

# Effects of Systematic Screening and Detection of Child Abuse in Emergency Departments

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## KEY WORDS

child abuse, mass screening, emergency service, hospital

## ABBREVIATION

OR—odds ratio

Drs Korfage, de Koning, Moll, and Affourtit designed the protocol and wrote the successful research protocol; Drs Louwers and Manai coordinated the data collection process; Drs Scheewe, van de Merwe, Vooijs-Moulaert, van den Elzen, Jongejan, and Ruijs contributed to the collection of study data; Drs Bosschaart, Teeuw, Affourtit, and Louwers defined the cases for the study; Drs Looman and Louwers analyzed the data, which was scrutinized and discussed by Drs Korfage, de Koning, and Moll; Dr Louwers wrote the first draft; All authors commented on the manuscript and suggested revisions; and Dr Korfage had full access to all of the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

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**WHAT'S KNOWN ON THIS SUBJECT:** Systematic screening for child abuse of all children presenting at emergency departments might increase the detection rate of child abuse but studies to support this proposal are scarce.



**WHAT THIS STUDY ADDS:** Systematic screening for child abuse in emergency departments is effective in increasing the detection of suspected child abuse. Training emergency department staff and requiring screening legally at emergency departments increase the extent of screening.

## abstract

**OBJECTIVE:** Although systematic screening for child abuse of children presenting at emergency departments might increase the detection rate, studies to support this are scarce. This study investigates whether introducing screening, and training of emergency department nurses, increases the detection rate of child abuse.

**METHODS:** In an intervention cohort study, children aged 0 to 18 years visiting the emergency departments of 7 hospitals between February 2008 and December 2009 were enrolled. We developed a screening checklist for child abuse (the "Escape Form") and training sessions for nurses; these were implemented by using an interrupted time-series design. Cases of suspected child abuse were determined by an expert panel using predefined criteria. The effect of the interventions on the screening rate for child abuse was calculated by interrupted time-series analyses and by the odds ratios for detection of child abuse in screened children.

**RESULTS:** A total of 104 028 children aged 18 years or younger were included. The screening rate increased from 20% in February 2008 to 67% in December 2009. Significant trend changes were observed after training the nurses and after the legal requirement of screening by the Dutch Health Care Inspectorate in 2009. The detection rate in children screened for child abuse was 5 times higher than that in children not screened (0.5% vs 0.1%,  $P < .001$ ).

**CONCLUSIONS:** These results indicate that systematic screening for child abuse in emergency departments is effective in increasing the detection of suspected child abuse. Both a legal requirement and staff training are recommended to significantly increase the extent of screening. *Pediatrics* 2012;130:457–464

The prevalence of child abuse in the Netherlands in 2005 was estimated at 1 in 30 children.<sup>1</sup> However, early detection of child abuse at emergency departments in the Netherlands is low (0.2%) compared with, for example, the United Kingdom (1.4%–6.4%), Italy (2%), and the United States (10%).<sup>2–7</sup> Even allowing for the difficulty of comparing these data because of differing definitions and populations, the detection rate of child abuse at Dutch emergency departments is strikingly low. Starting in January 2009, the Dutch Health Care Inspectorate legally required all emergency departments to screen every child for child abuse and to regularly train their emergency department staff.<sup>8</sup>

To identify high-risk populations, checklists of warning signs for child abuse are used.<sup>9</sup> These checklists contain (on average) 6 to 9 questions, such as, “Was there a delay in seeking medical attention?” or “Do the findings of the physical examination confirm the history?” Emergency department nurses generally complete these checklists, and, if at least one of the warning signs is positive, the nurse informs the physician about the possible suspicion of child abuse. However, large studies to support the value of checklists in the detection of child abuse are scarce.<sup>9–12</sup>

To assess the effect of screening for child abuse, we conducted a prospective intervention cohort study at 7 emergency departments in the Netherlands. After a baseline monitoring of 6 months,<sup>7</sup> our aim was to implement a new checklist for screening for child abuse in emergency departments and to implement training in interview techniques for emergency department nurses.<sup>9</sup> Also assessed was the effect of changes in national and local policy on the screening and detection of child abuse.

