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Implementing Adverse Childhood Experiences (ACEs) Screening in an Urban Pediatric Primary Care Clinic

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Abstract

Children who are exposed to traumatic events are more likely to engage in risky behaviors, are at increased risk for developing lifelong health problems, and are less likely to reach their full academic and career potential (Centers for Disease Control and Prevention [CDC], 2019). The American Academy of Pediatrics endorses screening for toxic stress within the pediatric primary care setting; however, this recommendation has not been widely implemented (Garner & Shonkoff, 2012). A quality improvement project aiming to increase provider knowledge of ACEs and implement the use of an ACEs screening tool was performed in a small urban pediatric primary care clinic. The impact of a provider education session was evaluated via a pre-post-test design and utilization of the patient and/or caregiver completed Pediatric ACEs and Related Life-events Screener (PEARLS) was monitored over a 16-week period. Initially, an increase in provider knowledge was achieved following the educational session; however, this increase in knowledge was not sustained at the end of the 16 weeks. During the implementation period, 89.5% (343 of 383) of eligible patients were given the opportunity to complete a PEARLS, with a 66.5% (228 of 343) completion rate. Results demonstrated feasibility and acceptability of using the PEARLS at yearly well child exams. Further research is needed on how to sustain provider engagement, improve provider knowledge retention, and determine whether or not an improvement in provider ACEs knowledge leads to the implementation of appropriate interventions for affected children.

Keywords: Adverse childhood experiences, toxic stress, childhood trauma, screening, pediatric primary care

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Introduction

Adverse childhood experiences (ACEs) are stressful or traumatic events that occur before a child reaches the age of 18 (Centers for Disease Control and Prevention [CDC], 2019). The three major categories of ACEs are abuse, neglect, and household instability (CDC, 2019). Exposure to ACEs has been linked with negative health and well-being outcomes, including risky health behaviors, chronic health conditions, low life potential, and early death (CDC, 2019). The original ACE study, conducted by the CDC and Kaiser Permanente in the late 1990s, found that ACEs were common, established a link between ACEs exposure and adult health risk behaviors and diseases, and discovered that the risk for negative health outcomes increased as the number of ACEs experienced increased (Felitti et al., 1998). The landmark ACE study also highlighted the need to develop strategies to identify and support children at risk for ACEs and associated negative health outcomes (Felitti et al., 1998).

Background

Young children are at high risk for trauma exposure and are particularly vulnerable because of their dependence on caregivers and lack of adequate coping skills (Buss, Warren, & Horton, 2015). Nearly half of children and adolescents in the United States have endured at least one ACE with 10% of children having experienced three or more ACEs (Sacks & Murphey, 2018). Despite the identification of childhood trauma as a public health crisis, the overwhelming majority of pediatric primary care providers do not screen children for exposure to ACEs (Dube, 2018; Kerker et al., 2016). Among providers that do ask about childhood trauma, there is a lack of standardization in the process (Kerker et al., 2016).

Pediatric primary care providers report several barriers to screening for ACEs. Providers acknowledge discomfort with the discussion of trauma (Bethall, 2017). Additionally, they report a lack of knowledge regarding the impact of ACEs and available assessment methods (Kerker et al., 2018). Pediatric providers also raise concern regarding loss of patient and family trust due to their duty to report (Becker-Blease & Freyd, 2006). Furthermore, providers carry beliefs and assumptions that discussing past trauma is upsetting, harmful, and stigmatizing for patients (Black & Black, 2007). An opportunity to address issues that have the potential to impact a child's development and present and future health is missed when children are not screened for ACEs exposure (Kerker et al., 2018). Children who have endured multiple ACEs often experience negative health outcomes that are best managed by early intervention; thus, provider education followed by a practice change of universal screening at routine well child visits is recommended and supported in the literature despite not having been widely implemented in practice (Bucci et al., 2015).

Problem Statement

Children continue to experience ACEs in spite of the prevention strategies currently in place and should be identified early to aid in the prevention of negative health outcomes and to allow for anticipatory guidance or early referral to a mental health professional when needed (Bucci et al., 2015). The majority of children who have experienced ACEs are not identified due to healthcare provider discomfort and lack of knowledge about childhood trauma or available pediatric screening tools (Kerker et al., 2018). Universal screening for ACEs would allow healthcare providers to identify affected children. Early anticipatory guidance or targeted treatment could then be implemented to lessen the physical, psychological, behavioral, and economic consequences and improve health outcomes for children who have experienced

childhood trauma.

Needs Assessment

Knowledge deficits and inconsistencies in practice related to ACEs screening exist among pediatric primary care providers. In a 2015 American Academy of Pediatrics (AAP) survey, 76% of pediatricians reported no familiarity with the landmark ACE study (Kerker et al., 2016). Additionally, only 4% of pediatricians endorsed that they usually asked about all seven ACEs, while 32% reported that they usually did not ask about any ACEs during visits (Kerker et al., 2016). Furthermore, among providers who did screen for ACEs, a lack of standardization existed with only 2% of pediatricians reporting routine use of a screening tool (Kerker et al., 2016). Pediatric nurse practitioners (PNPs) shared similar statistics. In a National Association of Pediatric Nurse Practitioners (NAPNAP) survey, a significant number of PNPs did not routinely ask about child maltreatment and psychosocial risk factors at well child visits (Hornor et al., 2017). PNPs cited the following barriers to screening for and providing anticipatory guidance about child maltreatment and psychosocial risk factors: time (67%), lack of training (48%), lack of comfort (32%), and lack of an evidence-based validated screening tool (29%) (Hornor et al., 2017).

