Implementation of a Child Physical Abuse Screening Program in the Emergency Department

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Abstract

Children often present to the emergency department (ED) for treatment of abuse-related injuries. ED healthcare providers (HCPs) do not consistently screen children for physical abuse, which may allow abuse to go undetected and increases the risk for re-injury and death. ED HCPs frequently cite lack of knowledge or confidence in screening for and detecting child physical abuse. The purpose of this evidence-based quality improvement project was to implement a comprehensive screening program that included ED HCP education on child physical abuse, a systematic screening protocol, and use of the validated Escape Instrument. After a 20-minute educational session, there was a significant increase in ED HCP knowledge and confidence scores for child physical abuse screening and recognition ($p < .001$). There was no difference in diagnostic coding of child physical abuse by ED HCPs when evaluating a 30-day period before and after implementation of the screening protocol. In a follow-up survey, the Escape Instrument and educational session were the most reported screening facilitators, while transition to a new electronic health system was the most reported barrier. The results of this project support comprehensive ED screening programs as a method of improving HCP knowledge and confidence in screening for and recognizing child physical abuse. Future research should focus on the impact of screening on the diagnosis and treatment of child physical abuse. Efforts should also be made to standardize child abuse screening programs throughout all EDs, with the potential for spread to other settings.

Keywords: child abuse, physical abuse, non-accidental trauma, screening, detection, recognition, systematic protocol, emergency department, healthcare provider, staff education

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Not only can a child exposed to violence suffer physical harm, but the emotional and psychological damage secondary to abuse can also predispose the child to post-traumatic distress, a future of criminal activity, and a host of other mental and behavioral health issues (Felitti et al., 1998; Teeuw, Derkx, Koster, & van Rijn, 2012). To prevent or reduce these adverse effects, healthcare providers (HCPs) should routinely screen children for signs of abuse. This is especially important in the emergency department (ED). Abused children frequently present to the ED for care, and if HCPs do not consistently screen children for non-accidental trauma (NAT), a child can be released unintentionally back into an abusive home, which may lead to extremely detrimental—or even fatal—results.

Overview of the Problem

The United States (U.S.) has one of the worst child abuse records among industrialized nations (U.S. Department of Health and Human Services [USDHHS], 2017). A child abuse report is made every 10 seconds, and four to seven children die from abuse and neglect every day (Childhelp, 2017). The economic burden of child abuse is also staggering. The *lifetime* estimated financial costs for just one year of newly confirmed cases of child abuse and neglect are approximately $124 billion (Fang, Brown, Florence, & Mercy, 2012). Data from the USDHHS (2017) reveals that more than 683,000 children (9.2 children per 1,000) were the victims of abuse or neglect in 2015—an increase of 3.8% from 2011. Of those cases, 117,560 (17.2%) were victims of physical abuse, and 1670 of them died (2.25 per 100,000 children). However, because only reports received and investigated by Child Protective Services (CPS) are included in these statistics, officials estimate the actual number of children who are victims of abuse and neglect is much higher—potentially by 50% or more (Childhelp, 2017). Additionally, many cases of child

abuse go unrecognized and unreported due to insufficient HCP knowledge and skill in recognizing, diagnosing, and reporting suspicious childhood injuries (Crichton et al., 2016).

Most states have defined physical abuse as any non-accidental physical injury to the child, which can include kicking, biting, striking, burning, or any action that causes physical impairment of the child (Child Welfare Information Gateway [CWIG], 2016). The federal government provided a similar, albeit more expansive, definition of child abuse and neglect in the Child Abuse Protection and Treatment Act (CAPTA) of 1974. Notably, although the first documented case of child abuse in the U.S. was in 1874, it was not until the enactment of CAPTA in 1974 that the federal government provided funding for state-based programs directed toward the prevention, identification, and treatment of child abuse and neglect (CWIG, 2011). This financial assistance has continued with the reauthorizations of CAPTA in 1996 and 2010. The CAPTA Reauthorization Act of 2010 also introduced the statutory requirement that all states mandate child abuse *reporting*, although mandatory *screening* was not included. In addition to CAPTA, there have been widespread initiatives, advocacy, and research funding for child abuse prevention, recognition, and treatment through the USDHHS, the National Children's Alliance (NCA), CPS, the American Academy of Pediatrics (AAP), the National Association of Pediatric Nurse Practitioners (NAPNAP), and many others (AAP, 2017; NAPNAP, 2016; NCA, 2014).

Background and Significance

In the U.S. alone, nearly 1,000,000 children are victims of NAT each year, with an estimated 1.3% to 15% of ED childhood injury visits resulting from physical abuse (Allareddy et al., 2014; Escobar et al., 2016; Teeuw et al., 2012). Moreover, 25% to 30% of abused infants have already had a previously noted sentinel injury, such as bruising or an intraoral injury, at the time they receive a child abuse diagnosis (Glick, Lorand, & Bilka, 2016; Petska & Sheets, 2014;

Sheets et al., 2013). Despite these sobering statistics, there is insufficient and inconsistent

screening of children by ED HCPs for NAT. Abused children have a higher rate of ED usage

than nonabused children, but the abuse often remains unrecognized (Acehan et al., 2016;

Crichton et al., 2016; Guenther, Knight, Olson, Dean, & Keenan, 2009; Jordan & Moore-Nadler,

2014; Louwers et al., 2011). In fact, the early detection rate of child abuse in the ED is a mere

10%, with the estimated percentage of missed abuse cases ranging from 11% to 64% (Allareddy

et al., 2014; Sittig et al., 2016). This lack of effective screening contributes to child physical

abuse being an underreported problem. Additionally, if physical abuse goes undetected at the

initial presentation, the abused child has a 35–50% chance of experiencing recurrent abuse and a

10–30% chance of eventual death from that abuse (Acehan et al., 2016; Escobar et al., 2016;

Teeuw et al., 2012).

Barriers to Child Abuse Screening in the ED

Abused children often present to the ED with various injuries and chief complaints, and

ED HCPs may be their first and only medical contact (Bair-Merritt & Lane, 2011; King, Kiesel,

& Simon, 2006; Tiyyagura, Gawel, Koziel, Asnes, & Bechtel, 2015). It is imperative that ED

HCPs consistently screen children for NAT to ensure early identification, intervention, and

prevention of continued or worsening abuse. Yet standardized screening rarely occurs due to a

variety of identified barriers, including insufficient HCP knowledge of injuries consistent with

abuse; lack of a validated ED child abuse screening tool; limited time to conduct screening or

develop screening policies; and HCP desire to believe caregivers and prevent false CPS reports

(Bair-Merritt & Lane, 2011; Crichton et al., 2016; Louwers, Korfage, Affourtit, De Koning, &

Moll, 2012a; Jordan & Moore-Nadler, 2014; Jordan & Steelman, 2015; Tiyyagura et al., 2015).

As a result, a multifaceted approach is needed to improve HCP confidence in and performance of

child physical abuse screening, as well as reduce the number of children who are not appropriately identified as being victims of abuse.

ED staff worldwide utilize a variety of methods to screen for child abuse, including screening checklists, structured clinical examination of the undressed child ("top-toe" inspection), and specialized training of HCPs. Unfortunately, the majority of these screening methods are not substantiated by empirical evidence (Bailhache, Leroy, Pillet, & Salmi, 2013; Hoytema van Konijnenburg, Teeuw, Zwaard, van der Lee, & van Rijn, 2014; Louwers, Affourtit, Moll, de Koning, & Korfage, 2010; Teeuw et al., 2012). A systematic review by Woodman et al. (2008) found the quality of screening tests at the time was poor, with no evidence that any test was highly predictive of physical abuse. Woodman et al. (2009) also noted that screening markers—such as a child's age, type of injury, and rate of ED usage—do not reliably identify abused versus nonabused children. ED HCPs in the Netherlands often administer the SPUTOVAMO checklist to screen for abuse, but its high false positive rate, even in the revised version, warrants careful consideration prior to use (Sittig et al., 2014). This prompted Louwers et al. (2014) to develop the "Escape Form" as an alternative child abuse screening instrument. A study by Dinpanah, Pasha, and Sanji (2017) showed excellent diagnostic accuracy of the Escape tool (99.2%). Yet regardless of the specific tool used, assessment by a child abuse pediatrician or clinician properly trained in the assessment and treatment of child abuse injuries should always follow any positive screening test (Sittig et al., 2016; Teeuw et al., 2016). This will reduce the number of false positive reports while also limiting the risk of failing to diagnose child abuse.

Methods to Improve HCP Screening

Recommendations in the literature appear to focus more on adequate training for HCPs and the implementation of systematic guidelines than on the use of a specific screening tool.

Researchers agree a validated child abuse screening tool is imperative, but they emphasize the

importance of HCP education to improve screening results and reduce false positive reports

(Acehan et al., 2016; Hoft & Haddad, 2017; Jordan & Moore-Nadler, 2014; Louwers et al.,

2012b; Teeuw et al., 2016). Standardized educational programs and well-defined screening

protocols not only improve detection of child physical abuse in the ED, but they also decrease

bias and increase self-efficacy in the HCPs performing the screenings (Higginbotham et al.,

2014; Milani, Vianello, Cantoni, Agostoni, & Fossali, 2016; Smeekens et al., 2011). In addition,

hospital policymakers and ED administrators need to support child physical abuse screening by

embedding it into the routine structure of the hospital, integrating it into electronic systems, and

forming multidisciplinary teams to properly assess and treat children with positive screening

results (Benger & Pearce, 2002; Escobar et al., 2016; Louwers et al., 2012a). Through the

integration of administrative support, a validated screening tool, systematic guidelines, and HCP

education, child abuse screening programs have the potential to be widely successful.

Internal Evidence

In a pediatric ED that is part of a large medical center in southern Arizona, there is no

formal method of screening for or tracking cases of child physical abuse. A retrospective chart

review completed by their social work team revealed that not all childhood injuries secondary to

physical abuse were properly identified and coded by ED staff. The ED HCPs do not use a child

abuse screening tool to identify injuries consistent with NAT, nor do they receive specialized

training on how to recognize injuries that are concerning for abuse. Rather, most of the identified

child abuse cases are the result of injuries leading to hospital admissions, social work consults,

child abuse team (CAT) consults, and/or CPS referrals, with the remaining unidentified abuse

cases being discharged from the ED without further intervention or follow-up (D. Woolridge,

personal communication, November 11, 2016). Finally, although the ED has an on-call

multidisciplinary CAT, many of the ED HCPs—including physicians and nurses—have

verbalized concern over their own inabilities to recognize injuries suggestive of abuse.

Problem Statement

Even though all HCPs are mandated reporters of child abuse and neglect, no standardized

process currently exists for screening children for abuse in the ED. As a result, children

presenting to the ED with NAT might "slip through the cracks" and be discharged without the

appropriate follow-up or referral. Sadly, research has shown that children who die from abuse

often have been seen by a medical provider at least once prior to their death (Acehan et al., 2016;

Bair-Merritt & Lane, 2011; King et al., 2006; Teeuw et al., 2012). It is imperative that ED HCPs

identify abusive injuries early in order to reduce the risk of re-injury or death secondary to

recurrent and escalating abuse.

Search Process

The initial inquiry and exploration of the literature led to the clinically relevant PICO

question: In ED HCPs, how does a systematic protocol compared to no systematic protocol

affect screening for child physical abuse?

A systematic and exhaustive literature search was conducted to address the above PICO

question and gather the best evidence to support a practice change. Scholarly databases searched

included PubMed, Cumulative Index of Nursing and Allied Health Literature (CINAHL), Web

of Science, Academic Search Premier, PsycINFO, JSTOR, ProQuest Dissertations and Theses,

the Cochrane Library, and the National Guideline Clearinghouse. The initial search strategy

consisted of the following keywords, combinations, and Boolean phrases: ("*child physical*

abuse" OR *"child abuse"* OR *"child maltreatment*" OR "*nonaccidental trauma*" OR "*non-*

accidental trauma" OR "*intentional injury*") AND (*screening* OR *detection* OR *identification*
OR *assessment* OR *evaluation* OR *detect* OR *identify*) AND (*protocol* OR *guideline* OR *tool* OR
instrument OR *questionnaire* OR *algorithm* OR *process* OR *standardized* OR *systematic*) AND
("*emergency department*" OR "*emergency room*" OR "*emergency*" OR "*accident & emergency*
department*"). Due to the wide variety of terms used to refer to the same concept across studies
and the paucity of studies on child abuse screening, these word combinations allowed for more
robust results. Database searches were initially conducted as "all field" searches and then refined
by "abstract" or "title/abstract" searches. However, applying these limits significantly reduced
the number of studies retrieved, resulting in the need to return to a broader, all-field search focus.

Initial Search Results

The above search strategy yielded a combined total of 724 results: 278 from PubMed;
101 from CINAHL; 138 from Web of Science; 126 from Academic Search Premier; and 81 from
PsycINFO. The same search strategy performed in JSTOR, ProQuest Dissertations and Theses,
the Cochrane Library, and the National Guideline Clearinghouse did not produce any additional
results, so they were excluded. After the initial keyword search, a second search was performed
in PubMed using a combination of MeSH terms and keywords to ensure no pertinent studies
were missed. The MeSH terms "*child abuse*" and "*emergency service, hospital*" were combined
with the following keywords and Boolean connectors: (*screening* OR *detection* OR *identification*
OR *assessment* OR *evaluation* OR *detect* OR *identify*) AND (*protocol* OR *guideline* OR *tool* OR
instrument OR *questionnaire* OR *algorithm* OR *process* OR *standardized* OR *systematic*). This
search produced only 91 results, all of which were included in the initial yield of 278. Therefore,
to guarantee the exhaustive quality of this systematic literature search, all 278 studies from the
initial PubMed search were included in the second stage of the search process.

Review and Refinement of Retrieved Citations

The complete list of retrieved database citations was reviewed and duplicates were removed. The remaining 430 individual articles were filtered for language (English only) and publication dates (2011–2017 or "past 5 years"), resulting in 193 articles eligible for further review (Appendix A). To ensure inclusion of all relevant studies, supplemental ancestry searches of study reference lists, hand searches of child abuse journals, and an electronic grey literature search were performed. These searches led to the retrieval of eight additional studies. Each article was reviewed by title and abstract to ensure relevance to the current study. In addition to considering the article titles and abstracts, specific inclusion and exclusion criteria were applied. The primary inclusion criterion was that the study directly addressed screening for or detection of child physical abuse in the ED, including discussion of barriers and facilitators to screening and/or interventions to improve HCP detection of child physical abuse. The primary exclusion criterion was any study conducted in a non-ED setting. Additionally, studies were excluded if their main focus was sexual or emotional abuse or neglect; interpersonal or domestic violence; treatment of an already established child abuse diagnosis; detection of child abuse based on parental characteristics (the Hague protocol); pre-hospital child abuse assessment; injury-specific evaluation (e.g., burns, bruises, fractures); child protection (CPS) decision-making; child abuse prevention; and/or accidental trauma.

