

# Children in Methamphetamine Homes

## A Survey of Physicians Practicing in Southeast Tennessee

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**Objectives:** Methamphetamine (meth) abuse in the rural South has increased greatly in the last decade. This addiction harms meth abusers and producers and endangers children who live with them. Appropriate medical evaluation and treatment of these exposed children are largely undefined. The objective of this research was to ascertain how emergency medical practitioners view this problem and their management approaches.

**Methods:** A survey of medical practices was mailed to 87 physicians associated with emergency departments and child services in 12 southeastern Tennessee counties with high rates of meth lab seizures. This survey asked about physicians' examination of children in provided clinical scenarios who may have been exposed to meth, their assessment of the severity of the meth problem in their area, and the utility of a standardized protocol for management. Twenty-six practitioners responded.

**Results:** In a clinical scenario developed to suggest high possibility of meth exposure, the average response regarding likelihood of meth exposure was 8 on a scale of 1 to 10. In a scenario suggesting ambiguous exposure, the physicians' mean response about likelihood of meth exposure was 4 on a scale of 1 to 10. In a third scenario presenting a confirmed meth exposure, physicians ordered the following tests: toxicology screening (96%), complete blood count (88%), oxygen saturation (76%), chest radiograph (72%), and carboxyhemoglobin concentration (52%). Ninety-two percent of respondents felt that medical knowledge of meth could be improved.

**Conclusions:** Southeastern Tennessee emergency practitioners varied in their estimation of the likelihood of meth exposure to children in different scenarios. In addition, their clinical responses to cases of definite exposure were highly divergent. These prac-

tioners also stated that standardized guidelines would aid in providing care for meth-exposed children.

**Key Words:** methamphetamine, exposure, evaluation, protocol

Methamphetamine (meth) abuse is an enormous problem that is placing a heavy burden on medical, social, financial, and legal infrastructures. In 2005, there were 1201 seizures of clandestine meth labs in Tennessee.<sup>1</sup> The most affected area in Tennessee is the southeast region of the state.<sup>2</sup> The epidemic has widespread repercussions, especially for the many children exposed to its effects. The National Jewish Medical and Research Center reported that, nationally, 30% to 35% of meth labs seized are places where children live.<sup>3</sup> Tennessee Department of Children's Services (TDCS) estimates that more than 700 children are placed in state custody every year because of meth use in a family.<sup>2</sup>

For children exposed to meth, the health risks are 2-fold. First, there is the physical danger of living in a home where meth is made. Children living in meth homes are exposed to toxic chemicals that are the ingredients and by-products of meth production. Anhydrous ammonia, ether, lye, iodine, drain cleaner, muriatic acid, sulfuric acid, camp stove fuel, toluene, and red phosphorous are just a few of the chemicals that can be used in meth production.<sup>4</sup> The other health risk for children in meth homes is the impact of meth use in the environment in which they live. Meth-using guardians may not be able to provide adequate food, shelter, and care to children. They are at risk of neglecting during crashes and highs. In addition, they may expose children to other drug-using adults, paranoia-induced behaviors, firearms, and other dangerous items.

Caring for these children requires accurate evaluation, diagnosis, and medical intervention. To date, little published information about medical management and few evidence-based guidelines exist. Appropriate medical evaluation and treatment of these exposed children are largely undefined. The objective of this study was to determine how emergency medical practitioners in areas where meth abuse is prevalent view this problem and ascertain their approaches to managing it.

### METHODS

A survey was developed to elicit practitioners' opinions about the appropriate identification and treatment of children exposed to meth. The Vanderbilt University

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Approval for this survey was sought from Vanderbilt University's institutional review board. After reviewing the survey and methods, the board granted a status of exemption for this research.

