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Teeuw, A.H.

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Chapter 3

Results of the implementation of a new screening protocol for child maltreatment at the Emergency Department of the Academic Medical Center in Amsterdam

Teeuw, AH¹
Sieswerda-Hoogendoorn, T²
Sangers, EJ³
Heymans, HSA⁴
van Rijn, RR⁵

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1. Lecturer, Pediatrician. Department of Social Pediatrics, Emma Children’s Hospital-Academic Medical Center, Amsterdam, The Netherlands
2. Resident in Pediatrics, Department of Pediatrics, Emma Children’s Hospital-Academic Medical Center, Amsterdam, The Netherlands
3. Medical Student, Faculty of Medicine, University of Amsterdam, The Netherlands
4. Professor, Emma Children’s Hospital-Academic Medical Center, Amsterdam, The Netherlands
5. Professor, Department of Radiology, Emma Children’s Hospital-Academic Medical Center, Amsterdam, The Netherlands
Abstract

Objective - This study examines the results of the implementation of a new screening protocol for child maltreatment (CM) at the Emergency Department (ED) of the Academic Medical Center in Amsterdam, The Netherlands. This protocol consists of adding a so called ‘top–toe’ inspection (TTI), an inspection of the fully undressed child, to the screening checklist for child maltreatment, the SPUTOVAMO.

Design - We collected data from all patients 0-18 years old directly after introduction (February 2010) and 9 months later. Outcome measures were: completion of the screening and reasons for non-adherence. Data were collected on age, gender, reason for visiting the ED (defined by International Classification of Disease, ICD), presence of a chronic illness, type of professional performing the TTI and admission during week or weekend days.

Results - In February 560 and in November 529 pediatric patients were admitted. In February the complete screening protocol was performed in 42% of all children, in November in 17%. A correlation between completion of the SPUTOVAMO and having a TTI performed was found. Older age and presence of a chronic illness influenced the chance of having both SPUTOVAMO and TTI performed negatively. The completion rate of SPUTOVAMO was influenced by ICD code. Completion of TTI was influenced by type of investigator. The best performing professional was the ED physician followed by the pediatrician followed by the ED nurse. The reasons for not performing a TTI were not documented. Refusal of the TTI by a patient or parent was reported three times.

Conclusion - Implementation of this new screening protocol for CM was only mildly successful and declined in time. A negative correlation between older child age and having a chronic illness and completion of the screening was found. A practical recommendation resulting from this study could be that, if CM screening protocols prove to be effective in detecting CM; regularly training sessions have to be held. Filling out the checklist is something that could be performed by ED nurses. Performing a TTI is perhaps easier for the ED physicians to make part of their daily routine.

Highlights

• Implementation of a new screening method for child maltreatment at the Accident and Emergency Department of the Academic Medical Center in Amsterdam was only mildly successful and declined in time
• The best performing professional was the Emergency Department physician, followed by the pediatrician and the Emergency Department nurse
• Older age and presence of a chronic illness influenced the chance of having the screening method performed negatively

Key words
Child maltreatment; Checklist; Emergency Department; Screening
Introduction
Child maltreatment (CM) is a serious public health problem with severe acute and long term consequences. The prevalence of CM in the Netherlands is estimated as at least 3%. The Emergency Department (ED) represents the main system entry for crises-based health care visits and as such provides an opportunity to detect CM. It is estimated that, depending on inclusion criteria, 0.3-3% of children visit the ED because of CM. At the same time literature shows that CM is under detected by clinicians as well as nursing staff. Early identification and intervention are vital to reduce the likelihood of further CM. As a consequence many EDs have started to use screening instruments for CM.

In 2000 the ED of the Academic Medical Center (AMC) in Amsterdam implemented a Dutch checklist, the SPUTOVAMO checklist (from here on referred to as SPUTOVAMO, see Table 1), with 9 risk factors in order to detect CM. Although SPUTOVAMO to date has not been formally validated, its nationwide implementation, or variations on SPUTOVAMO, has been made mandatory in 2009 by the Dutch Health Care Inspectorate. Although the phrasing in the SPUTOVAMO is very much directed towards injuries, in clinical practice it is also being used for other complaints, e.g. abdominal pain or fever.

