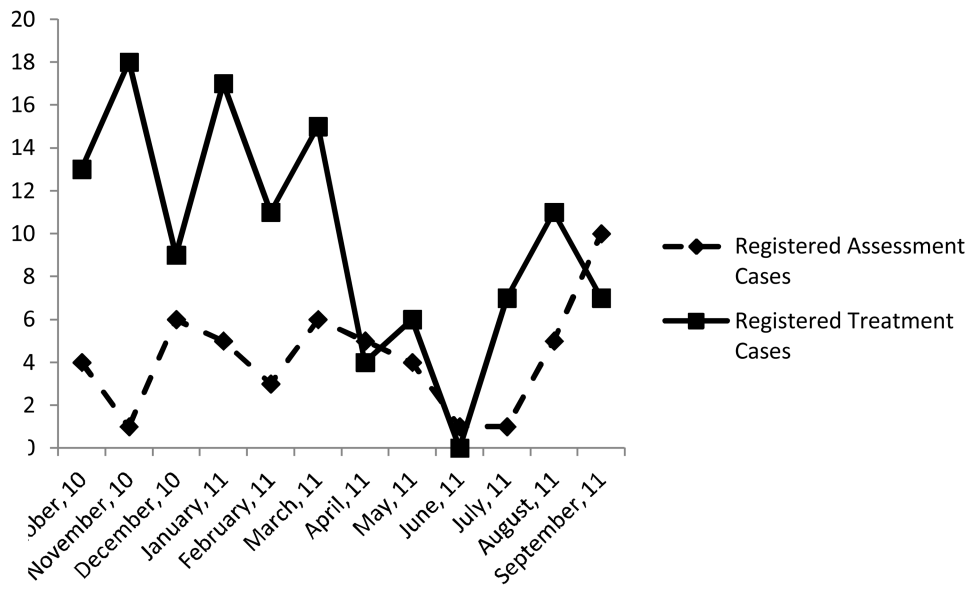


Figure 5. New ADHD assessment and ADHD treatment cases added to ADHD web portal by Community Pediatrics between October, 2010 and September, 2011

Table 1
Dates, targeted behavior, and Plan-Do-Study-Act (PDSA) cycles for Community Pediatrics

Date	Measure to Improve	Test of Change (PDSA)
9/27/2010	Average Time to Obtaining First Set of Teacher Follow-up Rating Scales Since Beginning Treatment	Create office policy for setting period length on all medication start-ups at 7-14 days
9/27/2010	Average Time to Obtaining First Set of Parent Follow-up Rating Scales Since Beginning Treatment	Create office policy for setting period length on all medication start-ups at 7-14 days.
9/27/2010	Average Time to Obtaining First Set of Parent Follow-up Rating Scales Since Beginning Treatment	Create office policy for setting period length on all medication start-ups at 7-14 days.
10/1/2010	Percentage of Patients with Completed Teacher Rating Scales During Assessment	Engage school district. Offer to make a presentation on ADHD at the local elementary schools. During presentation emphasize the importance of teacher completed rating scales for assessment and for medication management.
10/1/2010	Percentage of Patients with Completed Teacher Rating Scales During Assessment	Encouraged parents to inform teacher the web portal is a secure web site
11/24/2010	Average Time to Obtaining First Set of Teacher Follow-up Rating Scales Since Beginning Treatment	Create office policy for setting period length on all medication start-ups at 7-14 days