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Title: "Educating and Supporting Primary Care Providers in the Implementation of Evidence-Based Practices for ADHD "

MAIN PROPOSAL

1. Goal and Objectives

1A. Goal: The goal of this project is to increase the use of evidence-based practices (EBPs) for assessing and treating children with ADHD between 5 and 12 years in the context of primary care practice, as described in the American Academy of Pediatrics (AAP) guidelines for ADHD. Our team will accomplish this goal by using an integrated approach that includes education about EBPs, communication training, collaborative consultation, an electronic health record (EHR)-linked portal to support shared decision making, and ongoing performance feedback.

1B. Objectives: The objectives of this project directly address the need to increase the use of EBPs among pediatric primary care physicians (PCPs) for children with ADHD.

Primary Objective: Develop an integrated intervention for PCPs that includes education about ADHD management, communication training, collaborative consultation, and an EHR-linked portal to promote shared decision making (SDM); and evaluate the effectiveness of this intervention by conducting a randomized clinical trial (RCT). The control condition for the study will be practice as usual; PCPs in this condition will receive the educational intervention after the collection of post-intervention data.

Secondary Objective: Provide education, collaborative consultation, and practice supports to providers over the course of 8 months in the context of a quality improvement program. Participants in both the experimental and control conditions will be able to fulfill Performance in Practice (Part 4) requirements of the American Board of Pediatrics (ABP) Maintenance of Certification (MOC) program through their participation in the 8-month intervention.

Secondary Objective: Disseminate the methods, findings, and lessons learned from this project regionally and nationally through web postings, policy briefs, presentations, and publications.

2. Technical Approach

2A. Description of How This Project Addresses the RFP

This project addresses the RFP in that it is designed to educate PCPs about EBPs for managing ADHD and support the implementation of these practices. The intervention designed in this project provides training and education to providers about EBPs using a collaborative consultation model, which has been shown to be effective in improving practice.[1] The intervention addresses gaps in communication between PCPs and patients by providing strategies to facilitate communication [2] and SDM.[3] In addition, the intervention will include a web-based, EHR-linked portal to promote consistent implementation of SDM strategies and ongoing communication with teachers. Further, the intervention provides performance feedback by comparing providers to themselves (i.e., their previous performance) as well as their peers.

2B. Current Assessment of Need

2B1. Local Needs Assessment. Numerous studies have demonstrated that a high percentage of PCPs are knowledgeable about the AAP guidelines for managing ADHD, but a substantially lower percentage implement these guidelines consistently.[4,5] Our team at The Children's Hospital of Philadelphia (CHOP) conducted a survey of providers from 27 of CHOP's practices (121 providers) to examine the problem.[6] The sample included providers (PCPs) from both urban and suburban practices. Survey participants were asked to evaluate 24 practice activities,

based upon the AAP guidelines. For each activity they rated the appropriateness of the activity for PCPs (scope of practice) and the feasibility of implementing the activity in their practice.

The findings demonstrated that PCPs viewed the three major domains of practice (assessing ADHD, providing mental health support, and managing FDA-approved medications for ADHD) as within their scope of practice. However, PCPs indicated that there were substantial problems with feasibility in each domain. Although feasibility problems were noted for most areas of EBP, the table below reports on items (i.e., EBPs for PCPs in managing ADHD) for which there were significant differences between provider ratings of appropriateness and feasibility. Feasibility concerns were especially noteworthy in the urban practices with regard to assessing ADHD using information derived from parents and teachers. A subsequent focus group highlighted that continuing education alone was not sufficient to address feasibility challenges. The providers expressed a need for supports to promote ongoing provider-patient communication, collection of data from parents and teachers for progress monitoring, and collaboration with the school. The purpose of this project is to overcome these feasibility concerns and promote the consistent use of EBPs for managing ADHD.

Table: Primary Care Providers' Perceptions of the Appropriateness and Feasibility of Using EBPs in Managing ADHD

Items (EBPs for Managing ADHD)	Appropriate for PCP Mean(SD)	Feasible for PCP Mean (SD)
Providing information to families about how to pursue behavior therapy in the community	3.38 (0.69)	2.73 (0.87)
Providing information to families about how to obtain educational treatments/supports	3.36 (0.76)	2.78 (0.87)
Recommending specific behavior management strategies to parents	3.05 (0.89)	2.44 (0.89)
Determining if there are acting out behaviors that warrant additional assessment or treatment	3.18 (0.83)	2.69 (0.92)
Determining if there is a need for a psychoeducational evaluation	3.45 (0.73)	2.96 (0.87)

Note: The items listed are those demonstrating significant differences in PCP ratings of appropriateness versus. feasibility. Ratings of 3.0 or greater are relatively high and ratings less than 3.0 are relatively low.

