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**PEDIATRIC EARLY INTERVENTION IMPROVEMENT THROUGH UTILIZATION
OF THE
PARENTS' EVALUATION OF DEVELOPMENTAL STATUS SCREENING TOOL**

BY

SHANNON TILLAR THOMPSON RN, MSN, CPNP-PC

A DNP PROJECT

**Submitted in partial fulfillment of the requirements for the
Degree of Doctor of Nursing Practice
to
The School of Graduate Studies
of
The University of Alabama in Huntsville**

**HUNTSVILLE, ALABAMA
February 21, 2018**

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X *Shannon T. Thompson* 2/22/2018

Shannon Tillar Thompson

CPNP-PC

DNP PROJECT APPROVAL FORM

Submitted by Shannon Tillar Thompson in partial fulfillment of the requirements for the degree of Doctor of Nursing Practice and accepted on behalf of the Faculty of the School of Graduate Studies by the DNP project committee.

We, the undersigned members of the Graduate Faculty of The University of Alabama in Huntsville, certify that we have advised and/or supervised the candidate on the work described in this DNP project. We further certify that we have reviewed the DNP project manuscript and approve it in partial fulfillment of the requirements for the degree of Doctor of Nursing Practice.

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(Date)

2/22/18 Javier Rodriguez MD

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Haley Hays College of Nursing, Associate Dean for Graduate Studies

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ABSTRACT

The School of Graduate Studies
The University of Alabama in Huntsville

Degree: Doctor of Nursing Practice College: Nursing

Name of Candidate: Shannon Tillar Thompson

Title: Pediatric Early Intervention Improvement through Utilization of the Parents' Evaluation of Developmental Status Screening Tool

Developmental delays are commonly identified in roughly 12% of children in the United States. While the American Academy of Pediatrics (AAP) has recommended “standardized developmental screening tests” to be given at the 9, 18, and 30 (or 24 month) well child visits since 2006, its use is not widely practiced. This delay in identification of developmental delays decreases the likelihood that children will be enrolled in early intervention services, which worsens outcomes in cognitive, social, and emotional functioning, and leads to higher future healthcare costs. A gap analysis of a San Diego, California community health clinic highlighted the lack of standardized developmental screenings at well child visits as recommended by the AAP. The purpose of this evidence based scholarly project is to increase provider adherence to meet the AAP’s recommendation for developmental screenings, and to improve early intervention referral rates for children identified with developmental delays. Utilizing Lewin’s Theory of Planned Change as the conceptual framework, the study plans to utilize a San Diego community health clinic to recruit parents of children presenting for the 9, 12, 15, 18 or 24 month well child visits and implement developmental screenings using the Parents’ Evaluation of Developmental Status (PEDS) standardized screening tool. Participating providers will grade the screenings and refer patients for early intervention services as needed. Based on a review of

IMPROVING EARLY INTERVENTION RATES

the literature, it is expected that this project will increase identification of developmental delays, improve early intervention rates, and lead to organization-wide dissemination of the new developmental screening protocol.

Keywords: developmental delay, early intervention, children, community health, screening tools, primary care

ACKNOWLEDGMENTS

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IMPROVING EARLY INTERVENTION RATES

TABLE OF CONTENTS

	Page
SECTION I: DNP PROJECT	
I. Identification of the Problem	
A. Introduction.....	10
B. Local Problem.....	11
B. Purpose of the Evaluation.....	12
II. Review of the Evidence	
A. Methods	12
B. Findings	13
III. Conceptual Framework.....	18
IV. Methodology	
A. Participants.....	20
B. Measures	
a. PEDS screening tool.....	20
b. Cost.....	21
d. Setting.....	21
C. Implementation.....	22
D. Data Analysis.....	23
SECTION II: DNP PROJECT PRODUCT	
I. Journal of Pediatric Health Care.....	24
A. Scope & Aim of Journal	

IMPROVING EARLY INTERVENTION RATES

II. Manuscript: Pediatric Early Intervention Improvement through Utilization....25

of the Parents' Evaluation of Developmental Status Screening Tool

A. Cover Letter.....	26
B. Ethical Statement.....	27
C. Title Page.....	28
D. Abstract.....	29
E. Introduction.....	30
F. Purpose.....	31
G. Review of the Evidence	
a. Search Strategy.....	31
b. Findings.....	31
H. Methods	
a. Conceptual Framework.....	36
b. Participants.....	37
I. Measures	
a. PEDS test.....	37
b. Setting.....	38
J. Procedure.....	39
K. Data Analysis.....	40
L. Results	
a. Provider Training.....	40
b. Parent/Child Characteristics.....	40
c. Developmental Delay Detection.....	41

IMPROVING EARLY INTERVENTION RATES

d. Early Intervention Referral.....	41
e. Developmental Checklist.....	41
M. Discussion.....	42
N. Limitation & Recommendations for Future Research.....	43
Tables	
Table 1: Participant Demographic Characteristics.....	44
Table 2: Pre & Post Implementation Data.....	45
Figures	
Figure 1: Mean Pre & Post Provider Training Survey Results.....	46
Appendices	
PEDS Test.....	47
Provider Consent.....	50
Provider Pre/Post Training Survey.....	52
Parent Demographic Survey & Consent Form.....	56
IRB Letter.....	60
Agency Approval Letter.....	61
Proof of Manuscript Journal Submission.....	62
References.....	63

IMPROVING EARLY INTERVENTION RATES

Improving Early Intervention Rates using the Parents' Evaluation of Developmental Status (PEDS) Screening Tool

I. Identification of the Problem

Introduction

Identifying developmental delays in vulnerable pediatric patients is a mainstay of primary care pediatric practice. Unfortunately, the use of standardized validated screening tools is not widely practiced, despite recommendations by the American Academy of Pediatrics (AAP). AAP guidelines for routine developmental screenings suggest using standardized tools at 9,18, and 30 (or 24) month well child visits with the policy being reaffirmed in 2009 and 2014 (Council on Children with Disabilities [CCD], Section on Developmental Behavioral Pediatrics, Bright Futures Steering Committee, & Medical Home Initiatives for Children with Special Needs Project Advisory Committee, 2006; Aly, Taj, & Ibrahim, 2009). Citing reasons from time, lack of resources to purchase screening tools, cultural and linguistic barriers, and an inability to bill sufficiently for a screening visit, providers frequently fail to meet AAP recommendations causing pediatric patients to suffer delays in care (Carroll et al., 2014; Vitrikas et al., 2017). National rates of standardized developmental screenings were approximately 29% in 2011, with even lower rates among vulnerable populations (ethnic or racial minorities, or those in poverty or with a disability (Child Trends Data Bank, 2013; Huntington, Horan, Epee-Bounya, & Schonwald, 2016; Knuti Rodrigues, Hambidge, Dickinson, Richardson, & Davidson, 2016). Avoidance of standardized screening tool use may decrease rates of early intervention (EI), leading to poorer outcomes in cognitive, social, and emotional functioning, increasing lifespan healthcare costs (Talmi et al., 2014). While the most recent United States Preventive Services

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Task Force (USPSTF) recommendations do not support or refute the benefit of using standardized tools for screening due to varying evidence, much of the research supports its implementation (Mackrides & Ryherd, 2011; Vitrikas et al., 2017).

Local Problem

In order to thoroughly assess the developmental screening process, it is necessary to first understand the clinical environment in which the need occurs. This community health clinic was established in 1986 as an amnesty center for immigrants and has now grown to provide medical, dental, optometric, radiological and social support services to underserved, ethnically diverse families, including refugees living in Southern California (LMFC, 2016). The clinic operates with a specific purpose to provide a “Circle of Care” that focuses on family wellness and cultural competence as well as medical health; however, the pediatric department’s existing developmental screening practices do not promote optimal family wellness (Centers for Care Innovations, 2015). Currently the pediatric department does not have a protocol for evidence based developmental screenings. Providers will individually evaluate and refer patients for developmental delay (DD) using their own clinical expertise. While the Modified Checklist for Autism in Toddlers (M-CHAT) is available for use within the electronic medical record, it is not designed to detect all DDs at the ages recommended by the AAP. These techniques are limited in its sensitivity and specificity for diagnosing DD. One study found that using only clinical decision making in choosing to developmentally screen missed 45% of children with actual DD (Mackrides & Ryhed, 2011). This causes delays and missed opportunities for children with DD to receive EI services, which are recognized to improve health outcomes (Limbos & Joyce, 2011). Reaching Healthy People 2020 goals to increase the number of children screened for DD

IMPROVING EARLY INTERVENTION RATES

by age thirty-six months and enrolled in specialty services by forty-eight months is only possible through appropriate screening (Healthy People 2020, 2014).

Purpose of the Evaluation

The goal of the proposed evidence based project is to implement a standardized developmental screening protocol in a community health clinic at the 9, 12, 15, 18, and 24 month well child visits utilizing the Parents' Evaluation of Developmental Status (PEDS) evidence based screening tool, and evaluate improvement rates in EI referrals and developmental delay detection. The clinical question is: In children ages 9, 12, 15, 18, and 24 months presenting for well child visits (**P**), does implementing standardized evidence based developmental screenings using the PEDS screening tool (**I**) versus informal checklists and individual clinical decision making (**C**) improve rates of developmental delay detection and early intervention referrals (**O**) in a community health center over a 3-month period (**T**)?

