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REVIEW

Educational paper

Detection of child abuse and neglect at the emergency room

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Abstract The emergency room (ER) represents the main system entry for crises-based health care visits. It is estimated that 2% to 10% of children visiting the ER are victims of child abuse and neglect (CAN). Therefore, ER personnel may be the first hospital contact and opportunity for CAN victims to be recognised. Early diagnosis of CAN is important, as without early identification and intervention, about one in three children will suffer subsequent abuse. This educational paper provides the reader with an up-to-date and in-depth overview of the current screening methods for CAN at the ER. *Conclusion*: We believe that a combined approach, using a checklist with risk factors for CAN, a structured clinical assessment and inspection of the undressed patient (called 'top–toe' inspection) and a system of standard referral of all children from parents who attend the ER because of alcohol or drugs intoxication, severe psychiatric disorders or with injuries due to intimate partner violence, is the most promising procedure for the early diagnosis of CAN in the ER setting.

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Keywords Child abuse and neglect · Emergency room · Risk factors · Partner violence · Checklist · Screening methods

Abbreviations

ER	Emergency room
CAN	Child abuse and neglect

Introduction

Child abuse and neglect (CAN) is a highly prevalent important medical and social problem [13, 19, 28, 50, 58]. Studies based on reporting by professionals or on administrative data performed in the US, Canada and the Netherlands show a national incidence rate of 1.6–3% [13, 18, 91–95, 97]. Community-based studies using self-reports of parents or children show tenfold or even higher rates than studies based on reporting by professionals or on administrative data, even though many incidences are never omitted or reported by parents or children [19, 28, 58].

Assessing the incidence of CAN in Europe is difficult as many different definitions are used and, in many countries, national registries are lacking. In a systematic review on physical abuse, Woodman et al. state in their review on screening methods for CAN in injured children presenting at the ER that the most effective protocol is to report all injured infants and children who have had previous contact with social services or mental health services or were registered in the Child Protection Register (CPR), so-called social work active children, to social services for further investigation [102].

Woodman et al. concluded that there is consistent evidence that physical abuse affects about 1 in 11 children

in the UK each year [102]. However, the true extent of CAN remains unknown and many published studies have been criticised for under-representation [49, 51, 56, 64, 91–93, 95].

The emergency room (ER) represents the main system entry for crises-based health care visits. Therefore, ER personnel may be the first hospital contact and opportunity for CAN victims to be recognised. It is estimated that 2% to 10% of children visiting the ER are victims of CAN [4, 5, 32, 35, 38, 42, 70, 72]. Other studies, one from New York and two from the Netherlands, show significantly lower figures (respectively, 0.14% and 0.1% of confirmed cases and 0.2% of suspected CAN) [6, 43, 54]. Reasons for the low incidence in these three studies are not clear. One possible explanation is a low number of completed CAN checklists [54]. Knowledge, training, attitude and experience of health care personnel, socioeconomic status of the family, familiarity, injury characteristics and concerns about lost patients revenue and available resources for referral are factors that have shown to play a role in identification and reporting of CAN [20–22, 25, 41, 75, 89].

Recognising CAN victims in the everyday routine of an ER is a major challenge for ER health care personnel. There is evidence that potential CAN is under-detected by clinical as well as nursing staff [27, 40, 67, 68, 71, 74, 81, 84]. Early diagnosis is very important because, without early identification and intervention, approximately one in three children will suffer subsequent CAN [12, 76, 82]. Moreover, there is evidence to suggest that 20–30% of children and youth who die from CAN have previously been seen by health care providers for abusive sequelae before CAN was formally identified [8, 40, 45].