## METHODS

### Study Design and Setting

The province of South Holland (the Netherlands) has a population of 3.5 million people served by 22 hospitals. For this study, data were collected from 7 of these hospitals with a total of about 200 000 emergency department visitors annually. All children aged 0 to 18 years visiting the emergency departments from February 2008 to December 2009 were included. Data were collected on demographics, reason for the emergency department visit, the referrer, the treating specialist, the diagnosis, and place of discharge. We used emergency department triage systems and (electronic) patient files and, if available, data from the checklists for child abuse. Data collection lasted on average 22 (range, 17–23) months.

This study was approved by the Medical Ethical Committee of the Erasmus MC, University Medical Centre Rotterdam (MEC-2007-195).

### Interventions

#### Screening Instrument

We developed a new checklist for screening for child abuse (ie, the “Escape Form”) based on a systematic literature review,<sup>9</sup> earlier developed tools, interviews with professionals, and testing the feasibility of the proposed

Escape Form with emergency department nurses (Table 1). The Escape Form is a checklist with 6 questions on warning signs for all types of child abuse, suitable for all children visiting an emergency department. This Escape Form was used in an interrupted time-series design at 2 emergency departments (hospitals A and B) and, after a process evaluation, in 2 other emergency departments (hospitals C and D). Emergency department nurses completed the Escape Form during the triage of the patients. If one of the warning signs was marked, the nurse informed the physician, who had the responsibility to evaluate the increased risk for child abuse and take action if necessary. All completed Escape Forms were collected in hospitals A, B, C, and D, and all checklists (with similar content)<sup>2</sup> were used in hospitals E, F, and G.

#### Training

For nurses, an important barrier to detecting and reporting child abuse is a low level of knowledge, vocational skills, and self-efficacy.<sup>13–15</sup> To help emergency department nurses feel more competent in their communication about possible child abuse, training was implemented comprising an interactive workshop in interview techniques in case of suspicion of child abuse. We planned to invite all emergency

**TABLE 1** “Escape Form”: Checklist for Potential Child Abuse Used at Emergency Departments<sup>a</sup>

Is the history consistent?	Yes	No <sup>a</sup>
Was there unnecessary delay in seeking medical help?	Yes <sup>a</sup>	No
Does the onset of the injury fit with the developmental level of the child?	Yes/NA	No <sup>a</sup>
Is the behavior of the child/the carers and the interaction appropriate?	Yes	No <sup>a</sup>
Are the findings of the top-to-toe examination in accordance with the history?	Yes	No <sup>a</sup>
Are there any other signals that make you doubt the safety of the child or other family members?	Yes* <sup>a</sup>	No
*If ‘Yes’ describe the signals in the box ‘Other comments’ below.		
Other comments		

NA, not applicable.

<sup>a</sup> If one of these answers is selected, the risks of child abuse could be increased and additional action is recommended.

department nurses of hospitals A, B, C, and D for the workshops, which they would attend during working hours.

### Case Definition

Child abuse teams are multidisciplinary teams that deal with child abuse policy and assist hospital staff when child abuse is suspected. In the 7 hospitals, data on all children with suspected abuse reported during the study period by emergency department staff to the child abuse teams were collected and recorded in a database (Microsoft Access 2003). Subsequently, in the cases presented, these children were scored by 4 professionals independently (a forensic pediatrician [A.B.], 2 social pediatricians [M.A., A.T.], and a physician [E.L.]) to assess suspected child abuse. They scored the cases on the basis of an overview composed of the clinical notes with the variables of age, gender, signs at presentation at the emergency department, history and findings at the emergency department, conclusion of the screening instrument, and diagnosis (of the physician). If a professional marked one or more inclusion criteria, we defined that patient as a "potential case." If a professional marked 1 or more exclusion criteria, we defined that patient as "no case"; if a child met both inclusion and exclusion criteria, the exclusion criteria took precedence. Cases were included for analysis if at least 2 professionals, including 1 of the external professionals (A.B., A.T.), confirmed a child as a "potential case." The following definition was used for child abuse: "any form of threatening or violent physical, mental 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."<sup>16</sup> Based on this definition, we formulated the 8 inclusion criteria

and 4 exclusion criteria a priori of the scoring (see Appendix).