II. Review of the Evidence

Methods

An electronic search of the Cumulative Index to Nursing & Allied Health Literature (CINAHL) and PubMed databases to find English language, peer reviewed articles published from 2005-2018 was completed. The search was conducted both with and without the limitation of "research article" to easily delineate between primary and secondary sources. Key words included "developmental delay," "developmental screening," "children," "community health," "primary care," and "screening tools." Of the studies yielded, 24 articles were extracted as relevant and of moderate to high quality based on the Grading of Recommendations Assessment Developmental and Evaluation (GRADE), Appraisal of Guidelines for Research & Evaluation (AGREE II), and the Critical Appraisal Skills Program (CASP) screening methods, and included

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articles that summarized the current literature, research studies to test the effectiveness of screening and variability in current screening practices, and clinical guidelines.

Findings

Current screening practices. In July of 2006, the AAP provided a policy statement regarding developmental screenings in primary care, recommending that, along with routine clinical surveillance, standardized developmental screenings be administered at the 9, 18, and 30 month (or 24 month) well child visits, regardless of the child's developmental status. The policy paper cited the natural progression of developmental achievements in motor, social, language, and cognition at these ages as the determining factor in choosing to screen for possible early intervention (CCD, 2006).

Detecting developmental delay in primary care pediatrics is a routine part of every well child visit. While roughly 12 to 16% of all children in the United States have developmental delays, early intervention rates plummet to 5% for children under 5 years and 1.8% for children under 2 years of age, highlighting the fact that not all children with DD receive important EI services. (Chunsuwan, Hansakunachai, & Pornsamrit, 2016; Hix-Small, Marks, Squires, & Nickel, 2007; Knuti Rodrigues et al., 2016; Kroening, Moore, Welch, Halterman, & Hyman, 2016; Mackrides & Ryherd, 2011; Rydz et al., 2006; Thomas, Spragins, Mazloum, Cronkhite, & Maru, 2016). The primary methods in which primary care providers determine if a child has a DD is through clinical surveillance, developmental checklists, routine screening using standardized screening tools, or a combination of the three techniques (Brothers, Glascoe, & Robertshaw, 2008; Rydz et al., 2006; Sand et al., 2005; Vitrikas et al., 2017). Standardized screening processes involve the use of a standardized screening tool to determine if a child should undergo further evaluation for DD (Lynch et al., 2015; Pizur-Barnekow, Johnston, &

IMPROVING EARLY INTERVENTION RATES

Lucinski, 2010; Vitrikas et al., 2017). Clinical surveillance is a less exact process which involves each provider using their own individual clinical expertise and judgement during office observations, and can include the use of informal checklists to determine a child's need for further evaluation (Brothers et al., 2008; Pizur-Barnekow et al., 2010; Rydz et al., 2006).

According to several studies, clinical surveillance, when compared to other screening methods, identify significant rates of under detection of children with DD, with rates varying anywhere from 45 to 67% (Honigeld, Chandhok, & Spiegelman, 2012; Lynch et al., 2015; Mackrides & Ryherd, 2011; Vitrikas et al., 2017).

While surveys of pediatricians have shown self-reported increases in the percentage of patients screened with standardized tools (with rates increasing from 23% in 2002 to 47% in 2009 and 48% in 2011) still less than half of pediatric providers use such tools (Mackrides & Ryherd, 2011; Radecki, Sand-Loud, O'Connor, Sharp, & Olson, 2011; Sand et al., 2005; Thomas et al., 2016; Vitrikas et al., 2017). The use of non-formal screenings, like checklists, have not been validated, may fail to identify children with mild delays, and do not include tasks that have been proven to be strong correlates of delay and school performance (Brothers et al., 2008; Lynch et al., 2015; Vitrikas et al., 2017). A 2005 survey of primary care providers found that 71% of providers used clinical assessment or informal tools to monitor children's development with 33% using informal checklists (Sand et al., 2005). Although limited in that the study only surveyed currently working AAP members, it echoes the consensus of other research that many providers are not using standardized screening tools as recommended by the AAP (Brothers et al., 2008; Limbos & Joyce, 2011; Lynch et al., 2015; Sand et al., 2005; Vitrikas et al., 2017).

Early Intervention. The long-term benefits of early intervention (EI) have been widely researched in the literature. As previously mentioned, more children are identified with DD than

IMPROVING EARLY INTERVENTION RATES

actually utilize EI services (Hix-Small et al., 2007; Mackrides & Ryherd, 2011; Radecki et al., 2011). According to several studies, benefits of EI are significant. These services include but are not limited to developmental testing, occupational and physical therapies, and speech therapy before the age of three. (Limbos & Joyce, 2011; Mackrides & Ryherd, 2011; Pizur-Barnekow et al., 2010; Rydz et al., 2006). Research studies indicate that children with DD who receive EI are more likely to reach their intellectual peak, rely less on federal funding programs as adults, have improved adaptability, and decreased emotional/behavioral issues, as well as improve the family's ability to cope with the added stressors associated with having a child with a developmental disability (Limbos & Joyce, 2011; Lynch et al., 2015; Mackrides & Ryherd, 2011; Pizur-Barnekow et al., 2010; Rydz et al., 2006). Due to their increased specificity and sensitivity, the use of standardized screening tools has been shown to improve provider referral rates for EI by 70 to 90%, depending on the tool used (Mackrides & Ryherd, 2011; Lynch et al., 2015; Rydz et al., 2006; San Antonio, Fenick, Shabanova, Leventhal, & Weitzman, 2014; Sand et al., 2005; CCD, 2006). Several studies analyze EI referral rates both with and without the use of standardized screening tools (Guevara et al., 2013; Honigeld et al., 2012; Talmi et al., 2014). Of significance, Hix-Small et al. (2007) found that pediatricians missed 67% of children eligible for EI services with clinical surveillance rather than standardized screening tool use. Similarly, Guevara et al. (2013) found that four urban pediatric practices, who implemented routine standardized developmental screenings in children less than 30 months, had statistically significant increases in referral rates without significant over referrals when compared to the clinical surveillance group.

One study challenges the benefit and usefulness of standardized screening for DD in primary care. Rydz et al. (2006) found that, when implementing two AAP recommended tools,

IMPROVING EARLY INTERVENTION RATES

the Ages & Stages Questionnaire (ASQ) or the Child Development Inventory (CDI), children were incorrectly identified by the ASQ with specificity and sensitivity levels dropping to 34% and 50% respectively, well under the recommended minimum of 70%. While the ASQ is one of the most common screening tools used among providers, the results of the above study did determine that provider's clinical opinion did not improve detection rates (Rydz et al., 2006). Limitations to the Rydz study include a three-month delay between original screening and assessment, the small sample of children who completed initial and follow up testing, and the specific middle class, high school educated population in which it was conducted, thus decreasing the study's generalizability (Mackrides & Ryherd, 2011; Rydz et al., 2006). More recently, the Canadian Task Force on Preventive Health Care advised against the use of developmental delay screening in children ages 1-4 who did not present with apparent signs of developmental delay or whose parents were not concerned for developmental delay, citing a lack of evidence supporting improved outcomes; which echoes similar differences between the USPSTF and the AAP (LeBlanc & Williams, 2017).

Barriers to Implementation. Several barriers to the implementation of DD screenings using standardized tools are noted throughout the literature. The most prominent barrier presented in the research is provider time constraints, either perceived or actual (Honigeld et al., 2012; Huntington et al., 2016; Mackrides & Ryherd, 2011; Morelli et al., 2014; Pizur-Barnekow et al., 2010; Rydz et al., 2006; Schonwald & Huntington, 2009; Vitrikas et al., 2017). In several qualitative surveys, roughly 70 to 80% of primary care providers cite time constraints as preventing the implementation of AAP recommendations; however, multiple studies implementing standardized screening protocols have shown improved feasibility (Mackrides & Ryherd, 2011). When such protocols were implemented via the North Carolina Assuring Better

IMPROVING EARLY INTERVENTION RATES

Child Health & Development Project, the Enhancing Developmentally Oriented Primary Care Project in Illinois, and a Philadelphia based study of four urban community clinics, rates of EI referrals improved by statistically significant numbers, with providers reporting easier implementation than expected, improved efficiency, and increased feasibility of use (Chunswan et al., 2016; Honigeld et al., 2012; Mackrides & Ryherd, 2011; Morelli et al., 2014; Schonwald, Huntington, Chan, Risko, & Bridgemohan, 2009).

Financial constraints are also well documented throughout the literature, including both the cost of purchasing screening tools, and the lack of insurance reimbursement, with Medicaid reimbursement for developmental screenings during well child visits only covered in some states (Drotar, Stancin, Dworkin, Sices, & Wood, 2008; Honigeld et al., 2012; Mackrides & Ryherd, 2011; Pizur-Barnekow et al., 2010; Radecki et al., 2011; Rydz et al., 2006). In support of the perceived importance of insurance reimbursement, a study by Pizur-Barnekow et al. (2010) found rates of developmental screening to be higher in states where Medicaid reimbursement was available. Other barriers discussed in the literature include staffing shortages, lack of training on proper use and administration of standardized screening tools, the lack of consensus on appropriate screening tools, high staff turnover, and a lack of physician confidence in parent reports of their child's development (Chunswan et al., 2016; Honigeld et al., 2012; Mackrides & Ryherd, 2011; Radecki et al., 2011; Rydz et al., 2006).

While gaps in DD detection and utilization of EI services is evident, debate over exactly how to improve the situation continues. Both the AAP and the majority of studies in the literature support the use of standardized screening tools to aid providers in recognizing developmental issues that warrant EI referral. With such widely varied rates of appropriate EI referrals, standardized tools can aid in creating consistent, appropriate referral patterns so that a

IMPROVING EARLY INTERVENTION RATES

child's most critical years of development are utilized and their maximum potential is reached. While barriers to implementation are noted, the literature supports the contention that incorporation of standardized developmental screening tools into busy private and public community health practices is both possible and beneficial. The use of these standardized screening tools assist children in obtaining services that improve individual physical, cognitive, and behavioral outcomes, and provide supportive services to the entire family.