Another important reason for early detection is the possible prevention of serious long-term adverse physical and psychological health outcomes as well as behaviours that increase the risks for such outcomes and criminality. Important retrospective and ongoing prospective studies with adults show graded relationship between the number of categories of childhood exposure (the Adverse Childhood Experience (ACE) score) and adult health risk behaviours and diseases [1, 2, 14, 15]. The number of categories of ACE showed a graded relationship to the presence of adult diseases including ischaemic heart disease, cancer, chronic lung disease, skeletal fractures and liver disease, the leading causes of death in adults. The effect of ACE seems not to be influenced by social changes over time [16]. Studies on behaviour have shown that victims of CAN are at risk for young adult tobacco smoking, preteen alcohol use and unsafe sexual behaviour [31, 36, 77, 78, 90]. Other studies have shown a relation between CAN and an increased risk for hospital-based treatment prior to 18 years for physical and mental health symptoms, ranging from asthma to depressive disorders [9–11, 37, 39, 46, 62, 66, 87, 96]. On a more fundamental level, studies on neurobiological effects of CAN point to structural and functional abnormalities in brain development [59, 85, 86]. The effect of CAN has been observed in several neurobiological systems: atypical development of the hypothalamic–pituitary–adrenal axis; reduced hippocampus volume, a structure implicated in memory formation and retrieval (learning); structural and functional abnormalities have been observed in the prefrontal cortex, a region implicated in emotion regulation, planning and perspective taking, and in the amygdala, a structure involved in fear responses [2, 55].

In light of the above, it is clear that early recognition of CAN is paramount. However, health care professionals often fail to recognise victims of child maltreatment and, therefore, there is an urgent need for reliable screening methods for CAN in ERs [8, 52, 67, 68, 74, 84, 88, 99]. In this review, we will present an overview of published screening methods and present the methods that, in our view, are the most likely to enhance CAN detection at ERs.

Overview of screening methods for child abuse and neglect at ERs

The aim of a screening method at the ER should be to detect CAN with a high sensitivity and specificity. Missing CAN may have detrimental effects on the physical and mental health of the child, both in the short term as well as in the long term. In the most severe CAN cases, it can even result in the death of a child. On the other hand, a false-positive test in suspected CAN in nearly all cases will have a severe social impact. Such an outcome will put both parents/caretakers and the child under strain; it might lead to formal complaints and disciplinary cases. It can also lead to a lower compliance by ER personnel, thus decreasing the effect of the screening method.

For this educational paper, screening methods for the detection of CAN are divided into six categories.

Checklists with risk factors

Throughout the world, ERs use checklists with risk factors for CAN [5, 53, 54, 81, 101, 102]. In the Netherlands, many ERs use a checklist with nine risk factors (the so-called SPUTOVAMO list, Table 1), or a variant of this list, based on personal/local experience or literature on risk factors for child maltreatment. Sensitivity, specificity and predictive values of the SPUTOVAMO list are unknown. In a combined paper on three systematic reviews, Woodman et al. [101] presented risk factors such as age, repeated ER attendance and type of injury as markers for CAN in injured children attending ERs. Their study showed that, although all included studies were of poor scientific quality,

Table 1 Dutch SPUTOVAMO checklist

The 9 questions on the Dutch SPUTOVAMO checklist	
Which type of injury? (contusion, stab wound, burn, cut, etcetera)	
Which place? (construct drawing)	Is this a normal place for this kind of injury? □ yes □ no*
What are the external characteristics of the injury? (color, form, border, etcetera)	Does the injury look usual? □ yes □ no*
When did the accident happen? How much time ago?	Does the appearance of the injury fit with the stated age? □ yes □ no*
What was the cause of the accident? What explanation is given?	Does the explanation fit with sort, place and appearance of the injury? □ yes □ no* □ doubtful*
Who caused the accident?	Is this person present in the ER? □ yes □ no* □ not applicable
Were witnesses present? Who?	Are the witnesses present in the ER? □ yes □ no* □ not applicable
What measures were taken by parents, carers or others?	Were the undertaken measures appropriate? □ yes □ no* Why not?
Which old injuries can be seen?	Did somebody perform an inspection for old injuries? □ yes □ no Were old injuries found? □ yes* □ no Do you have a suspicion of child abuse or neglect? □ yes* □ no

This is a translation of the Dutch SPUTOVAMO checklist for child maltreatment at the ER. SPUTOVAMO is an acronym in which each letter represents one question on the form

*Direct referral for further assessment by specialised paediatrician

age can be an important factor. Infancy increased the risk of physical abuse or neglect in severely injured or admitted children (likelihood ratios (LRs), 7.7–13.0; two studies) but was not strongly associated in all injured children attending the ER (LR, 1.5; 95% CI, 0.9, 2.8; one study). Repeat attendance did not substantially increase the risk of abuse or neglect and may be confounded by chronic disease and socioeconomic status (LRs, 0.8–3.9; three studies). However, to date, none of these widely used risk factors have a scientifically proven sensitivity, specificity and predictive value.