### Statistical Analysis

The  $\chi^2$  test was used to compare categorical variables between children suspected and not suspected of abuse. The effect of interventions on the screening rate for child abuse was calculated by interrupted time-series analyses.<sup>17</sup> Interrupted time-series analysis models the impact of an intervention on the screening and detection rate by allowing a sudden change at the moment of introduction of the intervention, and by allowing for a difference in trend before and after the intervention. The intervention was timed at the start, midpoint or end of the month, which was the unit of time. In each hospital the odds ratios (ORs) were calculated for the detection of child abuse in screened children, and a pooled OR.

Statistical significance was defined as  $P < .05$ . The statistical packages SPSS 17.0 (SPSS Inc, Chicago, IL) and R 2.7.1 (R Development Core Team, Vienna, Austria) were used for the analysis.

## RESULTS

During the 23-month study period, a total of 104 028 emergency department visits in the 7 hospitals were included. The average age of the children was 7.2 years; 56% were male; 48% of the children presented at the emergency department without a referral; and 49% had a surgical problem. In total, 37 404 (36%) screening instruments were completed from the 104 028 emergency department visits (Table 2).

### Screening Rate

Overall, the screening rate for child abuse in the 7 emergency departments increased from 20% in February 2008 (hospitals A, B, D, F, and G) to 67% in December 2009 (hospitals A, B, C, D, E, F,

and G). The screening rate in the intervention hospitals increased twice as much (ie, from 14% to 69%) as those in the control hospitals (ie, from 35% to 63%) (Fig 1).

The Escape Form was implemented in hospital A in July 2008, in hospital B in August 2008, and in hospital D in September 2009. In hospital C, the existing checklist was adapted by using the Escape Form but was not completely replaced by it. Hospital B had a screening rate of <3% before the introduction of the Escape Form; the screening rate increased to 34% in the first month of implementation. Hospitals A and D already screened for child abuse by using different checklists; in these hospitals the screening rate showed no significant change at the moment of implementation of the Escape Form.

In hospitals A and C, training was implemented for emergency department nurses; 43 (95%) emergency department nurses participated up to March 2009.

Interrupted time-series analysis shows a direct significant increase in the screening rate after training and, subsequently, an increasing trend from March 2009 on. In hospital B, 22 (55%) emergency department nurses were able to attend the training but without a direct significant effect on the screening rate.

In the middle of our study period (February 2008 to December 2009) the Dutch Health Care Inspectorate legally required screening for child abuse in all emergency departments. After this change, the screening rate increased sharply, in addition to the already increasing screening rate. Also, after this change in national policy, the increase in the screening rate persisted.

Interrupted time-series analyses of the individual hospitals showed the best positive effect of training of nurses on

**TABLE 2** Characteristics of All Emergency Department Visitors Aged  $\leq 18$  y During the 23-mo Study Period in Seven Dutch Hospitals Classified by Cases of Suspected Child Abuse or Total Population

Characteristics	Cases Not Involving Suspected Child Abuse	Cases of Suspected Child Abuse	<i>P</i> <sup>a</sup>	Total Population
Emergency department visitors	103 785 (99.8%)	243 (0.2%)		104 028
Age, y				
0–4	41 952 (40%)	150 (62%)	<.001	42 102 (40%)
5–8	17 865 (17%)	37 (15%)		17 902 (17%)
9–12	17 220 (17%)	25 (10%)		17 245 (17%)
13–18	26 748 (26%)	31 (13%)		26 779 (26%)
Gender (male)	58 322 (56%)	123 (51%)	.080	58 445 (56%)
Referrer				
Self-referral	49 990 (48%)	102 (42%)	<.001	50 092 (48%)
General practitioner	31 751 (31%)	76 (31%)		31 827 (31%)
Other	17 985 (17%)	54 (22%)		18 039 (17%)
Unknown	4059 (4%)	11 (5%)		4070 (4%)
Treating physician				
Surgeon	50 475 (49%)	151 (62%)	<.001	50 626 (49%)
Pediatrician	43 374 (42%)	75 (31%)		43 449 (42%)
Other	9493 (9%)	17 (7%)		9510 (9%)
Unknown	443 (0.4%)	0		443 (0.4%)
After emergency department visit referred to				
Home	42 728 (41%)	61 (25%)	<.001	42 789 (41%)
Outpatient department	23 158 (22%)	76 (31%)		23 234 (22%)
Hospital admission	14 674 (14%)	55 (23%)		14 729 (14%)
Other	13 527 (13%)	29 (12%)		13 556 (13%)
Unknown	9698 (9%)	22 (9%)		9720 (9%)
Completed checklists (screen rate)	37 221 (36%)	183 (75%)	<.001	37 404 (36%)

<sup>a</sup> Categorical variables calculated with the  $\chi^2$  test.

