A Preliminary Screening Instrument for Early Detection of Medical Child Abuse

abstract

OBJECTIVE: The goal of this research was to develop a screening instrument for early identification among hospitalized children of medical child abuse (MCA).

METHODS: We developed a preliminary screening instrument for the early identification of MCA. Items were chosen based on published characteristics of MCA, including caregiver, patient, and illness information. Each item in the instrument was scored with 1 point if positive. This instrument was tested by reviewing the hospital charts of child protective services–confirmed MCA patients and comparing the results with charts of children with admissions for apnea, vomiting/diarrhea, and seizures who were not diagnosed with MCA. Nineteen cases and 389 controls were used for analysis. We used receiver operating characteristic curves, starting with items most highly associated with MCA in our sample. Predictive values and strengths of association were assessed by using χ² and Fisher’s exact tests, as appropriate.

RESULTS: From an initial 46 questions, we determined that 26 items showed a statistically significant difference between cases and control patients. From these, an instrument with 15 items maximized the area under the receiver operating characteristic curve, and a score of ≥4 had a sensitivity of 0.947 and a specificity of 0.956 (P < .05) in detecting MCA.

CONCLUSIONS: This chart review screening instrument identified differences in characteristics of children, caregivers, and illness during hospitalization that may allow for earlier detection of MCA and referral for further assessment to the multidisciplinary team.

INTRODUCTION

Munchausen syndrome by proxy (MSBP) was first described by Meadow in 1977 as a condition in which fabricated symptoms or signs are created or projected onto a dependent child by a parent or guardian. Roesler and Jenny proposed using the term medical child abuse (MCA) instead of MSBP to describe any situation in which a child is harmed as a result of medical interventions caused by a caregiver’s actions or reporting of symptoms. The diagnosis of MCA is often difficult, with an average time from onset of symptoms to diagnosis of 14.9 months and 21.8 months reported, respectively, in 2 large series. The availability of multiple medical tests and procedures, “doctor shopping,” subjective treatment-resistant symptoms, and a desire by the medical profession to rule out all potential medical causes are some of the reasons for a delayed diagnosis. This delay may result in significant morbidity and, in up to 6% of cases, death.
Systematically screening hospitalized children who have chronic symptoms may lead to early identification of potential MCA victims and a more rapid mobilization of resources for the patient and family. However, there are currently no widely available tools designed for use by pediatricians or hospitals to screen for MCA. This article describes the development of a preliminary screening instrument for MCA that differentiates children at risk for MCA compared with otherwise normal children hospitalized for the evaluation of 3 common pediatric conditions (apnea, vomiting/diarrhea, and seizures).

METHODS
Screening Instrument

Based on published characteristics of MCA, we developed a screening instrument to differentiate MCA from other diagnoses that can symptomatically overlap with MCA: apnea, vomiting/diarrhea, and seizures. These symptoms account for nearly 70% of MCA diagnoses. Items were chosen based on characteristics of MCA previously reported in the literature, which included caregiver, patient, and illness characteristics. Additional items were added to the screen based on the senior author’s (SS) clinical experience in diagnosing MCA.

Based on a literature review, 46 items were identified that included characteristics of the caregiver (7 questions), child (24 questions), and symptoms in the 3 study categories (apnea [6 questions], vomiting and diarrhea [4 questions], and seizures [5 questions]).

One author (SK) scored each hospitalization to ensure consistency in the scoring process. Approval was obtained from the institutional review board of Wake Forest University.

Cases

Nineteen patients with 34 hospitalizations and confirmed MCA were identified through hospital child abuse team records at a single institution from 1989 to 2009. All patients included in this cohort were previously reported to the appropriate child protective services agency, and MCA had been substantiated. A diagnosis of MCA was made by positive results on toxicology screening, video monitoring, or resolution of symptoms (illness abatement when patient was not with his or her primary caregiver). We selected the first hospitalization for each patient for review because our goal was to develop a tool useful for first admission. In addition, suspicion for MCA during previous admissions could affect documentation and potentially add circular reasoning to the comparison between MCA and control patients.