The Centers for Disease Control and Prevention (CDC) reports that one in four children has experienced at least one form of maltreatment, which indicates that the prevalence of trauma within the pediatric population is becoming more difficult to ignore (Tello, 2019). In response to this reality, there has been recent organizational focus on trauma-informed care. Leadership support of trauma-informed care initiatives suggest appropriate timing for the initiation of ACEs screening at well child visits. At the time this project was introduced, the organization did not yet have a standardized approach for pediatric primary care providers to assess patients' ACEs

exposure.

The group that managed and led the primary care division of the organization was a key stakeholder for this quality improvement project. This group, which included the clinic site manager, had the authority to approve or request project changes (Watt & Watt, 2014). Staff who worked directly within the clinic site, including front desk staff, medical assistants, nurse practitioners, pediatricians, a licensed professional counselor, and a social worker each played a role in project implementation and impacted project success. The project manager guided team members by providing leadership, direction, and support throughout all phases of the project (Watt & Watt, 2014). The site mentor and faculty project mentor were actively involved in supporting and guiding the project manager in project planning, implementation, and evaluation. Stakeholders who were actively affected by project outcomes included patients, patients' families, and the community. The cost of ACEs and associated sequelae has been estimated at hundreds of billions of dollars annually (CDC, 2019). The economic burden of ACEs-associated costs is shared among financial stakeholders, including the government, health insurance companies, communities, and workers and employers who must contribute to disability benefits via income taxes. Consideration of all project stakeholders in the project planning phase was vital to building strong stakeholder relationships, which was advantageous for project success (Watt & Watt, 2014).

Contribution to the Literature

In 2012, the AAP issued a policy statement that called for pediatric medical homes to "actively screen for precipitants of toxic stress" (Garner & Shonkoff, 2012). Uptake of ACEs screening in pediatric primary care has been slow and remains inadequate in the eight years that have passed since the AAP released this policy statement (Popp, Geisthart, & Bumpus, 2020).

Literature on ACEs and toxic stress has largely focused on current ACEs screening practices, provider knowledge of and comfort with discussing ACEs, the assessment of perceived barriers to ACEs screening, and parental perceptions of ACEs screening. Available literature about pediatric ACEs provided a base for the AAP recommendation but to date, limited literature focusing on the implementation of ACEs screening in pediatric primary care is available. This project aimed to contribute knowledge on the impact of a pre-implementation provider education session followed by the implementation of an ACEs screening tool on provider knowledge and comfort with ACEs screening, clinic staff compliance with administration of the screening tool, and patient and caregiver screening tool completion rates within an urban pediatric primary care setting.

Significance to the Nursing Profession

Nurses are trained to provide holistic care and are ideally positioned to advance the practice of trauma-informed care (Stokes, Jacob, Gifford, Squires, & Vandyk, 2017). Trauma-informed care encompasses caring for every patient as though he or she may have experienced trauma and providing care in a manner that offers patients a feeling of safety (Stokes et al., 2017). Pediatric nurse practitioners collaborate with other healthcare professionals in the prevention, identification, and treatment of children who have a history of or current exposure to ACEs (Hornor, 2015). Early identification of trauma exposure in pediatric patients combined with appropriate interventions is crucial to preventing lifelong consequences and improving outcomes for children with a history of trauma exposure (Hornor, 2015).

Moral distress must be considered as an ethical and moral challenge associated with addressing childhood adversity (Albaek, Kinn, & Milde, 2018). Moral distress occurs when an individual is unable to perform actions felt to be morally appropriate due to limitations, such as

unsatisfactory competence, organizational culture, and system attributes (Albaek et al., 2018). Nurses and nurse practitioners who work in healthcare practices where greater emphasis is placed on physical health and social and mental health is largely ignored, may, for example, experience moral distress as a result of recognizing the gap in holistic care within their organizational culture. Additionally, nurses and healthcare providers who work in a healthcare setting in which ACEs screening is implemented without prior staff education can also experience moral distress due to feelings of inadequate knowledge and confidence (Albaek et al., 2018). As the divide between knowing that assessment of toxic stress is a critical part of holistic care and the implementation of ACEs screening into pediatric practice is narrowed, changing organizational culture through staff education is pivotal for project success.

Purpose Statement

This project aimed to assess the impact of a pre-implementation provider education session focused on ACEs and the Pediatric ACEs and Related Life-events Screener (PEARLS) followed by clinic site implementation of the PEARLS, on provider knowledge, provider comfort with discussing ACEs, staff compliance with administering the PEARLS, and patient and caregiver PEARLS completion rates. Limited studies exist that evaluate the impact of pre-implementation education and the implementation of a pediatric ACEs clinical screening tool on provider knowledge and comfort with discussing ACEs. Once these aspects have been assessed and the clinic site has successfully implemented the PEARLS, future work would include expansion of pre-implementation education and PEARLS implementation to other clinic sites within the organization, allowing for broader identification of children who have experienced ACEs.

Theoretical Framework

The Commission on Social Determinants of Health (CSDH) was formed by the World Health Organization (WHO) with the task of better understanding the complexity that defines health (Solar & Irwin, 2010). The CSDH developed a conceptual framework to guide their work (Solar & Irwin, 2010). This framework highlights how socioeconomic-political context, structural determinants and socioeconomic position, and intermediary determinants of health create differences in health across the population (Solar & Irwin, 2010). The socioeconomic-political context encompasses the governance, policies, cultural and societal values, and epidemiological conditions of a social system that shape and maintain social hierarchies, such as policies that determine how societies distribute resources (Solar & Irwin, 2010). Structural determinants and socioeconomic position refer to differences in access to material resources, health-promoting amenities, and exposure to risk factors as a result of differing positions within the social hierarchy due to educational level, occupation, and income (Solar & Irwin, 2010).