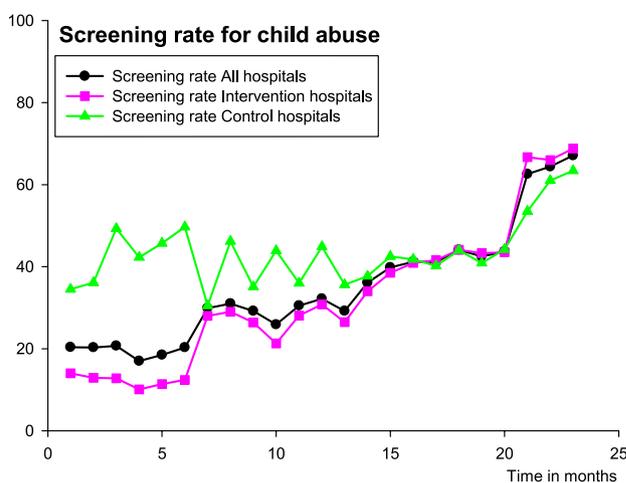
the screening rate in hospital A (ie, from 29% to 65%). The screening rate in hospital B showed the best increase after the implementation of screening (ie, from 3% to 34%). In hospital C, the screening rate had been increasing since screening became legally required, and the training for emergency

department nurses had an additional positive effect on this trend. Implementation of the Escape Form in hospital D after legal requirement of screening did not have a significant effect on the screening rate. In the control hospitals E and G, there was a positive effect on the screening rate after screening became

legally required, but this was not seen in control hospital F.

### Detection Rate

Between February 2008 and December 2009, of the total 104 028 children, 306 (0.2%) were reported to the child abuse teams of 1 of the 7 hospitals. Of these, 63 children were not considered to be a case of abuse by the 4 professionals (A.B., A.T., M.A., and E.L): 12 children due to alcohol intoxication, 4 due to a suicide attempt, and 29 due to injuries caused by strangers or peers, and in 18 cases there was insufficient information to make a judgment. In 50% of the scored cases, all 4 professionals agreed on classification as a case or as no case. The agreement rate for 3 or more professionals was 70.6%. The 243 (0.2%) cases that were considered suspected of abuse, and thus included for the analysis, were significantly younger than the total pediatric emergency department population (4.7 vs 7.2 years;  $P < .001$ ). The



**FIGURE 1**

Plot of the average screening rate for child abuse in 7 Dutch emergency departments from February 2008 to December 2009.

cases of suspected child abuse were less often self-referrals, were more often surgical problems, and were more often hospitalized. The most reported diagnoses of the cases were fractures (19%), burns (8%), and minor head injury (8%). Cases of suspected child abuse were more often screened by emergency department staff than children in the total pediatric emergency department population (75% vs 36%,  $P < .001$ ) (Table 2).

Pooled ORs for detection of suspected child abuse in children screened in the 7 hospitals was 4.88 (95% confidence intervals, 3.58–6.68) (Fig 2). In other words, the detection rate of suspected child abuse was significantly higher in children who were screened for child abuse than in those not screened for child abuse (0.5% vs 0.1%,  $P < .001$ ).