Conceptual Framework

A pioneer in the field of organizational development, Kurt Lewin's Theory of Planned Change is a suitable framework for this project. At its base, Lewin believed that change requires a shift in organizational equilibrium and involves three main components: unfreezing, changing, and refreezing (Burnes, 2004; Mitchell, 2013; Shirey, 2013).

While the Theory of Planned Change is one of Lewin's major contributions to organizational development, its foundation originates in Lewin's idea of force field analysis. Force field analysis refers to factors that drive a person or persons within an organization either closer to or further away from a desired goal (Burnes, 2004; Mitchell, 2013; Shirey, 2013). Driving forces lead towards a desired goal while restraining forces represent barriers to reaching a desired (Burnes, 2004; Mitchell, 2013; Shirey, 2013). *Unfreezing* involves the recognition of a need for change, gaining others support for the desired change, and increasing driving forces while reducing restraining forces (Burnes, 2004; Mitchell, 2013; Shirey, 2013). Within the constraints of this project, the unfreezing process starts with the recognition that clinic patients with DD may not be fully identified, and utilization of gap analysis facilitating management staff support providing evidence of the need for a research-informed developmental screening

IMPROVING EARLY INTERVENTION RATES

protocol. This stage also incorporates anticipation of possible barriers to routine developmental screening, and identification of strategies to minimize their effect.

In the *changing* stage, Lewin proposes that changes in behavior and/or thoughts be obtained through both research and action (Burnes, 2004). Through evidence based research, stakeholders can develop a plan that aids in creating the desired change, and implement that plan by engaging people in the proposed change and creating a new structure, practice, or policy (Burnes, 2004; Mitchell, 2013; Shirey, 2013). An in-depth literature review of appropriate methods of routine standardized developmental screening facilitates development and implementation of the evidence based protocol.

Refreezing can be referred to as the stabilization phase. This last but critical step ensures that the change is reinforced to ensure that a return to old behaviors is less likely to occur (Burnes, 2004; Mitchell, 2013; Shirey, 2013). Maintaining change through implementation of a written protocol and frequent review of the new screening process ensures that restraining and driving forces are stabilized and keeps providers and clinical staff engaged and invested in the organizational change. While many criticize Lewin's work for being too simplistic or linear, further analysis of his theoretical work shows otherwise (Burnes, 2004; Shirey, 2013). His works discuss the unpredictability of change and that refreezing does not equate to staying still, but refers more to preventing regression into old habits (Burnes, 2004). This clarification increases its applicability to advanced practice nursing, organizational development, and this project.

IMPROVING EARLY INTERVENTION RATES

III. Methodology

Participants

A convenience sample of parents or guardians presenting with a child ages 9, 12, 15, 18, or 24 months for well child visits will be eligible to participate in the study. Parents of children previously diagnosed with a developmental delay will be excluded from study participation. Participants will be recruited through identification of parents whose children meet eligibility criteria.

Measures

Parents' evaluation of developmental status (PEDS). The AAP recommends using a developmental screening tool to assess for DD at the 9, 18, and 30 (or 24) month well child visit; however, the tool is determined by the facility in which implementation is to occur (CCD, 2006). When choosing the proper screening tool, it is recommended that consideration be given to the tool's validity, reliability, administrative costs, availability, time requirements and cultural sensitivity (CCD, 2006; Thomas et al., 2016; Vitrikas et al., 2017). Based on the above mentioned areas, this project will utilize the Parents' Evaluation of Developmental Screening (PEDS) tool to screen children for developmental delays (see Appendix A).

The PEDS screening tool is a highly researched, validated, 10-question parental questionnaire that focuses on the development of children ages birth-8 years in the areas of cognitive, emotional, social, and linguistic development (Sices, Stancin, Kirchner, & Bauchner, 2009; Thomas et al., 2016; Vitrikas et al., 2017). Positive screens are determined based on the identification of significant concerns which place the child at low, medium or high risk for developmental delays (Chunswan et al., 2016; Limbos & Joyce, 2011). Taking approximately

IMPROVING EARLY INTERVENTION RATES

5 minutes to complete, the PEDS is considered positive if one or more significant concerns are identified (Chunsuwan et al., 2016; Limbos & Joyce, 2011). If identified as a positive screen, the PEDS algorithm is followed to determine which interventions are appropriate, including referrals to EI services, additional screening (ie: autism screening using MCHAT), and/or watchful waiting (Chunsuwan et al., 2016; Limbos & Joyce, 2011). Available in more than 35 languages, the PEDS has a moderate sensitivity and specificity (0.74-0.79; 0.70-0.80) and has been validated in subjects from various socioeconomic minorities, including both African-American and Hispanic populations (Huntington et al., 2016; Sices et al., 2009; Thomas et al., 2016; Vitrikas et al., 2017).

Cost. The PEDS screening tool costs approximately \$0.30 per visit (PEDS, 2016). Currently, California Medicaid does not pay additional reimbursement to cover the additional expenses required for developmental screening materials. To purchase manuals and screening materials for this project, the estimated total cost is \$284, based on the current cost for two manuals, 50 English/Spanish response forms and scoring sheets, and the associated algorithms (PEDS, 2016). Cost coverage will be approved by the organization's major stakeholders, including the chief medical officer, chief operating officer, and board of directors.

Setting. La Maestra Community Health Clinic (LMFC) is comprised of four clinics located throughout San Diego, California, and offers medical, dental, imaging, and pharmaceutical care to an ethnically diverse population, including immigrants and refugees. Currently, the pediatric department does not have a protocol for evidence based developmental screenings, and providers individually evaluate and refer patients for developmental delay. While the Modified Checklist for Autism in Toddlers (M-CHAT) is available for use within the center's electronic medical record, it is not designed to detect all developmental delays at the

IMPROVING EARLY INTERVENTION RATES

ages recommended by the AAP. The City Heights clinic where the study was conducted is located in central San Diego and is home to approximately 102,000 residents with an estimated 31.2% living below the federal poverty level (United States Census Bureau, 2010). With a population make up of 58% Hispanic, 16% Asian 11% Caucasian, and 13% African American, these demographics reflect the ethnic/racial composition of LMFC's City Heights clinic (United States Census Bureau, 2010).

Implementation

Pre-Implementation data will be collected through a randomized chart review of 50 pediatric patients who presented to the clinic for 9, 12, 15, 18, or 24 month well child checks between January 2016 and December 2016. Measurable data includes the number of children identified with DD, the number of EI referrals made, and the use of the developmental checklist or MCHAT. This pre-implementation data will be utilized for comparison once the implementation phase is completed. In the Implementation phase, providers will attend a 1-hour "Lunch and Learn" session to review the new developmental screening tool and obtain consent for their participation in the study (see Appendix B). Providers will become familiarized with the PEDS screening tool, including its administration, scoring, and the associated treatment algorithm, and knowledge gained was evaluated using a qualitative questionnaire (see Appendix C).

Over a 3 month implementation period, parents of children presenting for 9, 12, 15, 18, or 24 month well child visits will be invited to participate in the study. Participant parents will complete the PEDS tool in the waiting room, and if needed, the form can be completed with assistance. The PEDS tool will be received by the provider, who is responsible for completing the PEDS assessment and following the algorithm. The principal investigator will provide the

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parent with a clipboard and pen to complete the PEDS tool in the waiting room. Should the parent require translation services, the principal investigator and translator will help the parent complete the form by reading the questions and recording the parent's responses (see Appendix D). The principal investigator will provide the completed screening tool to the provider who will be responsible for scoring the PEDS and following the associated algorithm to determine the necessary referral and/or follow up. At the conclusion of the 3 month implementation period, the data collected from the pre-implementation chart review will be analyzed in comparison to the implementation group, including the number of developmental delay diagnosis, documentation of EI referral, and use of the developmental checklist.

Data Analysis

Analysis of the data was completed to determine if the use of an evidence-based developmental screening protocol using the PEDS screening tool increased the diagnosis of developmental delay and/or improved early intervention referral rates. The collected data during this study included qualitative surveys completed by providers before and after training, demographic characteristics of participants, the number of children identified with developmental delays, the number of early intervention referrals made, and the use of the developmental checklist. SPSS software was used to conduct paired t-tests to determine differences in the rates of developmental delay detection and early intervention referral pre and post implementation.

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Section II

Journal Selection: Scope and Aim

The Journal of Pediatric Health Care (JPHC) is the official journal of the National Association of Pediatric Nurse Practitioners (NAPNAP), and was developed to strengthen pediatric nurse practitioners (PNPs) practice and impact the healthcare of children and their families through evidence based practice education and research. The journal publishes research, clinical, and continuing education articles as well as primary and acute care case studies, health policy, pharmacology, practice guidelines, professional issues, and research methods relevant to pediatric advance nursing practice. The design of this project falls within the scope and aim of the JPHC and is therefore suitable for its scholarly publication.

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Pediatric Early Intervention Improvement through Utilization of the
Parents' Evaluation of Developmental Status Screening Tool

IMPROVING EARLY INTERVENTION RATES

February 19, 2018

Journal of Pediatric Health Care

Elsevier Editorial System

Editor for Manuscript Submission

Dear Editor:

We are interested in submitting a manuscript to The Journal of Pediatric Health Care. Our manuscript, entitled *Pediatric Early Intervention Improvement through Utilization of the Parents' Evaluation of Developmental Status Screening Tool*, addresses the issue of improving developmental delay detection rates for pediatric patients. We feel this is a unique and interesting topic, and would be of benefit to other clinicians and healthcare professionals. Neither the manuscript, nor parts of it, has been submitted elsewhere for publication. We appreciate the opportunity to submit to your journal and look forward to your feedback and response.