2.B.2. Importance of "Common Factors" (Communications) Training for PCPs. The American Academy of Pediatrics Policy Statement,[7] *The Future of Pediatrics: Mental Health Competencies for Pediatric Primary Care*, emphasized the need for PCPs to develop competencies related to "Generic mental health skills…drawn from the literature on 'common factors' in mental health care—techniques used to increase patients optimism, feeling of well-being, and willingness to work towards improvement… (p. 413)." In adult psychotherapy the common factors have been found to explain more of the variance in outcome than specific treatment techniques, and training PCPs in the use of common factors has been found to improve satisfaction with and adherence to care, decrease patients' emotional distress, and improve parent-rated child mental health functioning.[2,8] Co-Investigator, Dr. Blum, is involved in an AAP effort to develop a curriculum to teach common factors approaches to PCPs and pediatric residents.

2.B.3. Importance of Shared Decision Making (SDM). National guidelines prioritize shared decision making (SDM) as a strategy to engage families in ADHD treatment and improve adherence and outcomes**.** SDM is a process by which families and clinicians jointly participate in decision-making, exchange information and treatment preferences, and work together to decide on a treatment plan.[9] SDM is particularly helpful for conditions like ADHD that have multiple evidence-based options and for which variation exists in how families weigh their risks and benefits.[10] In fact, the AAP recommends that clinicians engage families, be attentive to family preferences and goals, and weigh benefits and harms before deciding on a treatment course.[11] In addition, the Institute of Medicine has prioritized research on the comparative effectiveness of SDM,[12] and the 2010 Patient Protection and Affordable Care Act supports its implementation in clinical settings.[13]

Prior work from our team indicates that both parents and clinicians view SDM favorably.[14] However, parents described SDM as a partnership between equals, with physicians providing medical expertise and the family contributing in-depth knowledge of the child. In contrast, clinicians understood SDM as a means to encourage families to accept clinicians' preferred treatment, potentially compromising this process. We also found that families who were more easily able to contact their child's doctor outside of office visits were more likely to report high levels of SDM,[15] suggesting that interventions that facilitate communication and information sharing outside the context of office visits, such as patient portals, may improve SDM and engagement in care.

To support SDM in the treatment of ADHD, we developed the ADHD Preference and Goal Instrument (ADHD PGI), a measure of parental preferences and goals for ADHD treatment.[16] We administered the survey to 237 parents receiving care at CHOP. Factor analyses identified 4 medication subscales (treatment acceptability, feasibility, stigma, and adverse effects), 3 behavior therapy subscales (acceptability, feasibility, and adverse effects), and 3 goal subscales (academic achievement, behavioral compliance, and interpersonal relationships). Validation of this measure was demonstrated in a follow-up study; baseline preferences were associated with treatment initiation, and parents with different goals decided to initiate different treatments.[17]

2.B.4. Need for Cross-System Collaboration. Fragmentation of services and poor communication among providers adversely impact the uptake of EBPs for children with ADHD and their families,[18,19] which can result in suboptimal outcomes for children. For example, fragmentation impairs communication and coordination between providers and educators in delivering treatment responsive to a family's preferences and goals. [20] Poor communication and coordination may result in duplication of services, inadequate monitoring of treatment, and, more importantly, treatment that is inconsistent with a family's preferences and goals. The quality of care and the uptake of evidence-based therapies have been reported to be low in poorly integrated systems. [21] **Therefore, interventions that can facilitate communication and support cross-systems collaboration are urgently needed. Recently, it has been demonstrated that web-based portals can contribute greatly to improving coordination among parents and providers.**[22] We will utilize a web-based, EHR-linked portal in this study.

2.B.5. Need for Performance Feedback. Performance feedback using evidence-based strategies has been proven to be effective in our network at CHOP and nationally.[23,24] Feedback may be particularly effective because it addresses the well-described inability of physicians to

accurately assess their performance.[25] Previous studies have shown that feedback is most effective when rates of adherence to practice guidelines are low,[26,27] when the information is directly useful for care,[28] and when practitioners are motivated to change.[29] In particular, feedback that defines "achievable benchmarks"[30,31] has been found to improve outcomes.[30,31,32] In the proposed study, each clinician will be presented with a comparison of his or her own results with those of other providers in the experimental condition. Prior research suggests that this approach, known as "peer comparison feedback," may be more effective than feedback without these comparisons.[32,33]

2.B.6. Target Audience of Intervention. This intervention is targeted for physicians who serve as primary care providers in CHOP's pediatric practices, all of which are National Committee for Quality Assurance (NCQA) accredited medical homes. We plan to disseminate our findings at a local, state, and national level through presentations, publications, policy briefs, and web-based methods. In addition, whenever possible, we will record intervention content so that strategies can be readily disseminated.