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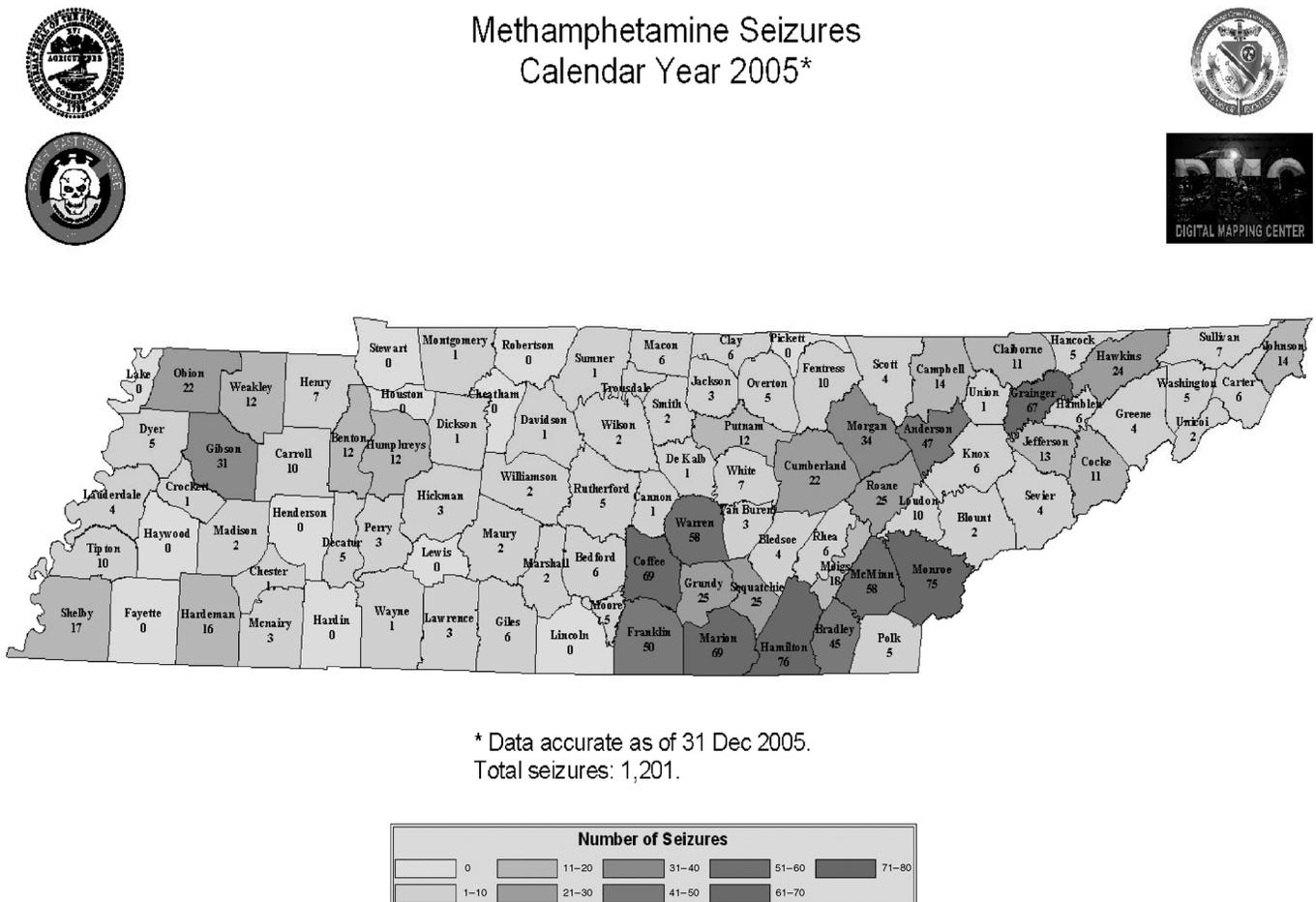
institutional review board approved the survey. This survey had 3 sections. The first section presented clinical scenarios (see Appendix) with variable likelihoods of a child exposure to meth, from definite to unlikely, and asked physicians to rate the likelihood of meth exposure. For these scenarios, physicians were also asked to list the factors in the scenario that made them suspect meth exposure. Next, they were asked to complete a checklist of diagnostic tests and examinations they would perform or have performed, as well as include any other test or information they feel is important to obtain in the situation. Finally, they were asked if they felt that contacting authorities was warranted and whom they would contact in each situation.

The second section of the survey elicited information about physicians' experience with meth exposure in their area and their concerns about the problems faced by affected children. Finally, the survey presented a protocol written by the National Alliance for Drug-Endangered Children as an example of an already existing protocol. This protocol was developed through the consensus of experts and is in use in some areas of the country (see

Appendix). The practitioners were asked about the utility of such a protocol in Tennessee.

