Practices and Resources for Screening Children’s Blood Lead Levels

Assessment of Idaho Health Care Providers’ Practices and Resources for Screening Children’s Blood Lead Levels

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Introduction and Research Questions

Current statistics from the office of Idaho Medicaid report that 11.9% of eligible children have ever been screened for elevated blood lead level (EBLL) as of October, 2009 (Medicaid Advisory Committee Minutes, October, 2009). The lack of screening and parental education comes at a time when both Medicaid and Head Start programs mandate screening children at 12 months and again at 24 months, or between 36-72 months if the child was not previously screened. While the incidence of EBLL have decreased nationally there is little data specific to Idaho from which one can conclude that there is a low prevalence of children with EBLL (IDHW, 2007; Medicaid Lead Advisory Committee Meeting Minutes, 2009). Lead exposures continue through lead based paint dust, toys containing lead, water and soil contaminated with lead, and household items with lead paint, glaze or components. Once lead is absorbed it accumulates in the bones and nervous system and does damage that cannot always be reversed. Lead can impact physical, behavioral and intellectual development and have lifelong implications for health and wellbeing through its effects on neurological
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development and cognitive function and has been linked to lower high school graduation rates and increased criminal behavior (Bellinger, 2008; Gould, 2009; Lanphear, 2000; Muenniq, 2009; Needleman, 1990).

A key to reducing risk of lead exposure, as well as early detection is blood lead screening of children during well child exams and education of parents. Parents need to understand both how children might be exposed to lead and also realize that children with low hemoglobin (anemia), low calcium and vitamin C intake are more likely to absorb lead from the environment. Health care providers are key to the successful screening, case finding of children with elevated blood lead level (EBLL), and education of parents and caregivers. For this reason is it important to understand both current practice as well as the underlying facilitators and barriers to screening and education. For example, health care providers may be more likely to screen children if they perceive a local risk for EBLL, if they receive data about local risk such as lead hazard maps, or reports of elevated lead levels by area. Additionally, providers may respond to reports of their own patient screening results and facilitators, such as the availability of alternative screening tests such as capillary sampling in medical offices rather than venipuncture (MMWR, August, 2009; Polivka, Gottesman, Casavant & Bush, 2004).

As part of an effort to increase screening children for EBLL, the Idaho Medicaid program purchased 64 capillary blood level analyzers and distributed these free of charge to providers throughout the state. Capillary testing is less traumatic than venous blood sampling, making it more acceptable to parents, children and providers (Polivka, 2005). Accepted practice is to use a capillary blood test for screening children and then, if an elevated level is detected, follow with a venous blood sample. However 64 machines for
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the 1398 providers in the Idaho Healthy Connections program can be only one component of a program to increase screening.

As other interventions are currently being considered, questions remain about how health care providers determine if they should screen children for EBLL and what they perceive as barriers, benefits and best practices for screening children and educating parents, and how results are reported for lead surveillance data. Given this situation, we developed a brief survey as an initial step in answering the following research questions:
1. What do health care providers perceive as the barriers, facilitators, benefits and best practices for screening blood lead levels and educating parents about lead exposure prevention?
2. Are clinics with capillary blood analyzers testing more children than clinics without the machines?
3. How knowledgeable are providers about CDC lead screening regulations related to children?
4. Are there differences between the rate of EBLL testing for urban vs. rural providers?
5. Do clinics located in a known lead-hazard area test children more frequently than those clinics in an area with “no perceived” lead problem?

Methods

Questionnaire Development

In order to collect data on current practice and attitudes related to blood lead level screening (BLL) and lead poisoning prevention we developed a short questionnaire to be completed by health care providers (e.g., physicians, advanced practice nurses, physician’s assistants, and registered nurses). Questionnaire items were developed to
correspond to topics identified by the Investigators. These included a) characteristics of the practice and patients; b) providers screening practices, including the use of Lead Care Analyzer Machines; c) attitudes toward screening and perceptions of risk in patient populations; and d) communication with parents, including availability and use of educational materials. From a large pool of draft questions, Investigators selected a smaller number of questions based on their priorities and relevant literature. Selected items were reviewed for content validity by seven outside reviewers and revised based on their comments. This resulted in a draft questionnaire which was then tested by six volunteers, including a physician, advanced practice nurses and a health researcher, and finalized based on their responses. The final questionnaire consisted of 24 items and was printed on both sides of one piece of legal size paper. The questionnaire as well as the study were approved by the Boise State University Institutional Review Board in March, 2010.