In 2010 a study by Pless et al. showed that, in their patient population consisting of children under 6 years of age seen at the ED with an injury or poisoning, a screening method consisting of a full physical examination in combination with a 10-point checklist had a sensitivity of 89% for the detection of CM, with a false-positive rate of only 1%. Based on these promising results we added the so called ‘top–toe’ inspection (TTI), a full physical examination of the undressed patient, to the screening protocol in our center.

The aim of our study is to evaluate the implementation of the new protocol (consisting of both the checklist and fully undressed top-toe inspection), mandatory for every patient 0-18 years old presenting at the ED, directly after introduction and 9 months later. We are not aware of other published studies with the aim to evaluate implementation of screening tests for CM. The studies of Louwers et al, aimed at determining the value of a checklist for CM and performed in the Dutch healthcare setting as well, shows that completion of this checklist was only successful in 36-79% of pediatric ED visitors. We will describe the completion of both instruments over time and the relationship between completion and age, gender, reason for visiting the ED (defined by International Classification of Disease, ICD), the presence of a chronic illness, type of professional performing the TTI and admission during week or weekend days.

Methods
Setting of this study was the ED of a large teaching hospital in Amsterdam. In the Netherlands, the ED is a place where patients are seen with acute problems. Patients have to be referred to the ED by a general practitioner (GP), or can visit the ED directly, which
is discouraged. The GP is a first-line doctor who is in most non-life-threatening cases consulted by patients with their complaints. Most health problems will be treated by the GP, if the GP thinks specialized care is needed; he/she will refer to the OPD for non-acute complaints, or the ED for acute problems.

Table 1. Dutch SPUTOVAMO checklist

<table>
<thead>
<tr>
<th>The 9 questions on the Dutch SPUTOVAMO checklist^ 21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Which type of injury? (contusion, stab wound, burn, cut et cetera)</td>
</tr>
<tr>
<td>Which place? (construct drawing)</td>
</tr>
<tr>
<td>Is this a normal place for this kind of injury?</td>
</tr>
<tr>
<td>[ ] yes</td>
</tr>
<tr>
<td>What are the external characteristics of the injury? (color, form, border, etcetera)</td>
</tr>
<tr>
<td>Does the injury look usual?</td>
</tr>
<tr>
<td>[ ] yes</td>
</tr>
<tr>
<td>When did the accident happen? How much time ago?</td>
</tr>
<tr>
<td>Does the appearance of the injury fit with the stated age?</td>
</tr>
<tr>
<td>[ ] yes</td>
</tr>
<tr>
<td>What was the cause of the accident? What explanation is given?</td>
</tr>
<tr>
<td>Does the explanation fit with sort, place and appearance of the injury?</td>
</tr>
<tr>
<td>[ ] yes</td>
</tr>
<tr>
<td>Who caused the accident?</td>
</tr>
<tr>
<td>Is this person present in the ED?</td>
</tr>
<tr>
<td>[ ] yes</td>
</tr>
<tr>
<td>Were witnesses present? Who?</td>
</tr>
<tr>
<td>Are the witnesses present in the ED?</td>
</tr>
<tr>
<td>[ ] yes</td>
</tr>
<tr>
<td>What measures were taken by parents, caregivers or others?</td>
</tr>
<tr>
<td>Were the undertaken measures appropriate?</td>
</tr>
<tr>
<td>[ ] yes</td>
</tr>
<tr>
<td>Which old injuries can be seen?</td>
</tr>
<tr>
<td>Did somebody perform an inspection for old injuries?</td>
</tr>
<tr>
<td>[ ] yes</td>
</tr>
<tr>
<td>Were old injuries found?</td>
</tr>
<tr>
<td>[ ] yes*</td>
</tr>
<tr>
<td>Do you have a suspicion of child maltreatment?</td>
</tr>
<tr>
<td>[ ] yes*</td>
</tr>
</tbody>
</table>

^Translation of the Dutch SPUTOVAMO checklist for child maltreatment at the ED. SPUTOVAMO is an acronym in which each letter represents one question on the form.  
* Direct referral for further assessment by specialized pediatrician
Prior to the addition of TTI to the screening protocol for CM, extensive training sessions were held. Nurses and physicians of the ED were invited for a full day in-house training session. In this session they received theoretical background on CM, instruction on how to perform the TTI, injury recognition using images of CM related injuries, and communication role-play training with actors. Attendance of the training was mandatory and all involved professionals were trained. Barriers of the professionals against the new protocol were collected and discussed. After this initial training the ED physicians received another instructional exercise with volunteers of three different age groups: infants, school-aged children and adolescents. During the study period, between February 2010 and November 2010, staff turnover was estimated to be 15%. All new personnel received a short introductory course consisting of a theoretical lecture about CM and the TTI, followed by three or more supervised TTIs in patients.