Sincerely,

Shannon T. Thompson CPNP

Shannon T. Thompson, RN, MSN, CPNP-PC

Marlena S. Primeau DNP, FNP-BC, NHDP-BC, BSHECS

IMPROVING EARLY INTERVENTION RATES

February 19, 2018

Journal of Pediatric Health Care

Elsevier Editorial System

Editor for Manuscript Submission

Dear Editor:

We declare that this manuscript entitled *Pediatric Early Intervention Improvement through Utilization of the Parents' Evaluation of Developmental Status Screening Tool* has not been published before, is not currently being considered for publication elsewhere, and has been approved by all authors. We know of no conflicts of interest associated with this publication. The study was supported in part by La Maestra Community Health Clinic, covering expenses associated with the purchase of the PEDS screening tool. The funding source had no involvement in study design, collection, analysis and interpretation of data, writing of the article, or decision to submit the article for publication.

Sincerely,

Shannon T. Thompson CPNP

Shannon T. Thompson, RN, MSN, CPNP-PC

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Pediatric Early Intervention Improvement through Utilization of the Parents' Evaluation of Developmental Status Screening Tool

by

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Keywords: developmental delay, early intervention, children, community health, screening tools, primary care

IMPROVING EARLY INTERVENTION RATES

Abstract

Introduction: The American Academy of Pediatrics recommends standardized developmental screening during routine well child visits. The purpose of this study was to determine the effects of standardized developmental screenings on developmental delay detection and early intervention referrals using the Parents' Evaluation of Developmental Status tool (PEDS).

Methods: Fifty children presenting for well child visits between the ages of 9-24 months were evaluated for developmental delay using the PEDS. Developmental checklist use, developmental delay diagnosis, and early intervention referrals were compared to pre-implementation data using paired t-tests. **Results:** Developmental checklist use increased by 28% ($t=3.45;p=.001$). There were no statistically significant changes in early intervention referrals ($t=0.00;p=1.00$) or developmental delay diagnosis ($t=0.57;p=.569$). **Discussion:** This study highlights inconsistencies in reported benefits of standardized developmental screening tools. Further research is warranted to determine if other AAP recommended tools would yield better results under similar settings, or if other factors significantly affected the study results.

IMPROVING EARLY INTERVENTION RATES

Introduction

Identifying developmental delays in vulnerable pediatric patients is a mainstay of primary care practice. Unfortunately, the use of standardized, validated screening tools is not widely practiced, despite recommendations by the American Academy of Pediatrics (AAP). AAP guidelines for routine developmental screenings suggest using standardized tools at 9, 18, and 24 or 30 month well child visits, with the policy being reaffirmed in 2009 and 2014 (Council on Children with Disabilities [CCD], 2006; Aly, Taj, & Ibrahim, 2009; Lynch et al., 2015; Moore, Zamora, Gera, & Williams, 2017; Vitrikas, Savard, & Bucaj, 2017). Citing reasons from time constraints, lack of resources to purchase screening tools, cultural and linguistic barriers, and an inability to bill appropriately for a screening visit, providers frequently fail to meet AAP recommendations, causing pediatric patients to suffer delays in care. (Carroll et al., 2014; Vitrikas et al., 2017). National rates of standardized developmental screenings were approximately 29% in 2011, with even lower rates among vulnerable populations (ethnic or racial minorities, immigrants and refugees, or those in poverty or with a disability) (Child Trends Data Bank, 2013; (Huntington, Horan, Epee-Bounya, & Schonwald, 2016; Knuti Rodrigues, Hambidge, Dickinson, Richardson, & Davidson, 2016). Avoidance of standardized screening tool use may decrease rates of early intervention, leading to poorer outcomes in cognitive, social, and emotional functioning, and increasing lifespan healthcare costs (Talmi et al., 2014). While the most recent United States Preventive Services Task Force (USPSTF) recommendations do not support or refute the benefit of using standardized tools for screening due to varying evidence, much of the research supports its implementation (Mackrides & Ryherd, 2011; Vitrikas et al., 2017).

IMPROVING EARLY INTERVENTION RATES

Purpose

The goal of this study is to implement a standardized developmental screening protocol in a community health clinic at the 9, 12, 15, 18, and 24 month well child visits. Utilizing the Parents' Evaluation of Developmental Status (PEDS) evidence-based screening tool, the study will determine if the use of the PEDS improves rates of early intervention referrals and developmental delay detection.

Review of the Evidence

Search Strategy

An electronic search of the Cumulative Index to Nursing & Allied Health Literature (CINAHL) and PubMed databases to find English language, peer reviewed articles published from 2005-2018 was completed. Key words included “developmental delay,” “developmental screening,” “children,” “community health,” “primary care,” and “screening tools.” Of the studies yielded, 24 articles were extracted including clinical guidelines, research studies evaluating the effectiveness of current screening practices, and articles that summarized the current literature.

Findings

In July of 2006, the AAP provided a policy statement regarding developmental screenings in primary care citing the natural progression of developmental achievements in motor, social, language, and cognition in children ages 9, 12, 18 and 24 or 30 months as the determining factor in choosing to screen for possible early intervention (CCD, 2006).

While roughly 12 to 16% of all children in the United States have developmental delays, early intervention rates plummet to 5% for children under five years and 1.8% for children under two years of age, highlighting the fact that not all children with developmental delays receive

IMPROVING EARLY INTERVENTION RATES

important early intervention services. (Chunsuwan, Hansakunachai, & Pornsamrit, 2016; Hix-Small, Marks, Squires, & Nickel, 2007; Knuti Rodrigues et al., 2016; Kroening, Moore, Welch, Halterman, & Hyman, 2016; Mackrides & Ryherd, 2011; Rydz et al., 2006; Thomas, Spragins, Mazloum, Cronkhite, & Maru, 2016). The primary methods in which primary care providers determine if a child has a developmental delay is through clinical surveillance, developmental checklists, routine screening using standardized screening tools, or a combination of the three techniques (Brothers, Glascoe, & Robertshaw, 2008; Rydz et al., 2006; Sand et al., 2005; Vitrikas et al., 2017). Screening processes involve the use of a standardized screening tool to determine if a child should undergo further evaluation for developmental delay (Lynch et al., 2015; Pizur-Barnekow, Johnston, & Lucinski, 2010; Vitrikas et al., 2017). Clinical surveillance is a less exact process which involves each provider using their own clinical expertise and judgement during in-office observations, and can include the use of informal checklists to determine a child's need for further evaluation (Brothers et al., 2008; Pizur-Barnekow et al., 2010; Rydz et al., 2006). When compared to other screening methods, several studies indicate that clinical surveillance under-detects developmental delays, with rates varying anywhere from 45% to 67% (Honigeld, Chandhok, & Spiegelman, 2012; Lynch et al., 2015; Mackrides & Ryherd, 2011; Vitrikas et al., 2017).

While surveys of pediatricians have shown self-reported increases in the percentage of patients screened with standardized tools (with rates increasing from 23% in 2002 to 47% in 2009 and 48% in 2011), still less than half of pediatric providers use such tools (Mackrides & Ryherd, 2011; Radecki, Sand-Loud, O'Connor, Sharp, & Olson, 2011; Sand et al., 2005; Thomas et al., 2016; Vitrikas et al., 2017). The use of informal screenings, like checklists, has not been validated, may fail to identify children with mild delays, and does not include tasks that have

IMPROVING EARLY INTERVENTION RATES

been proven to be strong correlates of delay and school performance (Brothers et al., 2008; Lynch et al., 2015; Vitrikas et al., 2017). A 2005 survey of primary care providers found that 71% of providers used clinical assessment or informal tools to monitor children's development, with 33% using informal checklists (Sand et al., 2005). Although the study only surveyed currently working AAP members, it echoes the consensus of other research that many providers are not using standardized screening tools as recommended (Brothers et al., 2008; Limbos & Joyce, 2011; Lynch et al., 2015; Sand et al., 2005; Vitrikas et al., 2017).

The long-term benefits of early intervention have been widely researched. According to several studies, benefits of early intervention are significant. These services include, but are not limited to, developmental testing, speech therapy, and occupational and physical therapies-before age three. (Limbos & Joyce, 2011; Mackrides & Ryherd, 2011; Pizur-Barnekow et al., 2010; Rydz et al., 2006). Research studies indicate that children with delays in development who receive early intervention are more likely to reach their intellectual peak, rely less on federal funding programs as adults, have improved adaptability, decreased emotional/behavioral issues, and improve the family's ability to cope with the associated added stressors (Limbos & Joyce, 2011; Lynch et al., 2015; Mackrides & Ryherd, 2011; Pizur-Barnekow et al., 2010; Rydz et al., 2006). Due to their increased specificity and sensitivity, the use of standardized screening tools has been shown to improve provider referral rates for early intervention services by 70% to 90%, depending on the tool used (Mackrides & Ryherd, 2011; Lynch et al., 2015; Rydz et al., 2006; San Antonio, Fenick, Shabanova, Leventhal, & Weitzman, 2014; Sand et al., 2005; CCD, 2006). Several studies analyze early intervention referral rates both with and without the use of standardized screening tools (Guevara et al., 2013; Honigeld et al., 2012; Talmi et al., 2014). Of significance, Hix-Small et al. (2007) found that pediatricians missed 67% of children eligible for

IMPROVING EARLY INTERVENTION RATES

services with clinical surveillance rather than standardized screening tool use. Similarly, Guevara et al. (2013) found that four urban pediatric practices, after implementing routine standardized developmental screenings in children less than 30 months, had statistically significant increases in referral rates without significant over-referrals.