Another systematic review of Woodman et al. was performed to determine the clinical effectiveness of screening tests for physical abuse, amongst others checklists with risk factors, in children attending ERs in the UK [102]. A total of 66 studies (11 unpublished), carried out between 2004 and 2006, were included. Again, the overall quality of the studies was poor. The included studies only showed indirect evidence that checklists with risk factors may improve the sensitivity of the standard care clinical screening assessment. This evidence was derived from evaluating the changes in the referral rate for suspected abuse after the introduction of a checklist. All studies showed an increase in referrals, but whether this is due to true-positive or false-positive cases is unknown, as none of the studies reported confirmation or exclusion of CAN. The included studies did not analyse which component of a checklist was most predictive of abuse. The performance of the clinical screening assessment was poorly quantified and there was no evidence that any screening instrument was specifically sensitive for physical abuse.

A second systematic review on the value of screening tests in the ER was published by Louwers et al. [53]. Only four studies in which the intervention consisted of a checklist for indicators of risk for child abuse were included and assessed for quality. After implementation, there was a 180% increase in the rate of suspicion for CAN, but the number of confirmed cases of child abuse, reported in only two out of the four studies, showed no significant increase. A study from the same author performed in seven Dutch hospitals states a somewhat higher detection rate of suspected CAN in hospitals which have a higher completion rate of the checklist (checklist completed in 36% (16–56%) vs. in hospitals with a low completion of 0.4%) [54].

The rate of suspected CAN in these hospitals was 0.3% vs. 0.1%.

As mentioned before, a screening method yielding many false positives is highly unwanted because of the severe social consequences and the risk of downgrading the confidence in the screening method. This could lead to a decreased compliance of the ER personnel, leading to an even worse performance of the screening method.

Routine review of all ER records by a trained professional

The systematic review of Woodman et al. showed weak evidence that a community liaison nurse (CLN) improved the performance of the screening assessment in the ER by thorough review of all ER records of children [102]. Records of children with possible child protection concerns were presented by the CLN at a weekly child protection safety net meeting attended by the CLN, a consultant paediatrician, a hospital social worker and other staff. In this study, CLN review resulted in referral of nine additional children to social services (36% increase), compared to referral by clinical assessment alone. Using a clinical effectiveness model, Woodman et al. concluded that a combination of standard screening with dedicated CLN screening increased sensitivity from 43.5% to 59.0% and that the false-positive rate increased from 5% to 8.9%. However, given the poor quality of the data, these estimates are highly uncertain.

Referring all children known to have had previous contact with social services, mental health services or child protection services

Woodman et al. state in their review on screening methods for CAN in injured children presenting at the ER that the most effective protocol is to report all injured infants and children who have had previous contact with social services or mental health services or were registered in the CPR, so-called social work active children, to social services for further investigation [102]. Their statement is based on more than one assumption and several unpublished studies. Government guidelines in the UK specify that ER staff should be familiar with local procedures for checking children against the relevant CPR [3, 29, 73]. There is no uniformity of the way in which UK ERs access the CPR and there is also substantial variation in the criteria used to check the register. The most common form of access (via the duty social worker) often fails to meet the needs of ERs, principally because it is too time consuming [73]. One study reported that only 30% of 190 UK ERs routinely checked if children were registered in the CPR [73]. The risk of prejudices against parents based on CPR information is also mentioned, especially in presentations with inconsolable infant crying [24]. Sensitivity and specificity of assessing CPR status related to ER presentation is unknown, neither is the positive or negative predictive value. False negative results because the child has no CPR record while the injury is a result from non-accidental trauma are well recognised [65].

An increasing number of countries, including the UK and the Netherlands, are developing parallel data systems operating as a bridge between key professionals and agencies that offer assessments and services to children [13]. This should make it easier to determine whether a child had previous contact with social services or child protection services (CPS). To date, strict European laws on privacy protection prohibit large-scale implementation of these parallel data systems.