Critical Appraisal and Synthesis

A total of 41 studies met the criteria for critical appraisal (Appendix A). Once critical appraisal was complete, 10 studies were retained for in-depth evaluation (Appendix B) and synthesis (Appendix C). Although several appraised studies contributed to the background and significance of this research topic, many were excluded from further evaluation because they

were of poor quality, addressed parental characteristics instead of the child's characteristics, or focused more on child abuse prevention and/or treatment than on the actual screening process.

The majority of studies were level four evidence, with the remaining studies comprising levels two, three, and six evidence (Melnyk & Fineout-Overholt, 2015). The studies included one randomized controlled trial, one quasi-experimental study, four prospective cohort studies, two diagnostic accuracy studies, and two qualitative studies. Considering the ethical issues surrounding child abuse screening, these are the best levels of evidence to answer the PICO question. Six of the studies were conducted in the Netherlands, three in the United States, and one in Iran. This is not surprising given the fact that the Netherlands has made child abuse screening compulsory in the ED and, as a result, has created the only validated child abuse screening tool to date: the Escape Instrument (Dinpanah et al., 2017; Louwers et al., 2014).

All 10 studies were conducted in the pediatric and/or general ED, and each included up to seven sites. The participants in six of the studies were children (one study limited participants to 12 months of age or younger), with mean ages ranging from 6.4 months to 7.95 years. These studies all had large sample sizes, and all but one had slightly more males than females. Aside from the one study that directly addressed socioeconomic status (SES) and racial bias, no other significant demographic variations were noted. Participants in the remaining four studies were HCPs. Interestingly, all four of these studies had very small sample sizes, with one having a high attrition rate (36%) due to participants' work shift patterns. Finally, a few of the studies raised concern about potential sample bias due to the temporal nature of the data, site selection, and small sample sizes, but no other bias was evident (Appendix C).

There were a variety of measurement tools and independent variables used across studies (Appendix C). The eight quantitative studies used a combination of child abuse screening

instruments (SI), physical exam, CAT or expert panel evaluation, and/or medical chart review, while the two qualitative studies used tape-recorded, transcribed semi-structured interviews. Two studies evaluated the diagnostic accuracy of the Escape Instrument, which demonstrated validity and reliability in screening for child physical abuse in the ED. Two other studies used the SPUTOVAMO checklist to screen for child abuse in the ED, and the authors of both studies cautioned against its widespread use due to its high false-positive rate.

The dependent variables also exhibited wide variation across studies (Appendix C). The majority of studies evaluated child abuse screening rates and/or detection of child abuse risk to some degree. Individual studies also examined barriers and facilitators to child abuse detection, HCP knowledge and self-efficacy in recognizing child abuse, racial and SES bias, and factors influencing completion of child abuse SIs and screening protocols in the ED. Despite this heterogeneity, clear relationships and themes emerged. Screening protocols increased screening consistency and screening rates in four studies and decreased SES bias in one study. Child abuse education programs improved HCP knowledge and self-efficacy in two studies, while simultaneously increasing child abuse screening and detection rates in three studies and use of screening protocols in a forth. Finally, the two qualitative studies revealed similar barriers and facilitators to child abuse detection. Barriers included lack of child abuse knowledge, practical problems, personal beliefs, and fast ED staff turnover, while facilitators included educational training, administrative support, and presence of a CAT (Appendix C).

Purpose Statement

The evidence clearly shows that child abuse education improves ED HCP knowledge and self-efficacy, which subsequently increases screening for and recognition of injuries consistent with abuse. Additionally, systematic screening protocols—especially when combined with a

validated SI—promote screening consistency, decrease SES bias, and increase rates of child

abuse detection. Therefore, the purpose of this evidence-based quality improvement project was

to implement a comprehensive child physical abuse screening program that incorporated HCP

education on child physical abuse, a systematic screening protocol, and use of the validated

Escape Instrument to support best practice for child physical abuse screening in the ED.

Logic Model

To assist with project planning, a logic model was created prior to development of the

comprehensive child physical abuse screening program (Appendix D). The logic model was

utilized to plan the project and provide a tool for program evaluation. The model also clearly

depicted the relationships between the inputs, outputs, outcomes, and impact of the screening

program, which helped gain buy-in from the project site's ED HCPs and administrators.

Evidence Based Practice Model

The model chosen to guide implementation of this project was Rosswurm and Larrabee's

(1999) revised Model for Evidence-Based Practice Change. This model utilizes research and

change theory to support evidence-based practice (EBP) change in the acute care environment. It

integrates teamwork, quality improvement (QI), and the translation of evidence to promote and

sustain practice change (Melnyk & Fineout-Overholt, 2015). The child physical abuse screening

program developed for this project aligns well with this model for several reasons: the ED is an

acute care environment; the QI project needs to be integrated into the standard of care to change

practice throughout the ED; and the components of teamwork are vital to the sustainability of

this EBP project, as it is a practice change that requires adoption by all ED HCPs and staff.

The Model for EBP Change is comprised of six steps that include assessing the need for

change, locating the best evidence, critically analyzing the evidence, designing a practice change,

implementing and evaluating the change in practice, and integrating and maintaining the change in practice. Although the steps are progressive, they are not explicitly linear (Larrabee, 2009). This allows for reappraisal and monitoring throughout the process, which is crucial for the practice change in this project.

Development of the child physical abuse screening program directly followed the steps of the EBP model. Key stakeholders, including ED HCPs and administrators, identified the need for improved child abuse screening in the ED. The proposed intervention—implementation of a comprehensive child physical abuse screening program—was linked to the desired outcome of improved child physical abuse recognition, and an exhaustive literature review and synthesis of the evidence supported this practice change. A screening protocol and ED HCP badge cards containing the Escape Instrument and child physical abuse diagnostic codes were distributed based on identified needs, and ED HCPs and administrators were educated on the specifics of the new protocol and Escape screening tool. Once implemented, process evaluation occurred throughout the duration of the project, and outcomes were evaluated at project conclusion. Finally, recommended changes were communicated to stakeholders, and regular monitoring and evaluation of the screening process and desired outcomes will continue in order to fully integrate and sustain the new child physical abuse screening program as a standard of practice in the ED.

Theoretical Framework

Bandura's Self-Efficacy Theory guided development of the educational module and systematic screening protocol for this project. Self-efficacy is the belief in one's ability to successfully achieve a task or reach a desired goal and is influenced by one's past mastery experiences, vicarious experiences, verbal persuasion, and physiological/emotional state (Bandura, 1977, 1986, 1997). Self-efficacy beliefs drive a person's actions, thoughts, feelings,

and motivations. High self-efficacy results in a person believing that difficult tasks are

challenges to be mastered, not threats to be avoided. Conversely, low self-efficacy results in low

aspirations, feelings of inadequacy, and poor commitment to new goals or tasks (Bandura, 1994).

Self-efficacy theory informed the content and structure of this project through its premise

that improving one's self-efficacy will support positive practice change (Bandura, 2009).

Increasing the HCPs' child abuse knowledge and self-efficacy through education and positive

feedback will increase their motivation to screen, overcome barriers to detection, improve

confidence, and produce positive experiences. The ED HCPs have already recognized the need

for improved child abuse education and screening practices, and the retrospective chart review

supported the need for improved diagnostic coding of child physical abuse in the ED. Therefore,

educating the HCPs about child physical abuse and providing them with a systematic screening

protocol should remove sociostructural barriers, clearly delineate outcome expectations, and

improve self-efficacy, thereby producing the desired screening behavior.

Methods

Ethical Considerations

This QI project was approved and deemed exempt from full review by the Arizona State

University (ASU) Institutional Review Board (IRB) (Appendix E). After receiving ASU IRB

approval, the project was approved by the project site's Director of Professional Practice and the

Research and Innovation Council (Appendix F).

Participants 18 years of age or older were recruited by the project team leader during

regularly scheduled staff meetings in July and August 2017 (for the *Child Abuse Awareness*

pretest/posttest) and again in December 2017 (for the *Project Evaluation Survey*). Participants

provided their consent for each phase of data collection through completion of the anonymous

project surveys. The *Child Abuse Awareness pretest* and *posttest* were linked by random, pre-

numbered codes that were unique to each participant; identities were not linked to the codes.

Random participant codes were also assigned for the *Project Evaluation Survey*. No personally

identifiable information was collected during either of the project surveys, and participants were

not asked questions intended to target or exclude special populations.

Setting and Organizational Culture

This QI project took place in the pediatric ED (PED) of a children's hospital that is

housed within a large, urban, academic level 1 trauma center in southern Arizona. The PED has

18 beds and provides care to approximately 20,000 children each year. One attending physician

staffs each shift, along with several emergency medicine (EM) residents and registered nurses

(RNs). The PED does not currently utilize nurse practitioners or physician assistants. All patients

are initially evaluated in the ED's triage area, with the exception of trauma patients, who are

taken directly to the trauma bay. Once triaged, pediatric patients are admitted to the PED.

During the course of this project, there were changes in ED management, as well as

turnover of several RNs and transition of EM residents from one rotation to the next. The

medical center also transitioned to a new electronic health record (EHR) six weeks after

implementation of the child abuse screening project. These changes resulted in some project

challenges that will be addressed during the results and discussion sections of this paper.

Participants

All ED HCPs (attending/resident EM physicians and RNs) were invited to participate in

the project during regularly scheduled staff meetings. Participation was voluntary. Consent was

obtained prior to the *Child Abuse Awareness pretest/posttest* and again prior to the *Project*

Evaluation Survey. All participants who completed the *Child Abuse Awareness posttest* had

attended the educational session on child physical abuse. Completion of the *Project Evaluation Survey* was independent of the *Child Abuse Awareness pretest/posttest* and educational session. Participants only needed to have worked in the PED during the project period and be aware of the child physical abuse screening program to complete the *Project Evaluation Survey*.

Intervention

The project intervention was two-phased. First, a 20-minute educational session on child physical abuse was offered to all ED HCPs during two regularly scheduled staff meetings (one for EM physicians and one for PED RNs). The educational sessions were delivered in-person by the project team leader and included an evidence-based overview of child physical abuse; types of injuries that raise the index of suspicion for child abuse; use of the validated Escape Instrument; the specific steps in the systematic screening protocol; and documentation of findings, including diagnostic coding of suspected and confirmed child physical abuse.

After the educational sessions were completed, the systematic child abuse screening protocol was implemented in the PED. The project team leader placed laminated copies of the screening protocol (Appendix G), Escape Instrument (Appendix H), and child physical abuse diagnostic codes (Appendix I) in the PED physician's room and at the nurses' station. All ED HCPs were given laminated badge cards containing the Escape Instrument and child abuse diagnostic codes. Laminated reminders with the words "Did you remember to ESCAPE?" were placed on each computer screen in the PED patient rooms and at the nurses' station to remind the RNs to complete the Escape Instrument during patient intake. An email was sent to all PED HCPs and staff announcing the official launch of the child physical abuse screening program. After implementation, the project team leader visited the PED weekly to bi-weekly to answer questions, educate new HCPs on the screening protocol, and offer support to the staff.

Outcome Measures

The impact of the comprehensive screening program on ED HCP recognition and documentation of child physical abuse was the primary outcome evaluated for this project. The secondary outcomes evaluated were (a) ED HCP knowledge in screening for and recognizing child physical abuse, (b) ED HCP confidence in screening for and recognizing child physical abuse, and (c) the utility of the child physical abuse screening program.

Instruments

The impact of the screening program on HCP recognition and documentation of child physical abuse was measured by analyzing the number of International Classification of Diseases, 9th and 10th edition (ICD-9 and ICD-10) diagnostic codes entered by ED HCPs for both *suspected* and *confirmed* child physical abuse. ICD codes can be reliably used to identify cases of child abuse. The specificity of ICD codes for child physical abuse ranges from 92% to 100%, but sensitivity is lower (74% to 98.2%) due to errors in HCP documentation and coding (Hooft et al., 2015; Hooft et al., 2013; McKenzie, Scott, Waller, & Campbell, 2011).

ED HCP knowledge and confidence in screening for and recognizing child physical abuse were both measured with the 7-item *Child Abuse Awareness pretest* (Appendix J) and *posttest* (Appendix K). Items one and two used a 5-point Likert scale to assess HCP confidence, and items three through seven used multiple choice and multi-select responses to evaluate HCP knowledge. The tests were similar, except for items five and six, which were changed to evaluate accurate application of the Escape Instrument on the *posttest*. Since there was no valid instrument to measure the desired outcomes, test questions were developed to align with the educational session objectives (Appendix L). The test questions were evaluated by three child abuse experts to establish face and content validity (McDonald, 2014), and one psychometric

expert. Content validity was assessed using a content validity index (CVI) (Polit & Beck, 2006).

Only items with a CVI score of 1.00 and agreed upon face validity by all three experts were

included in the final pretest and posttest.

The utility of the child physical abuse screening program was measured with the 8-item

Project Evaluation Survey (Appendix M). The purpose of this final survey was to evaluate the

implementation process from the HCP perspective; ascertain the level of HCP support of system-

wide implementation of the program throughout all EDs; and determine the effect of the

evidence-based screening program on HCP confidence and self-efficacy in screening for and

recognizing child physical abuse. Questions regarding attendance at previous child abuse

educational seminars were also included to provide information on additional training received

by the HCPs who completed the final project survey.

In addition to the instruments used for data collection, RNs completed the validated

Escape Instrument (Appendix H) for any child ≤ 18 years old who was admitted to the PED. This

6-item child abuse screening tool requires yes/no responses for each item. Item three also

includes a non-applicable (n/a) response for children presenting to the ED with a non-injury

complaint. One or more aberrant answers indicates a positive screen—and a heightened concern

for child physical abuse—while no aberrant answers constitutes a negative screen and a

decreased risk of abuse (Louwers et al., 2012b). As previously noted, the Escape Instrument has

demonstrated high reliability (99.2%) when used to screen children for physical abuse in the ED

(Dinpanah et al., 2017). Additionally, Louwers et al. (2014) found the specificity and negative

predictive value of the Escape tool to be high (98% and 99%, respectively), indicating that child

physical abuse is unlikely with a negative screen.