Questionnaire Distribution and Response

The goal of this study was to collect information from providers that could be used to inform Medicaid policy and outreach programs in the State of Idaho related to blood lead level screening and lead poisoning prevention. An attempt was made to distribute the survey to all providers affiliated with the Idaho Medicaid program for children. The questionnaire was distributed by mail rather than electronically based on recent experience with a web survey that generated very limited response from Medicaid providers. The questionnaire and a return envelope were included in a mailing from the Medicaid office to 525 providers along with their patient lists. Another 76 questionnaires were mailed to providers directly who were not receiving mailings from Medicaid.
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Follow-up phone calls were made to providers in the three weeks following the mailing at which time additional copies of the survey were faxed to providers who requested them. A total of 69 completed questionnaires were received for an 11.5% response rate.

Analyses

All analyses were conducted with SPSS v. 17. For frequencies, percentages are reported for all valid, non-missing responses for each item.

Survey Results

Respondent Characteristics

For this study, the target pediatric population was defined as children younger than five years of age. For the majority of the respondents (68%), children under five made up 10 percent or less of their total patient population. The other 32% of responding providers have a pediatric population that accounts for greater than 10% of their practice. The majority of providers completing the questionnaire care for patients of various ages, not exclusively young children.

Among the providers (69) who completed the survey, 71% were Family Physicians, 14% were Pediatricians, 7% were Obstetricians, 4% were Internists and just under 3% indicated ‘other’ in respond to the item that asked their area of practice. The survey was completed by primarily by physicians (49%), but also by advanced practice nurses (29%), Physician Assistants (about 9%), Registered Nurses (3 %) and office staff (9%). The geographic location of their practices was indicated by their selection of one of the seven Idaho health districts. Seven surveys were completed by providers in neighboring states who care for children in Idaho and 4 respondents did not answer this
The practices’ distribution by health district for the remaining 58 surveys is reported in Table 1.

Table 1: Health District for Providers

<table>
<thead>
<tr>
<th>Idaho Health District</th>
<th># (%)</th>
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</thead>
<tbody>
<tr>
<td>1: Panhandle</td>
<td>8 (13.8%)</td>
</tr>
<tr>
<td>2: North Central</td>
<td>4 (6.9%)</td>
</tr>
<tr>
<td>3: Southwest</td>
<td>2 (3.4%)</td>
</tr>
<tr>
<td>4: Central District</td>
<td>14 (24.1%)</td>
</tr>
<tr>
<td>5: South Central</td>
<td>14 (24.1%)</td>
</tr>
<tr>
<td>6: South East</td>
<td>8 (13.8%)</td>
</tr>
<tr>
<td>7: District 7</td>
<td>8 (13.8%)</td>
</tr>
</tbody>
</table>

The majority of providers have little or no experiences in treating children with elevated blood lead levels. One questionnaire item asked, “in the past 5 years have you treated children with an elevated blood lead level?” The majority (89%) of providers reported that in the last 5 years of their practice they have not seen a single case of elevated BLL of $\geq 10$mcg/dL. Of the seven providers who had treated EBLL in the past five years, three had only 1 case, two reported having 3 cases, and two declined to specify the number of cases. In addition when queried about lower levels, 92% of the providers who completed the survey reported that they have not seen any child with the BLL greater than or equal to 5mcg/dL but less than 10mcg/dL.

**Current Practice**
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Providers were asked about current screening practices at well child exams for one year olds, two year olds and for children 36-72 months old. Almost 51% report assessing for risk of lead exposure with a questionnaire or discussion with parents (28.1% use a questionnaire to assess lead exposure risk of all 1 year olds and another 22.8% will use a questionnaire if there is a risk). But 49% of providers don’t assess risk or use a questionnaire at well child exams for 1 year olds. At the 24 month well child exam, about the same percentage of providers (53.5%) screen with a questionnaire almost all of the time or if indicated but 47% rarely use a questionnaire to screen. At 36-72 months, 18% use a questionnaire if there has been no previous screening, 24% if there is an indicated risk, while 58% rarely screen with a questionnaire for children in this age group.