2.C. Intervention Design and Methods

2.C.1 Planned Intervention. The following is a description of the multiple components of the experimental intervention, referred to as **Supporting Practice for ADHD (SPA)**:

(1) A series of web-based workshops and meetings will be conducted to provide education to providers. Videos of the workshops and meetings as well as handouts for providers will be posted on the project website. One focus of training will be on EBPs for managing ADHD, which will include education related to: (a) screening for ADHD, (b) assessment of ADHD and comorbid problems, (c) parent education, (d) pharmacological management, (e) psychosocial treatments, (f) collaboration with school professionals, and (f) evaluation of child outcomes using parent and teacher ratings. Another focus will be on communication training utilizing the common factors framework described above. The training will include education in instilling hope in patients, listening empathically, reflecting an understanding of the child and family by using their language, forming partnerships with families to develop solutions for identified problems, and identifying family beliefs and attitudes to promote family engagement in SDM. These workshops will be developed and conducted by the key investigators for this project as well as other providers in the ADHD Center at CHOP. A manual will be prepared to describe each component of training and procedures for delivering the intervention, including videos when possible.

(2) Collaborative consultation designed to address clinical issues arising in practice will be provided via web-based case conference meetings scheduled on a periodic basis, and telephone consultation as requested. Telephone consultation will be offered by the study investigators and members of the ADHD team. Providers will be encouraged to email, send a message through the EHR, or call the project coordinator to schedule telephone consultation. The focus of collaborative consultation will be to help providers address the preferences and goals of families and the challenging concerns presented by children as they provide services to children with ADHD. A manual will be prepared to describe the components of collaborative consultation and procedures for delivering this component.

(3) A set of practice supports will be developed and integrated into a web-based portal in collaboration with PCP representatives and the clinical informatics team at CHOP (see Appendix for a sample screen shot of this portal). The purpose of these practice supports is

to promote the implementation of EBPs in care. The portal will be used to promote SDM with families, assess child attainment of targeted goals, facilitate the collection of parent and teacher rating scales to monitor child progress in response to intervention, and promote communication between PCP and teacher. We plan to develop a web-based portal linked with the EHR for this purpose, which will be modeled after MyAsthma portal, developed by Dr. Fiks (Co-PI) and Dr. Grundmeier (Collaborator) at CHOP, to assist with the management of asthma in primary care.[23] The already implemented MyAsthma portal (a) captures and shares patient and family treatment preferences and goals, (b) monitors symptoms, treatment receipt and side effects as well as goal attainment, and (c) facilitates communication. For this project, families' preferences and goals will be measured through the portal using the ADHD PGI (see Appendix to view this measure).[16]

(4) To promote provider investment in the project, PCPs will be able to fulfill the Performance in Practice (Part 4) requirements of the American Board of Pediatrics (ABP) Maintenance of Certification (MOC) program. CHOP is an ABP approved sponsor of quality improvement projects that physicians can participate in to meet the Part 4 requirements of MOC and both Drs. Fiks and Blum have participated in the leadership of previous CHOP sponsored projects. As part of this QI project, providers will be given systematic performance feedback with regard to their use of EBPs for ADHD, as captured by the metrics described below. The feedback provided will be both ipsative (comparing provider performance with his or her previous performance) and normative (comparing provider performance with peers in the same treatment condition). This report will be generated every 2 months during the 8-month intervention period. Although we anticipate that most providers will elect to use the intervention as a MOC project, some may choose not to. Performance feedback will be offered to those in the intervention regardless of their involvement in a MOC project.

2.C.2. Control Condition. The control condition will be practice as usual supplemented with access to the portal. All providers enrolled in the study, including those in SPA and the control condition, will have the ability to use the web-based portal and enroll their patients onto the portal. Providers in the control group will be given brief education about how to use the portal. In contrast, only the experimental group (SPA) will receive education regarding EBPs for ADHD, communication skills training, collaborative consultation, and detailed guidance about how to use the portal to promote SDM with families. After post-intervention data are collected, providers in the control condition will be offered the 8-month intervention and the opportunity to fulfill MOC requirements.

We considered other alternatives for a control group. For example, we thought of providing an active control condition, which might include broad education about the management of ADHD, training in the use of a portal to collect rating scales [but not components of SDM], and ongoing performance feedback as required for MOC projects. We decided against this idea because there is no consensus about a standard of practice that could serve as an active control condition, because this type of control group blurs the distinction between the experimental and control conditions, and because there are insufficient resources to include a third group [practice as usual] to determine the effect of the active control condition. We acknowledge that research will be needed in the future to unravel this integrated intervention and examine the contribution of specific components of SPA.)