Data Collection and Analysis

ICD-10 codes entered by ED HCPs for *suspected* and *confirmed* child physical abuse were collected for 30 consecutive days prior to implementation of the screening program (June 1, 2017 – June 30, 2017) and 30 consecutive days after implementation (August 20, 2017 – September 18, 2017). ICD-10 sub-classification codes were included in the data sets to ensure all child physical abuse diagnostic codes were captured (Appendix I). To control for seasonal factors, data sets for the same ICD-10 codes were collected for the exact two sets of 30 consecutive days during the previous year (2016). The ICD-9 code for child physical abuse (995.54) was also included in the 2016 data sets due to the transition from ICD-9 to ICD-10 in October 2016. All ICD coding data was collected by the Clinical Data Warehouse (CDW) staff and presented to the project team leader in aggregate form. Coding data was intended to include four months of data both before and after project implementation. However, due to the project site's change to a new EHR shortly after implementation of the child physical abuse screening program, the CDW staff were not able to collect any ICD coding data after September 18, 2017.

The *Child Abuse Awareness pretest and posttest* were administered at two individual staff meetings in July and August 2017. The *pretest* was administered immediately before the 20-minute educational session, and the *posttest* was administered immediately after the session. The *Project Evaluation Survey* was subsequently administered at two individual staff meetings in December 2017—four months after implementation of the child physical abuse screening program (see Appendix N for the complete project flow diagram).

Data analysis was performed using Statistical Package for the Social Sciences (SPSS) version 24, with a statistical significance level set at $\leq .05$. Descriptive statistics were used to describe the sample and outcome variables. A paired-samples *t* test was run on data from the *Child Abuse Awareness pretest and posttest* to measure the difference in HCP knowledge (items

3, 4, 7) and confidence (items 1, 2) before and after the educational session. Items five and six were not included in the total score or paired-samples *t* test because they differed between tests.

Qualitative data from the *Project Evaluation Survey* was entered into SPSS to allow quantification of common responses. Text responses and comments were summarized to fully capture project feedback from all survey participants.

Budget

There was no formal financial budget for this project. No external funding or grant monies were received. The only material costs incurred were printing and laminating costs for the HCP badge cards and the PED project-related signage, as well as refreshments served during the child abuse educational sessions and the occasional PED project-related visits. Total material costs for this project were less than $200 and were at the expense of the project team leader.

Budgeting of personnel time was vital to this project. Approximately 50 hours were required for the project team leader to develop and deliver the child abuse educational session to ED HCPs. Time spent by ED HCPs who participated in the educational session and *Child Abuse Awareness pretest/posttest* was 30 minutes, and time spent by ED HCPs who participated in the *Project Evaluation Survey* was 10 minutes. The educational session and data collection occurred during non-mandatory staff meetings that were scheduled during normal work hours. Finally, the running and compilation of ICD coding data by the CDW staff required 60 minutes and only involved one staff member.

<div align="center">

Results

</div>

Demographic Data

To protect the privacy of the ED HCPs participating in the project, limited demographic data about HCPs was collected. Fifty-two ED HCPs completed both the *Child Abuse Awareness*

pretest and *posttest*, including 39 (75%) EM physicians and 13 (25%) PED RNs. Fourteen ED

HCPs completed the final *Project Evaluation Survey*, including 10 EM physicians (71.4%) and

four PED RNs (28.6%). Of these 14 survey participants, 12 (85.7%) attended the 20-minute child

physical abuse educational session at the start of the project, and two (14.3%) did not. The

number of previous child abuse educational sessions attended by the participants ranged from 0–

11, with an average of 4.43 (*SD* = 3.92).

No demographic data was collected on patients. ICD data searches were limited to only

include child physical abuse codes entered by ED HCPs on patients ≤ 18 years of age. All ICD

data was reported by the CDW staff to the project team leader in aggregate form.

Outcomes

Impact of the screening program on ED HCP recognition and documentation of

child physical abuse. There were no child physical abuse diagnostic codes entered by ED HCPs

in the 30-day period prior to implementation of the screening program, which was similar to the

same 30-day period in the preceding year. In the 30-day period immediately following project

implementation, there were three child physical abuse diagnostic codes entered by ED HCPs,

compared to two in the same 30-day period the preceding year. Due to the small sample sizes, no

statistical analysis was conducted.

ED HCP knowledge in screening for and recognizing child physical abuse. The

average total knowledge score on the *Child Abuse Awareness* pretest was 21.4% (*SD* = 21.71).

Post educational session, the average score was 73.2% (*SD* = 25.64). A significant increase in

knowledge was found from the pretest to posttest ($t(51)$ = -13.831, $p < .001$) (Table O1). Items

five and six on the pretest—which assessed knowledge of when to screen for child physical

abuse—were both answered correctly by 86.5% ($n = 45$) of participants. On the posttest—which

evaluated accurate use of the Escape Instrument—88.5% ($n = 46$) of participants answered item

five correctly, and 92.3% ($n = 48$) answered item six correctly.

ED HCP confidence in screening for and recognizing child physical abuse. Prior to

the educational session, the average confidence score for recognizing child physical abuse was

3.48 (*SD* = .70), and the average confidence score for screening for child physical abuse was

3.31 (*SD* = .67). Post educational session, the average confidence score for child physical abuse

recognition was 3.87 (*SD* = .56), and the average confidence score for child physical abuse

screening was 3.77 (*SD* = .61). A significant increase from pretest to posttest was found for both

confidence in recognizing child physical abuse ($t(51) = -5.236$, $p < .001$) and confidence in

screening for child physical abuse ($t(51) = -5.778$, $p < .001$) (Table O2).

The utility of the child physical abuse screening program. Only 14 ED HCPs

completed the *Project Evaluation Survey*. The average confidence score for recognizing child

physical abuse was 3.93 (*SD* = .48), while the average confidence score for screening for child

physical abuse was 3.79 (*SD* = .70). The Escape Instrument and the educational session were

each noted as facilitators to screening and detection of child physical abuse by 35.7% ($n = 5$) of

participants. The systematic screening protocol was noted as a facilitator by 14.3% ($n = 2$) of

participants, as was nursing involvement (RN-driven screening process, with positive results

communicated to EM physicians). Five participants (35.7%) did not note any facilitators.

Fifty percent ($n = 7$) of survey participants noted the EHR transition to be the most

significant barrier to child physical abuse screening in the PED. Two participants (14.2%)

identified the busy ED setting and time restrictions as another barrier, and two participants

(14.2%) did not note any barriers to screening. Finally, the following barriers were identified by

a total of one participant (7.1%) each: delays in obtaining a CAT consult; uncertainty regarding

the details of the screening program; RN-driven screening process (participant reported RNs are not appropriately trained to screen for child physical abuse); positive Escape screens that did not have significant concern for abuse; no dedicated place to document the Escape screening results in the EHR; and ED triage staff not being as familiar with the Escape Instrument as PED RNs.

Building the Escape Instrument into the EHR was recommended by 57.1% ($n = 8$) of survey participants, with two participants (14.3%) specifically recommending that completion of the screening tool be required before the ED HCP could proceed to other sections of the EHR. Additional changes that were recommended by a total of one participant (7.1%) each included: increased and more widespread training; having the EM physicians administer the Escape Instrument instead of the RNs; having a more thorough discussion with EM physicians prior to implementing the screening protocol; increasing screening awareness and knowledge of next steps; and having occasional lectures on child physical abuse at future staff meetings. Three survey participants (21.4%) did not recommend any changes to the child physical abuse screening protocol or educational session.

Of the 14 ED HCPs who completed the *Project Evaluation Survey*, 11 (78.6%) supported system-wide implementation of the ED child physical abuse screening program, and three (21.4%) did not. Survey participants provided a variety of rationales in support of system-wide implementation. Two participants (14.3%) noted increased knowledge and awareness of child physical abuse; two (14.3%) noted increased identification of abuse cases that would otherwise be missed; and two (14.3%) noted the program is a system that is designed to protect children. Additional supporting factors noted by one participant (7.1%) each included: the Escape Instrument is practical and easy to use; the systematic screening protocol facilitates RN to physician communication; and the program allows collection of data on the actual prevalence of

child abuse. Of the three participants not supporting system-wide implementation, one noted the short implementation time and unclear results at the project site; one stated that RNs do not have adequate training to screen for child physical abuse; and one noted the program should first be widely validated and peer reviewed.

Discussion

Despite some unanticipated system changes that occurred during implementation of this QI project, the comprehensive child physical abuse screening program demonstrated statistically significant results that were consistent with the evidence. Both ED HCP knowledge and confidence in screening for and recognizing child physical abuse improved after the 20-minute educational session. The Escape Instrument, screening protocol, and educational session were all noted as facilitators to child physical abuse screening and detection in the ED. Participants also noted that integration of the Escape Instrument into the EHR would greatly facilitate the screening process, as it would provide a specific place to document and view screening results. Finally, at the end of the project, the majority of ED HCPs surveyed supported full implementation of the screening program throughout all EDs in the health system.

The results of the final *Project Evaluation Survey* also pointed to some interesting power dynamics within the ED. One participant commented that RNs do not have the proper training to screen for child physical abuse and should not be entrusted to administer the Escape Instrument. Rather, it was suggested that the EM physicians be responsible for completing the Escape Instrument and interpreting the results. Due to the limited participant demographics collected on the survey, it is uncertain whether the respondent who questioned the appropriateness of the RN-driven screening process directly works with the PED RNs.

Limitations

The biggest limitation to this project was the loss of access to all ICD coding data on child physical abuse after September 18, 2017. This loss of access resulted in only 30 days of coding data being available for collection after official implementation of the newly developed PED child physical abuse screening protocol. The number of child physical abuse cases that present to the ED can vary significantly from month to month. Having only one month of post-implementation data available for comparison to pre-implementation data prevented analysis that would demonstrate the true impact of the screening program—specifically, whether or not ED HCP detection and documentation of child physical abuse increased after implementation of the educational session and systematic screening protocol.

Another limitation was the lack of a previously validated tool to measure ED HCP knowledge and confidence in screening for and recognizing child physical abuse. However, once developed by the project team leader, three child abuse experts reviewed the *Child Abuse Awareness pretest and posttest* to establish face and content validity prior to participant administration. This expert review helped reduce the effects of this limitation on the project.

Although the project team leader desired to include nurse practitioners (NPs) as participants in this project, the PED at the project site does not currently employee NPs. Additionally, the PED RNs and EM physicians were not required to attend the staff meetings at which the child physical abuse educational sessions were offered. As a result, not all ED HCPs participated in the educational session that preceded implementation of the systematic screening protocol, nor did all ED HCPs receive training in the use of the Escape Instrument. Finally, due to the constant change in EM residents that rotate through the PED, as well as RN staffing and management changes that occurred during the tenure of this project, not all the ED HCPs were aware of the specifics of the screening program and what their particular roles in screening were.

Implications for Practice

Child abuse and neglect costs the U.S. $220 million each day. This equates to more than $80 billion every year (Gelles & Perlman, 2012). In addition to a validated screening tool and systematic screening guidelines, provider-based education is needed to increase HCP knowledge of child abuse injuries (Jordan & Moore-Nadler, 2014; Louwers et al., 2012b; Louwers et al., 2014). Comprehensive child physical abuse screening programs—such as the one developed for this project—can help ED HCPs make significant strides in the effort to identify child physical abuse early and prevent its immediate and long-term effects. Not only will these types of programs increase ED HCP knowledge, confidence, and self-efficacy in child physical abuse screening and recognition, but they can also result in improved detection of non-accidental childhood injuries. Ultimately, these implications can be far-reaching, positioning ED HCPs to be at the frontlines of early detection and treatment of child physical abuse.

Conclusion

This evidence-based QI project evaluated the implementation of a comprehensive child physical abuse screening program in the PED that included delivery of a 20-minute educational session to ED HCPs, creation of a systematic child physical abuse screening protocol, and completion of the validated Escape Instrument by PED RNs for all patients ≤ 18 years of age. Overall, the project appeared to be successful. ED HCPs had statistically significant increases in their knowledge and confidence scores for child physical abuse screening and recognition after the educational session. The Escape Instrument, educational session, and systematic protocol facilitated screening in the PED, while transition to a new EHR presented significant barriers to screening for child physical abuse. However, no significant difference in ED HCP diagnostic coding of child physical abuse was appreciated after implementation of the screening program.

The results of this project are consistent with past research supporting comprehensive programs to improve ED HCP knowledge and confidence in screening for and recognizing child physical abuse. They also highlight the importance of integrating the child physical abuse SI into the EHR to facilitate screening. Future research should focus on the impact of screening programs on HCP diagnosis and treatment of child physical abuse. Longitudinal studies examining the relationship between screening results, child physical abuse diagnosis, and final case adjudication are also needed. Finally, efforts should be made to support best practice by standardizing child physical abuse screening programs throughout all EDs, with the potential for spread to other settings, including primary care clinics and urgent care centers.