All patients between the ages of 0 to 18 years who presented in our ED were included in the study. According to protocol SPUTOVAMO was to be completed by the ED triage nurse in all cases. Patients admitted to the pediatric ward should have a TTI performed by a pediatrician, those directly admitted to the ED physician by an ED physician and those admitted to other specialties should have the examination done by an ED nurse (see Figure 1). Both forms (SPUTOVAMO and TTI) gave the professional the opportunity to document reasons for not performing these screening tests. In some cases, based on hospital triage rules, non-referred patients are sent to the general practitioner, who practices on the hospital grounds, by the ED triage nurse. In these cases SPUTOVAMO should be completed, but by protocol these children do not undergo a TTI (see Figure 1).

Figure 1. Flow diagram showing the professional performing the TTI
Data collection and processing
We collected data for two separate months, first directly after the introduction of the TTI to the screening protocol (February 2010) and 9 months later (November 2010). Primary outcome measure was completion of SPUTOVAMO and TTI. Furthermore we collected data on possible factors influencing completion of SPUTOVAMO and/or performing TTI.

These factors were:
1. Patient’s age and gender
2. Reason for visiting the ED classified using the ICD-10 in 17 categories: (0) unknown, (1) infection, (2) neoplasm, (3) endocrine, feeding disorder, metabolic or immune disease, (4) hematology (5) psychiatry, (6) central nervous system and senses, (7) heart and blood vessels, (8) respiratory system, (9) gastro-intestinal system, (10) urogenital system, (11) obstetric complications, (12) skin and subcutaneous tissue, (13) bone, muscle and collagen tissue, (14) congenital disorders, (15) perinatal disorders, (16) complaints not otherwise classified, and (17) injury and poisoning.
4. Professional performing the TTI.
5. Admission during a week or a weekend day.

The correlation between completion of the SPUTOVAMO and the performance of a TTI was analysed.

Statistical analysis
Statistical analysis was performed with PASW Statistics for Windows, Version 18.0. (Chicago: SPSS Inc.). Non-normally distributed data were described with median and interquartile range (IQR). Pearson Chi square was used for calculating statistical difference in performing SPUTOVAMO and TTI between February and November. Factors influencing chances for performing SPUTOVAMO and TTI were assessed with Pearson’s Chi square in case of two variables and with univariate logistic regression in case of more than 2 variables or numeric variables. A p-value <0.05 was used as cut-off.

Results
In February 560 and in November 529 pediatric patients were admitted to the ED of the AMC. Patient characteristics are shown in Table 2. ICD code distribution was almost similar in February and November and is shown in Figure 2 for both months, the majority of the patients could be classified in the main categories skin and subcutaneous tissue (22%), bone, muscle and collagen tissue (22%), infection (13%), gastro-intestinal system (13%) and unknown (8%).

In February in only 5.6% of all patients, the paper patient file showed data on the presence of a chronic illness. This was insufficient to perform a statistical analysis. In November,
Results of the implementation of a new screening protocol for child maltreatment

Table 2. Patient characteristics

<table>
<thead>
<tr>
<th></th>
<th>February 2010</th>
<th>November 2010</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of patients admitted</td>
<td>560</td>
<td>529</td>
<td>NS*</td>
</tr>
<tr>
<td>Female</td>
<td>265 (47.3%)</td>
<td>212 (40.1%)</td>
<td>NS*</td>
</tr>
<tr>
<td>Male</td>
<td>295 (52.7%)</td>
<td>317 (59.9%)</td>
<td>NS*</td>
</tr>
<tr>
<td>Mean age/ Median age</td>
<td>7.95/ 6.4 (IQR 11.94)</td>
<td>7.95/ 7.5 (IQR 11.45)</td>
<td>NS*</td>
</tr>
</tbody>
</table>

* NS = Not significant

ICD code

**Figure 2. Chart bar ICD codes**
after the implementation of an electronic patient file, 146 patients were known with a chronic illness, 380 patients had no chronic illness; in 2 patients medical history was unknown. In February in 199 of 477 children (42%), who by protocol should have had a SPUTOVAMO and TTI performed, both procedures were documented. In November this was the case in 73 of 433 children (17%).