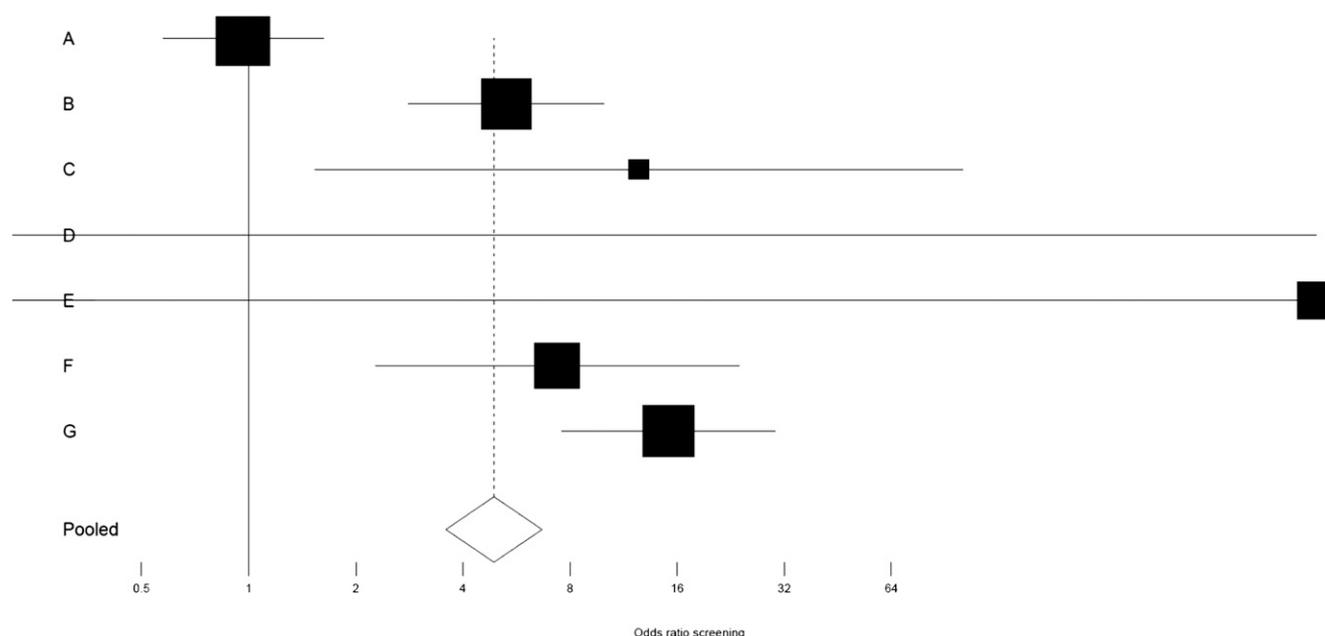
## DISCUSSION

Screening for child abuse in Dutch emergency departments proved to be effective in detecting suspected child

abuse. Training of emergency department nurses and making screening a legal requirement were appropriate interventions for optimizing the screening rate for child abuse in emergency departments. During a period of 23 months, the detection rate of suspected child abuse in 7 emergency departments was 0.2% of all 104 028 children aged 18 years or younger. The detection rate was significantly higher in children screened for child abuse than in those not screened for child abuse (0.5% vs 0.1%,  $P < .001$ ).

The screening rate for child abuse increased during the study period, probably as a result of various interventions. The difference in the detection rate of screened children (0.5%,  $N = 183$ ) and of nonscreened children (0.1%,  $N = 60$ ), and the pooled ORs of 4.9 for detection of suspected child abuse in screened children, supports the importance of screening for child abuse. An abnormal OR of 0.96 in the university children's hospital A may be explained by the historical presence of a high

awareness for child abuse. In some hospitals, the age limit for screening was not 18 but 16 years; however, analyses using 16 years as the age limit had no significant effect on the results. A limitation of the study is that the hospitals were not randomized to the intervention and the control arm. However, randomization was impossible for both logistical and ethical reasons. For instance, if all staff had recently been trained in screening for child abuse, training them in the context of the current study was not logistically possible. Also, for example, if a hospital wanted to introduce screening for child abuse as soon as possible, we considered it unethical to ask them to postpone this because of our plans for implementation. In all 7 hospitals, we performed baseline monitoring during a 6-month period to measure all the differences in the screening and detection rates of child abuse.<sup>7</sup> This showed that differences in the screening rates between the intervention and control hospitals at the start of the implementation



**FIGURE 2**

Forest plot: ORs for detection of suspected child abuse in children screened in the 7 Dutch hospitals and pooled ORs. Squares are proportional to the number of cases with confidence intervals shown as horizontal solid lines, pooled OR is represented by the center line of the diamond and confidence intervals as the lateral tips of the diamond, and the solid vertical line indicates no effect.

study are clearly visible (Fig 1). However, this does not alter the results of the interventions.