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Appendix A

Search Strategy Flow Diagram

Stage 1: Initial Search Results	Identified citations from database search after duplicate citations removed ($n = 430$)	→	Duplicate citations excluded ($n = 294$)
Stage 2: Filters Applied	Included according to filters ($n = 193$)	→	Excluded according to filters ($n = 237$)
Stage 3: Title Review	Included by title ($n = 59$)	→	Excluded by title ($n = 134$)
Stage 4: Abstract Review	Included by abstract ($n = 33$)	→	Excluded by abstract ($n = 26$)
Stage 5: Critical Appraisal	Full text articles critically appraised ($n = 41$)	←	Ancestry, hand, and grey literature search ($n = 8$)
Stage 6: Final Search Results	Included studies ($n = 10$)	→	Articles excluded based on article content ($n = 31$)

Appendix B

Evaluation Table

Citation	Conceptual/ Theoretical Framework	Design/ Method	Sample/Setting	Major Themes, Variables, & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Themes	Decision for Use/ Application to Practice
Dinpanah, H., et al. (2017). Potential child abuse screening in emergency department: A diagnostic accuracy study Funding: None Conflicts/Bias: None Country: Iran	Cochrane protocol for systematic review of interventions	**Design:** Prospective DAS **Purpose:** Evaluate accuracy of Escape tool in screening children at risk for CA	*N* = 6120 **Demographics:** F = 52% Reside in city: 71.5% MA = 2.19 +/- 1.12 years *1-4 years*: 2244 (36.6) *4-8 years*: 1548 (25.3) *8-12 years*: 1192 (19.5) *12-16 years*: 1136 (18.6) AR: 0 **Setting:** 2 EDs **Eligibility:** Children < 16 y.o. presenting to ED from 2011 – 2014	IV: Escape tool (SI) DV: Detection of children at risk for CA	Escape SI for potential CA • ≥ 1 aberrant answer = positive screen • V&R per Louwers et al (2014): Sn 0.80; Sp 0.98; PPV 0.10; NPV 0.99 Physical exam by ED specialist + CA diagnosis by ED specialist → reevaluation of child by CAT to confirm CA diagnosis (gold standard)	Sn, Sp, PLR, NLR, PPV, and NPV, and area under the ROC were calculated with 95% CI to evaluate accuracy of SI STATA 11.0 used for data analysis	**+ Escape tool:** *n* = 137 1 +SII: 120 (2) 2 +SII: 4 (0.1) 3 +SII: 1 (0.01) 4 +SII: 1 (0.01) **CAT opinion:** + CA = 35 (0.5) **DV:** *Escape tool accuracy:* Sn = 100 (87.6-100) Sp = 98.3 (97.9 – 98.6 PLR = 25.5 (18.6-33.8) NLR = 100 (99.9-100) PPV = 0.34 (0.25-0.46) NPV = 0 (0-NAN)	**LOE:** IV **Strengths:** Large *N* (minimum required = 2696); 2 study sites; ED and CAT specialists blind to SI results (↓ bias); all pediatric age groups included; final CA diagnosis known **Limitations:** Convenience sampling – ↑ risk of bias; not controlled **Conclusions:** Escape is a suitable SI for detecting potential CA cases in ED (99.2% accuracy in this study).

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			Inclusion criteria: Consent for participation; cooperation in filling out SI; hemodynamically/ clinically stable **Exclusion criteria:** Cases of suicide injury, poisoning, peer injury, or disclosed CA				Area under ROC curve = 99.2 (98.9-99.4)	**Feasibility:** This is a brief, 6-item SI that can easily and quickly be administered by ED nurses or providers to screen children for CA. Minimal impact on work flows if filled out during triage. No cost to use SI.
Higginbotham, N., et al. (2014). Utility of a child abuse screening guideline in an urban emergency department. Funding: Dell Children's Medical Center of Central Texas/Seton Healthcare Conflicts/Bias: None noted	Guideline for the evaluation of suspected NAT	**Design:** QES; Data collected 18 months before and 18 months after SP implementation **Purpose:** Implement SP with goal of limiting bias in screening for suspected CA **Hypothesis:** Implementing a SP for all	N = 332 PREG: n = 111 PSTG: n = 221 **Demographics:** *PREG* MA (SD), months = 6.7 (3.1) F = 53 (47.8) M = 58 (52.3) W = 46 (41.4) H = 49 (44.1) B/A/O = 16 (14.4) PI = 38 (34.2) GSNI = 73 (65.8)	IV: CA SP DV1: Racial bias/referral patterns DV2: SES bias/ referral patterns DV3: Performance of SP-mandated tests	Hospital databases and medical chart review (PREG vs. PSTG)	χ^2 analysis to compare patient characteristics, SP diagnostic test use, CAT/ CPS referral UVR to examine association between race and insurance status with CA screening likelihood $p < 0.05$	No SSD among groups for age, race, sex, SF type, insurance **DV1:** *PREG* SS = H/B/A/O > W (OR, 1.31; 95% CI, 0.61-2.83; p= 0.49) CAT referral = GSNI > PI (OR, 2.6; 95% CI, 1.11-5.95; p = 0.028	**LOE:** III **Strengths:** Good LOE; no SSD between PREG and PSTG; evidence-based SP **Limitations:** N only included infants; temporal nature of data – possible bias due to changes in patient population during tenure of study (authors suggest this

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Country: U.S.A.		patients younger than 12 months who present to the hospital with a SF not caused by a MVC will attenuate racial and SES bias on the part of the clinician.	*PSTG* MA (SD), months = 6.1 (3.4) F = 94 (42.5) M = 137 (57.5) W = 108 (48.9) H = 85 (38.5) B/A/O = 28 (12.7) PI = 90 (40.7) GSNI = 131 (59.3) AR: 0 **Setting:** PED trauma center **Inclusion criteria:** age < 12 months; any type of SF (non MVC-related) **Exclusion criteria:** None listed				CPS referral = GSNI > PI (OR, 3.85; 95% CI, 1.66-8.91; p=0.002) *PSTG* SS = No SSD between W and H/B/A/O (OR, 1.05; 95% CI, 0.51-2.91; p = 0.89) CAT referral = GSNI > PI (OR, 2.5; 95% CI, 1.34-4.50; p = 0.004) CPS referral = GSNI > PI (OR, 3.0; 95% CI, 1.71-5.26; p < 0.001) **DV2:** *PREG* SS = GSNI > PI (OR, 2.69; 95% CI; p = 0.017)	is limited due to similarities between PREG and PSTG); study lacked data on final case adjudication by CPS and law enforcement **Conclusions:** Implementation of a SP can help attenuate SES bias, but not racial bias, when screening for CA; SP allows CA screening to become more consistent and evidence-based; SP results in ↑ frequency of appropriate and ↓frequency of unnecessary CA screening tests/ referrals **Feasibility:** Recommend SP implementation.

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							PSTG SS = Insurance status no longer a factor (OR, 1.18; 95% CI, 0.56-2.46; p = 0.66) **DV1 & DV2**: ORs for UA & TA screening showed similar relationships with race/SES, but no SSD. **DV3**: PSTG > PREG for UA, TA, & SS ($p < 0.001$) UA = 56.6% vs. 13.6%) TA = 62.0% vs. 10.9% SS = 84.6% vs. 60.4% OC = PSTG < PREG (20.8% vs. 40.4%) $p < 0.001$	Low risk intervention. Hospital currently has a CAT, but no SP. Management is supportive of implementing SP that will attenuate bias, ↑ screening consistency, and ↓ unnecessary testing/ referrals.

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							CAT referral PSTG < PREG (32.6% vs. 44.6%), p=0.05 After SP implemented, more injuries adjudicated as AI (62% vs 74%) than NAT (38% vs. 26%); $p = 0.03$	
Jordan, K. S., & Moore-Nadler, M. (2014). Children at risk of maltreatment: Identification and intervention in the emergency department. Funding: Not disclosed Conflicts/Bias: Authors deny any conflicts/bias	Cognitive learning theory *combined with* Theory of reasoned action	**Design:** RCR/ PCS; pre- and post-test design **Purpose:** Implement a series of strategies in a PED to identify children at risk of CA and ensure their safety and protection	N = 31 nurses (completed CA education program) N = 2309 children presented to PED Children who should have been screened for CA according to RCR: n = 42 Children actually screened for CA: n = 37 (88)	IV1: Comprehensive CA nursing education program IV2: CA SI DV1: Knowledge and skill set of PED nursing staff DV2: CA SR for PED patients with	Likert scale: 3-part pretest data collection tool on nurses' CA confidence, attitudes, self-efficacy, and clinical practice behaviors Validated risk of CA was assessed by reviewing and matching CA SI data to nurse's documentation in patient's EMR	Only percentiles reported; no other statistical tests/data analysis noted	**DV1:** *Pretest:* 76% of questions answered correctly *Posttest:* 90% of questions answered correctly Questions most missed: age when child most vulnerable to CA; injuries specific to CA	**LOE:** IV **Strengths:** All nurses completed the educational program; 94% of nurses had > 6 years experience; pre-/ post-test design allows evaluation of knowledge/practice changes **Limitations:** Small convenience sample limited to

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Country: U.S.A.			**Demographics:** *Nurses:* >6 years nursing experience: $n = 29$ (94); Prior CA training: $n = 16$ (52) AR = 0 **Setting:** PED **Inclusion criteria:** All nurses working in PED; all children presenting to PED over a 1-month period with high-risk diagnoses for CA were to be screened with SI High-risk diagnoses for CA classified as SF in child <36 months; head injury in child <12 months; burn-related injuries; alleged sexual or	high-risk diagnoses	Patient census log reviewed and compared with completed SI or EMR daily to assess for documentation of CA risk		100% of nurses rated CA skill set; knowledge level; and confidence in ability to identify & document on CA higher after educational program **DV2:** 37 out of 42 high-risk children screened; IR 88% 35 of the 37 children (94.6%) had evidence of CA (1.5% of total PED population)	only 1 PED and 5 preselected high-risk CA diagnoses – ↑ risk of sample bias; tools designed by study coordinator – no V&R data; study coordinator solely conducted the RCR – limits IR **Conclusions:** Nurses need ↑ CA education to ↑ SE, knowledge, and skill set; value in ↑ CA education for nurses, implementing a CA SP in ED, and working with a collaborative and cooperative approach to achieve best practice for CA screening and management **Feasibility:** Recommend CA SP and staff education.

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			physical abuse; and factitious disorder by proxy **Exclusion criteria:** Children not meeting the inclusion criteria; no other exclusion criteria noted					Low risk intervention. Possible cost to train staff, but costs should ↓ once all current ED staff trained.
Louwers, E.C., et al. (2012a). Facilitators and barriers to screening for child abuse in the emergency department. Funding: The Netherlands Institute for Health Research and Development Conflicts/Bias: Authors deny any conflicts/bias	Child Abuse Framework of the Dutch Health Care Inspectorate	**Design:** 2-phased QS; audio-recorded, SSIs **Purpose:** Phase 1: Define facilitators/ barriers to CA screening Phase 2: Make suggestions on methods to optimize ED CA screenings	$N = 33$ $n = 27$ (phase 1) $n = 6$ (phase 2) **Demographics:** *Phase 1 interviews:* $n = 7$ pediatricians $n = 2$ surgeons $n = 6$ ED nurses $n = 6$ ED managers $n = 6$ hospital board members $n = 6$ *Phase 2 interviews:* $n = 5$ CA experts $n = 1$ expert in implementation AR: 0	IV: Audio-taped SSIs with HPs focused on CA detection in EDs and related training and policy DV1: Facilitators to CA detection DV2: Barriers to CA detection DV3: Methods to overcome barriers to CA screening	Tape recorded transcribed interviews	Qualitative content analysis	**DV1:** *Facilitators to CA detection:* Support of hospital board; presence of CA attendant; presence of CAT; intensive training of ED staff; financial support **DV2:** *Barriers to CA detection*: Lack of CA knowledge; practical problems (i.e.,	**LOE:** VI **Strengths:** HPs had mixed disciplines and backgrounds; used national CA framework to order study results; most hospital Boards were supportive of CA screening; most hospitals had CA attendant, protocol for suspected CA, and/or a suitable SI; all Dutch hospitals that see children were represented in N

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Country: The Netherlands			**Setting:** 7 EDs who treat children **Inclusion criteria:** HP must be associated with at least 1 of the 7 participating hospitals **Exclusion criteria:** None listed				lack of suitable location/limited time); personal barriers (i.e., fear of unjustified suspicion); insufficient communication skills (talking with family); lack of support from hospital board; fast ED staff turnover **DV3:** *Methods to overcome barriers to CA screening:* ↑ training of staff to better recognize CA; improving communication skills; coding injuries as CA to receive funding; full SP	**Limitations:** Low LOE; small *N* and discipline-specific *n*'s – risk of bias; HP interviews conducted before the Dutch Health Care Inspectorate published its official CA framework, so registry and information section of framework was not addressed in this study **Conclusions:** For a successful SP, providers must be properly educated on CA detection and effective interviewing techniques; CA attendants and CATs must be available to ED staff; and hospital management must support the required

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							support by management; implementing CATs to ensure good inter-disciplinary collaboration; appointing a CA attendant; and implementing an SP and validated SI to ensure uniform CA screening process	training and SP implementation. **Feasibility:** Recommend CA SP for ED. Low risk. Management supportive of CA SP development/staff training. CAT team already in place. Possible cost to train staff, but cost should ↓ once all current ED staff trained.
Louwers, E.C., et al. (2014). Accuracy of a screening instrument to identify potential child abuse in emergency departments. Funding: The Netherlands Institute for Health	Cochrane protocol for systematic review of interventions *combined with* Standards for the Reporting of Diagnostic Accuracy	**Design:** PCS **Purpose:** 1. Measure the accuracy of a newly developed SI for CA in EDs (Escape tool) 2. Examine the possibility to minimize burden of	N = 38,136 IG: n = 18,275 (48); M = 10,322 (56) CG: n = 19,861 (52); M = 11,389 (57) **Demographics:** MA = 5.5 years *0-4 years*: IG = 10,035 (55) CG = 9759 (49)	IV: Escape tool (6-item SI; yes/no answer options) DV: Actual risk of/potential for CA **CA definition:** "Any form of threatening or violent physical, mental	CA risk measured by Escape tool • SI developed by team of pediatricians and screening experts (study authors) • ≥ 1 aberrant answer = positive screen	χ^2 to compare categorical variables LRs to validate Escape tool's Sn, Sp, PPV and NPV UVR and MVR to determine PV of each SII 95% CI	**IV:** + SI screen n = 420 (2.3) - SI screen n = 17,855 **DV:** CA DR 5 times ↑ in IG than CG Referred to CAT: n = 89	**LOE:** IV **Strengths:** Good LOE; multi-center setting; large IG; all pediatric age groups included; several potential CA cases identified; SI detected most children at risk for CA; extremely high correlations between the SIIs.