Intermediary determinants of health are the individual-level influences and are comprised of material circumstances, psychosocial, behavioral, and biologic factors, and differences in access to healthcare (Solar & Irwin, 2010). Key material circumstances include housing conditions and the neighborhood environment (Solar & Irwin, 2010). Psychosocial factors include stressors, such as negative life events, and social support and coping styles, or lack thereof (Solar & Irwin, 2010). Biological and behavioral factors include genetics and lifestyle factors such as diet, exercise, smoking, and alcohol consumption (Solar & Irwin, 2010). Socioeconomic positions create differences in intermediary determinants of health which, in turn, generate health inequities (Solar & Irwin, 2010).

ACEs are categorized within psychosocial factors of intermediary determinants of health within the context of the CSDH framework. ACEs are present across all socioeconomic groups;

although, data continues to reveal higher rates of ACEs in children from lower income families (Halfon, Larson, Son, Lu, & Bethell, 2017). Additionally, children from higher income families are less likely to experience ACEs but the effect on their health status when exposed to ACEs is greater than for children from lower income families (Halfon et al., 2017). The complexity of the factors known to influence health outcomes explains why primary prevention strategies are insufficient and unable to eliminate ACEs; thus, highlighting the need for secondary and tertiary prevention strategies. Universal ACEs screening in primary care, as a secondary prevention measure, aims to improve health outcomes through early detection (Bucci et al., 2015).

Project Goals and Objectives

The first project goal was to present education about ACEs and the PEARLS to all pediatric providers at the clinic site with a measurable outcome of at least 80% participating in the offered training. A second project goal was to ensure providers and clinic staff were prepared to administer the PEARLS and had the resources necessary to use the PEARLS for all applicable well child visits. The outcome for this goal was that providers and clinic staff would give the PEARLS to at least 80% of patients and/or caregivers presenting for applicable well child visits. To ensure the success of these goals and gain user buy-in, provider education and staff workflows were developed and presented prior to project implementation. Furthermore, data on staff compliance and PEARLS completion rates was collected and distributed frequently throughout the implementation period to allow for prompt staff and provider feedback and improvement. An effective staff workflow, education about ACEs and the PEARLS, and prompt feedback, gave pediatric providers the opportunity to identify affected children and adolescents and recommend early interventions to maximize current and future health outcomes.

Literature Review

Question of Interest

The goal of this literature review was to examine the available evidence on the effect of ACEs education and training about a clinical ACEs screening tool on pediatric primary care provider knowledge of ACEs, provider comfort level with discussing ACEs, staff compliance with administering the clinical ACEs screening tool, and ACEs screening tool completion rates during pediatric well child visits. This DNP project focused on implementing a means to improve early identification of children who have experienced multiple ACEs. Early identification allows for targeted interventions and assists providers in recognizing affected patients as being at an increased risk for chronic health problems, developmental and learning delays, and mental and physical health problems (Bucci et al., 2015). The long-term physical, mental, and developmental well-being of affected children was outside of the scope of this project but is an important area of focus for future studies.

Search Strategy

A search was conducted using principle nursing literature databases MEDLINE and CINAHL, as well as PsycINFO and PubMed. Search keywords included combinations of the following key words or phrases: *adverse childhood experiences, screen(ing), ask, pediatric, provider, education, intervention,* and *psychosocial.* Articles published prior to 2013 were excluded from review. In searches with combinations of keywords that resulted in more than 125 articles, a filter for age to include articles only related to children and adolescents was selected. All evidence types were included.

After removal of duplicates in EndNote, 725 articles were identified via these search criteria. After reviewing article titles and abstracts, 35 full-text articles were retained for evaluation. Out of the 35 articles evaluated, 22 articles and one position statement, which was

obtained directly from the AAP website, met inclusion criteria for this literature review. Articles discussing assessment of adult or parental ACEs were excluded. Articles that were educational but did not share new findings were not reviewed. Articles meeting inclusion criteria were those discussing how often providers screen for ACEs, provider perceptions of barriers to screening for ACEs, provider and patient/family acceptance of ACEs screening, and studies involving the implementation of student or provider ACEs education and/or an ACEs screening protocol.

Synthesis of the Literature

Exposure to ACEs is linked with health safety risks, poor health outcomes, preventative healthcare underuse, and urgent/emergent healthcare overuse, establishing the need for ACEs screening to identify affected children and improve outcomes (McKelvey, Conners, Fitzgerald, Kraleti, & Whiteside-Mansell, 2017). Kerker et al. (2016) highlighted that few pediatricians ask patients about ACEs and for those that do, there is a lack of consistency in how many ACEs are addressed. Only 4% of pediatricians endorsed usually asking about all 7 ACEs and 32% reported that they usually did not ask about any ACEs (Kerker et al., 2016). Additionally, of those that did screen, the majority of pediatric healthcare providers were screening for abuse and neglect with much lower rates of screening for other ACEs (Popp et al., 2020).

Perceived barriers to ACEs screening are well documented. Pediatric nurse practitioners reported time, a lack of training, and lack of comfort as barriers to screening for child maltreatment and psychosocial risk factors (Hornor et al., 2017). Similarly, over half of residents reported no formal training on screening patients for ACEs (Tink, Tink, Turin, & Kelly, 2017). The lack of an appropriate screening tool was also frequently cited as a barrier to ACEs screening (Popp et al., 2020). In a meta-synthesis, Albaek et al. (2018) examined professionals' experiences with addressing ACEs and identified an overarching metaphor of "walking children

through a minefield," due to participant feelings of inadequacy, fear that attempts to help could create more harm, and emotional distress associated with addressing child adversity.