2.C.3. Population and Sample. The population is primary care physicians (PCPs) serving patients in primary care practices situated in a large metropolitan area. There are 190 PCPs working in CHOP's 31 primary care practices. We will exclude pediatric residents from the study.

The focus of this study is on provider practice with patients in the age range from 5 to 12 years. We have excluded younger children because providers are often reluctant to make the diagnosis of ADHD in younger children and ADHD practice guidelines emphasize the use of behavioral interventions prior to pharmacological interventions with this age range. We have excluded teenage children because these patients and their families require a different model of care, that is, one that involves youth much more actively in SDM. We plan to develop a model for adolescents in the future.

Across the CHOP primary care network, there are approximately 7,800 children with ADHD. Most practices serve between 100 and 500 patients with ADHD between the ages of 5 and 12 years. The overall prevalence of ADHD among patients in the 5 to 12 year age range for the 31 CHOP practices is 7.5%. The population of children with ADHD is quite diverse, including 31% Black/African American and 59% White/Caucasian. An estimated 5% of the population is Latino, and 38% of children with ADHD in the network are eligible for Medicaid.

2C.4. Recruitment of Providers. The Medical Director of the Primary Care Network (Dr. Lisa Biggs) and the Director of the Pediatric Research Consortium (PeRC; Dr. Louis Bell) have provided strong support for this project (see letters of support). PeRC is a practice-based research network that was initiated over 10 years ago with funding from the Agency for Healthcare Research and Quality. We will work with the Institutional Review Board at CHOP to obtain approval of the study. We have planned to obtain formal, written consent for providers to participate. With the support of Dr. Biggs and Bell, our team will contact all of the providers in the network to inform them of the study. We will explain that practices will be included in the study if at least 50% of providers in the practice offer consent to participate. Providers will be informed that consent indicates willingness to be randomly assigned to the experimental or control condition. Providers will be informed that they will have the opportunity to fulfill MOC requirements through the study. Providers randomly assigned to SPA can meet these requirements during the experimental phase of the study. Those in the control condition will be able to receive the intervention and fulfill MOC requirements after the study has been completed (after collection of post-intervention data).

Based upon our experience in conducting multiple studies in these practices, we conservatively expect that at least 70% of PCPs (190) will participate. In past trials, Dr. Fiks has repeatedly enrolled >80% of eligible practices (and providers) in research oriented toward improving the quality of primary care. [3,34,35] The opportunity for PCPs in both treatment conditions to meet MOC requirements through this project should serve as a significant incentive for participation.

2.D. Innovation. The inclusion of training and practice support to promote SDM in managing ADHD is highly innovative. Further, **the project is original in its integration of multiple components to promote effective practice**, including (a) education about EBPs for ADHD, (b) communication training to promote SDM, (c) collaborative consultation between PCPs and experts in the management of ADHD, (d) a web-based system to promote SDM and the sharing of information between primary care practice and school, and (e) a strategy to promote PCP buy in and offer ongoing performance feedback by providing the intervention as a MOC project.

2.E. Evaluation Design
2.E.1. Description of Study Aims and Overview of Design
Primary Aim: Evaluate the effectiveness of the integrated educational intervention (SPA) in improving provider implementation of EBPs for managing ADHD.
Hypothesis 1: SPA will be more effective than practice as usual in improving PCP use of EBPs for managing ADHD, as assessed by EHR indicators of provider use of decision supports for ADHD management and an ADHD decision making portal developed during this project.
Hypothesis 2: SPA will be more effective than practice as usual in improving PCP perceptions of the acceptability and feasibility of using EBPs in practice, and in improving their sense of self-efficacy in using these strategies.
Exploratory Aim: We will explore the effect of factors such as PCP engagement in training (i.e., attendance at workshops, use of collaborative consultation, use of the portal) on outcomes related to parent and teacher use of the portal, and communication between PCP and teacher.

The effectiveness of SPA will be evaluated by using a RCT. Random assignment will occur at the level of practice. However, data will be analyzed at the level of the provider. The analyses will account for the nesting of providers within practices to account for the effect that providers in a practice have on one another. Outcomes will be assessed using metrics described below.

2.E.2. Measures. The following metrics will be used to assess outcomes. Data from all of these measures, including the portal, will be collected from providers in both conditions.

(1) The **primary outcome metric** will be provider use of ADHD decision supports and the SDM portal at office visits. Each visit will be scored for the following elements: (a) provider use of practice templates for managing medication, (b) provider downloading of parent education handouts from the EHR, (c) evidence that the provider enrolled families in the SDM portal or used the portal during the office visit, and (d) evidence that the provider made a request for teacher rating scales (by printing out teacher ratings scales from the EHR and giving them to families to give to teachers, printing out from the EHR a handout for parents to give to teachers explaining how to use the portal to enter teacher rating scale data, or contacting teachers directly through the portal). We will derive a score for each visit that will reflect the number of these components provided during each office visit. At present, we anticipate that this score will range from 0 to 4. Subsequently, we will derive a score for each provider by computing the mean of the scores for each office visit conducted for children with ADHD during each 2-month assessment period.