The survey was conducted in 12 southeastern Tennessee counties, chosen because of their heavy rates of meth lab seizures (map of seizures, Fig. 1). Each hospital with an emergency department in these areas was contacted by phone. Emergency department directors were asked to give surveys to their physicians on staff. The appropriate number of surveys and return envelopes were then mailed to the emergency department. A few directors in very rural counties named local private physicians who were actively involved with TDCS. These physicians were sent surveys as well. A few counties did not have hospitals with emergency departments. In those cases, the Department of Children's Services local office or public health department was contacted and asked where the children removed from labs in those areas were likely to be examined. Ultimately, this survey was sent to 87 physicians associated with emergency departments and child services in June 2005.

All responses were anonymous, individually and by county and hospital. Fewer than 20 responses were returned



\* Data accurate as of 31 Dec 2005.  
Total seizures: 1,201.

Data provided by EPIC's National Clarendine Lab Seizure System (all occurrences) and the South/East Tennessee Methamphetamine Task Force.

**FIGURE 1.** Tennessee methamphetamine lab seizures, 2005.

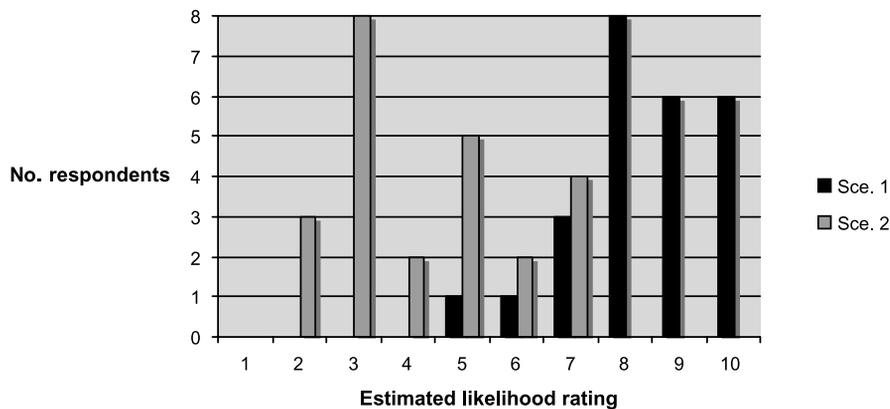


FIGURE 2. Practitioners' rating of likelihood of exposure in scenarios 1 and 2.

on initial mailing. A second mailing of the same survey was performed with each including a \$2 bill. A total of 26 surveys were returned by January 2006, representing a response rate of 30%.

**RESULTS**

Scenario 1 (see Appendix) was developed to suggest a high possibility of meth exposure. Physicians were asked to rate the likelihood of meth exposure from 1 to 10, with 10 being definite. Responses are shown in Figure 2. The average response was a rating of 8.38. This increased to 9.2 among the 31% of physicians who later described the meth problem in their community as severe. Among the 19% of physicians who rated the meth problem in their community as low, the

average likelihood rating was 8.6. The 3 variables in the scenario rated most suspicious were appearance/behavior of the accompanying adult, the ammonia-like odor, and burns on the child, each noted by approximately 75% of responders. The physicians' responses regarding what information they would obtain from laboratory studies or physical examination are shown in Table 1. Other information desired included a history from the child (20%), a TDCS consult (12%), and adult questioning (12%). One practitioner wanted information from the child's school. Another respondent indicated, "In my area, most testing is less than useful." Practitioners' responses regarding contacting authorities in these scenarios are listed in Tables 2 and 3. When questioned regarding which entity should be contacted, 69% (including those who left the answer to previous question blank) indicated the TDCS or Child Protective Services, 16% indicated the local law enforcement and DCS, and 4% indicated local law enforcement, DCS, and hospital administration.

In scenario 2 (see Appendix), designed to suggest ambiguous exposure, the physicians' mean response about the likelihood of meth exposure was 4.2. The range of their responses is shown in Figure 2. For this scenario, practitioners identified poor hygiene, cough without fever, and headache as the factors most suspicious for meth exposure. The physicians' responses regarding what information they would obtain from laboratory studies or physical examination are shown in Table 4.

In scenario 3 (see Appendix), practitioners are presented with a confirmed meth exposure and asked which tests they would order. The responses are listed in Table 5. As the probability of meth exposure decreased, the amount

TABLE 1. Percentage of Physicians Ordering the Following Tests in Clinical Scenario 1

Diagnostic Test/Exam	Percentage
Toxicology screening	92%
Complete blood count	81%
Oxygen saturation	81%
Electrolytes	69%
Liver function tests	62%
Chest radiograph	62%
Urinalysis	58%
Developmental exam	58%
Carboxyhemoglobin level	42%
Metabolic panel	35%
Mental health exam	31%
Lead levels	27%
Pulmonary function tests	4%
Coagulation studies	4%
Other tests	31%*

\*Three practitioners wrote they would consult the DCS. Other tests mentioned included blood urea nitrogen/creatinine, electrocardiogram, heavy metal screen, examining other children in the household, neuro-examination, and school performance.