Despite provider concerns of parental discomfort related to ACEs assessment, available literature revealed that most families felt comfortable completing screening tools for ACEs, felt supported or glad to discuss their answers with their child's healthcare team, and believed screening should continue (Selvaraj et al., 2018). When caregivers were asked about unmet social needs, they later reported having greater confidence in their ability to ask for and receive help from their provider, as well as greater acceptance of the practice of provider screening (Colvin, Bettenhausen, Anderson-Carpenter, Collie-Akers, & Chung, 2016). Furthermore, 97% of parents and guardians felt an ACEs discussion should occur with their child's primary care provider as opposed to another healthcare professional (Bodendorfer et al., 2019).

The need for the proposed intervention of ACEs education and the implementation of an ACEs screening tool is backed by the AAP who states that "pediatric medical homes should actively screen for precipitants of toxic stress" (Garner & Shonkoff, 2012, p. e229). Education or training is known to enhance provider understanding of ACEs (Wen, Miller-Cribbs, Coon, Jelly, & Foulks-Rodriguez, 2017). After engaging in an educational curriculum on ACEs, students from health profession programs were substantially more likely to administer and assess an ACEs questionnaire for their patients (Strait & Bolman, 2016). The students also identified increased confidence levels in helping patients who had experienced trauma (Strait & Bolman, 2016). As an added benefit, ACEs training has also been found to improve child maltreatment detection (Bachmann & Bachmann, 2018).

Several studies found that ACEs provider education and the implementation of an ACEs screening intervention improved provider skill, knowledge, perceived confidence, and screening

practices for child traumatic stress (Flynn et al., 2015). The implementation of an educational intervention and ACEs screening also led to a statistically significant improvement in provider awareness of resources for children with positive ACEs screens (Bryant & VanGraafeiland, 2019). In a qualitative study, Pearce, Murray, and Larkin (2019) identified that ACEs education and training improved therapeutic practice via empathetic understanding, enhanced commitment to routine enquiry of childhood adversity, and increased referral patterns.

Within pediatric primary care settings, providers found ACEs education and screening tool implementation to be both feasible and acceptable. ACEs screening had a minimal impact on provider workflow, with providers estimating that the majority of conversations on the topic took four minutes or less (Bodendorfer et al.,2019). Furthermore, Marsicek et al. (2019) demonstrated no statistically significant difference in the average length of visits before and after PEARLS implementation. Following the implementation of ACEs screening, providers noted improved quality of care, commenting specifically on the positive impact of ACEs screening on the patient-provider relationship (Kia-Keating, Barnett, Liu, Sims, & Ruth, 2019).

Based on an analysis of the level of evidence and quality of the studies reviewed, the available evidence was good and consistent but had limitations in reliability and validity. The majority of studies reviewed were non-experimental or quality improvement studies, which increases the risk of confounding variables and lowers internal validity (Price, Jhangiani, & Chiang, 2015). Additionally, although the AAP supports the intervention of screening for ACEs, it is relatively unknown which ACEs screening tools are best for use in children and adolescents (Garner & Shonkoff, 2012). Very few ACEs screening tools are validated; thus, unvalidated tools were frequently used in the reviewed studies which compromises findings (Ali, Ryan, & De Silva, 2016). Furthermore, many of the studies used convenience samples and had small sample

sizes and/or suboptimal response rates, which negatively affects the reliability and generalizability of the research findings. Future research with larger sample sizes is needed.

In spite of the limitations, the available body of evidence indicated that provider ACEs education improved provider knowledge, confidence, and comfort in the discussion of ACEs and increased the administration of ACEs screening tools to pediatric patients. Additionally, ACEs screening was acceptable to parents and guardians and minimally affected provider workflow (Bodendorfer et al., 2019). Without continued reinforcement following provider education and the implementation of a screening tool, there was concern that provider compliance with screening may decrease over time; however, long-term outcomes were not well studied (Flynn et al., 2015). Although ACEs provider education and the use of an ACEs screening tool in the pediatric primary care setting was supported in the reviewed literature, additional studies are needed to improve the generalizability of the evidence.

Project Implementation

Context and Setting

The setting of this quality improvement (QI) pilot project was one primary care clinic that is part of a large independent pediatric healthcare organization with an academic institution partnership. During the project, the clinic site was staffed with two full-time physicians, two part-time float nurse practitioners, two medical assistants, three front desk staff, one clinic manager, one integrated behavioral health psychotherapist, and one part-time social worker. The four pediatric primary care providers at the clinic site, including two physicians and two nurse practitioners, were the target sample and all of the providers participated in the intervention. This clinic site serves as a medical home for approximately 1,800 patients, the majority of whom are African American (87.8%) and for whom Medicaid (86.5%) is the primary payer. During the

implementation period, 383 patients were seen for qualifying well child exams. Qualifying well child exams were deemed to be yearly preventative health visits starting at age one in infancy through age nineteen in adolescence.

There are currently no validated ACEs screening tools for use in the pediatric population (Koita et al., 2018). The PEARLS was designed by researchers from the Bay Area Research Consortium on Toxic Stress and Health (BARC) to screen for ACEs and other potential risk factors for toxic stress (Koita et al., 2018). The PEARLS was written at a sixth-grade reading level, which is in alignment with health literacy recommendations for written materials (Hersh, Salzman, & Snyderman, 2015; Koita et al., 2018). The PEARLS was assessed to have high face validity and is currently undergoing further evaluation on reliability and content and construct validity in a longitudinal study (Koita et al., 2018). The PEARLS was chosen by the clinic site and project manager over other available screening tools because it was most conducive to the pediatric primary care setting in that it allowed for screening of both children and adolescents, encompassed the three main categories of ACEs, had an administration time of five minutes or less, required self and parent report versus interview, and did not require significant provider training (Lee et al., 2018).