(2) The **secondary outcome metric** will reflect the extent of use of the ADHD portal. Each visit will be scored for the following elements: (a) whether parent-reported goals and preferences for ADHD treatment were assessed or re-assessed, (b) whether goals for treatment were delineated or refined, and (c) whether the treatment plan was tailored and revised to match family goals. The score for each visit will be the number of these components provided during each office visit. At present, we anticipate that this score will range from 0 to 3. We expect the experimental group to be more successful than the control group in getting families to enroll in the portal. As such, we will analyze these data in two ways. First, we will include data from all office visits in the analyses, including visits for which there was a portal used and those for which the portal was not used. If the portal was not used, the score for the visit will be 0. Using this approach, the score for each provider will be the mean of the scores for each office visit (for a child with ADHD) during

the specified assessment period. This index will reflect absolute differences between groups with regard to use of the portal for shared decision making. Second, we will include in the analyses only visits for which the portal was used. Using this approach, the score for each provider will be the mean score for office visits in which the portal was used during the specified assessment period. If providers do not use the portal for any visits during the assessment period, their data will not be reflected in the analyses. As such, this index will reflect the extent to which the portal is used by providers who use the portal at all.

(3) We will derive **additional metrics** about parent and teacher engagement in EBPs for ADHD. We will collect information about parent completion of rating scales, parent reporting of child progress in attaining treatment goals, teacher completion of rating scales, and evidence of family involvement in behavior therapy. We expect that most of these data will be collected using the portal, but we know that some data will be collected outside the portal and documented in the EHR. To ensure that there is consistency in the assessment of outcomes across both study groups, we will review the EHRs for a sample of 150 patients with ADHD (75 from each study arm), who will be randomly selected from the pool of patients with ADHD served by participating providers during the study period. We will examine the records carefully and code for: (a) number of parent rating scales completed, (b) number of times parents report on child progress in meeting goals, and (c) number of teacher rating scales completed. Using this information, we will derive three scores for each patient with ADHD served in the participating practices. In the analyses, we will determine whether there are differences between groups on each of these metrics.

(4) The **social validity** of the intervention will be measured by assessing provider perceptions of the acceptability and feasibility of using EBPs in primary care. To accomplish this, we plan to obtain PCP ratings on the ADHD Questionnaire for PCPs (see Appendix to view this measure).[6] In addition, provider perceptions of their self-efficacy in using EBPs in practice will be assessed using a brief measure of provider self-efficacy adapted from existing measures used in primary care.[36]

(5) **Provider satisfaction** with components of the educational intervention will be assessed after the intervention through brief open-ended and Likert-scaled items.

2.E.3. Data Collection. Data for the primary and secondary outcome metrics (#1 and #2 above) will be extracted prior to intervention, every 2 months during the course of the 8-month intervention period, and post-intervention, yielding six data points for outcome assessment. Data regarding the frequency with which data have been collected from parents and teachers (#3 above) will be collected at post-intervention. Data regarding social validity (#4 above) will be assessed at pre-intervention and post-intervention. Data regarding provider satisfaction will be collected immediately following the intervention.

2.E.4. Methodological Control and Analyses. To conduct a rigorous evaluation of the intervention, we plan to conduct a RCT. As indicated, we expect 20 practices to meet criteria for participation (i.e., at least 50% of providers in a practice agree to participate). Random assignment will occur at the level of practice (to address a concern about potential contamination related to providing both conditions in the same practice). Our statistician will oversee the process of random assignment to treatment conditions. Randomization will be stratified according to: (a) number of providers in the practice (classified as six or more versus

five or less), and (b) percent of patients in the practice eligible for Medicaid (to equate the groups for SES level of patients; classified as above or below 20% eligibility).

Although random assignment will occur at the level of practice, the unit of analysis will be the provider. The main focus will be on analyzing data before and after intervention with regard to use of decision supports in the management of ADHD. Also, the analyses will focus on examining changes in provider use of the web-based portal developed during this project. Data will be analyzed using an intent-to-treat approach; participants will be analyzed in the condition to which they have been randomly assigned. The general analytic method for testing hypotheses 1 and 2 will be the mixed effects model and Generalized Estimating Equation (GEE). A potential advantage of GEE is that it does not require that the assumption of normality be met, nor does it require the correct specification of the variance-covariance structure. The study design will allow us to examine a between-subjects effect related to the two conditions, and a within-subjects effect corresponding to pre- and post-treatment, as well as a group by time interaction effect. The analyses will be conducted using SAS Proc Mixed, which utilizes mixed effects linear models, and SAS Proc Genmod, which utilizes GEE. The advantage of utilizing these methods is that all information available from each provider is used, including those with missing observations. Statistical comparisons will be conducted at a p value of .05.