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Research and Development and Foundation Physico Therapeutic Institute Conflicts/Bias: None noted Country: The Netherlands	Studies (STARD)	completing the tool while maintaining Sn and Sp.	*5-8 years*: IG = 3537 (19) CG = 3457 (17) *9-12 years*: IG = 2614 (14) CG = 2908 (15) *13-18 years*: IG = 2089 (12) CG = 3737 (19) AR: 0 **Setting**: 3 EDs **Eligibility:** All children aged ≤ 18 years, regardless of ED visit reason Cases included for analysis if ≥2 CAT professionals classified case as a "potential case" **"Potential case":** ≥ 1 inclusion criteria checked by CAT professional	or sexual interaction with a minor which is perpetrated actively or passively by parents or other persons on whom the minor is dependent and causes or will probably cause physical or mental injury and serious harm to the minor" (p. 1277).	SI data independently evaluated by EP of 4 physicians with extensive experience in CA	$p < 0.05$ SPSS 17.0 used for analysis	Potential CA case: $n = 55$ (56); + screen: $n = 44$ (80); - screen: $n = 11$ *SI ≥ 1 item +* OR, 189.8 (97.3 -370.4); $p < 0.001$; Sn 0.80; Sp 0.98; PLR 40; NLR 0.20; PPV 0.10; NPV 0.99 *Individual SII analysis* Sp and NPV of each SII = 0.99; $p < 0.001$ SII 1 – OR, 50 (23.6-106.2); Sn 0.71; PPV 0.11 SII 2 – OR, 17.4 (7.3-41.3); Sn 0.12; PPV 0.04	**Limitations:** Rate of confirmed CA unavailable; using data of potential CA cases could result in overestimation of rate of true cases of CA. **Conclusions:** Escape tool may miss some cases of CA, but CA not likely when SI result is negative. Excluding some SIIs from the SI is not recommended due to decreased Sn/Sp. Combining the Escape SI with training of ED staff on CA risk factors is an effective way to ↑ CA SR and DR. **Feasibility:** This is a brief, 6-item SI that can

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			"No case": ≥ 1 exclusion criteria checked by CAT professional (even if ≥ 1 inclusion criteria also checked) **Inclusion criteria:** Injury caused by person on whom child is dependent; from caregiver neglect; withheld from medical care; psychological harm from actions or failure of person on whom child is dependent; child witnessed domestic violence; child witnessed or was victim of sexual act **Exclusion criteria:** Suspicion of CA known prior to ED visit; alcohol intoxication;				SII 3 – OR, 137.0 (72.7-258.5); Sn 0.34; PPV 0.21 SII 4 – OR, 65.3 (32.3-131.9); Sn 0.21; PPV 0.13 SII 5 – OR, 82.1 (37.9-178.2); Sn 0.17; PPV 0.17 SII 6 – OR, 182.9 (102.3-327.4); Sn 0.59; PPV 0.18 ↓ *SI burden analysis:* Exclude SII 2 – Sn ↓ to 0.73 Exclude SII 1, 4, *or* 5 – Sn ↓ to 0.78 Exclude SII 1, 4 *and* 5 – Sn ↓ 0.75; Sp 0.98	easily and quickly be administered by ED nurses or providers to screen children for CA. Low risk intervention. No cost to use SI. ↓ staff burden if filled out during triage.

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			suicide attempt; injury caused by a stranger or peers					
Louwers, E.C., et al. (2012b). Effects of systematic screening and detection of child abuse in emergency departments. Funding: The Netherlands Institute for Health Research and Development and Foundation Physico Therapeutic Institute Conflicts/Bias: Authors deny any conflicts/bias Country: The Netherlands	Cochrane protocol for systematic review of interventions *combined with* Cognitive learning theory	**Design:** Interventional PCS **Purpose:** Determine if introducing a SI and training of ED nurses increases DR of CA	N = 104,028; MA = 7.2 years; M = 58,445 (56) n = 37,404 (36) (screened for CA) **Demographics:** *Suspected CA:* n = 243 (0.2) M = 123 (51) Age = 0-4 years: 150 (62) 5-8 years: 37 (15) 9-12 years: 25 (10) 13-18 years:31 (13) *Not CA:* n = 103,785 (99.8) M = 58,322 (56) Age = 0-4 years: 41,942 (40) 5-8 years: 17,865 (17) 9-12 years: 17,220 (17)	IV1: "Escape Form" (6-item SI; yes/no answer options) IV2: Training (interactive workshop in interview techniques) for ED nurses DV1: CA SR DV2: CA DR **CA definition:** "Any form of threatening or violent physical, mental or sexual interaction with a minor which is perpetrated actively or passively by	Data collection: EMRs and ED triage systems CA risk measured by Escape Form • SI developed by the authors of this study • ≥ 1 aberrant answer = positive screen Suspected CA cases were independently scored by 4 HPs with variables of age, gender, signs at ED presentation, history and findings at ED, conclusion of the SI, and physician diagnosis	χ^2 to compare categorical variables Interrupted time-series analyses to calculate effect of interventions on CA SR Pooled ORs for detection of CA in screened children $p < 0.05$ SPSS 17.0 and R 2.7.1 were used for the analysis	**DV1:** Overall CA SR ↑ from 20% in February 2008 to 67% in December 2009 SR in the 5 intervention hospitals ↑ twice as much (14% to 69%) as in the 2 control hospitals (35% to 63%) **DV2:** DR 5 times higher in children screened than not screened for CA (0.5% vs. 0.1%, $p < 0.001$)	**LOE:** III **Strengths:** Controlled; good LOE; large N and screened n; inclusion of all pediatric age groups; universal implementation of Escape form; long study period; 6-month baseline monitoring period clearly shows SR and DR changes after interventions implemented; results represent variety of ED settings – ↑ generalizability of findings **Limitations:** Hospitals were not randomized to the intervention and

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			13-18 years: 26,748 (26) **Setting:** 7 EDs in the province of South Holland – 5 intervention hospitals; 2 control hospitals **Eligibility:** All children aged 0 to 18 years who visited the ED from February 2008 – December 2009 Cases included for analysis if at least 2 CAT professionals confirmed case as a "potential case" **"Potential case":** ≥ 1 inclusion criteria checked by CAT professional **"No case":** ≥ 1 exclusion criteria checked by	parents or other persons on whom the minor is dependent and causes or will probably cause physical or mental injury and serious harm to the minor" (p. 459).			Suspected CA cases were significantly younger than total PED population (4.7 vs. 7.2 years; $p < 0.001$) and were more often screened by ED staff than children in the total PED population (75% vs. 36%, $p < 0.001$) Pooled ORs for DR in children screened at all 7 ED sites: 4.88 (95% CI, 3.58-6.68)	control arms (authors note impossibility due to logistical and ethical reasons); possible over-estimation of "actual" CA cases since only potential CA cases were presented; number of false-negative CA cases not known; possibility of inconsistent SI use; Dutch Health Care Inspectorate mandated CA screening in all EDs during middle of this study, which could partially explain ↑ in SR **Conclusions:** Systematic CA screening in EDs is effective in ↑ the DR of CA. Training ED staff and mandating CA

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			CAT professional (even if ≥ 1 inclusion criteria also checked) **Inclusion criteria:** Injury caused by person on whom child is dependent; from caregiver neglect; withheld from medical care; psychological harm from actions or failure of person on whom child is dependent; child witnessed domestic violence; child witnessed or was victim of sexual act **Exclusion criteria:** Suspicion of CA was known prior to ED visit; alcohol intoxication; suicide attempt; injury caused by a stranger or peers					screening in EDs significantly ↑ the extent of CA screening. **Feasibility:** Recommend implementing a systematic SP for CA screening in the ED that includes both an SI and an educational module for ED staff. The Escape tool is a feasible SI for this purpose. No cost to use tool. Low risk intervention. Possible cost to train staff, but costs should ↓ once all current ED staff trained.

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Sittig, J.S., et al. (2016). Value of systematic detection of physical abuse at emergency rooms: a cross-sectional diagnostic accuracy study. Funding: The Netherlands Institution for Health Research and Development Conflicts/Bias: Authors deny any conflicts/bias Country: The Netherlands	Quality Assessment of Diagnostic Accuracy Studies (QUADAS) *combined with* Standards for the Reporting of Diagnostic Accuracy Studies (STARD)	**Design:** Cross Sectional DAS with a 6-month follow-up **Purpose:** Establish whether the SPUTOVAMO-R checklist accurately detects or excludes CA among children presenting to the ED with physical injury.	$N = 4290$ (screened with SI); Age 0-7 years $n = 720$ (RSP and EP Assessment) Positive screen: $n = 112$ (2.6) 15% random sample of negative screens: $n = 645$ **Demographics:** M = 417 (58) North European = 498 (69) Low SES = 170 (24) Age < 1 year = 43 (6) MA in years (SD) AI: 3.8 (1.8) II: 1.03 (0.8) Neglect: 2.1 (1.3) AR: 0.9% (37 parents refused to participate in RSP)	IV: SPUTAVAMO-R checklist (6 questions with yes/no answer options) DV1: Injury due to CA (defined as "use of physical force or implements against the child that has resulted in physical injury" [p. 2]). DV2: Injury due to neglect (defined as "failure to meet a child's basic physical needs or failure to ensure a child's safety" [p. 2]). DV3: Need for help from social	SPUTOVAMO-R checklist (SI) • Revised version of original 9-item checklist • ≥ 1 aberrant answer = positive screen RSP: The SPUTOVAMO-R checklist (SI) was tested against the majority opinion of a 3-member CA EP • ED visit medical file • Detailed injury history by CA pediatrician • Risk factors derived from questionnaires (HPs, CPS) • 6 months follow-up information	PVs, Sn, and Sp with 95% exact CIs to establish diagnostic accuracy of SI RR for being reported to CPS with + SI result as compared to – SI result was calculated with approximate 95% CI IR between EP members assessed by 2-way ICC: < 0.20 = poor 0.21-0.40 = fair 0.41-0.60 = moderate 0.61-0.80 = good 0.81-1.00 = very good agreement	**DV1:** Based on RSP, II in 3 children – prevalence 0.07% (95% CI, 0.01-0.2) PPV 0.03; NPV 1.00; Sn 1.000; Sp 0.865; false-positive rate = 0.97 (95% CI, 0.915-0.994); false-negative rate = 0.0 (95% CI, 0.0-0.006) **DV2:** Based on RSP, injury caused by neglect in 6 children – prevalence of 0.27% (95% CI, 0.15-0.49) PPV 0.050; NPV 0.998; Sn 0.833; Sp 0.867	**LOE:** IV **Strengths:** Large *N*; met all QUADAS criteria for diagnostic accuracy studies; good agreement (IR) between EP members; all true-negative cases correctly identified; panel members blind to SI results; ↓ incorporation bias **Limitations:** Possible misclassification of outcome as reason for low CA prevalence compared to prior studies; risk of implicit bias; unable to unequivocally diagnose injury due to neglect and need for help from social services

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			Setting: 4 EDs in region of Utrecht **Inclusion criteria:** All children aged 0-7 years admitted to ED between June 2009 and December 2010 for any physical injury **Exclusion criteria:** Obvious victims of CA (admitted by perpetrator at presentation); victims of witnessed MVCs; children who died before ED arrival	services (defined as "any concern about the situation of the child that requires consultation of social services" [p. 2]).		PASW statistics V.20.0 and STATA/SE V.11.0 were used for the analysis	**DV3:** Based on RSP, help from social services was needed in 102 children – prevalence of 11.6% (95% CI, 10.6-12.6) PPV 0.330; NPV 0.889; Sn 0.326; Sp 0.892 CPS reports for physical CA = 1.6%: + SI = 70; - SI = 63 (RR 4.51; 95% CI, 2.14-9.95) CPS reports for general CA = 4.8%: + SI = 15; - SI = 188 (RR 3.31; 95% CI, 2.03-5.39) Panel IR for II = 0.82 (95% CI,	**Conclusions:** SPUTOVAMO-R has a very high false-positive rate for physical CA and did not reliably diagnose injury due to neglect and need for help. Results in ↑ workload for CA pediatricians and CPS workers. Should consider use of this SI carefully before de novo implementation. **Feasibility:** Would NOT recommend use of SPUTOVAMO-R as CA SI in EDs due to high false-positive rate. ↑ risk of unsubstantiated CPS reports could result in ↑ costs as well as negatively impact children and their families.

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							0.80-0.84); neglect = 0.07 (95% CI, 0.02-0.11); social service help = 0.40 (95% CI, 0.35-0.44)	
Smeekens, A.E., et al. (2011). Successful e-learning programme on the detection of child abuse in emergency departments: A randomised controlled trial. Funding: Augeo Foundation Conflicts/Bias: Authors deny any conflicts/bias Country: The Netherlands	Bandura's social learning theory *combined with* Cognitive learning theory	**Design:** Blinded RCT; pre- and post-intervention design **Purpose:** Evaluate the effectiveness of an electronic learning (e-learning) program on nurses' recognition of CA in a simulated ED case	N = 38 (included) n = 25 (analyzed) IG: n = 13 CG: n = 12 **Demographics:** F = 18 (72) MA (years) = 42 (SD 9) Mean work experience (years) = 9 (SD 7) AR: 36% (due to participants' work/ shift patterns) **Setting:** University Medical Center ED **Inclusion criteria:** All nurses with	IV: 2-hour e-learning program focused on CA recognition DV1: Performance during case simulation to detect CA DV2: Self-reported SE for the detection of CA	Simulation performance: assessed by EP using a standardized assessment form – scored quantity and quality of questions posed by the nurse (minimum score 0; maximum score 114) SE in detection of CA: measured using visual analogue scale: consisting of 8 statements (total score minimum 0 mm; maximum 800 mm)	Student t-test used for apparently normally distributed data Mann-Whitney U to assess group differences IR assessed using ICC to determine consistency among EP members $p \leq 0.05$ SPSS 17.0 used for analysis	No SSD in characteristics of IG and CG **DV1:** Total performance of IG significantly better than CG during post-test (89 vs. 71; 95% CI 2.9-33.3; $p <$ 0.022; ES = 1) + correlation between length of simulation test and # of adequate ?'s (Spearman correlation 0.586, $p =$ 0.002)	**LOE:** II **Strengths:** High LOE; large ES for simulation performance; medium ES for SE; EP blind to IG/CG allocation; objective measurement to determine effect of educational program on CA detection; no baseline SSD when comparing nurses lost to follow-up with those analyzed; simulations based on real CA cases **Limitations:** Small N (↑ risk of bias); high AR

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			permanent contract in the ED during the study period **Exclusion criteria:** None listed				Separate IG/CG post-/pretest performance comparison: IG: 89 vs. 74 (p = 0.053) CG: 71 vs. 69 (p = 0.728) IR of EP: 0.70 (95% CI, 0.51-0.84, p = 0.000) **DV2:** Mean post-test SE: IG = 502; CG = 447 (95% CI -25.4 to 134.7, p = 0.171; ES = 0.56) + correlation between total SE score and performance on simulation test (Spearman correlation 0.387, p=0.056)	(36%) might ↓ generalizability of findings; used simulation rather than observation of clinical practice; time for CA assessment may be restrictive factor in ED, whereas it was not in simulated cases **Conclusions:** E-learning improved the performance in case simulations and the SE of nurses in detection of CA in the ED. **Feasibility:** 2-hour e-learning CA module feasible for ED practice. Small time commitment for providers; training can be done at work or home. Cost of