The PEARLS is available in both identified and de-identified formats (National Pediatric Practice Community on Adverse Childhood Experiences [NPPCACES], 2018). The identified format asks the completer to specify which ACEs the child has experienced (NPPCACES, 2018). The de-identified format asks the completer for only the total number of ACEs experienced (NPPCACES, 2018). Prior to this project, both the identified and de-identified formats of the PEARLS were distributed to a small number of patients and caregivers, who preferred the

identified format. The identified child parent-caregiver report, teen self-report, and teen parent-caregiver report PEARLS forms were used (NPPCACES, 2018).

Intervention

All four providers at the clinic site participated in an ACEs and PEARLS educational session. An initial session was held for the two full-time physicians and a second session was held shortly after PEARLS implementation due to the addition of two float nurse practitioners to clinic site staff. The educational and training session for providers was a 45-minute in-person PowerPoint presentation. The information provided in the presentation included the definition, prevalence, and impact of ACEs on health; types of stress, including toxic stress; protective factors; AAP's screening recommendation; barriers to ACEs screening; importance of ACEs screening in primary care; an introduction to the PEARLS and proposed scoring algorithm; and next steps, including anticipatory guidance and community resources.

Following the educational session and the development of provider and front desk/medical assistant workflows, the PEARLS was implemented at the clinic site. The intervention period was initially planned to be eight weeks in length but was later extended to sixteen weeks given timely Institutional Review Board (IRB) approval, a decline in PEARLS completion rates during week eight, and weeks with fewer qualifying well child exams due to holidays. Initially, provider documentation of PEARLS scores was measured; however, this was stopped after week six given low rates of compliance and unfavorable impact on provider workflow. All children and families that presented for an annual pediatric well child visit, starting at age one, were provided with a PEARLS during the rooming process. Children under the age of 12 received the identified child parent-caregiver report PEARLS. Children age 12 and older were given the identified teen self-report PEARLS, as well as the identified teen parent-

caregiver report PEARLS if accompanied to their visit by an adult. Front desk staff, who were already responsible for distributing other assessment and screening tools, attached the PEARLS and an accompanying letter indicating the importance of ACEs screening to patient clipboards after the patients and caregivers completed the other screening tools in the waiting room. After rooming the patient and family, the medical assistant provided the PEARLS to patients and caregivers and encouraged completion. This workflow was chosen to allow for patient/caregiver confidentiality while completing the screener. Providers were responsible for scoring completed PEARLS, entering referrals in Epic for needed follow-up, and providing anticipatory guidance or education.

Measures

Providers completed one pre-test immediately prior to the educational session and two post-tests, the first immediately following the educational session and the second at the conclusion of the 16-week intervention period. Provider knowledge was assessed via multiple-choice and true/false questions on ACEs content whereas provider perception of ACEs knowledge, current ACEs screening practices, comfort in talking with patients and caregivers about ACEs, and confidence in initiating interventions for children who have experienced ACEs was measured via a 5-point Likert scale. The provider pre-test and post-tests were paper copies and were distributed and collected by the project manager. Confidentiality was maintained by not collecting provider names.

Patient chart review was performed for all patients presenting for well child visits during the intervention period. Chart review was necessary to determine provider electronic documentation of PEARLS completion, which was later discontinued due to poor fit in provider workflow, and compare the number of patient visits for qualifying well child exams to the

number of PEARLS collected each week to determine staff compliance with distributing and collecting the PEARLS. Patient and caregiver completion rates were also tracked. Patient confidentiality was maintained by collecting limited aggregate de-identified data. During the implementation period, feedback was provided one to two times monthly to clinic staff regarding staff compliance and patient/caregiver screening tool completion.

Analysis

Paired or dependent t-tests were performed to analyze whether or not there were changes in provider ACEs knowledge, as assessed by multiple choice and true/false questions, between the pre-test and initial post-test scores and the pre-test and final post-test scores. Analysis of Variance (ANOVA) was used to compare provider ACEs knowledge between the pre-test, initial post-test, and final post-test scores, in an effort to reduce the risk of type one error (Heavey, 2015). Paired t-tests were also utilized to analyze if there were differences in the 5-point Likert question responses between the pre-test and final post-test. Paired t-tests were performed to analyze provider responses for each individual 5-point Likert question, in addition to provider's total scores for the five questions. Descriptive statistics were used to report provider demographics, screening tool use during the implementation period, patient and/or caregiver PEARLS completion, and provider electronic documentation.

Ethical Considerations

This project was reviewed by the clinic site organization's Human Research Protection Program and the St. Catherine University IRB, who determined that the project did not constitute research or human subjects research. This project asked for disclosure of sensitive information; thus, creating the risk of psychological harm via re-traumatization (Cannon et al., 2020). Additionally, there was a risk that affected children would not receive adequate follow-up care as

a result of system failure and the limited availability of trauma-informed mental health resources (Albaek et al., 2018). To minimize these risks, the project took place in a clinic site with an integrated behavioral health psychotherapist who specialized in trauma and had availability to provide initial counseling.

Evaluation

Provider Knowledge and Perceptions

Each of the providers at the clinic site participated in the educational session and PEARLS implementation period. The average number of years of experience for the providers was 9.5 years with an average of 1 year of experience at the clinic site, in part due to two part-time float nurse practitioners starting at the clinic site during the implementation period. All providers, including two full-time physicians and two part-time float nurse practitioners, completed the pre-test, initial post-test, and final post-test (n=4).