One study challenges the benefit and usefulness of standardized screening for developmental delay in primary care. Rydz et al. (2006) found that, when implementing two AAP recommended tools, the Ages & Stages Questionnaire (ASQ) or the Child Development Inventory (CDI), children were incorrectly identified by the ASQ with specificity and sensitivity levels dropping to 34% and 50% respectively, well under the recommended minimum of 70%. While the ASQ is one of the most common screening tools used among providers, the results of the above study did suggest that clinical surveillance did not improve detection rates (Rydz et al., 2006). Limitations to the Rydz study include a three-month delay between original screening and assessment, the small sample of children who completed initial and follow up testing, and the specific middle class, high school educated population in which it was conducted, thus decreasing the study's generalizability (Mackrides & Ryherd, 2011; Rydz et al., 2006). More recently, the Canadian Task Force on Preventive Health Care advised against the use of developmental delay screening in children ages 1-4 who did not present with apparent signs of developmental delay or whose parents were not concerned for developmental delay, citing a lack of evidence supporting improved outcomes; which echoes similar differences between the USPSTF and the AAP (LeBlanc & Williams, 2017).

Several barriers to the implementation of developmental screenings using standardized tools are noted throughout the literature. The most prominent barrier presented in the research is provider time constraints (Honigeld et al., 2012; Huntington et al., 2016; Mackrides & Ryherd,

IMPROVING EARLY INTERVENTION RATES

2011; Morelli et al., 2014; Pizur-Barnekow et al., 2010; Rydz et al., 2006; Schonwald & Huntington, 2009; Vitrikas et al., 2017). In several qualitative surveys, approximately 70% to 80% of primary care providers cite time constraints as preventing the implementation of AAP recommendations; however, multiple studies implementing standardized screening protocols have shown improved integration of parent-completed developmental screenings into primary care practice (Chunsuwan et al., 2016; Mackrides & Ryherd, 2011). When such protocols were implemented, rates of early intervention referrals improved by statistically significant numbers, with providers reporting easier implementation than expected, improved efficiency, and increased feasibility of use (Chunsuwan et al., 2016; Honigeld et al., 2012; Mackrides & Ryherd, 2011; Morelli et al., 2014; Schonwald, Huntington, Chan, Risko, & Bridgemohan, 2009).

Financial constraints are also well documented throughout the literature, including both the cost of purchasing screening tools, and the lack of insurance reimbursement. Medicaid reimbursement for developmental screenings during well child visits, for example, is only covered in some states (Drotar, Stancin, Dworkin, Sices, & Wood, 2008; Honigeld et al., 2012; Mackrides & Ryherd, 2011; Pizur-Barnekow et al., 2010; Radecki et al., 2011; Rydz et al., 2006). In support of the perceived importance of insurance reimbursement, a study by Pizur-Barnekow et al. (2010) found rates of developmental screening to be higher in states where Medicaid reimbursement was available. Other barriers discussed in the literature include staffing shortages, lack of training on proper use and administration of standardized screening tools, the lack of consensus on appropriate screening tools, high staff turnover, and a lack of physician confidence in parent reports of their child's development (Chunsuwan et al., 2016; Honigeld et al., 2012; Mackrides & Ryherd, 2011; Radecki et al., 2011; Rydz et al., 2006).

IMPROVING EARLY INTERVENTION RATES

While gaps in developmental delay detection and utilization of early intervention services are evident, debate over exactly how to improve the situation continues. Both the AAP and most studies in the literature support the use of standardized screening tools to aid providers in recognizing developmental issues that warrant referral. With such widely varied rates of appropriate referrals, standardized tools can aid in creating consistent, appropriate referral patterns so that a child's maximum potential is reached. While barriers to implementation are noted, the literature supports the contention that incorporation of standardized developmental screening tools into busy private and public community health practices is both possible and beneficial. The use of these standardized screening tools assists children in obtaining services that improve individual physical, cognitive, and behavioral outcomes, and provide supportive services to the entire family.

Methods

Conceptual Framework

Kurt Lewin's Theory of Planned Change is a suitable framework for this study. At its base, Lewin believed that change requires a shift in organizational equilibrium and involves three main components: unfreezing, changing, and refreezing (Burnes, 2004; Mitchell, 2013; Shirey, 2013). The unfreezing process starts with the recognition that children with developmental delay may not be fully identified, and gap analysis provides evidence of the need for a research-informed developmental screening protocol. Through evidence based research, stakeholders can develop a plan that aids in creating the desired change, implement that plan by engaging people in the proposed change, and create a new structure, practice, or policy (Burnes, 2004; Mitchell, 2013; Shirey, 2013). Maintaining change through written policy ensures that restraining and

IMPROVING EARLY INTERVENTION RATES

driving forces are stabilized and keeps providers and clinical staff engaged and invested in maintaining the change.

Participants

A convenience sample of parents or guardians presenting with a child ages 9, 12, 15, 18, or 24 months for well child visits were eligible to participate in the study. Parents of children previously diagnosed with a developmental delay were excluded from study participation. Participants were recruited through identification of parents/guardians whose children met eligibility criteria.

Participating pediatric providers working at La Maestra Community Health Center – City Heights (LMFC), in San Diego, California were recruited through a lunch and learn session designed to introduce providers to the proposed study and educate them on the new developmental screening tool.

Measures

Parents' evaluation of developmental status (PEDS). Although the AAP recommends using a developmental screening tool to assess for developmental delay, the tool used is determined by each individual facility (CCD, 2006). When choosing the proper screening tool, it is recommended that consideration be given to the tool's validity, reliability, administrative costs, availability, time requirements, and cultural sensitivity (CCD, 2006; Thomas et al., 2016; Vitrikas et al., 2017). Based on the above-mentioned areas, this study utilized the Parents' Evaluation of Developmental Screening (PEDS) tool to screen children for developmental delays.

The PEDS is a highly researched, validated, 10-question parental questionnaire that focuses on the development of children ages birth to eight years in the areas of cognitive,

IMPROVING EARLY INTERVENTION RATES

emotional, social, and linguistic development (Sices, Stancin, Kirchner, & Bauchner, 2009; Thomas et al., 2016; Vitrikas et al., 2017). Positive screens are determined based on the identification of significant concerns, which places the child at low, medium or high risk for developmental delays (Chunsuwan et al., 2016; Limbos & Joyce, 2011). Taking approximately five minutes to complete, the PEDS is considered positive if one or more significant concerns are identified (Chunsuwan et al., 2016; Limbos & Joyce, 2011). If identified as a positive screen, the PEDS algorithm is followed to determine which interventions are appropriate, including referrals to early intervention services, additional screening (ie: autism screening using MCHAT), and/or watchful waiting (Chunsuwan et al., 2016; Limbos & Joyce, 2011). Available in more than 35 languages, the PEDS has a moderate sensitivity and specificity (0.74-0.79; 0.70-0.80) and has been validated in subjects from various socioeconomic minorities, including both African-American and Hispanic populations (Huntington et al., 2016; Sices et al., 2009; Thomas et al., 2016; Vitrikas et al., 2017).

Setting. La Maestra Community Health Clinic (LMFC) is comprised of four clinics located throughout San Diego, California, and offers medical, dental, imaging, and pharmaceutical care to an ethnically diverse population, including immigrants and refugees. Currently, the pediatric department does not have a protocol for evidence based developmental screenings, and providers individually evaluate and refer patients for developmental delay. While the Modified Checklist for Autism in Toddlers (M-CHAT) is available for use within the center's electronic medical record, it is not designed to detect all developmental delays at the ages recommended by the AAP. The City Heights clinic where the study was conducted is located in central San Diego and is home to approximately 102,000 residents with an estimated 31.2% living below the federal poverty level (United States Census Bureau, 2010). With a

IMPROVING EARLY INTERVENTION RATES

population make up of 58% Hispanic, 16% Asian 11% Caucasian, and 13% African American, these demographics reflect the ethnic/racial composition of LMFC's City Heights clinic (United States Census Bureau, 2010).

Procedure

Pre-Implementation data was collected using a randomized chart review of 50 pediatric patients who presented to the clinic for 9, 12, 15, 18, or 24-month well child checks between January 2016 and December 2016. Measurable data included the number of children identified with developmental delays, the number of early intervention referrals made, and the use of the developmental checklist. Providers attended a 1-hour "Lunch and Learn" session to review the new developmental screening tool. Consent was obtained for their participation in the study. Providers were familiarized with the PEDS screening tool, including its administration, scoring, and the associated treatment algorithm, and knowledge gained was evaluated using a qualitative questionnaire.

Over a 3-month implementation period, 50 parents of children presenting for 9, 12, 15, 18, or 24 month well child visits completed the PEDS screening tool in the waiting room with the assistance of the principal investigator. Professional medical translation was available if needed. The principal investigator provided the completed screening tool to the provider who scored the PEDS and followed the associated algorithm to determine the necessary referral and/or follow up. Pre and post implementation data were analyzed and compared in the following areas: number of developmental delay diagnosis, documentation of early intervention referral, and use of the developmental checklist. The University of Alabama in Huntsville Institutional Review Board of Human Subjects Committee approved all procedures.

IMPROVING EARLY INTERVENTION RATES

Data Analysis

Analysis of the data was completed to determine if the use of an evidence-based developmental screening protocol using the PEDS screening tool increased the diagnosis of developmental delay and/or improved early intervention referral rates. The collected data during this study included qualitative surveys completed by providers before and after training, demographic characteristics of participants, the number of children identified with developmental delays, the number of early intervention referrals made, and the use of the developmental checklist. SPSS software was used to conduct paired t-tests to determine differences in the rates of developmental delay detection and early intervention referral pre and post implementation.