SPUTOVAMO
In 416 of 560 cases SPUTOVAMO (74%) was completed in February, in November 223 SPUTOVAMO (41.2%) were completed. Completion was 1.8 times lower in November compared to February (95% CI 1.6-2.0; p=0.00) (no difference if missing cases are analyzed either as completed or as not completed).

Logistic regression showed that older children are less likely to have had a SPUTOVAMO in both February and November. The percentage of infants (children aged < 1 year) with a completed SPUTOVAMO was 48% for February and 49% for November. In February the odds decreased by 7.4% (p=0.00) for every year increase in the child’s age. In November the odds decreased by 5.2% (p=0.00) for every year increase in the child’s age. SPUTOVAMO, assessed in the population of February and November as a whole, was completed in 60% of females and 57.7% of males (p=0.55).

Because ICD code distribution was almost similar in February and November we analyzed the whole study group as one. In 1066 of 1089 children of the group (92.3%) the ICD code was known. We compared the different ICD codes with ICD code (1) infection, a condition of which we assumed that the ED visit had no relation with CM. Compared to the ICD code ‘infection’ ICD code ‘skin and subcutaneous tissue’ had an OR for completing SPUTOVAMO of 1.9 (p=0.003). ICD code ‘gastro-intestinal system’ had an OR of 0.08 (p=0.001) for completing SPUTOVAMO compared to ‘infection’. No relevant OR could be calculated for the remaining ICD codes due to the low number of patients per group.

The correlation with the presence of a chronic illness could only be analyzed for November. SPUTOVAMO was completed in 31.5% of the patients diagnosed with a chronic illness compared to 46.6% of the patients without a chronic illness, (RR 0.68; 95% CI 0.52-0.88; p=0.00). There was no significant difference in completion of SPUTOVAMO between weekdays (59.9%) and weekend days (56.5 %); p=0.37. Professionals never documented the reasons for not performing the SPUTOVAMO.

Top-toe inspection
In February 217 of 477 patients (45.5%), who by protocol should have had a TTI performed, underwent a TTI. In 246 patients (51.6%) this examination was not performed, in 14 patients (2.9%) the form was missing. In November 89 of 433 patients (20.6%), who by protocol should have had a TTI performed, underwent a TTI (See Figure 3 for results in the total population).
The relative risk for undergoing a TTI was 2.2-2.4 times lower in November compared to February (95%CI 1.8-2.7 and 1.9-2.9 respectively, p=0.00) (a minimum and maximum RR are given, depending on whether the missing forms are counted as ‘TTI not performed’ or ‘TTI performed’). In February in 3 cases the parents or patient refused a TTI in November no parental or patient refusal was recorded. In none of the three cases a reason for refusal was recorded.

Completion of the SPUTOVAMO resulted in a higher chance of having a TTI performed; relative risk was 5.4 (95%CI 3.8-7.5; p=0.000). Logistic regression showed that older children were less likely to undergo a TTI both in February and November. Missing cases were not included for analysis (2.5% in February, 0% in November). The estimated percentage of infants under 1 year old having a TTI performed in February is 49%. In February the odds decreased by 4.9% for every year increase in the child’s age (p=0.001). The estimated percentage of infants under 1 year old having a TTI performed in November is 49%. In November the odds decreased by 5.6% for every year increase in the child’s age (p=0.005).

In the total group of patients who should have undergone a TTI (910 patients) 43.2% were female and 56.8% were male. In the group of patients in whom a TTI actually was performed 127 (41.5%) were female and 179 (58.5%) were male (Pearson Chi-Square 0.54, p=0.46).

As ICD code distribution was almost similar in February and November we analyzed the whole group as one. In 1006 of 1089 children (92.3%) the ICD code was known. We compared the different ICD codes to ICD code (1) infection however, no relation between ICD code and performing a TTI was found.