It is understood that outcomes related to a provider in a practice may be correlated with outcomes for other providers within the same practice. As such, the correlation among providers in a practice (i.e., intraclass correlation) will be accounted for using an analysis that considers provider data to be nested within practice (SAS proc Mixed). Although the primary statistical analyses will examine differences in change scores (pre- to post-intervention) between conditions, we will conduct additional, secondary analyses to examine differences between groups based on six time points using mixed effects models and GEE, with provider being nested within practice. If a significant time by treatment condition interaction is found, post hoc analyses will be conducted to determine differential effects at varying time points.

Given that random assignment of practices may not succeed in equating groups, we will compare groups at baseline to determine if there are differences between the two conditions on primary outcomes. Potential covariates will be considered in the analyses to control for any group differences at baseline. Further, to address Aim 2 (exploratory), we will conduct analyses to explore the effect of level of PCP engagement in workshop training, collaborative consultation, and portal usage on outcomes related to parent and teacher use of the portal.

2.E.5. Sample Size Justification, Amount of Change Expected, and Power Estimate. The primary care network at CHOP consists of 190 providers. Based upon our previous studies, we expect a PCP participation rate of at least 70% (133 providers; about 76 per group) across 20 practices. The investment of many providers in the care of children with ADHD and the opportunity for them to fulfill MOC requirements likely will be substantial incentives for them to participate. We have planned for there to be 10% attrition over the course of treatment. Therefore, the evaluable number of providers is estimated to be about 120 (60 per group).

We examined the power of the proposed design to detect differences based upon the amount of change expected on the primary outcome metric. We project that the baseline level of performance will be about 1.0 (SD = 0.50) for each group, based on a scale that varies from 0 to 4. At post-intervention, we conservatively estimate that performance will be 2.0 for the SPA condition and 1.25 for the control group with a pooled standard deviation of 1.0. Thus, the

difference in change scores between groups will be about 0.75. Given the pooled standard deviation, the estimated effect size would be 0.75. Our projections demonstrated that a sample size of 60 participants per treatment condition achieves 80% power to detect an effect size of 0.65 SD at $p<.05$, assuming a correlation between pre-treatment and post-treatment of 0.5. We also conducted a power analysis for the secondary analysis including six time points. Our projection is that the analyses will be powered to detect an effect size of 0.60 SD assuming 60 subjects per group and an average correlation among data points of .5.

2.E.6. Determination of Provider Engagement. We will track PCP attendance at educational activities, PCP use of collaborative consultation, PCP use of EHR decision supports, and PCP use of the web-based portal. Also, we will track parent and teacher use of the portal, given that their utilization of this tool is indicative of PCP engagement in intervention. In addition, we will collect data about acceptability and feasibility at post intervention.

2E.7. Project Dissemination. Manuals will be developed to describe: (a) elements of the EHR that have been designed to capture provider use of EBPs; (b) activities and procedures for educating PCPs about using EBPs for managing ADHD and communicating effectively with patients; (c) methods for providing collaborative consultation to PCPs; and (d) elements of the web-based portal and how they facilitate SDM. These manuals will be aggregated into a guidebook that will be disseminated on the project web page as well as in print upon request. The guidebook will include a description of methods to develop and implement practice supports with the aide of web-based portals and without these technologies, in order to promote generalization at a national level.

The methods, lessons learned, and findings of this project will be disseminated by developing policy briefs, presenting at regional and national conferences, and preparing articles for peer-reviewed publications in Pediatrics, Psychology, and Child Psychiatry. In addition, Dr. Fiks will collaborate with the EHR vendor community to discuss ways to integrate the portal into existing electronic record-keeping systems.

3.   Detailed Workplan and Deliverables Schedule
3.A. Project Workplan
3.A.1. Formation of the Investigative Team. As soon as we learn that the project is likely to be funded, the project team will assemble. Team meetings will be conducted on a weekly basis. The Co-PIs (Power and Fiks) will chair these meetings.
3.A.2. Formation of a Project Advisory Committee (PAC). At the outset of the project, we will enlist three PCPs to assist us in developing the curriculum, portal, and procedures for delivering the intervention. PCPs from diverse practices will be involved on the PAC.
3.A.3. Development of the CHOP IRB protocol. As soon as we learn that the project likely will be funded, we will work on developing the IRB protocol.
3.A.4. Recruitment of Providers and Practices. The investigative team will work in collaboration with the Associate Chief Medical Officer of the Primary Care Network (Dr. Biggs) and the Administrative Director of the Pediatric Research Consortium to recruit providers for the study. Providers will have the option to participate and they will be informed that willingness to participate will not have an adverse impact on their status at CHOP. Also, they will be informed that a decision to participate will offer them an opportunity to fulfill the Performance in

Practice component of MOC requirements. In order for a practice to be included in the study, at least 50% of providers in the practice must decide to participate.