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							Significant ↑ in SE score in IG and CG with post-/pretest comparison: IG: 502 vs. 402 (p = 0.000) CG: 447 vs. 364 (p = 0.045)	implementation unknown, but benefits of ↑ in CA detection and SE likely outweigh any cost. No associated risks.
Teeuw, A.H., et al. (2016). Results of the implementation of a new screening protocol for child maltreatment at the emergency department of the academic medical center in Amsterdam. Funding: Stichting Kinderpostzegels Nederland Conflicts/Bias: Authors deny any conflicts/bias	Protocol for the evaluation of suspected NAT *combined with* Cognitive learning theory	**Design:** PCS **Purpose:** Evaluate the implementation of a new CA SP directly after introduction (February 2010) and 9 months later (November 2010)	N = 1089 February cohort: n = 560 November cohort: n = 529 **Demographics:** *February cohort:* F = 265 (47.3) M = 295 (52.7) MA = 7.95; median age 6.4 *November cohort:* F = 212 (40.1) M = 317 (59.9) MA = 7.95; median age 7.5	IV: SP – SPUTOVAMO 9-item checklist plus (TTI) DV1: Completion of SPUTOVAMO DV2: Completion of TTI DV3: Possible factors influencing completion of SPUTOVAMO and/or TTI	DVs were measured by comparison of data collected directly after introduction of the TTI to the SP (February 2010) and 9 months later (November 2010)	Median and IQR to describe non-normally distributed data Pearson Chi square used to calculate statistical difference in performing SPUTOVAMO and TTI between February and November Factors influencing chances for performing SPUTOVAMO	**DV1:** SPUTOVAMO completed in 416 of 560 February cases (74%); 223 of 529 November cases (41.2%); Completion 1.8 times ↓ in November than February (95% CI 1.6-2.0; p = 0.00) ULR: older children less likely to have SPUTOVAMO. February: odds ↓ 7.4% for	**LOE:** IV **Strengths:** Large overall N and cohort n's suitable for analysis; SP was implemented into daily routine; all ED HPs attended training session prior to addition of TTI to SP **Limitations:** Only able to analyze documented SPUTOVAMO and TTI reports; ED changed to EMR during study, resulting in ↓

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Country: The Netherlands			AR: Per authors, estimated to be 15% due to staff turnover. However, all new personnel received short introductory course to the SP process Setting: ED of a large teaching hospital Inclusion criteria: All patients between 0-8 years who presented to the ED Exclusion criteria: None noted	SPUTOVAMO Checklist Definition: 9 risk factors to detect CA; to be completed by ED triage nurse TTI Definition: Full physical examination (top-toe inspection) of the undressed patient; to be completed by pediatrician, ED physician, or ED nurse		and TTI were assessed with Pearson Chi square in case of 2 variables and with ULR in case of > 2 variables or numeric variables $p < 0.05$ PASW statistics 18.0 was used for statistical analysis	every year ↑ in age ($p = 0.00$); November: odds ↓ 5.2% for every year ↑ in age ($p = 0.00$) DV2: TTI completed in 217 of 477 February cases (45.5%); 89 of 433 November cases (20.6%) RR for having TTI 2.4 times ↓ in November than February (95% CI 1.9-2.9; $p = 0.00$) UVR: older children less likely to have a TTI completed. February: odds ↓ 4.9% for every year ↑ in age ($p = 0.001$);	visibility of the SP; assumptions for Pearson Chi square test may not be totally true in ED (patients differ, ED staff change); reasons for not performing TTI were seldom documented and could not be analyzed; some patients referred to general practitioner, so SP not completed Conclusions: Implementation of the new CA SP, where the TTI was added to the SPUTOVAMO, was only mildly successful and ↓ with time. SP completion was highest right after implementation, which was

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							November: odds ↓ 5.6% for every year ↑ in age ($p = 0.005$) **DV3:** *Completion of SPUTOVAMO:* Diagnosis "skin & subcutaneous tissue": OR 1.9 ($p = 0.003$) Diagnosis "gastrointestinal infection": OR 0.08 ($p = 0.001$) Known chronic illness (31.5%) versus no chronic illness (46.6%) (RR 0.68; 95% CI 0.52-0.88; $p = 0.00$) SPUTOVAMO completion ↑ chance of TTI completion; RR	immediately preceded by extensive training sessions. Negative correlation between ↑ child age and having a chronic illness and completion of the SP. **Feasibility:** If new SP for CA is implemented, regular training sessions should be held to ↑ adherence and sustain HP motivation to complete the SP. Most practical for ED nurses to complete the SPUTOVAMO during triage and the ED physicians to perform the TTI.

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Citation	Conceptual/ Theoretical Framework	Design/ Method	Sample/Setting	Major Themes, Variables, & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Themes	Decision for Use/ Application to Practice
							5.4 (95% CI 3.8 -7.5; p = 0.000) *Completion of TTI*: No correlation between child's diagnosis and TTI completion Known chronic illness: RR 0.61 (95% CI 0.38-1.00; *p* = 0.05)	
Tiyyagura, G., et al. (2015). Barriers and facilitators to detecting child abuse and neglect in general emergency departments. Funding: Specific funding source not stated	Grounded theory	**Design:** QS; one-on-one SSIs; consistent with grounded theory **Purpose:** 1. Explore general ED providers' experiences with screening and reporting of CAN	*N* = 29 Physicians: *n* = 9 Nurses: *n* = 16 Physician Assistants: *n* = 4 Recruited participants through purposeful sampling and snowball sampling AR: 0 **Setting:** 3 general EDs in different	IV: Face-to-face, audio-taped, SSI with open-ended ?'s and prompts to encourage detailed discussion DV1: Barriers to recognizing CAN DV2: Barriers to reporting CAN	Tape recorded transcribed interviews	Qualitative content analysis Constant comparative method of data collection and analysis continued past the point of saturation	**DV1:** *Barriers to recognizing CAN:* Desire to believe caregiver; failure to recognize signs/ symptoms of CAN; personal biases about caregivers; challenges innate to working in ED	**LOE:** VI **Strengths:** Sample included 3 sites with different pediatric models of care; providers had variety of experience and ED roles; data composed of rich, candid narratives **Limitations:** Low LOE; small *N* from only 3 sites

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Citation	Conceptual/ Theoretical Framework	Design/ Method	Sample/Setting	Major Themes, Variables, & Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Themes	Decision for Use/ Application to Practice
Conflicts/Bias: Authors deny any conflicts/bias Country: U.S.A.		2. Identify barriers and facilitators to recognizing and reporting CAN in ED setting	regions of Connecticut and with different models of pediatric care; none had full-time, on-site social work or CA expert support **Inclusion criteria:** Recently evaluated and treated patients with CAN; various experience levels and roles in ED setting; willing to discuss CAN experiences with research team **Exclusion criteria:** None noted	DV3: Facilitators to CAN detection DV4: Provider preferences regarding CAN education and support			**DV2:** *Barriers to reporting CAN:* the reporting process (time and effort); negative consequences of reporting **DV3:** *Facilitators to CAN detection:* immediate case discussion with peers; belief that it was better to report with any suspicion; clear understanding of role of CPS and mandated reporter law **DV4:** *Provider requests for CAN education and support:*	within 1 state may limit generalizability of results; did not include direct observations of provider's clinical practices; focus groups may have stimulated greater discussion among providers than SSIs **Conclusions:** Detection of CAN by general ED providers can be improved by providing education through case review, improving follow-up by CPS agencies, and increasing real-time assistance with patient care decisions. **Feasibility:** Institution of a CAT, CA SI, educational case-

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							immediate consultation for unclear cases of CAN; feedback about case disposition; case-based education; standardized process of CPS reporting	based interventions for providers, and a CPS liaison are feasible, low-risk ways to improve CA detection and reporting in the ED.

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Appendix C

Synthesis Table

	Dinpanah (2017)	Higginbotham (2014)	Jordan (2014)	Louwers (2012a)	Louwers (2014)	Louwers (2012b)	Sittig (2016)	Smeekens (2011)	Teeuw (2016)	Tiyyagura (2015)
Level of Evidence	IV	III	IV	VI	IV	III	IV	II	IV	VI
Design	PDAS	QES	PCS/RCR	QS	PCS	PCS	CSDAS	RCT	PCS	QS
Pre/post design		x	x					x		
Study Demographics										
Setting										
GED	x			x	x	x	x		x	x
PED		x	x	x	x	x	x	x		
Number of sites	2	1	1	7	3	7	4	1	1	3
Country										
Iran	x									
Netherlands				x	x	x	x	x	x	
USA		x	x							x
Sample										
Total participants	6120	332	31	33	38,136	104,028	720	38	1089	29
Attrition rate	0%	0%	0%	0%	0%	n/a	0.9%	36%	15%	0%
Population										
Children	x	x			x	x	x		x	
HPs			x	x				x		x
Mean Age										
Months (mos) / Years (yrs)	2.2 yrs	6.4 mos	ND	ND	5.5 yrs	7.2 yrs	2.3 yrs	42 yrs	7.95 yrs	ND
Gender										
% Male	48	56	ND	ND	57	56	58	28	56	ND
Measurement/Instrumentation										
CA SI	x		x		x	x	x			
Physical exam/TTI	x									
CAT and/or EP evaluation	x				x		x			
CA simulation performance								x		
Hospital databases/MCR		x	x			x		x	x	
Likert scale – CA SE/detection			x							
Visual analogue scale – CA SE								x		
Tape-recorded, transcribed SSIs				x						x

C – consistency, **CA** – child abuse, **CAT** – child abuse team, **CSDAS** – cross sectional diagnostic accuracy study, **DR** – detection rate, **Escape** – 6-item child abuse screening tool, **EP** – expert panel, **GED** – general emergency department, **HP** – healthcare provider, **K** – knowledge, **MCR** – medical chart review, **n/a** – not applicable, **ND** – no data, **NR** – not recommended, **PCS** – prospective cohort study, **PDAS** – prospective diagnostic accuracy study, **PED** – pediatric emergency department, **QES** – quasi-experimental study, **QS** – qualitative study, **RCR** – retrospective chart review, **RCT** – randomized controlled trial, **SE** – self-efficacy, **SES** – socioeconomic status, **SI** – screening instrument, **Sn** – sensitivity, **Sp** – specificity, **SP** – screening protocol, **SPUTOVAMO** – 9-item child abuse screening checklist, **SPUTOVAMO-R** – revised 6-item screening checklist, **SSI** – semi-structured interviews, **SR** – screening rate, **ST** – screening test, **TTI** – "top-toe inspection", **U** – unnecessary

	Dinpanah (2017)	Higginbotham (2014)	Jordan (2014)	Louwers (2012a)	Louwers (2014)	Louwers (2012b)	Sittig (2016)	Smeekens (2011)	Teeuw (2016)	Tiyyagura (2015)
Independent Variables										
Audiotaped SSI				x						x
CA educational program			x			x		x		
CA SP		x	x						x	
Escape Form	x				x	x				
Independent CA SI			x							
SPUTOVAMO-R checklist							x			
Dependent Variables										
CA SR			x			x				
CA risk/DR	x				x	x	x	x		
Barriers to CA detection				x						x
Barriers to CA reporting										x
Facilitators to CA detection				x						x
HP CA education/support needs										x
HP CA knowledge/skill set			x							
SE in CA detection			x					x		
Racial bias/referral patterns		x								
SES bias/referral patterns		x								
Completion of SPUTOVAMO/TTI									x	
Factors influencing SP completion									x	
Findings/Outcomes										
Escape SI diagnostic accuracy	Sn 100%; Sp 98.3%				Sn 80%; Sp 98%					
SPUTOVAMO-R diagnostic accuracy							↑ false + rate: 97%			
SP effect on bias		↓ SES bias								
SP effect on CA screening		↑C	↑C			↑SR			↑C , ↑SR	
Effect of CA educational program			↑K, ↑SE		↑SR, ↑DR	↑SR, ↑DR		↑DR, ↑SE	↑SP use	
Barriers to CA detection/reporting										
Lack of CA knowledge				x						x
Practical problems (time, space)				x						x
Desire to believe caregiver										x
Personal barriers/beliefs				x						x
Deficient communication skills				x						
Lack of administrative support				x						

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Fast ED staff turnover				x						x
Negative results of reporting										x
Facilitators to CA detection										
Administrative support				x						
Presence of CA attendant				x						
Presence of CAT				x						x
Immediate discussion with peers										x
Intensive educational training				x						x
Financial support				x						
Standardized reporting process										x
Recommendations for ED Practice										
Escape Tool SI	x				x	x				
SPUTOVAMO-R							NR			
CA SP		x	x			x			x	
CA educational program for HPs			x	x	x	x		x	x	x