Various studies reporting on the prevalence of previous social work involvement among abused children have been published. Two Canadian studies address this subject. The first study, based on self-reported physical abuse in young adults, found that only 5% recalled any previous contact with social services, and only 9% of those reporting severe physical abuse [56]. The other study, based on children investigated for any type of CAN by social services, found that 42% had had previous investigations by social services [92]. Although these very different results may reflect recall bias in the first study, they raise the possibility that detection is focused on a particular subpopulation of abused children, while a large majority remains undetected. One Italian study, based on data from19 ERs that classified any type of suspected abuse based on a risk score, showed that children at high risk of abuse were four times more likely to have had previous contact with social services or mental health services than low-risk children [70]. From 1994 to 2000, in Northern Ireland, 191 children registered in the CPR were followed, 41% visited the ER on several occasions. Most ER visits were the result of accidental trauma. At the time of presentation, only six children (3%) were identified as being on the CPR [23].

Performing a complete physical inspection of every child presenting at the ER

Only one study on the performance of a checklist combined with a physical inspection of the undressed child has been published [72]. This study, conducted in 1976, dealt with children less than 6 years of age seen with an injury or poisoning in the Montreal Children's Hospital ER. This ER, at the time of the study, dealt with 6,000 injured children under the age of 6 annually. The clinical assessment comprised full physical examination by specially trained nurses who examined undressed children for bruises, burns and cuts. They also completed a ten-point checklist and

discussed their findings with the attending physician. Additional assessment was performed if necessary. Children with suspected abuse were referred to the hospital child protection team (test positive). To ascertain false negatives (abused children not referred), all ER records were reviewed by the investigators and every suspicious case was interviewed by a public health nurse at a special home or hospital visit and, if concerns persisted, referred to the child protection team. The reference standard was confirmation or exclusion of abuse by the child protection team or non-referral to the team. This combined approach of a checklist with a full physical inspection showed a promising sensitivity of 89%, with a false-positive rate of only 1% in this specific group of patients. We will illustrate this approach with a clinical case (Case A).

Referring all children from parents who attend the ER because of alcohol or drugs intoxication, severe psychiatric disorders or with injuries due to intimate partner violence

It is a well-known fact that parental alcohol and/or drug dependence, psychiatric illnesses and intimate partner (domestic) violence are risk factors for CAN [17, 26, 30, 33, 34, 38, 44, 47, 48, 57, 69, 79, 80, 91, 92, 95, 97, 98, 100, 103].

In the Hague, the Netherlands, a new policy has been introduced in which an attendance of a parent at the ER with injuries related to intimate partner violence, alcohol or drugs intoxication or with a severe psychiatric disorder is automatically followed by a mandatory report to the Advisory and Reporting Centre Child Abuse (Advies- en Meldpunt Kindermishandeling, AMK) of all children in this household. These mandatory reports are made irrespective of the fact whether or not the children were in the company of the parent at the time of presentation. The hospitals and child advocacy centres involved in this protocol claim that 98% of reported cases of possible CAN proved to be cases of CAN indeed. This figure is not surprising since being a witness of domestic violence is contained within the definition of CAN. In how many cases an intervention initiated by the AMK was necessary is not known.

A slightly different approach is used in Amsterdam; here, ERs of all hospitals refer children, from the same categories of parents attending the ER, within 1 week after initial presentation to a paediatrician specialised in social paediatrics [63]. The paediatrician carries out a full protocol for possible CAN and, if deemed necessary, refers the family for further help and intervention.

Scientific data for both approaches is currently lacking, but those involved ardently defend their approach as a potential efficient tool for the ER. We will illustrate this approach with a clinical case (Case B).

Identifying and referring all pregnant women presenting at the ER with specific well-defined psychosocial risk criteria related to drug addiction, mental insufficiency and particular social circumstances of possible relevance to problems of pregnancy and early child development

A pregnant woman's psychological health is a significant predictor of postpartum family violence [7]. In a study performed in Sweden from 1983 to 1999, amongst 1,575 pregnant women, an index group of 78 women was identified with specific psychosocial risk criteria related to drug addiction, mental insufficiency and particular social circumstances of possible relevance to problems of pregnancy and early child development [83]. A further 78 pregnant women who did not meet the inclusion criteria were used as a reference group. During a follow-up period of 16 years, 43 (57%) of the original index children and 63 (82%) of the original reference children were examined on indices of mental health and the presence of CAN. The index children, especially the boys, displayed significantly poorer mental health. Index children had an increased odd ratio of 16–27 for different social welfare interventions, and CAN had been investigated in 27% of index children compared to 1% of reference children. Early home visitation and parent education programmes are examples of evidence-based prevention programmes which, when introduced early, can prevent CAN [60]. Prenatal referral allows for early intervention, treatment and, when necessary, introduction of a guardian already before birth and early out of home placement [61]. Routine screening for psychosocial concerns of all pregnant women presenting at the ER could be a promising tool for early recognition and prevention of CAN. We will illustrate this approach with a clinical case (Case C).