In November 433 patients should have had a TTI performed according to protocol, 140 patients were known with a chronic illness (32.5%). The chance of having a TTI performed for patients with and without a chronic illness in November was low, 11.6% (17 of 146 patients) and 18.9% (72 of 380 patients) respectively. The RR for having a TTI performed in patients with a chronic illness was 0.61; 95%CI 0.38-1.00; p=0.05.

Figure 3 shows the completion in relation to the type of professional indicated to perform this examination. In both months, ED physicians completed the TTI most frequently compared to other professionals (53.4% and 28.6% for February and November respectively), followed by pediatricians (37.0% and 11.8%) and ED nurses (33.3% and 4.7%). Compared to the best performing professional (the ED physician), in February, the ORs for performing a TTI by the pediatrician and ED nurse were 0.51 (p=0.005) and 0.44 (p=0.003) respectively. Compared to the best performing professional (the ED physician), in November, the ORs for performing a TTI by the pediatrician and ED nurse were 0.33 (p=0.001) and 0.12 (p=0.001) respectively. There was no significant difference in completion of the TTI between weekdays (35.2%) and weekend days (30.5%); p=0.20. Professionals never documented the reasons for not performing the TTI.
Discussion

Our study showed that the implementation of the new screening protocol consisting of addition of TTI to SPUTOVAMO was moderate in February and declined after a 9 month interval.

The implementation rate of the new protocol in our study is higher compared to the published rate in the multicenter study of Louwers et al. on the implementation of a CM-checklist in seven Dutch hospitals. In this study the checklist was completed in 36% of the patients visiting an ED complying with screening guidelines and 0.4% in patients visiting a hospital not complying with the screening protocol. In a subsequent study of the same author the screening rate with a checklist rose from 20% to 67% after training sessions for nurses, however no long term follow-up was presented. In her latest study performed in three Dutch hospitals implementation rate was 47.9%. Our study adds to these studies that we tried to determine factors influencing the implementation of screening protocols for CM.

Implementing new protocols among health care staff is a difficult topic, on which extensive research has been performed. Influencing people on their approach to CM is especially difficult; it is known that many professionals have reluctance in dealing with suspicions of CM. Reported causes of this reluctance are disbelief of the existence and magnitude of CM, difficulties with communication of suspicions with children and their parents, fear of legal consequences, fear for an increased workload, and fear of false accusations. The lack of validation studies on the performance of SPUTOVAMO and TTI for detecting CM at the ED can also deter professionals from applying these screening methods in their daily routine. Performing a TTI of every patient, even when they are admitted with minor injuries, might form an obstacle for others.

![Figure 3. Schematic representation of the performed screening in the total patient group](image)
Results of the implementation of a new screening protocol for child maltreatment

There are several issues that influence implementation of and adherence to new protocols in general. In this study we found that time between training and adherence to protocol is an important factor. This could be explained by a tapering effect of training, a possible decrease of motivation in time. A practical recommendation resulting from this study could be that regularly training sessions have to be held.

During data collection, every day practice at the ED was changed due to the introduction of electronic patient files in July 2010. The screening protocol however, was not altered. The implementation of this electronically patient file seemed to influence adherence. Health care workers were able to take the paper file to the patient examination room. During working with the file the TTI form was directly visible. In the electronic patient file the professional has to open a specific page to fill out the SPUTOVAMO checklist and a different page to describe the TTI findings. The paper file gave less opportunity to ‘forget’ these procedures. Clearly, every day busy practice is always an obstacle for firm implementation of screening protocols aimed at CM.

Completion of the SPUTOVAMO resulted in a higher chance of having a TTI performed. It is possible that some patients raise more suspicion for CM motivating both the triage nurse and the second professional seeing the child to start screening for CM.

Risk factors for a failure to complete both SPUTOVAMO and TTI in our study were age and the presence of a chronic illness. With respect to TTI this result was to be expected, as many professionals find it easier to inspect a fully undressed infant or toddler compared to an older child or adolescent. For the completion of the SPUTOVAMO checklist the results are more difficult to explain. Perhaps professionals have the false idea that CM only affects younger children, or suspect that older victims of CM have the opportunity and capacity to speak freely about CM to the attending physician.

We found that the presence of a chronic illness had a negative correlation with completion of SPUTOVAMO. This is in contrast with the knowledge that children with a chronic illness have a higher risk of becoming a victim of CM. Perhaps familiarity with the patient and his family, repetitive visits to the ED and a higher likelihood that the reason for admission is accepted by the healthcare professional play a role in this finding.