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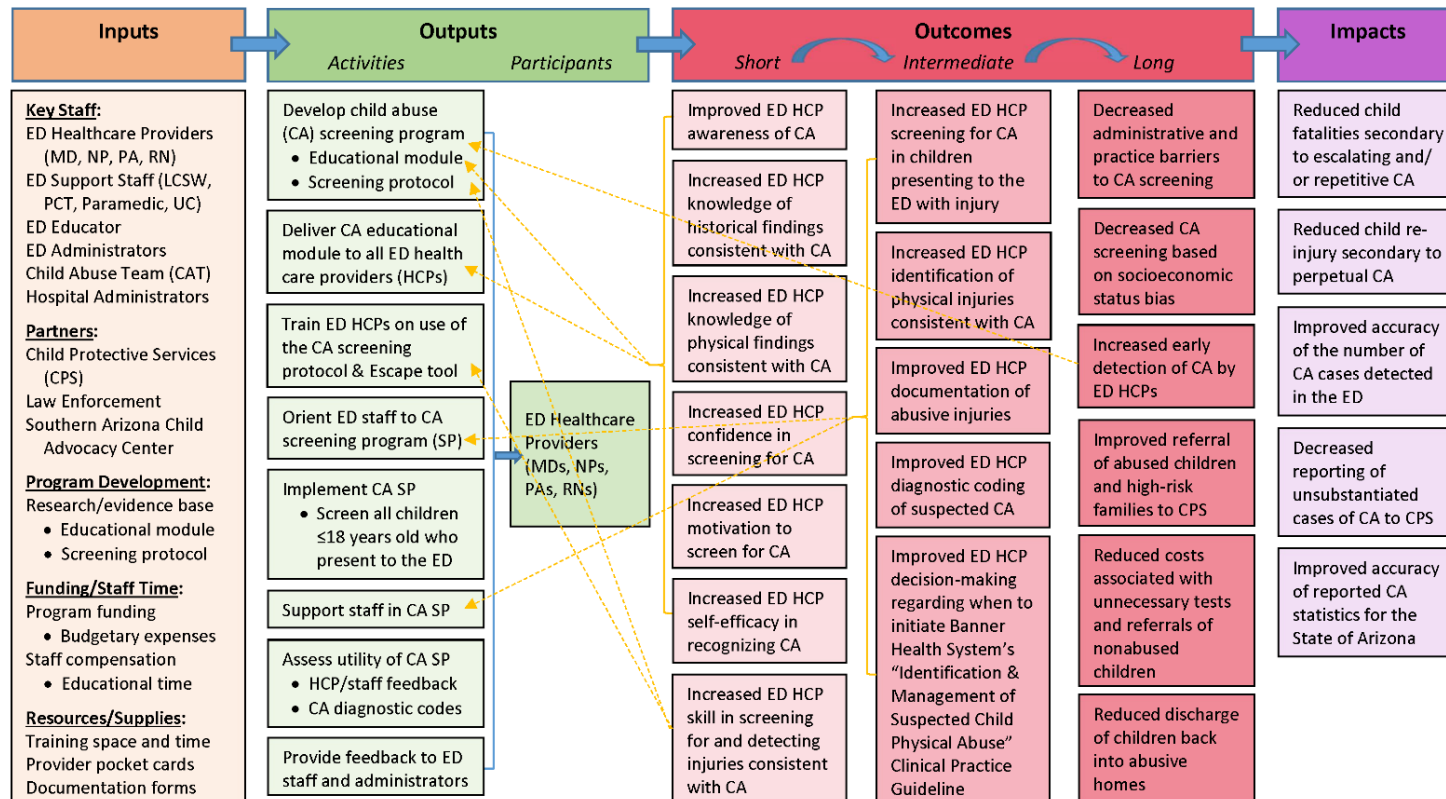
Appendix D

Logic Model

Emergency Department Child Abuse Screening Program – Logic Model

Problem: All healthcare providers are mandated reporters of child abuse, but no standardized process exists for screening children for abuse in the Emergency Department (ED). As a result, children presenting to the ED with abusive injuries might "slip through the cracks" and be discharged without the appropriate follow-up or referral. If abuse is undetected at the initial presentation, the abused child has a 50% chance of experiencing recurrent abuse and a 10-25% chance of death from that abuse (Acehan et al., 2016; Escobar et al., 2016).

Goal: Increase ED healthcare provider performance of child abuse screening in the ED in order to increase early detection of child physical abuse and reduce the risk of re-injury or death secondary to recurrent and escalating abuse.

Inputs	Outputs		Outcomes			Impacts
	Activities	Participants	Short	Intermediate	Long	
Key Staff: ED Healthcare Providers (MD, NP, PA, RN) ED Support Staff (LCSW, PCT, Paramedic, UC) ED Educator ED Administrators Child Abuse Team (CAT) Hospital Administrators **Partners:** Child Protective Services (CPS) Law Enforcement Southern Arizona Child Advocacy Center **Program Development:** Research/evidence base • Educational module • Screening protocol **Funding/Staff Time:** Program funding • Budgetary expenses Staff compensation • Educational time **Resources/Supplies:** Training space and time Provider pocket cards Documentation forms	Develop child abuse (CA) screening program • Educational module • Screening protocol Deliver CA educational module to all ED health care providers (HCPs) Train ED HCPs on use of the CA screening protocol & Escape tool Orient ED staff to CA screening program (SP) Implement CA SP • Screen all children ≤18 years old who present to the ED Support staff in CA SP Assess utility of CA SP • HCP/staff feedback • CA diagnostic codes Provide feedback to ED staff and administrators	ED Healthcare Providers (MDs, NPs, PAs, RNs)	Improved ED HCP awareness of CA Increased ED HCP knowledge of historical findings consistent with CA Increased ED HCP knowledge of physical findings consistent with CA Increased ED HCP confidence in screening for CA Increased ED HCP motivation to screen for CA Increased ED HCP self-efficacy in recognizing CA Increased ED HCP skill in screening for and detecting injuries consistent with CA	Increased ED HCP screening for CA in children presenting to the ED with injury Increased ED HCP identification of physical injuries consistent with CA Improved ED HCP documentation of abusive injuries Improved ED HCP diagnostic coding of suspected CA Improved ED HCP decision-making regarding when to initiate Banner Health System's "Identification & Management of Suspected Child Physical Abuse" Clinical Practice Guideline	Decreased administrative and practice barriers to CA screening Decreased CA screening based on socioeconomic status bias Increased early detection of CA by ED HCPs Improved referral of abused children and high-risk families to CPS Reduced costs associated with unnecessary tests and referrals of nonabused children Reduced discharge of children back into abusive homes	Reduced child fatalities secondary to escalating and/or repetitive CA Reduced child re-injury secondary to perpetual CA Improved accuracy of the number of CA cases detected in the ED Decreased reporting of unsubstantiated cases of CA to CPS Improved accuracy of reported CA statistics for the State of Arizona

*Gold dotted arrows indicate rapid-cycle quality improvement process

Assumptions: 1) HCPs do not receive adequate CA training during professional degree programs and/or employee orientation; 2) providing CA education for ED HCPs will increase their confidence in and motivation to screen for CA; 3) educating HCPs on the red flags for CA and injuries consistent with abuse will improve the detection of abuse while minimizing the risk for unsubstantiated CA reports; 4) providing a systematic screening protocol will standardize screening, overcome barriers, ensure consistency, and decrease socioeconomic status bias of the screener; 5) implementing a comprehensive screening program will increase the level of awareness of CA among ED staff, increase early detection of CA, and improve increase HCP documentation and coding of abuse; 6) improved HCP knowledge of CA will reduce costs associated with unnecessary tests and referrals of nonabused children.

Appendix E

Institutional Review Board (IRB) Approval Letter

ASU Knowledge Enterprise Development

EXEMPTION GRANTED

Debra Hagler
CONHI Academic Innovation
602/496-0802
DEBRA.HAGLER@asu.edu Dear

Debra Hagler:

On 7/7/2017 the ASU IRB reviewed the following protocol:

Type of Review:	Initial Study
Title:	A quality improvement project to increase emergency department healthcare provider recognition of child physical abuse
Investigator:	Debra Hagler
IRB ID:	STUDY00006473
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• Consent - Child Abuse Awareness Pre-test/Post-test, Category: Consent Form; • Banner Health HIPAA Patient Signature Form, Category: Other (to reflect anything not captured above); • Letter of Support from Banner UMC Site, Category: Off-site authorizations (school permission, other IRB approvals, Tribal permission etc); • Child Abuse Educational Session Objectives, Category: Other (to reflect anything not captured above); • Recruitment Script 2 - Program Evaluation Survey, Category: Recruitment Materials; • References - IRB application , Category: Other (to reflect anything not captured above); • Recruitment Script 1 - Child Abuse Awareness Pre/Post-test, Category: Recruitment Materials; • Consent - Project Evaluation Survey, Category:

	Consent Form;
	• Project Evaluation Survey, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);
	• Notice of Privacy Practices for Banner Health, Category: Other (to reflect anything not captured above);
	• Social Behavioral Protocol - HCP Recognition of Child Abuse, Category: IRB Protocol;
	• Escape Instrument - Screening Tool, Category: Screening forms;
	• Project Flow Diagram, Category: Technical materials/diagrams;
	• Child Abuse Awareness Pre-test/Post-test, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (4) Data, documents, or specimens, (2) Tests, surveys, interviews, or observation on 7/7/2017.

In conducting this protocol you are required to follow the requirements listed in the INVESTIGATOR MANUAL (HRP-103).

Sincerely,

IRB Administrator

cc:
        Sheri Carson

Appendix F

Site Approval Letter

Banner
University Medicine

Date: Wednesday July 12, 2017

To: Sheri Carson, MSN, RN, CPN, CPNP

Cc: Debbie Hagler, PhD, RN, ACNS-BC, CNE, CHSE, ANEF, FAAN
    Clinical Professor and Coordinator, Scholarship of Teaching and Learning

From: Jill Arzouman, DNP,RN,ACNS,BC,CMSRN

Re: A quality improvement project to increase emergency department healthcare provider recognition of child physical abuse.

Thank you for submitting the required documentation from Arizona State IRB as well as your project template. As per our previous discussion, we have assessed your project proposal for implementation potential and appropriateness of the project within BUMCT. From our final review we have determined that the project is feasible and congruent with Banner Health initiatives.

I will forward your proposal and IRB approval to our Nursing Research Director at the Banner Corporate Research Offices. You may now begin your project. Please do not hesitate to contact me for any questions during the process. The Research and Innovation Council will look forward to you presenting your results when the project is complete.
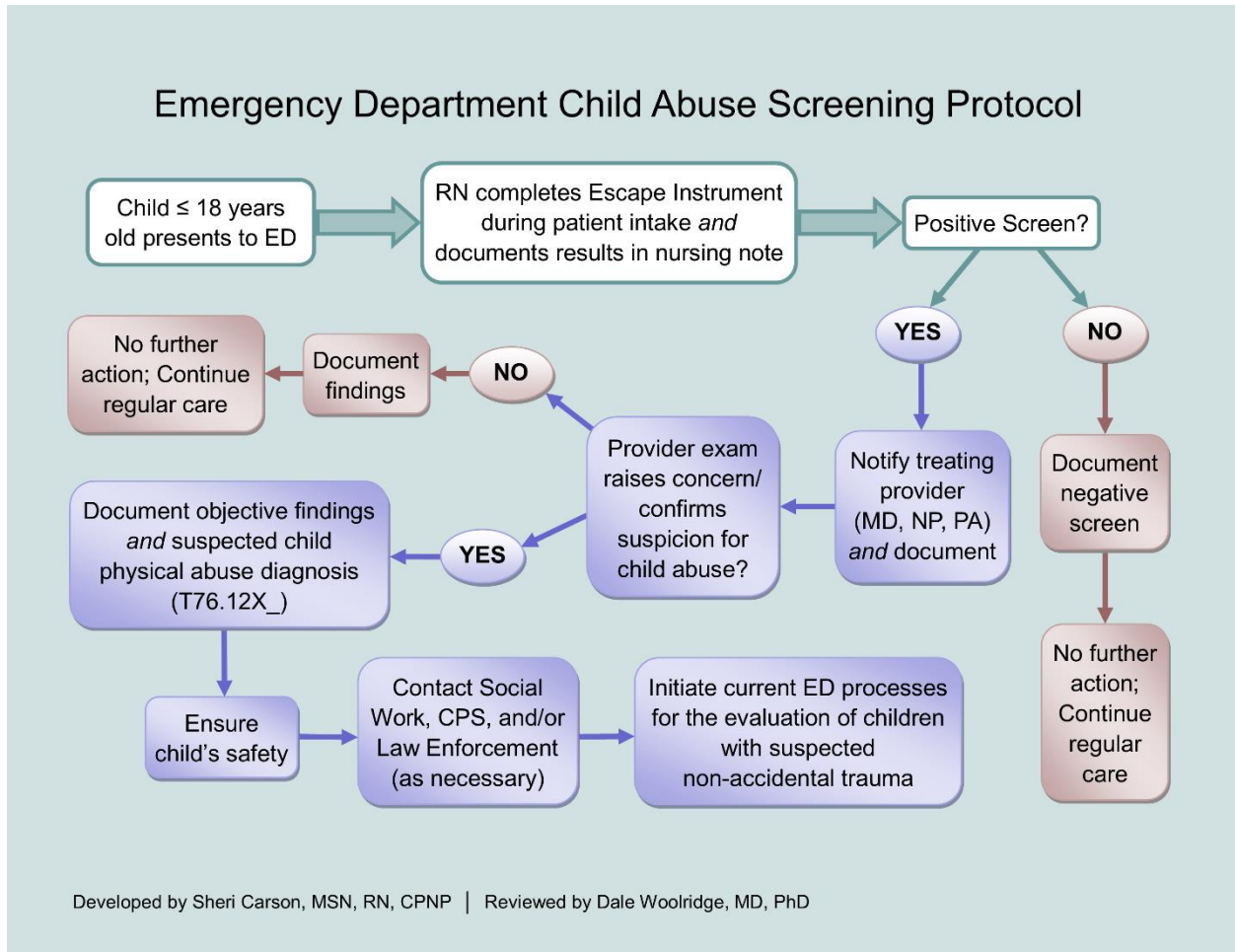
Best wishes on the successful completion of your project.

Sincerely,

Jill Arzouman
Director of Professional Practice
BUMCT/S

Appendix G

Systematic Child Physical Abuse Screening Protocol

Emergency Department Child Abuse Screening Protocol

Child ≤ 18 years old presents to ED → RN completes Escape Instrument during patient intake *and* documents results in nursing note → Positive Screen?

Positive Screen? → YES / NO

YES → Notify treating provider (MD, NP, PA) *and* document

NO → Document negative screen → No further action; Continue regular care

Notify treating provider (MD, NP, PA) *and* document → Provider exam raises concern/ confirms suspicion for child abuse?

Provider exam raises concern/ confirms suspicion for child abuse? → NO → Document findings → No further action; Continue regular care

Provider exam raises concern/ confirms suspicion for child abuse? → YES → Document objective findings *and* suspected child physical abuse diagnosis (T76.12X_)

Document objective findings *and* suspected child physical abuse diagnosis (T76.12X_) → Ensure child's safety → Contact Social Work, CPS, and/or Law Enforcement (as necessary) → Initiate current ED processes for the evaluation of children with suspected non-accidental trauma

Developed by Sheri Carson, MSN, RN, CPNP │ Reviewed by Dale Woolridge, MD, PhD

Appendix H

Escape Instrument

Escape Instrument
Adapted from Louwers et al. (2014)

	Yes	No
1. Is the history consistent?	Yes	**No**
2. Was seeking medical help unnecessarily delayed?	**Yes**	No
3. Does the onset of the injury fit with the developmental level of the child?	Yes/ n/a	**No**
4. Is the behavior of the child, his or her carers and their interaction appropriate?	Yes	**No**
5. Are findings of the head-to-toe examination in accordance with the history?	Yes	**No**
6. Are there other signals that make you doubt the safety of the child or other family members? *If yes, describe the signals in the box "Other comments" below	**Yes**	No
Other comments:		

One (or more) ticked answers in the dark boxes indicate the possibility of an increased risk of child abuse and further action is recommended. *THIS SHOULD BE RECORDED AS A POSITIVE SCREEN*

The Escape Instrument was published in an open-access article distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike License, which permits non-commercial use, distribution, and reproduction in any medium, provided the original author and source are credited. The above tool was created for the ED HCPs and adapted from "Accuracy of a Screening Instrument to Identify Potential Child Abuse in Emergency Departments," by E. C. Louwers, I. J. Korfage, M. J. Affourtit, M. Ruige, A. P. van den Elzen, H. J. de Koning, and H. A. Moll, 2014, *Child Abuse & Neglect, 38*(7), p. 1276.