In many countries, screening for child abuse in emergency departments is not common practice. We believe this is the first prospective intervention cohort study describing the effects of interventions on the screening and detection rate of suspected child abuse. Of the literature reviews on screening tests for child abuse in emergency departments, all conclude (but do not prove) that screening is useful to improve the detection of child abuse.<sup>9–12,18</sup> Our study supports these reviews in the effectiveness of screening for suspected child abuse in increasing the detection rate of child abuse in emergency departments. More convincing evidence for the effectiveness of screening might be provided by a randomized controlled trial; however, such a study is not legally feasible in the Netherlands. Despite many studies documenting the need for training in recognizing and handling child abuse, few studies have specifically tested a specific type of training for emergency department staff. There is some evidence that certain types of child protection training (didactic, interactive, and computer assisted) may have a positive influence on professional knowledge, attitudes, and behavior in relation to child abuse detection and knowledge.<sup>18</sup> Specifically for emergency departments, 1 study showed no improvement in documentation of cases of possible physical child abuse after three 1-hour didactic sessions and a reminder checklist in the patients' chart.<sup>19</sup> Another study showed that e-learning improved the performance and self-efficacy of emergency department nurses in the detection of child abuse.<sup>15</sup>

In the middle of our study period (ie, January 2009), the Dutch Health Care Inspectorate legally required screening for child abuse at emergency departments;

all hospitals received details on the requirements they had to meet.<sup>8</sup> All hospitals have to submit an annual report on the screening and detection rate for child abuse to the Health Care Inspectorate, who annually visit a number of hospitals to monitor compliance with screening. Introduction of the legal requirement of screening had an overall positive effect on the screening rate for child abuse in the current study, as well as significant differences at the hospital level.

Screening for child abuse in the emergency department should be embedded in the routine structure of all hospitals and (on a practical level) supported by electronic systems and (on a rational level) supported by policymakers and emergency department managers. Nevertheless, additional ways to increase the awareness of child abuse at emergency departments are needed since the detection rate of 0.2% remains very low. Compared with other countries, there may be a different threshold being applied, or there are still false-negative cases in the cohort. For optimal effect, the screening instrument could be made a required part of the electronic patient file, thereby obliging emergency department staff to complete the form before they can close the patient's chart. This measure was implemented in hospital B and probably explains the considerable increase in the screening rate that occurred in the past 3 months of our study period.

Various barriers were experienced when implementing screening and training for child abuse. Because the emergency department is a busy environment, it was difficult to achieve a 100% screening rate, due to lack of time, lack of awareness, and, possibly, lack of motivation. Successful implementation of an intervention in health care is seldom easy because of the numerous factors influencing such an implementation.<sup>20,21</sup>

Limitations of this study include the possibility of an overestimation of "actual" cases of child abuse, since we presented cases of suspected child abuse. Also, we do not know the number of false-negative cases of child abuse in the children not suspected of abuse. We cannot exclude the possibility that screening tools were being applied inconsistently. However, considering the numbers of completed checklists (37 404) and detected cases of potential abuse (243), we believe that, most of the time, the screening tools were applied independently of concerns of the nurse.

The prospective study focused on implementation of the screening instrument and on training. However, during the study period there were many changes in national (eg, screening became a legal requirement) and local policy for child abuse, and child abuse was a "hot item" in the media. Therefore, it was impossible to unravel all of these known and unknown influences on emergency department staff and their screening behavior.

The strengths of this study are the implementation of the Escape Form, a relatively long study period of 23 months, a large number (104 028) of children, inclusion of all consecutive patients ( $\leq 18$  years old) who visited the emergency departments, and the fact that the results are representative for various emergency department settings, thus enhancing the generalizability of our findings.

## CONCLUSIONS

Systematic screening for child abuse in emergency departments is effective in increasing the detection of suspected child abuse. Training emergency department staff and requiring screening legally at emergency departments increase the extent of screening. Future studies should focus on the validation of a screening instrument for child abuse in emergency departments.

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## **APPENDIX** Inclusion and Exclusion Criteria for Study Cases

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### Inclusion Criteria

1. Injury caused by a person the child is dependent on
2. Injury resulting from neglect by caregivers
3. Psychological harm resulting from actions of the person the child is dependent on
4. Psychological harm resulting from failure of the person the child is dependent on
5. Withheld from medical care
6. Child was witness of domestic violence
7. Child was witness of sexual acts
8. Child was victim of sexual acts

### Exclusion Criteria

1. Suspicion of abuse reported before emergency department visit
  2. Alcohol intoxication
  3. Suicide attempt
  4. Injury caused by stranger or peers
-

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