The fact that ICD code (12) ‘skin and subcutaneous tissue’ had a positive correlation with completion of SPUTOVAMO in our study is to be expected as many skin lesions have CM in the differential diagnosis and 50-75% of all physical abuse cases have cutaneous manifestations. ICD code (9) ‘gastro-intestinal system’ had a negative correlation with completion of SPUTOVAMO. Perhaps a link between gastro-intestinal complaints and CM is less clear to the attending professional. In contrast some studies suggest that belly ache and constipation are more often seen in (sexually) abused children. The ICD code showed no relation with performing a TTI.
Gender showed no correlation with both completion of SPUTOVAMO and performance of TTI. At the start of the study we expected that the professionals would have more difficulties in performing TTI in girls, especially in pubertal girls, in light of the mixed population of children from many different ethnic backgrounds who are present at the AMC. In Amsterdam the population consists for more than 50% of families from a different ethnic origin to the Dutch population as a whole.

The TTI was performed more often by ED physicians compared to pediatricians and ED nurses in decreasing order. It is however possible that a TTI is performed by pediatricians but that they didn’t specifically document this on the TTI form. ED nurses might, despite the extensive training, still find it difficult to perform the TTI. This is not part of their normal daily routine and involves newly gained knowledge. A practical recommendation resulting from this study could be that, if CM screening protocols prove to be effective in detecting CM, filling out the checklist is something that could be performed by ED nurses. Performing a TTI is perhaps easier for the ED physicians to make part of their daily routine. Although professionals never documented the reasons for not performing a SPUTOVAMO or TTI, in several team meetings ‘lack of time’ and ‘lack of proper examination rooms’ were frequently heard reasons. The latter could be addressed by redesigning or rebuilding the ED.

It is known that some Dutch hospitals have a SPUTOVAMO or revised SPUTOVAMO electronic checklist which has to be filled out before the professional is able to continue in the patient file and/or the hospital is able to send a bill. This could be a strategy to enhance the implementation. To our knowledge this approach is not evaluated so it is unknown if this strategy results in reliable checklists or whether all checkboxes are filled out randomly in order to be able to continue.

This study describes factors that play a role in the implementation of both the SPUTOVAMO and TTI. A strong feature of our study is the large number of patients, suitable for analysis, and implementation in daily routine. Our study also has some weaknesses, the fact that we could only analyze documented SPUTOVAMO and TTI reports. In reality it is possible that a TTI is performed but not documented on the separate form. As stated before we used Pearson Chi square for calculating statistical difference in performing SPUTOVAMO and TTI between February and November. This test assumes the 2 measurements are completely independently. In practice this is not totally true. Patients differ and there was some change in ED staff.

Due to Dutch privacy law, we were unable to assess possible relevant patient factors such as ethnic background, socio-economic status, and former visits to ED in other hospitals in the region. Literature shows that a higher proportion of children with an ethnic background are referred to CPS (Drake and Zuravin 1998). It is possible that ED personnel is better
motivated to perform SPUTOVAMO and TTI in patients from different ethnic groups or lower socio-economic status as CM is less likely expected in more privileged groups of patients. The fact that the reasons for not performing a TTI were seldom documented and therefore could not be analyzed is another weakness of this study. Finally a weakness of the study is the fact that some of the patients were referred to the general practitioner and do not undergo the complete screening protocol.

Conclusion
The implementation of the new screening protocol was moderate and showed a decline 9 months after introduction. The cause of this, as discussed in our paper, may be multifactorial. An important finding is the negative correlation between age and completion of both sections of the screening protocol. It is worrisome that the presence of a chronic illness, a known risk factor for CM, resulted in a significant lower chance having SPUTOVAMO and TTI performed.

The first implication of this study is that our hospital has to develop a method to improve implication of its own protocols. This might be the start of a more regular training program for health care personnel with attention to CM in older children and children with a chronic illness. Furthermore, given the (inter)national lack of validation studies on the performance of screening instruments for CM at EDs, validation studies are highly desirable.

To make a validation study possible firstly firm implementation of the new protocol is necessary, e.g. by making it mandatory to fill out the SPUTOVAMO and TTI in the electronic pediatric patient file. Future studies on the separate effect of training and screening are needed.

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