TABLE 2. Responses to the Question, "Would You Contact Authorities?"

	Scenario 1	Scenario 2
Yes	81%	4%
No	4%	80%
Maybe	8%	0%
Did not respond	8%	16%

**TABLE 3.** Responses to the Question, "Which Authorities Would You Contact?"

Child Protective Services	69%
Local law enforcement and Child Protective Services	16%
Hospital authorities, local law enforcement, and Child Protective Services	4%

of testing physicians would perform decreased as well. In response to an open-ended question on what other information they would like to obtain about this child, answers ranged from collecting clothing and hair samples to a urine drug screen.

Section 2 consisted of a series of open-ended questions. Practitioners' responses regarding factors that lead them to suspect meth exposure and to whom they would report in cases they thought appropriate were consistent with the close-ended responses discussed above. Some questions and responses to general questions about meth in their communities are listed in Table 6. Of those who answered yes to "Is child exposure to methamphetamine or methamphetamine production a problem in your community?" the follow-up question was "If so, would you describe the problem as mild, moderate, or severe?" Fourteen percent chose mild, 43% said moderate, and 38% said severe. One respondent said that meth was a problem, but did not indicate severity. Responses to a question regarding the frequency with which they had cared for children exposed to meth are shown in Figure 3. The subset of physicians who rated the meth problem in their community as "severe" reported they saw meth-exposed children at an average of 11.75 times a year.

**TABLE 4.** Percentage of Physicians Ordering the Following Tests in Clinical Scenario 2

Diagnostic Test/Exam	
Toxicology screening	31%
Complete blood count	73%
Oxygen saturation	73%
Electrolytes	23%
Liver function tests	12%
Chest radiograph	92%
Urinalysis	19%
Developmental exam	23%
Carboxyhemoglobin level	19%
Metabolic panel	19%
Mental health exam	8%
Lead levels	4%
Pulmonary function tests	4%
Coagulation studies	0%
Other tests	8%*

\*Other tests included DCS evaluation and urine drug screen.

**TABLE 5.** Percentage of Physicians Ordering the Following Tests in Clinical Scenario 3

Diagnostic Test/Exam	
Toxicology screening	96%
Complete blood count	88%
Oxygen saturation	76%
Electrolytes	72%
Liver function tests	76%
Chest radiograph	72%
Urinalysis	64%
Developmental exam	64%
Carboxyhemoglobin level	52%
Metabolic panel	52%
Mental health exam	48%
Lead levels	36%
Pulmonary function tests	20%
Coagulation studies	16%
Other tests	16%*

\*Other tests included DCS evaluation, urine drug screen, electrocardiogram, and heavy metal screen.

Responses to an open-ended question regarding the possibility of a statewide protocol were variable, ranging from desire for a "test protocol" to concerns about financial implications. A full list of responses is included in the Appendix. Ninety-two percent of physician respondents felt that medical knowledge of meth could be improved. The open-ended question about what aspects of the problem particularly needed to be investigated elicited responses dominated by concerns about the best decontamination procedures, the effects of meth production, the associated signs and symptoms of meth exposure, and the long-term effects of meth exposure. Other queries raised included acute medical risks, whether emergency evaluation was needed, impact on child development, cardiac and immunologic effects of meth, the role of methicillin-resistant *Staphylococcus aureus* in the meth epidemic, the impact on emergency departments, and studies of best outcomes. The concerns most often expressed about clinical management of these children included lagging mental development or mental illness (28%), neglect (20%), and impaired parents/family dysfunction (20%).