Provider ACEs knowledge was assessed via a cumulative score on 15 multiple choice and true/false questions before the educational presentation, immediately following the presentation, and again at the end of the PEARLS implementation period. A paired or dependent t-test demonstrated a statistically significant difference in provider ACEs knowledge between the pre-test (M = 13.5; SD = 1) and initial post-test (M = 14.75; SD = 0.5); $t(6) = 2.236$; $p = .033$. No statistically significant difference in provider ACEs knowledge existed between the pre-test (M = 13.5; SD = 1) and final post-test (M = 13.25; SD = 1.5); $t(6) = 0.277$, $p = .394$. A one-way ANOVA demonstrated that there was not a statistically significant difference between the pre-test, initial post-test, and final post-test means $F(2,9) = 2.214$, $p = .165$. A statistically significant increase in provider ACEs knowledge existed immediately following the educational presentation; however, the increase in knowledge was not sustained at the end of the 16-week

PEARLS implementation period. Among the provider responses, there were a total of seven incorrect answers on the final post-test: prevalence of ACEs in children (3), prevalence of ACEs in adults (2), major categories of ACEs (1), and when to refer a child who has experienced ACEs (1).

Provider perceptions were assessed via the five statements presented in Table 1 on the pre-test and final post-test. A 5-point Likert scale, where 1 = Strongly Agree, 2 = Agree, 3 = Uncertain, 4 = Disagree, and 5 = Strongly Disagree, was used for these statements. Paired t-tests were performed to analyze if there were changes in provider's responses to each statement, as well as in the total for the responses to the five statements, before and after the intervention. There were statistically significant differences between the pre-test and final post-test responses for the following statements: I ask all patients and/or caregivers about a child's exposure to ACEs, $t(6) = 2$, $p = .046$ and I feel confident in my ability to initiate interventions for a child who has experienced multiple ACEs, $t(6) = 3.65$, $p = .005$, as well as for the total score for the five statements, $t(6) = 2.12$, $p = .038$. No statistically significant differences between the pre-test and final post-test responses were found for the following statements: I feel I have adequate knowledge about ACEs, $t(6) = 1.39$, $p = .107$, I am comfortable talking with my patients about their exposure to ACEs, $t(6) = 1.55$, $p = .085$ and I am comfortable talking with parents/caregivers about their child's exposure to ACEs, $t(6) = 1.55$, $p = .085$. Following the provider education session and 16-week implementation of the PEARLS, providers asked more patients and/or caregivers about the child's exposure to ACEs and also felt more confident in their ability to initiate interventions for a child who had experienced multiple ACEs. Additionally, there was an improvement in providers' overall perceptions of their ACEs

knowledge, screening practices, comfort with discussing ACEs, and confidence in initiating interventions when needed.

Table 1

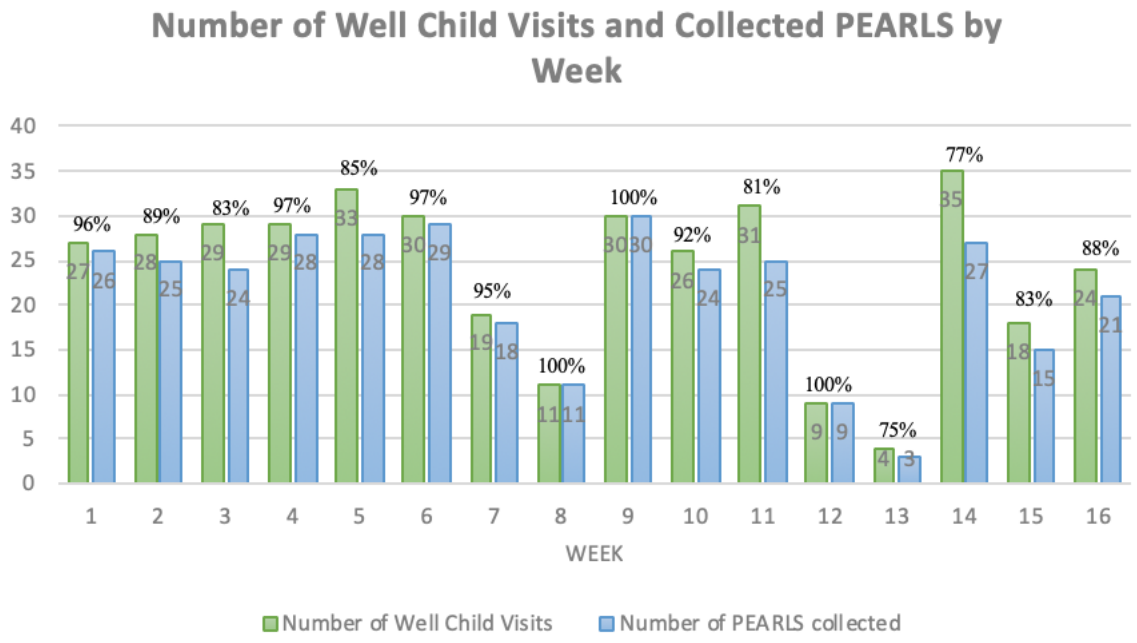
Provider Perceptions on ACEs Pre-Test and Final Post-Test Results

Variable	Pre-Test *M; SD*	Final Post-Test *M; SD*	P-Value
1. I feel I have adequate knowledge about ACEs.	3.5; 1.29	2.25; 1.25	0.107
2. I ask all patients and/or caregivers about the child's exposure to ACEs.	4; 1.41	2; 1.41	**0.046**
3. I am comfortable talking with my patients about their exposure to ACEs.	2.75; 1.5	1.5; 0.58	0.085
4. I am comfortable talking with parents/caregivers about their child's exposure to ACEs.	2.75; 1.5	1.5; 0.58	0.085
5. I feel confident in my ability to initiate interventions for a child who has experienced multiple ACEs	3.75; 0.5	2; 0.82	**0.005**
Total Score for Above 5-point Likert Questions	16.75; 5.56	9.25; 4.35	**0.039**

PEARLS Staff Compliance

There were 383 patients who presented for applicable well child visits during the 16-week PEARLS implementation period. Of the 383 eligible patients, there were 343 (89.5%) collected PEARLS. The number of well child visits and number of collected PEARLS varied per week, as demonstrated in Figure 1. Weeks 8, 12, and 13 were holiday weeks with fewer than five clinic days and as a result, had the lowest number of applicable well child visits. Weekly staff compliance with giving and collecting the PEARLS ranged from 75% to 100%, with an average of 89.5%.