3.A.5. Upgrades to the EHR to Capture Data about Provider Use of EBPs. The EHR already has the capability of capturing some data regarding provider use of EBPs (e.g., downloading of handouts for parents). We will work with the informatics team to upgrade the EHR so that it is more effective in capturing data regarding use of EBPs for managing ADHD.

3.A.6. Development of the Educational Curriculum for PCPs. The investigators will work closely with the PAC to develop the educational curriculum. Also, this team will develop a set of procedures for providing the training and case consultations in an acceptable, efficient, and feasible manner for PCPs.

3.A.7. Development of the MOC Program. Drs. Blum and Fiks have had leadership roles in the development of quality improvement programs that fulfill MOC requirements. They will work closely with the CHOP oversight committee to ensure that the intervention developed in this project meets criteria to be approved as a MOC project.

3.A.8. Ongoing Meetings of Advisory Committee. Members of PAC and the investigative team will meet monthly between March and August of Year 1 and quarterly after that to develop the intervention and provide guidance to address concerns that arise during the project.

3.A.9. Development of the SDM Portal. During the first 9 months of the project, the investigative team will work with PAC and the informatics team to adapt the portal using the MyAsthma portal as a model. The portal will include multiple components, including assessment of parents' goals and preferences, delineation of goals for patient care, obtaining parent and teacher ratings to monitor patient progress in meeting goals, and communication between provider and teacher.

3.A.10. Collection of Baseline Data. Prior to intervention, data will be extracted from the EHR regarding provider use of decision supports for managing patients with ADHD. Also, during baseline providers will complete measures of acceptability, feasibility, and self-efficacy.

3.A.11. Intervention Initiation. The intervention will begin Oct. 1, 2014 and end May 31, 2015.

3.A.12. Collection of Outcome Data and Performance Feedback. Outcome data pertaining to the primary and secondary outcomes will be collected during intervention at 2 month intervals. These data will be used for performance feedback to providers and outcome assessment.

3.A.13. Collection of Post-intervention Data. After the period of intervention has been completed, data will be collected on all measures, including the primary and secondary outcome metrics, the additional metrics related to parent and teacher engagement in EBPs for managing ADHD, and provider self-reports of the acceptability and feasibility of providing EBPs and their sense of self-efficacy in providing these practices. In addition, providers will complete a program satisfaction measure.

3.A.14. Educational Intervention Provided to Control Group. The intervention will be provided to the control group for the last 5 months of the funded project and 3 months after that, in order to enable providers to fulfill MOC requirements by participating in this intervention.

3.A.15. Data Analyses. After post-intervention data collection, data will be analyzed. The project statistician will oversee this process.

3.A.16. Dissemination of the Project. Near the end of the project, pur team will work on disseminating project outcomes through presentations, articles for publication, postings on the project website, policy briefs, and collaborations with the EHR vendor community.

3.B. Deliverables, Activities, and Anticipated Date of Completion

Deliverables	Activities	Date of Completion
IRB protocol; Notice of IRB approval	Development of protocol for CHOP IRB	March 31, 2014
Upgrades to the EHR to capture data about provider use of EBPs. Brief manual describing data capture elements	Collaboration with CBMi to upgrade the EHR.	May 31, 2014
Web-based portal to promote SDM, progress monitoring, and communication between practices and schools	Development of the ADHD portal in collaboration with PAC and Center for Biomedical Informatics (CBMi)	September 30, 2014
Manual describing procedures for providing: (a) training in EBPs for ADHD, (b) communication training; (c) collaborative consultation.	Collaboration with PAC to develop the educational curriculum for PCPs	September 30, 2014
Approved protocol describing goals, activities, procedures, and evaluation methods for the MOC project	Collaboration with PAC and Committee on Maintenance of Certification	September 30, 2014
Completed, de-identified data set, including outcome data for intervention study	Implementation of SPA and control condition; Collection of pre- and post-treatment data and QI data during intervention	July 31, 2015
Web postings, presentations, policy briefs, and manuscripts describing findings	Analyses of data; Submission of briefs, proposals and manuscripts	December 31, 2015
Final report to Pfizer	Preparation of report describing methods, results, deliverables, and budget information	December 31, 2015

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ORGANIZATIONAL DETAIL
1.A. Leadership and Organizational Capability
1.A.1. The Children's Hospital of Philadelphia (CHOP) houses the Department of Pediatrics for the Perelman School of Medicine at the University of Pennsylvania. CHOP is consistently recognized in the top 10 in every pediatric specialty area and has proudly earned the number one ranking on the *U.S. News & World Report*'s 2013-14 Honor Roll of the nation's Best Children's Hospitals. CHOP is the community hospital and primary care center for children in West and South Philadelphia and a major tertiary referral center for the greater Delaware Valley area with an estimated population of 10 million.