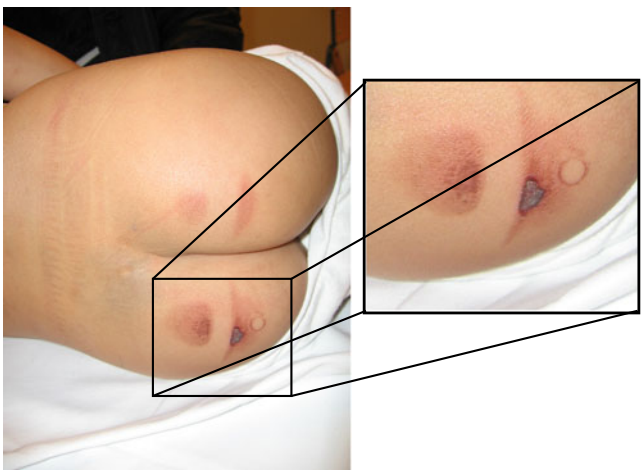

Fig. 1 Patient A showing Mongolian spots and bilateral sharply demarcated skin burns on the buttocks

Conclusion

In this educational paper, six different strategies aimed at a timely detection of CAN at the ER have been presented. For all approaches, it can be concluded that, at this time, there is no superior screening method for the detection of CAN at the ER.

In spite of the lack of evidence, the authors of this educational paper have a strong preference towards a combination of both a complete physical inspection of every child (called 'top–toe' inspection) presenting at the ER, in which case the age range has to be explored, and a system of standard referral of all (born and unborn) children from parents who attend the ER because of alcohol or drugs intoxication, severe psychiatric disorders or with injuries due to intimate partner violence. Although this will significantly increase the workload of all physicians involved, it seems to be the most valid approach. Indeed, we did find more cases of CAN after the combined introduction of these two approaches.

Cases

Case A

A 4-year-old boy presented at the ER 24 h after a staircase fall in his new home. The fall was not witnessed; he had direct complaints of shoulder pain and was sent to bed with an analgesic. As the pain lasted, his mother brought him to our ER. After initial inspection, he was send to radiology where an upper arm fracture was documented. This fracture is consistent with the clinical history and appropriate treatment could be given. However, the top–toe examination revealed bilateral skin burns of the buttocks with clear margins consistent with the imprint of an object, possibly an iron (Fig. 1). This finding led to an in-depth investigation, resulting in a diagnosis of child abuse. As a consequence of this diagnosis, child support measures could be taken and the security of the boy could be guaranteed.

Case B

Four days after an ER presentation of a female patient with injuries caused by domestic violence, her twins aged 3 years (brother and sister) were, in keeping with our protocol, presented at the outpatient paediatric clinic. At this time, a paediatrician performed a full clinical history and a physical exam. A physical exam was performed; during this top–toe examination, the girl asked the paediatrician to look at her 'poeni' (vagina). The paediatrician asked her why she thought special attention was necessary. The answer revealed a story of sexual abuse by her stepfather. This was independently confirmed by her twin brother. These findings were directly reported to the CPS, the mother filed charges and both the mother and the children were placed in a safe house.

Case C

A homeless patient was presented at the ER with psychiatric disorders and cocaine intoxication at 23 weeks pregnancy. Up to that time, obstetric controls were not performed, which is seen as a risk factor to the unborn child. The unborn child was reported to the CPS; this currently is a viable option in the Netherlands and has led to numerous successful interventions during pregnancies. Based on the investigation by the CPS, a guardian for the unborn child was appointed and the mother was placed in a rehabilitation clinic. She managed to stay clean and delivered a healthy baby at full term. With support from social services and youth services, she is now able to raise her child in her own home. The child is developing well, although CPS is still involved.

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