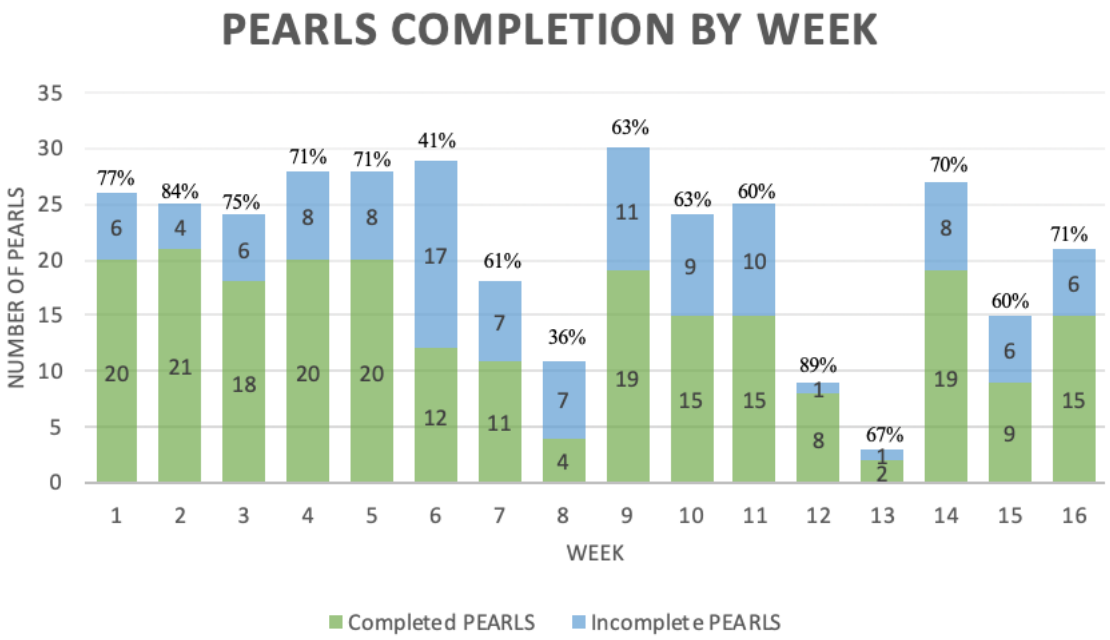
Figure 1



PEARLS Patient/Caregiver Completion

Among the collected PEARLS, 228 (66.5%) were completed. In order to be considered complete, the child parent-caregiver report PEARLS must have been finished for children under 12. For children age 12 and older, the teen self-report PEARLS *and/or* the teen parent-caregiver report PEARLS must have been finished. Four patients and/or caregivers received an incorrect PEARLS form, but if finished, these were marked complete. Weekly patient and parent/caregiver completion ranged from 36% to 89%, with an average of 66.5%.

Figure 2



Total teen completion rates (72%) were higher than child (64%) completion rates; however, there were 2.5 times more child PEARLS (245) collected than teen PEARLS (98). Additionally, teen PEARLS were able to be considered complete if either the self-report *or* parent/caregiver report PEARLS was completed, whereas child completion rates were exclusively dependent on completion of the child parent/caregiver report PEARLS. Table 2 demonstrates child, teen, and total completion rates by week.

Table 2

PEARLS Completion Rates by Week

Week	Child	Teen	Total
1	16/21 (76%)	4/5 (80%)	20/26 (77%)
2	15/19 (79%)	6/6 (100%)	21/25 (84%)
3	11/16 (69%)	7/8 (88%)	18/24 (75%)
4	16/21 (76%)	4/7 (57%)	20/28 (71%)
5	13/19 (68%)	7/9 (78%)	20/28 (71%)
6	7/17 (41%)	5/12 (42%)	12/29 (41%)
7	10/16 (63%)	1/2 (50%)	11/18 (61%)
8	4/10 (40%)	0/1 (0%)	4/11 (36%)
9	13/20 (65%)	6/10 (60%)	19/30 (63%)
10	10/18 (56%)	5/6 (83%)	15/24 (63%)
11	10/17 (59%)	5/8 (63%)	15/25 (60%)
12	3/4 (75%)	5/5 (100%)	8/9 (89%)
13	2/3 (67%)	0/0	2/3 (67%)
14	11/17 (65%)	8/10 (80%)	19/27 (70%)
15	6/12 (50%)	3/3 (100%)	9/15 (60%)
16	10/15 (67%)	5/6 (83%)	15/21 (71%)
Total	157/245	71/98	228/343

Provider Electronic Documentation

Provider electronic documentation ranged from 0% to 10% during the first six weeks of implementation, after which it was discontinued. In an effort to maintain patient confidentiality and prevent a parent or guardian from learning a child's PEARLS score if he or she requested a copy of a child's chart, providers chose to document the PEARLS score in a non-permanent part of the chart. This method affected workflow, as providers were unable to include the PEARLS score in the patient encounter. Electronic social work and/or integrated behavioral health referrals were to be placed in Epic when needed, though these were not tracked because referrals were not always made for positive PEARLS scores as some patients were already receiving these services and patient and parent/caregiver acceptance of a referral was voluntary.