1.A.2. CHOP's Research Institute is home to one of the largest government- and foundation-supported pediatric research programs in the country, with more than $267 million in total funding revenue and a total operating budget of approximately $299 million (FY12). The Research Institute currently has the largest NIH-sponsored research budget among U.S. pediatric hospitals and sixth largest in the country among all independent hospitals, with 470 external awards: 373 federal awards, 35 foundation grants, and 62 other industrial, state and local, and other awards last year. More than 525 investigators and 1,450 research staff operate within more than 640,000 gross square feet of research space.

1.A.3. CHOP Primary Care Network. The 31 primary care practices in the CHOP Care Network are distributed throughout the Philadelphia area and Delaware valley. The Network constitutes an integrated pediatric care delivery system, with shared state- of-the-art electronic health record (EHR), EpicCare. This administrative and health IT infrastructure facilitates CHOP's commitment to improving the health of children in the city and the region. Three of CHOP's community-based Primary Care Centers are located in the City of Philadelphia. The Primary Care Centers are models for pediatric primary care for disadvantaged children; over half of the families are living at or below the poverty line and more than 72% receive Medical Assistance.

1.A.4. Pediatric Research Consortium (PeRC). PeRC, the primary care practice-based research network (PBRN) at CHOP established with funding from the Agency for Healthcare Research and Quality in 2002, is dedicated to improving the safety, quality and health outcomes of pediatric care through clinical research. PeRC has been able to take advantage of CHOP's expanded organizational and technological infrastructure in assembling the components of the country's largest pediatric integrated delivery system. In addition, PeRC has taken advantage of the implementation of an EHR that affords immediate, electronic access to clinical information and communication at the point of care – to gather data for research and develop an array of integrated evidence-based decision support tools at the point of care. Dr. Fiks is PeRC's Associate Medical Director.

1.A.5. Division of Developmental and Behavioral Pediatrics is the largest entity in the tri-state region offering comprehensive care to children with cognitive and physical disabilities. The division consists of a multidisciplinary team of physicians, psychologists, nurse practitioners, and therapists that offers a wide range of programs for children with developmental problems, including the Center for the Management of ADHD, the Behavioral Pediatrics Program, the Regional Autism Center, the Child Development Program, the Outpatient Rehabilitation Service, and the Musculoskeletal Center. The division supports a wide range of research programs with a particular focus on ADHD, autism, and behavioral health in the community. Drs. Power and Blum are longstanding faculty members based in this division.

1.A.6. Division of General Pediatrics consists of over 45 research and clinical faculty and fellows. The division has substantial capacity to perform outcomes research in its PolicyLab and Center for Pediatric Clinical Effectiveness (CPCE) – two groups of multi-divisional pediatric investigators united by their "generalist" perspective. These groups achieve their goals by collecting and analyzing data of the highest quality in order to improve our understanding of how to best care for children. In the last decade, the Division has established a solid infrastructure for patient-centered research, drawing extensively upon the varied resources of CHOP and Penn. Drs. Guevara and Fiks are faculty members in this division.

1.A.7. Center for Management of ADHD is the region's largest and most comprehensive center for diagnosing and treating ADHD among children and adolescents. Dr. Power (Co-PI) and Dr. Blum (Co-Investigator) serve as the Director and Medical Director, respectively, of this center. The ADHD Center treats children from ages 3 to 18 by providing a wide range of psychological, psychiatric, and developmental pediatric services. The Center serves as an educational resource for the community, providing updated information about ADHD. In addition, the center supports research related to screening and diagnostic assessment, psychosocial and pharmacological intervention, and service delivery in primary care and school settings.

Center for Biomedical Informatics (CBMi) provides a structure for all research informatics activities at CHOP, including the development and deployment of intellectual, technical, educational, and service-based resources in biomedical computing. CBMi encompasses existing service units for bioinformatics and clinical reporting from hospital systems; works closely with fast-tracked efforts to create a single electronic health record for all CHOP clinical activities (CHOPLink); and partners with existing CHOP-based groups for outcomes research, quality improvement, and decision support. Dr. Grundmeier is Director of Clinical Informatics for CBMi.