MCA patients ranged in age from 3 weeks to 12 years and included 14 females and 5 males. Ten patients had apnea as the chief complaint, 5 had vomiting and diarrhea complaints, and 4 had seizure as the primary diagnosis. There were 2 deaths.

Controls

Control charts were identified by using discharge codes from International Classification of Diseases, Ninth Revision, for patients ages birth to 18 years who were hospitalized with the discharge diagnosis of apnea, diarrhea/vomiting, or seizures/epilepsy (Table 1). Control charts were requested in 2008, and medical records were obtained for −100 consecutive patients in each category identified in 2008. There were 408 control patient hospitalizations involving 389 control patients. These included 106 hospitalizations for apnea, 199 for chronic vomiting or diarrhea, and 103 for seizures. The first hospitalization for each patient was again selected for review. These patients ranged in age from 2 days to 17 years and included 180 females and 208 males. None of these patients had any concern for MCA noted in their medical records and had not been reported to child protective services for MCA.

Data Analysis

The 46 items were identified as being present or absent in the records reviewed. We evaluated the association of each item to determine an odds ratio (OR) and 95% confidence interval (CI) for the association with case status in an unmatched analysis. Strength of association was calculated by using χ² tests and Fisher’s exact tests. Of the original 46 items, 26 items demonstrated significant statistical differences between cases and control patients (P < .05).

We combined these 26 items that were significantly associated with MCA diagnosis into a single instrument by adding them, 1 by 1, starting with the item with greatest association. A receiver operating curve (ROC) was constructed at each iteration to assess the number of items that maximized the area under the ROC curve (Fig 1). The ROC curve plots the sensitivity against 1-specificity, which is useful for determining the best screening test for an outcome. A “perfect” test would have a sensitivity and specificity of 1, which would result in a curve that starts at the origin, goes straight.
up the y-axis, and then horizontally along the x-axis. The 15-item MCA screen was the closest curve to the “perfect” test, simultaneously minimizing false-positive and false-negative results. Once the most optimal number of items was identified, the total score (ranging from 0–15) closest to the upper left corner was located on the 15-item ROC curve.

RESULTS

Final Screening Tool

ROC analysis indicated that the 15-question screening instrument using a cutoff score of ≥4 as a positive test was the most reliable screen for a hospital admission with possible MCA (Table 2). Scores of ≥4 identified 18 of 19 (94.7%) of the MCA cases in our sample, yielding a sensitivity of 0.947 (P < .05). The tool falsely identified 17 of 389 (4.4%) of the control cases, yielding a specificity of 0.956 (P < .05).

Most Predictive Items

The most predictive caregiver items included personal history of child abuse (OR: 72), features of Munchausen syndrome (OR: 46) and mental illness (OR: 8.9), caregiver requests to leave hospital against medical advice or by transfer (OR: 18), and caregiver requests for apnea monitors (OR: 9.4) (Table 2). The most predictive patient items included illness abatement out of care of the primary caregiver (OR: 89), care at >1 hospital (OR: 3.5), and consultation with >1 subspecialist (OR: 8.8). The most predictive illness characteristics included bruising of face/neck (OR: 73), toxic (OR: 46) and erratic (OR: 10.8) drug levels, and chronic vomiting and diarrhea without diagnosis (OR: 10.1).

Least Predictive Items

Items excluded from the final tool because they did not assist in distinguishing MCA from control cases were sibling deaths and hospitalizations >30 days, both of which were more common in control patients and were not statistically significant. Symptoms such as lethargy, fever, and pain were also not useful in distinguishing MCA from non-MCA children.

DISCUSSION

Case reports of MCA continue to appear in the medical literature, and many review articles on the subject note characteristics of the caretakers and child victims. These articles often give detailed recommendations regarding how to establish an MCA diagnosis and how to manage the case once MCA is suspected or identified.