Appendix I

Child Physical Abuse Diagnostic Codes

Child Physical Abuse ICD-10 Codes

SUSPECTED
Child Physical Abuse

- Initial Encounter
  T76.12XA

- Subsequent Encounter
  T76.12XD

- Sequela
  T76.12XS

CONFIRMED
Child Physical Abuse

- Initial Encounter
  T74.12XA

- Subsequent Encounter
  T74.12XD

- Sequela
  T74.12XS

Remember to add appropriate child physical abuse code to child's chart BEFORE discharge/transfer from ED

Appendix J

Child Abuse Awareness Pretest

Date: _____ Participant Code: _____

PRE-Test – CIRCLE Answers

1. I am confident in my ability to *recognize* injuries that are high-risk for child physical abuse.

   (1) Strongly Disagree   (2) Disagree   (3) Uncertain   (4) Agree   (5) Strongly Agree

2. I am confident in my ability to *screen* for possible cases of child physical abuse.

   (1) Strongly Disagree   (2) Disagree   (3) Uncertain   (4) Agree   (5) Strongly Agree

3. On average, a child abuse report is made in the United States every:

   (1) 10 seconds
   (2) 30 seconds
   (3) 1 minute
   (4) 3 minutes

4. Which factors are "red flags" or increase suspicion for child physical abuse? **Select all that apply**.

   (1) Injury does not match child's developmental abilities
   (2) Spiral tibia fracture in 23-month-old who reportedly jumped off couch
   (3) Parents provide a different history to each healthcare provider
   (4) Bruising on torso of 3-year-old child
   (5) Burns with clear line of demarcation

5. A mother brings her 3-month-old infant to the ED for complaints of "fussiness", decreased feeding, and intermittent vomiting for the past 3 days. Mom is concerned and cooperative with all questions asked. On exam, the baby appears listless and you notice a small, fading bruise on his left temple. Mom states it happened when she bumped against the door jamb while holding the baby the preceding day. Based on this information, should you screen this infant for possible physical abuse?

   (0) No
   (1) Yes

6. Parents bring their 6-year-old son in for complaints of right upper arm pain. Per their reports, the patient was playing in the backyard a couple of days ago when he slipped on a patch of wet grass and fell, landing on his arm. While examining the child, you notice some bruising over his right shoulder, scapula, and forearm. He also has a small bruise over his left shoulder. Based on this information, should you screen this child for possible physical abuse?

   (0) No
   (1) Yes

7. An 11-year-old girl is brought to the ED via EMS for a head injury. She was found unresponsive on scene and intubated. Patient's parents are with her and state she fell while riding her bicycle. She has no cuts or abrasions, but there are several bruises on her forehead/temples and patterned bruises on her back and sides. You are concerned that she has been physically abused. What should you document? **Select all that apply.**

   (1) Objective findings
   (2) History as reported by parents
   (3) Opinion that injuries are due to physical abuse
   (4) Diagnostic code for head injury
   (5) Diagnostic code for suspected child physical abuse

Appendix K

Child Abuse Awareness Posttest

Date: _____   Participant Code: _____

POST-Test – CIRCLE Answers

1. I am confident in my ability to *recognize* injuries that are high-risk for child physical abuse.

   (1) Strongly Disagree   (2) Disagree   (3) Uncertain   (4) Agree   (5) Strongly Agree

2. I am confident in my ability to *screen* for possible cases of child physical abuse.

   (1) Strongly Disagree   (2) Disagree   (3) Uncertain   (4) Agree   (5) Strongly Agree

3. On average, a child abuse report is made in the United States every:

   (1) 10 seconds
   (2) 30 seconds
   (3) 1 minute
   (4) 3 minutes

4. Which factors are "red flags" or increase suspicion for child physical abuse? **Select all that apply**.

   (1) Injury does not match child's developmental abilities
   (2) Spiral tibia fracture in 23-month-old who reportedly jumped off couch
   (3) Parents provide a different history to each healthcare provider
   (4) Bruising on torso of 3-year-old child
   (5) Burns with clear line of demarcation

5. A mother brings her 3-month-old infant to the ED for complaints of "fussiness", decreased feeding, and intermittent vomiting for the past 3 days. Mom is concerned and cooperative with all questions asked. On exam, the baby appears listless and you notice a small, fading bruise on his left temple. Mom states it happened when she bumped against the doorjamb while holding the baby the preceding day. Based on the ED's new child abuse screening protocol, you complete the Escape Instrument for this infant. Circle the answers you would select on the tool below:

Escape Instrument		
Adapted from Louwers et al. (2014)		
1. Is the history consistent?	Yes	No
2. Was seeking medical help unnecessarily delayed?	Yes	No
3. Does the onset of the injury fit with the developmental level of the child?	Yes/ n/a	No
4. Is the behavior of the child, his or her carers and their interaction appropriate?	Yes	No
5. Are findings of the head-to-toe examination in accordance with the history?	Yes	No
6. Are there other signals that make you doubt the safety of the child or other family members?	Yes	No
*If yes, describe the signals in the box "Other comments" below		
Other comments:		

One (or more) ticked answers in the dark boxes indicate the possibility of an increased risk of child abuse and further action is recommended. *THIS SHOULD BE RECORDED AS A POSITIVE SCREEN*

Based on the above Escape Instrument, would you classify this as a positive or negative screen?

   (0) Negative
   (1) Positive

Date: _____   Participant Code: _____

POST-Test – CIRCLE Answers

6. Parents bring their 6-year-old son in for complaints of right upper arm pain. Per their reports, the patient was playing in the backyard a couple of days ago when he slipped on a patch of wet grass and fell, landing on his arm. While examining the child, you notice some bruising over his right shoulder, scapula, and forearm. He also has a small bruise over his left shoulder. Based on the ED's new child abuse screening protocol, you complete the Escape Instrument for this infant. Circle the answers you would select on the tool below:

Escape Instrument
Adapted from Louwers et al. (2014)

1.	Is the history consistent?	Yes	No
2.	Was seeking medical help unnecessarily delayed?	Yes	No
3.	Does the onset of the injury fit with the developmental level of the child?	Yes/n/a	No
4.	Is the behavior of the child, his or her carers and their interaction appropriate?	Yes	No
5.	Are findings of the head-to-toe examination in accordance with the history?	Yes	No
6.	Are there other signals that make you doubt the safety of the child or other family members?	Yes	No
	*If yes, describe the signals in the box "Other comments" below		
Other comments:			

One (or more) ticked answers in the dark boxes indicate the possibility of an increased risk of child abuse and further action is recommended. "THIS SHOULD BE RECORDED AS A POSITIVE SCREEN"

Based on the above Escape Instrument, would you classify this as a positive or negative screen?

  (0) Negative
  (1) Positive

7. An 11-year-old girl is brought to the ED via EMS for a head injury. She was found unresponsive on scene and intubated. Patient's parents are with her and state she fell while riding her bicycle. She has no cuts or abrasions, but there are several bruises on her forehead/temples and patterned bruises on her back and sides. You are concerned that she has been physically abused. What should you document? **Select all that apply.**

  (1) Objective findings
  (2) History as reported by parents
  (3) Opinion that injuries are due to physical abuse
  (4) Diagnostic code for head injury
  (5) Diagnostic code for suspected child physical abuse

Appendix L

Child Abuse Educational Session Learning Objectives

Upon completion of the child abuse educational session, participants will be able to:

1. Identify common "red flags" for child physical abuse

2. Demonstrate accurate use of the Escape Instrument based on a case study

3. Describe the process of screening for child physical abuse

4. State essential elements that must be documented in cases of suspected child physical
    abuse

Appendix M

Project Evaluation Survey

Date: _____

Project Evaluation Survey

1. I am confident in my ability to **recognize** injuries that are consistent with child physical abuse.

    (1) Strongly Disagree　　(2) Disagree　　(3) Uncertain　　(4) Agree　　(5) Strongly Agree

2. I am confident in my ability to **screen** for possible cases of child physical abuse.

    (1) Strongly Disagree　　(2) Disagree　　(3) Uncertain　　(4) Agree　　(5) Strongly Agree

3. What about the child abuse screening program has **facilitated** your screening for and detection of child abuse in the Pediatric Emergency Department?

4. What were the **obstacles or barriers** to screening?

5. What **changes** would you recommend to the child abuse screening protocol or educational module?

6. Would you support **system-wide implementation** of this child abuse screening program throughout all Banner Health System emergency departments:

    ☐ No (0)　　　☐ Yes (1)

    Why or why not?

7. Did you attend the child abuse educational session during the staff meeting at the start of the screening program?

    ☐ No (0)　　　☐ Yes (1)

8. How many educational sessions on child abuse have you attended in the past? _____

THANK YOU FOR YOUR PARTICIPATION!!

Appendix N

Project Flow Diagram for Data Collection
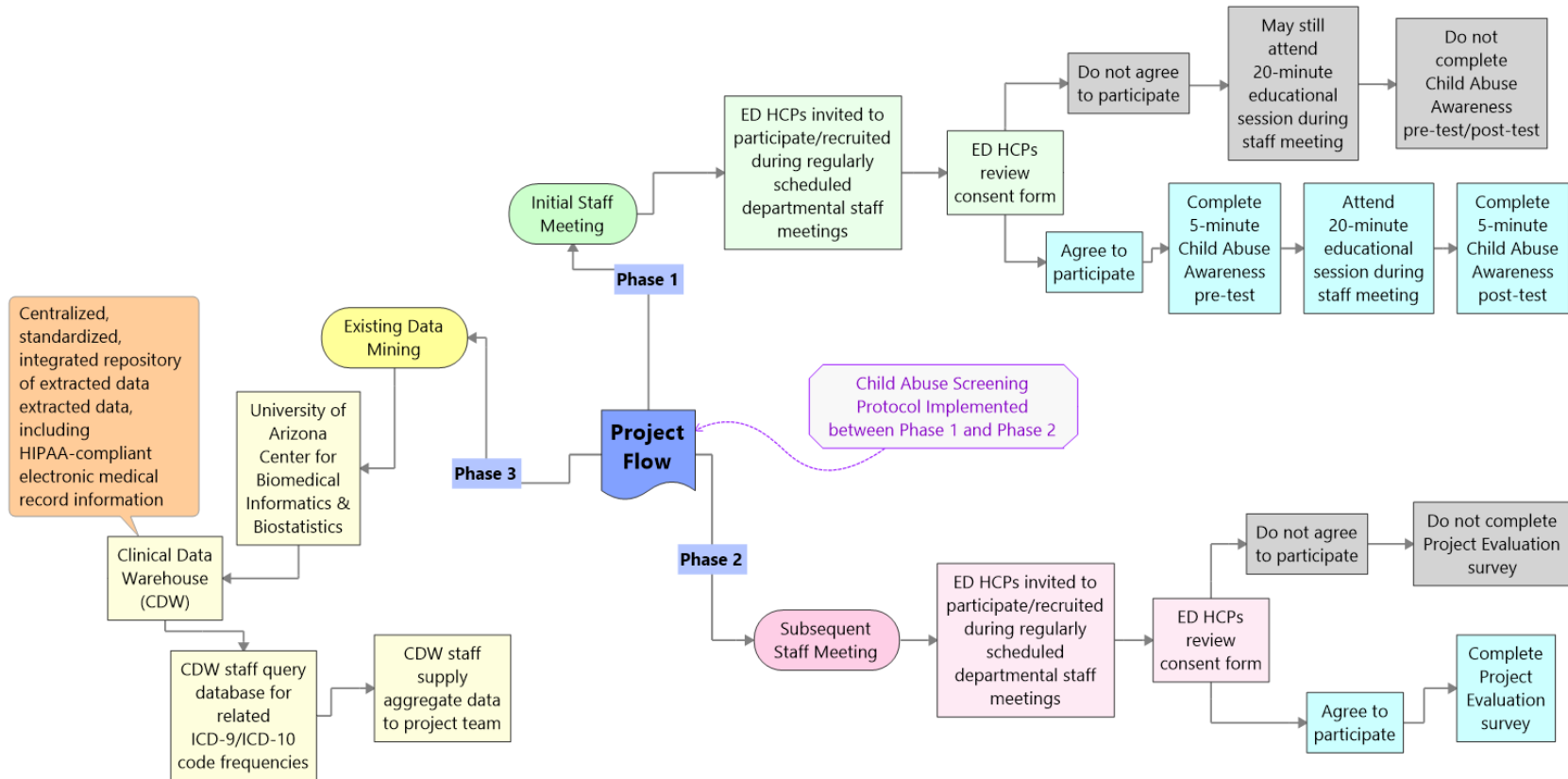
Appendix O

Paired Samples Statistical Analysis

Table 1

Paired Differences between Pre- and Post-Educational Session ED HCP Knowledge

Paired Variable	*M* (*SD*)	*SEM*	95% CI	*t*(51)	*p*
PRE CA Reporting – POST CA Reporting	-.83 (.38)	.05	[-.93, -.72]	-15.61	<.001
PRE CA Red Flags – POST CA Red Flags	-.44 (.50)	.07	[-.58, -.30]	-6.36	<.001
PRE CA Documentation – POST CA Documentation	-27 (.45)	.06	[-.39, -.15]	-4.34	<.001
PRE Total % Score – POST Total % Score	-51.75 (26.98)	3.74	[-59.26, -44.24]	-13.83	<.001

Note. CI = confidence level. CA = child abuse.

Table 2

Paired Differences between Pre- and Post-Educational Session ED HCP Confidence

Paired Variable	*M* (*SD*)	*SEM*	95% CI	*t*(51)	*p*
PRE Confidence to Recognize CA – POST Confidence to Recognize CA	-.39 (.53)	.07	[-.53, -.24]	-5.24	<.001
PRE Confidence to Screen for CA – POST Confidence to Screen for CA	-.46 (.58)	.08	[-.62, -.30]	-5.78	<.001

Note. CI = confidence level. CA = child abuse.