Results

Provider Training

Four participating providers attended the 1-hour developmental screening training. Analysis of the training results indicated increased confidence in the providers' ability to understand the importance of developmental screening, follow AAP screening guidelines, and ability to administer and interpret the PEDS [INSERT Table 1 here].

Parent/Guardian & Child Characteristics

Fifty parents or guardians of children presenting for their 9 to 24 month well child visit participated in the study. Mothers comprised 82% of participating parents/guardians, with over half of all participants falling between the ages of 24-34 years (60%), married (70%), and Hispanic or Latino (60%). Most parents reported having a high school education or less with 80% having an annual gross income of less than \$30,000 per year. Child participant's ages ranged from 9 to 25 months with a mean age of 13.8 months (n=50) [INSERT Table 2 here].

IMPROVING EARLY INTERVENTION RATES

Developmental Delay Detection

Fifty parent-child pairs were screened at their well child visit using the PEDS screening tool. The parent-completed PEDS screening and the provider score sheets were analyzed to compare pre and post implementation rates of developmental delay detection. There was a clinically significant increase in the rate of developmental delay detection from 12 to 14%. After running the paired t test, there was no statistically significant difference in the rates of developmental delay detection before (M=1.88, SD=0.33) and after (M=1.84, SD = 0.37) PEDS administration; $t(49) = 0.57$, $p = 0.57$. Results suggest that the use of the PEDS test did not improve rates of developmental delay under these study conditions.

Early Intervention Referral

There was no significant difference in rates of early intervention referrals pre (M=1.9, SD = 0.303) and post (M=1.9, SD = 0.303) PEDS administration; $t(49) = 0.00$, $p = 1.00$. This suggests that use of the PEDS test for standardized developmental screenings did not improve referral rates for early intervention services at this facility.

Developmental Checklist

Paired t-tests showed a statistically significant increase in the rates of developmental checklist use before (M=1.42, SD=0.50) and after (M=1.12, SD=0.33) PEDS administration ($t(49) = 3.45$, $p = 0.001$). These results suggest that implementation of standardized developmental screening using PEDS successfully increased developmental checklist use, and indicates that implementation of an important and recommended medical standard is certainly achievable [INSERT Table 3 here].

IMPROVING EARLY INTERVENTION RATES

Discussion

The purpose of this study was to determine the benefits of administering the PEDS screening tool on rates of developmental delay detection and early intervention referral within the community health clinic. Rates of developmental delay detection, early intervention referrals, and use of developmental checklists were compared pre and post intervention. While our research did not show statistically significant increases in these areas, it is important to note that there were no decreases in detection or intervention rates, indicating that the use of the PEDS test did not negatively impact patients, nor were there over-referrals for early intervention services. It is important to note that clinically significant improvements in developmental delay detection supports some benefit in PEDS test use as evidenced by higher rates of developmental delay detected among the implementation group. The lack of similar improvement in early intervention referral rates could demonstrate an area for further provider education surrounding the PEDS test algorithm and its proper use. A second hypothesis is that providers' use of clinical surveillance versus the algorithm's recommended early intervention referral at the time of the well child visit affected early intervention referral rates.

In addition, we found that rates of developmental checklist utilization substantially increased after PEDS test implementation (66% vs 88%). One reason for such an increase can be associated with the structure of the PEDS test which empowers parents to ask questions regarding their child's development during well child visits and ultimately improves family centered care by enhancing conversations between parent and provider. This could also reflect increased provider focus on developmental screenings after educational training emphasizing its importance.

IMPROVING EARLY INTERVENTION RATES

Limitations and Recommendation for Further Research

There were several limitations to the study. The use of a randomized chart review to create a control or pre-intervention group is not ideal for running paired t-tests. Lengthening the study timeframe would allow for improved comparison of the same group of patients, but this may be difficult to achieve given the revolving nature of patients within this community health clinic, requiring many more participants to obtain a sufficient sample size ($n > 50$). Expanding the evaluation of PEDS use throughout all four LMFC clinics would also provide an opportunity to expand the sample size for both patient and provider participants, creating more generalizable results. Another study limitation mentioned throughout the literature and echoed in this study is provider time constraints. The development of a streamlined approach to simultaneous screening for developmental delays and other developmental disorders like autism could be explored through further research. In this study, parental educational levels were primarily less than a high school education, with several parents reporting no formal education. While the study design included the use of a research assistant who was able to administer the PEDS to parents with lower literacy levels, and medical translation services for parents with limited English, this may not be easily replicated in real world scenarios. Further studies could address not only barriers to provider completion of recommended screenings, but also parental barriers that could limit their ability to complete screenings independently. Study results do not necessarily imply that the PEDS test is not of benefit, however it does emphasize that each clinic should determine which AAP-recommended standardized screening tool is best for each setting. Continued research should also address the effectiveness of different AAP recommended developmental screening tools, specifically in culturally diverse community health populations.

IMPROVING EARLY INTERVENTION RATES

TABLES

Table 1

Participant Demographic Characteristics

Characteristic	Value (n (%))
Participants (n)	50
Sex	
Male	9 (18)
Female	41 (82)
Parent Age Range	
18-23	10 (20)
24-34	30 (60)
35-44	8 (16)
45-54	2 (4)
Ethnicity	
White	2 (4)
Hispanic or Latino	30 (60)
Black or African American	3 (6)
Asian Pacific Islander	8 (16)
African	6 (12)
Syrian	1 (2)
Education Level	
Less than high school	15 (30)
High School/GED	18 (36)
Some College	13 (26)
4-year degree	2 (4)
Masters degree	2 (4)
Income	
No income	12 (24)
\$5,000-9,999	9 (18)
\$10,000-19,999	12 (24)
\$20,000-29,999	13 (26)
\$30,000-39,999	1 (2)
\$40,000 >	3 (6)
Marital Status	
Single	14 (28)
Married or domestic partnership	35 (70)
Divorced	1 (2)
Child Age (months)	
9-11m	10 (20)
12-14m	16 (32)
18-20m	11 (22)
21-25m	7 (14)

IMPROVING EARLY INTERVENTION RATES

Table 2

Pre and Post Implementation Data

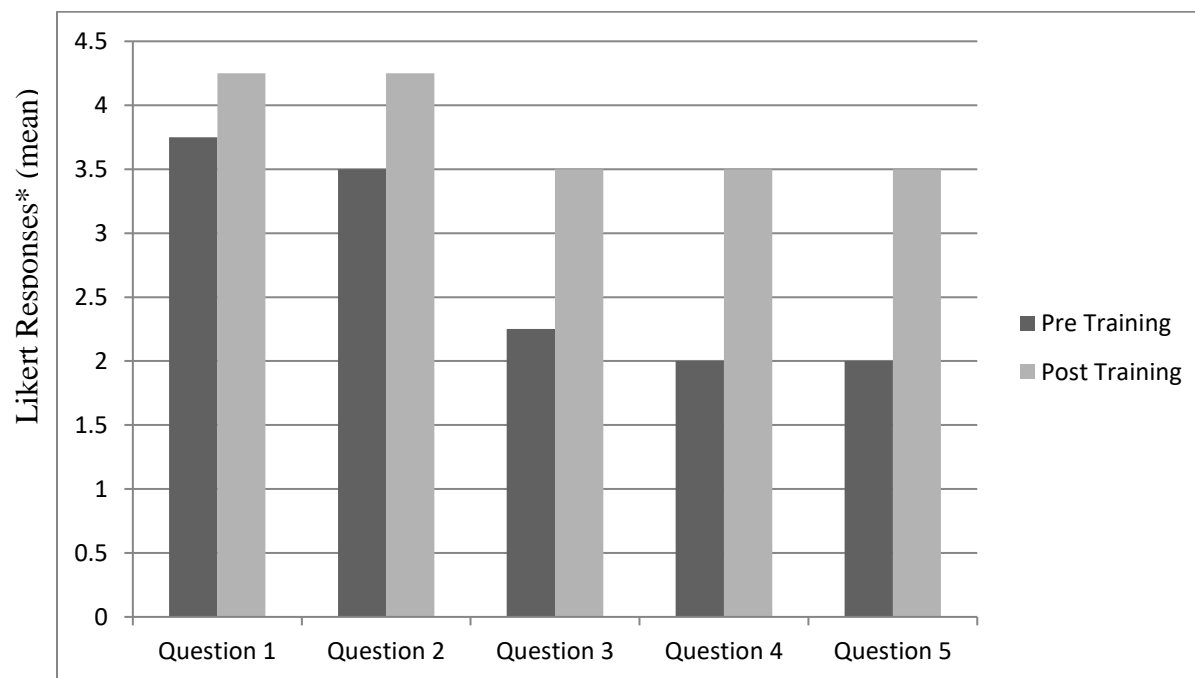
	Pre-Implementation		Post Implementation		Paired T-Test	
	Mean	SD	Mean	SD	t value	Sig (p value)
Documentation of Developmental Checklist	1.42	0.5	1.12	0.33	3.45	0.001
Early Intervention Referrals	1.9	0.303	1.9	.303	0.00	1.000
Children Diagnosed with Developmental Delay	1.88	0.33	1.84	0.37	0.57	0.569

IMPROVING EARLY INTERVENTION RATES

FIGURES

Figure 1

Mean Pre & Post Provider Training Likert Survey Results



*Providers were surveyed before and after training regarding their confidence level in performing developmental screenings and PEDS test administration. Responses range from Not Confident (1), Beginning Confidence (2), Somewhat Confident (3), Confident (4), Very Confident (5). Question 1: I am confident I can explain the importance of developmental screening. Question 2: I am confident I can identify the AAP recommendations for developmental surveillance and screening. Question 3: I am confident I can administer the PEDS tool to parents of pediatric patients at the appropriate age. Question 4: I am confident I can properly score the PEDS screening tool using the PEDS score form. Question 5: I am confident I can follow the treatment PEDS algorithm located on the PEDS interpretation form.