Discussion

Summary and Interpretation

Provider education did not lead to a sustained improvement in provider ACEs knowledge. Following provider ACEs education and PEARLS screening tool implementation, providers did, however, endorse more frequently asking about ACEs and feeling more confident in their ability to initiate interventions for children who have experienced multiple ACEs. Providers may have benefited from more frequent educational opportunities with the inclusion of complex case studies, hands-on learning activities, and self-assessment or reflection exercises as opposed to a single education session presented via lecture (Ward Zabhab, Maldonado, Whitehead, Bartlett, & Rodriquez de Bittner, 2015).

Project findings indicated the acceptability and feasibility of screening for ACEs and other risk factors for toxic stress using the PEARLS as a part of routine well child care (Garner & Shonkoff, 2012). Throughout the 16-week implementation period, almost 90% of patients

and/or caregivers who presented for an annual well child visit were offered the opportunity to complete the PEARLS, indicating high feasibility. Two-thirds of patients and/or caregivers completed the PEARLS, demonstrating that parents and caregivers found the PEARLS acceptable. As a result of these findings, the clinic site has continued to use the PEARLS for children presenting for yearly well child visits, with a vision of expanding use to other clinic sites within the organization in the near future.

This QI project took place within a primary care clinic with integrated behavioral health services. Positive PEARLS scores allowed providers to generate referrals to the clinic site integrated behavioral health (IBH) psychotherapist and/or social worker. If the IBH psychotherapist or social worker was available at the time of a positive screen, the provider was expected to facilitate a warm handoff in an attempt to start the relationship, reduce stigma, and improve the likelihood of the patient returning for follow-up psychological support.

Limitations

This pilot study was conducted in a small clinic site with a small sample size for the provider measures; therefore, the results do not meet the criteria for generalizability. Furthermore, two nurse practitioners joined the clinic site after the PEARLS was implemented and the project clinic site was not their primary work location, thus, they had limited experience with using the PEARLS during implementation, which may have impacted their final post-test responses. The two physicians within the clinic site were eager to implement ACEs screening, potentially positively impacting study outcomes. Clinic staff had also recently undergone a trauma-informed care training session. Additionally, this clinic site serves primarily low-income African American children whose families may have been more open to completing the

PEARLS as a result of greater familiarity with the issue due to known racial/ethnic and socioeconomic patterning of childhood adversity (Slopen et al., 2016).

Several factors also likely impacted patient and parent/caregiver completion rates. *Form fatigue*, described by Marsicek et al. (2019), is a phenomenon that can occur when children and families are asked to complete multiple forms and screening tools before well child visits. Furthermore, PEARLS completion was encouraged but not required and the limited time in a clinic visit may have impacted whether patients and families had time to complete the PEARLS after completing the rooming process and before the provider was ready to see the patient. Additionally, all PEARLS given to patients and parents/caregivers were to be collected, regardless of completion status; however, there was no mechanism to track whether all forms had been collected and not discarded, which may mean that staff compliance with handing out the screening tool was actually higher and patient and parent/caregiver completion was actually lower.

Additionally, there were imitations associated with the use of the PEARLS as the chosen ACEs screening tool. With the exception of face validity, the PEARLS has not yet completed evaluation on reliability and validity (Koita et al., 2018). At the time this study was being implemented, however, there was not a validated tool available designed to comprehensively screen pediatric patients for exposure to ACEs (Koita et al., 2018). Furthermore, the PEARLS was presented in English only, which was a barrier to completion for children and caregivers unable to read the English language. Additionally, although a small number of patients at the clinic site preferred the identified format to the de-identified format when presented the option prior to the start of this QI project, the identified format may have discouraged some patients and caregivers from completing the PEARLS. The PEARLS relies on parent/caregiver report for

children under age 12. Notably, there is evidence of discrepancies between caregiver and child reports of the child's trauma exposure (Lee et al., 2018). Parent/caregiver reports often underestimate a child's exposure to ACEs and their reports, which are based on their own perceptions, may be biased (Lee et al., 2018).

Conclusion and Recommendations

This project adds to the small yet growing body of evidence that indicates that the PEARLS is an acceptable and feasible way to screen for ACEs and other potential risk factors for toxic stress in the pediatric primary care setting (Bryant & VanGraafeiland, 2019; Marsicek et al., 2019). Incorporating ACEs screening and anticipatory guidance into pediatric primary care is a necessary component of holistic care and supports positive physical, psychological, and behavioral health outcomes for children (Marsicek et al., 2019). ACEs screening allows healthcare providers to identify children who have experienced childhood adversity and is the first step of many in ensuring affected children and parents/caregivers receive needed targeted support (Garner & Shonkoff, 2012).

Future QI projects to identify an effective ACEs provider continuing education program are needed. Patient, parent/caregiver, and staff interviews should be performed to gather qualitative information on the acceptability of ACEs screening. Studies assessing the feasibility and acceptability of ACEs screening in specialties that care for patients with chronic health conditions, such as asthma and diabetes, would also be beneficial. Additionally, outcomes of patients with positive PEARLS screens who accepted psychosocial referrals should be tracked to determine whether or not continuity of care was successful and ascertain whether patients made follow-up appointments for psychological support. Ultimately, further information on the impact

of ACEs screening on long-term child health outcomes would provide additional support for ACEs screening in pediatric primary care.

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Appendix A

Commission on Social Determinants of Health (CSDH) Framework