Unfortunately, it does not seem that the problem originally stated by Rosenberg has been solved: “The largest impediment to early diagnosis of MSBP (MCA) was omission of factitious illness from the differential diagnosis.”

Meadow noted that “the realization that the child’s prolonged illness may have been fabricated tends to come slowly.” In fact, in Rosenberg’s 1987 case series, mean time to diagnosis...
TABLE 2 MCA Screening Instrument (15-Item)

<table>
<thead>
<tr>
<th>MCA Screening Items</th>
<th>OR</th>
<th>95% CI</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Caregiver has features of Munchausen syndrome (multiple diagnoses, surgeries, and hospitalizations, with no specific diagnosis)</td>
<td>46</td>
<td>9.9–211</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Caregiver had received counseling/psychiatric care</td>
<td>8.9</td>
<td>2.4–279</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Caregiver has personal history of child abuse</td>
<td>72</td>
<td>7.2–738</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Caregiver leaves hospital against medical advice or insists on transfer</td>
<td>18</td>
<td>3.7–825</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>History of cyanosis</td>
<td>4.8</td>
<td>1.9–12.4</td>
<td>.0497</td>
</tr>
<tr>
<td>Care at &gt;1 hospital in 6 mo</td>
<td>3.5</td>
<td>1.2–12.8</td>
<td>.0176</td>
</tr>
<tr>
<td>Consults with ≥1 subspecialist</td>
<td>8.8</td>
<td>2.9–272</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Illness abates when patient out of care of primary caretaker</td>
<td>89</td>
<td>16.4–485</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>&gt;1 episode of apnea postdischarge from nursery</td>
<td>4.5</td>
<td>1.8–11.5</td>
<td>.0007</td>
</tr>
<tr>
<td>Bruising or trauma to face/neck</td>
<td>73</td>
<td>7.2–738</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Prescription/request for apnea monitor</td>
<td>9.4</td>
<td>3.5–25.2</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Chronic diarrhea with or without vomiting &gt;2 wk</td>
<td>4.7</td>
<td>1.2–17.7</td>
<td>.0135</td>
</tr>
<tr>
<td>Chronic vomiting/diarrhea without definite diagnosis</td>
<td>10.1</td>
<td>3.4–29.0</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Erratic drug levels</td>
<td>10.8</td>
<td>1.0–124</td>
<td>.0181</td>
</tr>
<tr>
<td>Toxic drug levels on &gt;1 occasion</td>
<td>46</td>
<td>3.9–528</td>
<td>&lt;.0001</td>
</tr>
</tbody>
</table>

for MCA was 14.9 months and the mortality rate was 9%. In Sheridan’s case series published 16 years later, mean time to diagnosis was 21.8 months and the mortality rate was 6%.4

MCA perpetrators tend to “doctor shop,” choosing physicians who recommend repeat testing and invasive procedures, and removing their children from the care of those physicians who refuse to escalate treatment.25 Meadow24 suggested that physicians want to think the best of their patient families and may also be reluctant to accept that they, through unnecessary testing and treatments, caused significant morbidity to their patients. Donald and Jureidini26 suggested that our medical system may be complicit in our failure to diagnose MCA. Even when physicians are confronted with 1 or more signs that a child may be abused, they can be reluctant to report to children services.27,28

Having a lower threshold to include MCA in the differential diagnosis with an earlier consultation with a child abuse pediatrician or multidisciplinary team may limit unnecessary medical procedures and decrease the risk of morbidity and mortality.18 However, many pediatric health care providers do not routinely include MCA in the differential diagnosis, which might contribute to the well-documented delay. We propose that this preliminary MCA screening tool could be used to bridge this gap by assisting hospital-based physicians and pediatric hospitalists in identifying potential cases for referral to the child abuse pediatrician, child protection, or multidisciplinary team.

Our study demonstrated significant differences between caregivers in MCA cases and control patients, including caregiver history of mental illness, child abuse, and Munchausen syndrome. This is consistent with previous reports that the “medical problems of the parent are similar to those of the child.”28,30 We did not find that caregivers of MCA cases were overfriendly with hospital staff or spent more time at the child’s bedside. It may be that these observations are often not noted in the medical record. We also did not find an increase in abuse or unexplained deaths of siblings of MCA cases, as has been suggested in the literature.4,30 This study may have had insufficient power to find this association.