IMPROVING EARLY INTERVENTION RATES

APPENDIX A

Sample PEDS Test

PEDS RESPONSE FORM

Child's Name _____ Parent's Name _____

Child's Birthday _____ age 30 months Today's Date _____

Please list any concerns about your child's learning, development, and behavior.

*Mostly his behavior. He doesn't mind me or seem to listen at all.
Tantrums all the time*

Do you have any concerns about how your child talks and makes speech sounds?

Circle one: No Yes A little COMMENTS:

Do you have any concerns about how your child understands what you say?

Circle one: No Yes A little COMMENTS:

Do you have any concerns about how your child uses his or her hands or fingers to do things?

Circle one: No Yes A little COMMENTS:

Do you have any concerns about how your child uses his or her arms and legs?

Circle one: No Yes A little COMMENTS:

Do you have any concerns about how your child behaves?

Circle one: No Yes COMMENTS:

This may just be the test, but it is really terrible

Do you have any concerns about how your child gets along with others?

Circle one: No Yes A little COMMENTS:

Do you have any concerns about how your child is learning to do things for himself/herself?

Circle one: No Yes A little COMMENTS:

He tries to be too independent

Do you have any concerns about how your child is learning preschool or school skills?

Circle one: No Yes A little COMMENTS:

I think he's too young for that sort of stuff

Please list any other concerns.

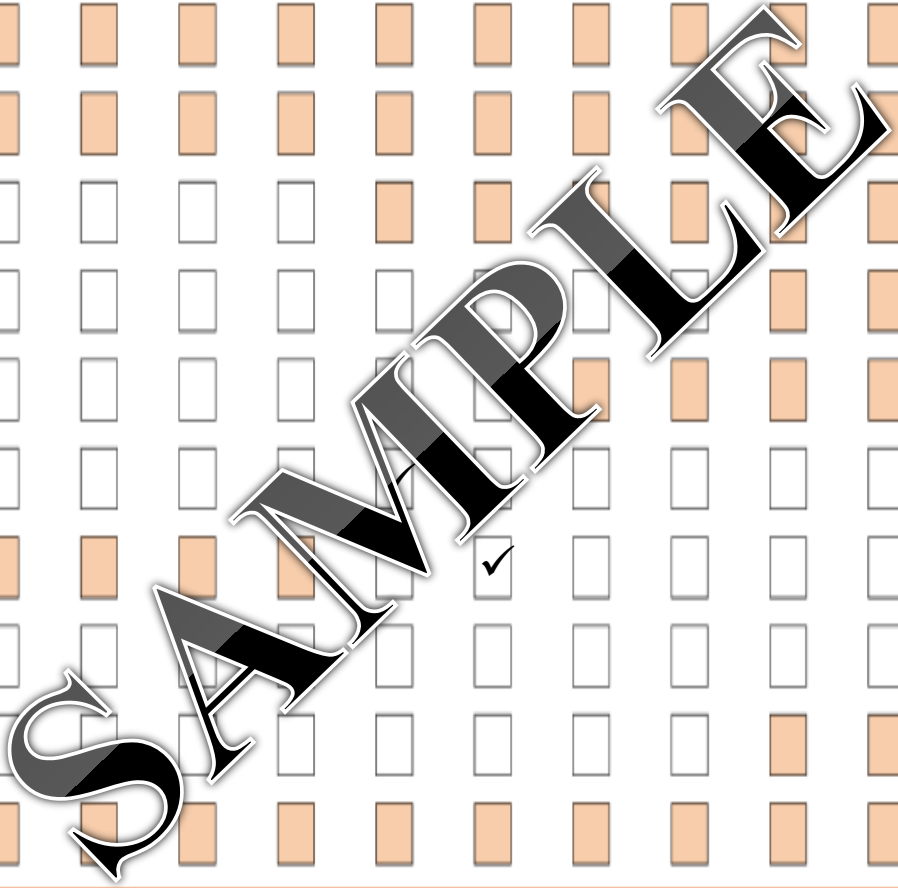
Nothing other than behavior and listening.

PEDS SCORE FORM

Child's Name _____ Birthday _____

Find appropriate column for the child's age. Place a checkmark in the appropriate box to show each concern on the PEDS Response form. See Brief Scoring Guide for details on categorizing concerns. Shaded boxes are predictive concerns. Unshaded boxes are non-predictive concerns.

Child's Age:	0-3 mos.	4-5 mos.	6-11 mos.	12-14 mos.	15-17 mos.	18-23 mos.	2 yrs.	3 yrs.	4-4½ yrs	4 ½-6 yrs.	6-7 yrs.	7-8 yrs.
Global/Cognitive												
Expressive Language and Articulation												
Receptive Language												
Fine-Motor												
Gross Motor												
Behavior												
Social-emotional							✓					
Self-help												
School												
Other												



Count the number of checks in the small shaded boxes and place the total in the large shaded box below.

0	0	0	0	0	0	0						
---	---	---	---	---	---	---	--	--	--	--	--	--

If the number shown in the large shaded box is 2 or more, follow Path A on PEDS Interpretation Form. If the number shown is exactly 1, follow Path B. If the number shown is 0, count the number of small unshaded boxes and place the total in the large unshaded box below.

0	0	0	0	0	1	1						
---	---	---	---	---	---	---	--	--	--	--	--	--

If the number shown in the large unshaded box is 1 or more, follow Path C. If the number 0 is shown, consider Path D if relevant. Otherwise, follow Path E.

IMPROVING EARLY INTERVENTION RATES

Child's Name _____

PEDS INTERPRETATION FORM

Specific Decisions

0-3 mos. counseled re: colic

4-5 mos. happy baby, happy mom, gave info on promoting sleep

6-11 mos. no concerns gave info babyproofing house

12-14 mos. concern about delayed walking, gave info on age range

15-17 mos. no concerns re: response to the limits of my child-proofing house

18-23 mos. concerned re: sufficient caloric intake. Growth rate normal

2-3 yrs. progressing well, no concerns. Gave info on tantrums and positive discipline

3 yrs. Sent home with PDI to return 4/28 4/28: passed; counseled mo re: SBL, return

4-4 1/2 yrs. _____

4 1/2-6 yrs. _____

6-7 yrs. _____

7-8 yrs. _____

Path A: Two or more significant concerns?

Yes? → Two or more concerns about self-help, social, school, or receptive language skills?

Yes? → Refer for audiological and speech-language testing. Use professional judgment to decide if referrals are also needed for social work, occupational/physical therapy, mental health services, etc.

No? → Refer for intellectual and educational evaluations. Use professional judgment to decide if speech-language, audiological, or other evaluations are also needed.

Path B: One significant concern?

Yes? → Screen or refer for screening.

If screen is passed, counsel in areas of concern and teach vocabulary.

If screen is not passed, refer for screening in area(s) of concern.

Path C: Nonsignificant concerns?

Yes? → Counsel in areas of concern, be successful, so refer for emotional/behavioral problems and refer as indicated. Otherwise refer for parent training, behavioral intervention, etc.

Path D: Parental difficulties communicating?

Yes? → Foreign language a barrier?

No? → Use a second screen that directly elicits children's skills or refer for screening elsewhere.

Yes? → Use foreign language versions, send PEDS home in preparation for a second visit; seek a translator, or refer for screening elsewhere.

Path E: No concerns?

Yes? → Elicit concerns at next checkpoint.

No? → Use PEDS between checkpoints (e.g. sick- or return-visit).

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APPENDIX B

Provider Consent Form

Consent Form: **Improving Early Intervention Rates Using the Parents' Evaluation of Developmental Status (PEDS) Screening Tool - PROVIDERS**

You are invited to participate in a research study about parent completed developmental screenings for children during routine physical exams. This study is designed to help us to better understand the clinic's developmental screening processes and improve developmental delay detection.

The primary investigator is Shannon Tillar, MS C-PNP, from La Maestra Community Health Center.

PROCEDURE TO BE FOLLOWED IN THE STUDY: Participation in this study is completely voluntary. Once written consent is given; you will be asked to attend a 1-hour "Lunch and Learn" session to review the new developmental screening protocol. Providers will become familiarized with the PEDS screening tool, including its administration, scoring, and the associated treatment algorithm. Providers will be responsible for scoring the PEDS screening and following the algorithm to determine the necessary referral and/or follow up. The project implementation phase will last for 3 months.

DISCOMFORTS AND RISKS FROM PARTICIPATING IN THIS STUDY: There are no expected risks associated with your participation.

EXPECTED BENEFITS:

Results from his study can benefit society by improving developmental screenings within the clinic and improve identification of children who may be at risk for developmental delay, ensuring that they receive the necessary early intervention services. It will also give the parent the opportunity to learn more about their child's development during your office visit. For medical providers, this is another way to enhance your developmental screening processes. Please see the section below for incentives and compensation for participation in this study.

INCENTIVES AND COMPENSATION FOR PARTICIPATION: There are no financial incentives for your participation in the study.

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CONFIDENTIALITY OF RESULTS: Participant numbers will be used to record your data, and these numbers will be made available only to those researchers directly involved with this study, thereby ensuring strict confidentiality. This consent form will be destroyed after 3 years. The data from your session will only be released to those individuals who are directly involved in the research and only using your participant number.

FREEDOM TO WITHDRAW: You are free to withdraw from the study at any time. You will not be penalized because of withdrawal in any form. Investigators reserve the right to remove any participant from the session without regard to the participant's consent.