In section 3 of the survey, the practitioners were presented with the protocol written by the National Alliance for Drug-Endangered Children (see Appendix) and asked if they felt such a protocol was appropriate for use in Tennessee. Seventy-three percent responded yes, 19% left the question blank, and 1 respondent said no. Seven practitioners stated that no changes were needed to be made in this protocol. Other suggested small changes such as assuring dental care and modifying it to a simple checklist. Three physicians questioned the appropriateness of emergency departments to conduct thorough examinations for every child removed from a meth lab. They suggested using

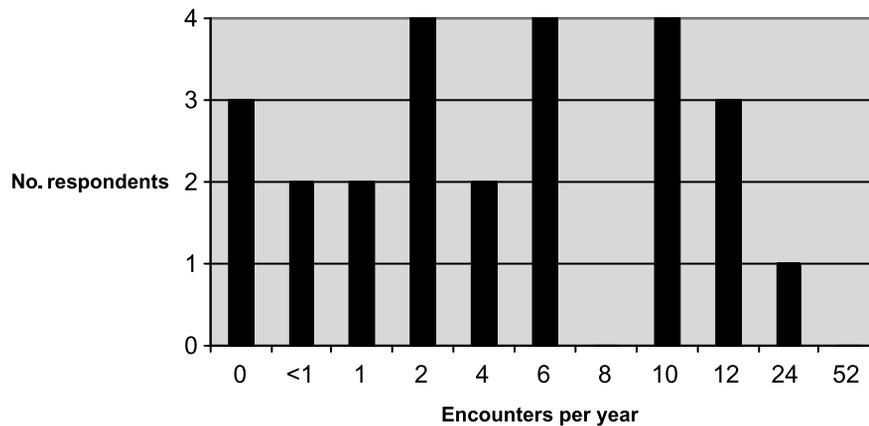


FIGURE 3. Perceived frequency of practitioner encounters due to meth exposure per year.

alternate resources such as health departments to examine “well-appearing” children.

## DISCUSSION

The issue of children exposed to meth is a complicated one, involving medical, social, and legal factors with both acute and chronic facets. Children of meth producers and users are subject to 2 categories of risk: the chemicals used in production of meth and the home environment. With regard to the chemicals themselves, these volatile compounds may be stored in the home, causing leaks into carpet or clothing, contamination of food, or release of fumes into the environment.<sup>5</sup> These materials have been found in 2-L bottles stored in refrigerator, near baby bottles and beds, and in open containers on counters and floors.<sup>5</sup> Toxic emissions and residue can be recovered from furniture, floors, clothes, and toys.<sup>2</sup> Dr John Martyny of the National Jewish Medical and Research Center directed a project in Colorado to determine contamination levels associated with meth production. Their data revealed that after a “meth cook,” nearly all vertical and horizontal surfaces of a home are contaminated with meth residue to some degree. Any clothing in the cook area becomes contaminated as well.<sup>3</sup> This group also conducted a controlled meth cook in a hotel room and found meth particles in several rooms down the hall. Breathing or ingesting meth or its precursors can

cause severe chemical burns, eye irritation, respiratory membrane damage, chest pain, and central nervous system effects. Many of the chemicals are also known carcinogens.<sup>5</sup> Children may be at higher risk of damage than adults because of their lower body weight, proportionately larger surface areas, developing nervous systems, and greater hand-to-mouth activity.<sup>3</sup> Unfortunately, although it is clear that exposure is dangerous, it is not known what levels of different chemicals cause permanent damage, the actual amounts absorbed by children,<sup>3</sup> or the long-term effects.

The other risk comes from living in a home with a meth user. Persons using meth often exhibit agitation, paranoia, and aggressiveness. They may stay awake for days while high. This will often be followed by a “crash,” with the user sleeping for days, unable to be awakened.<sup>4</sup> This kind of behavior is incompatible with the suitable care for infants or children and may set the stage for neglect or abuse. A common feature of homes beset by meth is the absence of order. Routines, from sleeping to eating, from basic hygiene to school attendance, may be chaotic or even absent. Many meth homes are discovered to have insufficient food (meth causes anorexia), heating, water, and plumbing (corrosive chemicals may have been poured down drains), as well as infestation of insects and vermin. If the lab is producing meth for sale, this may result in buyers being at the house regularly, at any time of day or night. As a result, children would then be vulnerable to the effects from other drug-using adults as well. Meth-induced paranoia may induce adults to leave “booby traps” or to have loaded firearms at their homes, which pose risk to children. In addition, other dangerous items such as needles or used condoms may be improperly disposed of and expose children to infectious hazards.