The strongest association with MCA was illness abatement when the patient was out of the care of the primary caregiver (OR: 89 [95% CI: 16.4–485]). Although this finding is important, as it is 1 of the gold standards for diagnosis of MCA, it could represent circular reasoning in our instrument if the clinician only recorded this in the medical records because the diagnosis of MCA was being considered.

Our study also demonstrated significant differences in the MCA illness characteristics, including bruising on the face and neck (concerning for suffocation), toxic drug levels, erratic drug levels, chronic vomiting and diarrhea, cyanosis, and apnea since birth hospital discharge. These symptoms are consistent with documented mechanisms of MCA in addition to other forms of maltreatment.4

We believe this preliminary screening tool would be best used for hospitalized children who have apnea, chronic vomiting/diarrhea, or seizures of unknown etiology not responsive to standard medical care. A positive screening result using this tool is neither diagnostic of MCA nor the basis for a referral to children’s services. It would, however, increase the concern for MCA in the differential diagnosis and could provide cause for consultation with a child abuse specialist or multidisciplinary team for additional assessment. The American Academy of Pediatrics Committee on Child
Abuse and Neglect recommends early involvement of professionals experienced in the diagnosis of child abuse. Involvement of child abuse teams, familiar with tools such as appropriate laboratory testing and video monitoring, can more accurately confirm MCA and prevent further morbidity and mortality.

Given the reality that MCA patients often see multiple providers, 1 potential application of this tool would be its use by hospital administration or insurance providers. These groups would have the ability to apply the screen to a larger patient base and would have knowledge about multiple provider involvement. If the screening result is positive, the primary physician could then be alerted to the potential concern of MCA. Similar screening programs by insurance companies that alert physicians to practice issues in settings of multiple providers and complex patients have been helpful in reducing potential morbidity.

There are several limitations regarding our conclusions and their generalizability. First, this was a retrospective study performed at a single institution. Second, we used a single reviewer to perform chart reviews; thus, we could not establish interrater reliability for the tool, and particularly as this reviewer was nonblinded, this creates a risk for bias and nonreproducibility. We chose comparison groups from 3 common primary diagnoses and analyzed the data by using unmatched analysis. A matched analysis may have strengthened our statistical conclusions, but controls were more recent, compared with the 20 years required to accumulate cases. Finally, our cases had a clinical determination and child protective services substantiation of MCA but not necessarily court findings or absolute certainty. Given our use of multiple comparisons among the 46 items initially identified and the use of a single chart reviewer of historical cases, this study may offer potential biases that should be addressed in other settings to evaluate its validity.

Despite these concerns, empirically validated screening tools can be useful for the diagnosis of rare conditions such as MCA. We were able to demonstrate a sensitivity of 0.947 and a specificity of 0.956 for MCA among our cases by using this preliminary 15-item screening instrument. To our knowledge, this is the first screening tool for MCA that has been developed with these test characteristics. Prospective use of this preliminary MCA screening tool in multiple hospital settings and populations is needed as a next step to assess its usefulness and accuracy in wider populations with additional medical concerns.

CONCLUSIONS

This study describes the development of a preliminary screening tool to aid in the detection of MCA among hospitalized children. This tool identified child, family, and illness characteristics that are significantly more common in MCA patients compared with hospitalized children with 3 major chronic diseases, which may assist clinicians in earlier identification and referral to child abuse physicians and multidisciplinary teams. This preliminary tool should be further evaluated in larger, multicenter, prospective trials with multiple reviewers to find evidence of clinical utility and interrater reliability among an additional number of illness presentations in both hospitalized and nonhospitalized children in broader geographic areas.

REFERENCES

13. Reisner AD. A case of Munchausen syndrome by proxy with subsequent stalking behavior.