CONTACT INFORMATION: If you have any questions, please ask them now. If you have questions later on, you may contact the Principal Investigator Shannon Tillar, MS CPNP, in La Maestra Community Health Center, at 619-795-5997 or at stillar@lamaestra.org. [or the faculty supervisor Javier Rodriguez, MD, in La Maestra Community Health Center at jrodriguez@lamaestra.org]. If you have questions about your rights as a research participant, or concerns or complaints about the research, you may contact the Office of the IRB (IRB) at 256.824.6101 or email the IRB chair Dr. William Wilkerson at irb.@uah.edu.

If you agree to participate in our research please sign and date below. If you are under the age of 18, please provide your parent or legal guardian's signature indicating consent.

This study was approved by the Institutional Review Board at UAH and will expire in one year from <date of IRB approval>.

Name (Please Print)

Signature

Date

Parent/Guardian Signature (if younger than 19)

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APPENDIX C

Provider Staff Training Pre/Post Evaluation

Pre-Training Evaluation

Please indicate your level of confidence with each of the following statements.

1. I am confident I can:

	Not confident	Beginning Confidence	Somewhat Confident	Confident	Very Confident
Explain the importance of developmental screening					
Identify the AAP recommendations for developmental surveillance and screening					
Administer the PEDS tool to parents of pediatric patients at the appropriate ages					
Properly score the PEDS screening tool using the PEDS score form					
Follow the treatment PEDS algorithm located on the PEDS interpretation form					

2. What do you hope to learn from today's presentation?

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3. How do you anticipate using the knowledge and skills you gain from this training on pediatric developmental screenings using the PEDS tool?

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Post-Training Evaluation

Please indicate your level of confidence with each of the following statements.

1. After completing the course, I am confident I can:

	Not confiden t	Beginning Confidenc e	Somewhat Confident	Confident	Very Confiden t
Explain the importance of developmental screening					
Identify the AAP recommendations for developmental surveillance and screening					
Administer the PEDS tool to parents of pediatric patients at the appropriate ages					
Properly score the PEDS screening tool using the PEDS score form					
Follow the treatment PEDS algorithm located on the PEDS interpretation form					

2. I will be able to apply the information I learned in the course to my developmental screening

- Strongly disagree
- Disagree
- Neither agree nor disagree

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- Agree
- Strongly Agree

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APPENDIX D

Participant Consent Form & Demographic Survey

Consent Form: **Improving Early Intervention Rates Using the Parents' Evaluation of Developmental Status (PEDS) Screening Tool**

You are invited to participate in a research study about parent completed developmental screenings for children during routine physical exams. This study is designed to help us better understand the clinic's developmental screening processes and improve developmental delay detection.

The primary investigator is Shannon Tillar, MS C-PNP, from La Maestra Community Health Center.

PROCEDURE TO BE FOLLOWED IN THE STUDY:

FOR PARENTS: Participation in this study is completely voluntary. Once written consent is given; you will be asked to complete a brief 5 minute questionnaire that addresses your child's development in language, behavior, and social skills and allows you to express any concerns you may have regarding your child's development. That questionnaire will be given to your child's medical provider to review the results during your normal well child visit today. Based on your developmental screening today, this study will also collect data including whether your child was recommended for additional developmental services or screenings.

DISCOMFORTS AND RISKS FROM PARTICIPATING IN THIS STUDY: There are no expected risks associated with your participation.

EXPECTED BENEFITS: Results from this study can benefit society by improving developmental screenings within the clinic and identify children who may be at risk for developmental delay, ensuring that they receive the services needed to succeed in school and social environments. Please see the section below for incentives and compensation for participation in this study.

INCENTIVES AND COMPENSATION FOR PARTICIPATION: There are no financial incentives for your participation in the study.

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CONFIDENTIALITY OF RESULTS: Participant numbers will be used to record your data, and these numbers will be made available only to those researchers directly involved with this study, thereby ensuring strict confidentiality. This consent form will be destroyed after 3 years. The data from your session will only be released to those individuals who are directly involved in the research.

FREEDOM TO WITHDRAW: You are free to withdraw from the study at any time. You will not be penalized because of withdrawal in any form. Investigators reserve the right to remove any participant from the session without regard to the participant's consent.

CONTACT INFORMATION: If you have any questions, please ask them now. If you have questions later on, you may contact the Principal Investigator Shannon Tillar, MS CPNP, at La Maestra Community Health Center, at 619-795-5997 or at stillar@lamaestra.org. [or the faculty supervisor Javier Rodriguez, MD, at La Maestra Community Health Center at jrodriguez@lamaestra.org]. If you have questions about your rights as a research participant, or concerns or complaints about the research, you may contact the Office of the IRB (IRB) at 256.824.6101 or email the IRB chair Dr. William Wilkerson at irb.@uah.edu.

If you agree to participate in our research please sign and date below. If you are under the age of 18, please provide your parent or legal guardian's signature indicating consent.

This study was approved by the Institutional Review Board at UAH and will expire in one year from <August 23, 2017>.

Name (Please Print)

Signature

Date

Parent/Guardian Signature (if younger than 19)

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Demographic Survey

Please answer the following questions about yourself.

What is your age?

- Less than 18
- 18-24
- 24-34
- 35-44
- 45-54
- 55-67
- 65+

What is your gender?

- Male
- Female

What is your relationship to the child being seen today?

- Mother
- Father
- Grandparent
- Legal Guardian
- Other (please specify): _____

What is your ethnicity (or Race)?

- White
- Hispanic or Latino
- Black or African American
- Native American or American Indian
- Asian Pacific Islander
- Other (please specify): _____

What is your marital status?

- Single, never married
- Married or domestic partnership
- Widowed

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Divorced

Separated

What is the highest level of education you have completed?

Less than high school

High School/GED

Some College

4-year college degree

Master's degree

Doctoral Degree (MD, JD, PhD)

What is your yearly income (before taxes)?

No income

\$5,000-9,999

\$10,000-19,999

\$20,000-29,999

\$30,000-39,999

\$40,000-49,999

\$50,000-59,999

\$60,000-69,999

\$70,000-79,999

\$80,000 or more

Please answer the following questions about your child who is being seen today.

What is your child's age? _____

What is your child's ethnicity (or Race)?

White

Hispanic or Latino

Black or African American

Native American or American Indian

Asian Pacific Islander

Other (please specify): _____

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APPENDIX E

IRB Approval Letter



October 19th 2017
Shannon Tillar
University of Alabama in Huntsville

Dear Ms. Tillar,

The UAH Institutional Review Board of Human Subjects Committee has reviewed your updated proposal, *Improving Early Intervention Rates Using the Parents' Evaluation of Developmental Status (PEDS) Screening Tool*, and found it meets the necessary criteria for approval. Your proposal seems to be in compliance with this institutions Federal Wide Assurance (FWA) 00019998 and the DHHS Regulations for the Protection of Human Subjects (45 CFR 46).

Please note that this approval is still only good for one year from the original date of approval; August 23rd, 2017. If data collection continues past this period, you are responsible for processing a renewal application a minimum of 60 days prior to the expiration date.

No changes are to be made to the approved protocol without prior review and approval from the UAH IRB. All changes (e.g. a change in procedure, number of subjects, personnel, study locations, new recruitment materials, study instruments, etc) must be prospectively reviewed and approved by the IRB before they are implemented. You should report any unanticipated problems involving risks to the participants or others to the IRB Chair.

If you have any questions regarding the IRB's decision, please contact me.

Sincerely,

A handwritten signature in black ink that reads 'Bruce Stallsmith'.

Bruce Stallsmith
IRB Chair
Professor, Biological Sciences

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APPENDIX F

Agency Approval Letter



**LA MAESTRA
COMMUNITY HEALTH CENTERS**
City Heights · El Cajon · National City · Lemon Grove

October 18, 2017

Dr. Bruce Stallsmith, IRB Chair
University of Alabama, Huntsville

Dear Dr. Bruce Stallsmith and IRB Members:

I have read over Shannon Tillar's proposal for a research project entitled *Improving Early Intervention Rates Using the Parents' Evaluation of Developmental Status (PEDS) Screening Tool* to be carried out at La Maestra Community Health Center. I understand that this student is conducting this project as part of their requirements for the Doctor of Nursing Practice degree at the University of Alabama in Huntsville, and will have the opportunity to present their research findings in other venues.

Due to unforeseen circumstances, it would be best to relocate the research project from our National City site to our City Heights clinic to ensure that the patient volume can support the scale of the project. I anticipate that there will be no delays in the start of the project at our City Heights location.

The agency continues to support this student's plan and approves the project and site change as it is reviewed and approved by the IRB of the University, including recruitment of participants and data collection, through our agency.

Should you have additional questions or concerns, you may contact me at jrodriguez@lamaestra.org.

Sincerely,

A handwritten signature in black ink, appearing to read 'Javier Rodriguez', is written over a white background.

Javier Rodriguez, MD
Chief Medical Officer
La Maestra Community Health Centers

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APPENDIX G

Documentation of Manuscript Submission

Journal of Pediatric Health Care <Evisesupport@elsevier.com>

This message was sent automatically. Please do not reply.

Ref: JPHC_2018_70

Title: Pediatric Early Intervention Improvement through Utilization of the Parents' Evaluation of Developmental Status Screening Tool

Journal: Journal of Pediatric Health Care

Dear Mrs. Thompson,

Thank you for submitting your manuscript for consideration for publication in Journal of Pediatric Health Care. Your submission was received in good order.

To track the status of your manuscript, please log into EVISE® at: http://www.evise.com/evise/faces/pages/navigation/NavController.jspx?JRNL_ACR=JPHC and locate your submission under the header 'My Submissions with Journal' on your 'My Author Tasks' view.

Thank you for submitting your work to this journal.

Kind regards,

Journal of Pediatric Health Care

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