In the midst of this chaos, absent a caring, responsible adult, infants and children must fend for themselves and their siblings. Many young children found at meth labs have been diagnosed with attachment disorders, often the result of neglect.<sup>5</sup> Clearly, these children are a vulnerable population who require intensive intervention. Unfortunately, not much is known about the long-term effects of growing up in

TABLE 6. Practitioner Responses to General Questions

	Yes	No	Other Response
“Is child exposure to meth a problem in your community?”	84%	16%	—
“Does your hospital have a meth-exposure protocol?”	35%	38%	27%*
“Would such a protocol be useful?”	92%	4%	4%†

\*19% did not know, 8% did not respond.

†Not a protocol, but guidelines.

a meth home. Physical damage from meth production or emotional and developmental harm from abuse and neglect has the potential to cause devastating harm. Multiple agencies including law enforcement, social services, and medical personnel are required to engage and cooperate to address this issue thoroughly. While the ultimate solution is not currently known, part of that solution includes consistent dissemination and application of treatment standards in the clinical arena.

With little published evidence regarding the best treatment for children exposed to meth, physicians often improvise their own approaches. This study in Southeastern Tennessee reveals a large amount of variability in acute medical management of a child who is perceived to have been living in a clandestine meth lab. This variability in the clinical management of children exposed to meth may contribute to the delay in establishing a best practice for the care of these children. It is clear that more scholarly exploration of the problem is needed. An important starting point in dealing with variability and uncertainty may be the consistent application of guidelines arising from the consensus of experts. As one of the physician respondents pointed out, consistency will allow for the thorough evaluation of methods and protocols. In addition, practice guidelines may help prevent overly enthusiastic evaluation of already traumatized children. The physicians surveyed in this study have privileged insight into important aspects of treating children exposed to meth, and the great majority of respondents (25 of 26) felt that standardized guidelines would be an aid to them in their practice.

An important source of practical clinical information may be the physicians in emergency departments in areas faced with the dilemma of meth-exposed children. Their valuable experience could be useful, both in the consideration of acute management protocols and the recognition of unique long-term care needs for these particular victims of meth use.

Limits of this study include the low response rate, increasing the risk of a self-selection bias among the respondents, as well as the limitation to one, albeit high risk, geographic locale. An additional limitation is that the blind study design does not afford the ability to ensure a homogenous representation of locales and practices.

This study contributes to our current understanding of the management of meth-exposed children in Southeastern Tennessee by identifying variability and similarities in physician practice. Our research affirms practitioners' desire for standardization of medical management of children with perceived exposure to meth. These authors think that dissemination of a standard management model for children exposed to meth may contribute to gaining future knowledge about the short- and long-term management of children exposed to meth.

Establishing appropriate medical protocols for the treatment of children exposed to meth may be a difficult task in the absence of outcomes data. Despite the paucity of data, it is incumbent upon professionals to thoughtfully address these children's medical, developmental, and social needs.

## ACKNOWLEDGMENT

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## APPENDIX A

*Scenario 1: "A child is brought to your facility by an adult relative (not a parent) who appears thin and who seems to have difficulty concentrating on what you say. The child has an ear infection and an ammonia-like odor. The child's clothing is ill fitting, and she has some minor burns on her hands. In your opinion, how possible is it that this child has been exposed to methamphetamine or its precursors? Please circle a choice on a scale of 1 to 10."*

*Scenario 2: "A child is brought to your facility by a parent. He complains of a persistent, unproductive cough and headache, with no fever or other symptoms. The child displays poor hygiene."*

*Scenario 3: "A child is brought to your facility by a Department of Children's Services official. She was living in a trailer home with her parents. They are known to have cooked a large amount of methamphetamine for the last 8 months in the trailer's kitchen."*

## APPENDIX B

*National protocol for medical evaluation of children found in drug labs. National Alliance for Drug-Endangered Children. Available at: <http://www.nationaldec.org/medical%20protocol/medicalprotocol.htm>. Accessed December 14, 2006.*

## APPENDIX C

*Comments regarding a standardized protocol for children exposed to meth:*

"In favor—need a test protocol and procedure"

"A protocol helps physicians be more aware of the problem"

"Needed"

"Simple, cost-effective"

“Simple, uniform, statewide”

“Uniformity to ensure adequate evaluation and justify tests”

“What labs to order and why”

“It should include local and state DCS, law enforcement personnel, DA, centralized evaluation and treatment facilities instead of ER unless acute medical condition exists”

“Would be difficult to enact”

“[It would need] full support of state systems to back us up”

“Removal from environment is the most important step after discovery”

“Be sure that exposure occurred before you involve any governmental agency”