Provider practices related to blood lead level testing vary depending on the age of the child and assessed risk levels. At the one year exam, some providers (15.8%) report that they do a blood test all the time. If a risk has been identified by a questionnaire or some other source, 40.4% providers will do a test but 43.9% of providers rarely do one. At the two year well child exam, 9.3% of providers do a screening test all the time; less than half (46.3%) if a risk is identified, and 44.4% of providers rarely do blood lead level screening. Combining responses, providers reported doing a BLL all the time and if there is a risk, a little more than half time at 24 (55.6%) months or 12 months (56.2%). This pattern is similar at the 36-72 months well child exam. Few (7.4%) providers will do a blood lead screening almost all the time, less than half (38.9%) if an identified risk and 53.7% don’t do a BLL testing at all. Providers are more likely to do a blood lead screening of children at younger ages, which corresponds to current practice guidelines,
but overall the screening rates are low. One respondent, who identified as a pediatrician wrote on the survey, “suggest using targeted screening of particular populations and geographic areas. Capillary screens are often contaminated by skin surface and overestimate problem” and cited an “MMWR article.”

When providers are asked about the type of blood lead screening used when it is done and where the test is analyzed, 48.4% do a venous blood draw and 31.3% use a capillary test. The majority use an outside lab to analyze results regardless of how the blood is collected.

One key question of interest is whether the Lead Care Analyzer Machines (LCAs) had any effect on BLL screenings. These machines have been made available to some Idaho practices by the Department of Health and Welfare. In this study, 82% (50) of respondents do not have a LCA while 18% (11) reported having one (with 8 missing responses). Training for staff in the use of the LCA was reported as “NO” by 73.7% of respondents (42) and “Yes” 22.8% (13) and “unsure” 3.5% (2). While 11 practices report having a LCA, only 7 report that is used routinely. Comments by practices about why they do not routinely use an LCA (whether they have one or not) included “takes too much time”, “expense”, “how many children are actually caught’ by method?,” and “low volume in my practice.” The comments suggest providers question the accuracy of the LCA and the cost. However, when providers were asked what would facilitate the use of the LCA the following were selected (respondents could check all that apply): 16.4% (10) stated that a reminder in the Well Child record would increase the use of machine; 19.7% (12) of respondents felt that parent request BLL would increase use of the LCAs; 9.8% (6) respondents checked parent preference for BLL testing in office
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would increase LCAs use; 16.4% (10) of respondents checked more LCA machines would facilitate BLL screening; 19.7% (12) of respondents felt more training in use of LCAs would facilitate BLL screening; 27.9% (17) of respondents felt reimbursement for BLL testing would facilitate more screening. These responses confirm that there are some LCA machines available in Idaho, but limited availability combined with a lack of training of clinic and office staff, and ongoing quality control of the machines contributes to reduced use and possible inaccuracy.

**Communicating with Parents**

The questionnaire included items concerning how providers communicate BLL results to parents. Generally, providers who do blood lead level testing (about ½ of the respondents) are likely to speak in person or by phone with parents. Table 2 reports health care providers responses to survey items that asked how they would communicate BLL test results to parents. The survey items asked what mode of communication the provider would use and if they would tell the parents the exact blood lead level.

<table>
<thead>
<tr>
<th>Table 2: How Providers communicate with Parents about Blood Lead Level Results</th>
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<tbody>
<tr>
<td>When Child’s Blood Lead Level is…</td>
</tr>
<tr>
<td>How do you most frequently tell parents results?</td>
</tr>
<tr>
<td>…in person</td>
</tr>
<tr>
<td>…by phone</td>
</tr>
<tr>
<td>…by mail</td>
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<tr>
<td>Do you tell parents the exact blood lead level?</td>
</tr>
<tr>
<td>…all of the time</td>
</tr>
<tr>
<td>…some of the time</td>
</tr>
<tr>
<td>…none of the time</td>
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Additional questions were asked about the content of providers’ discussions with parents related to preventing lead poisoning and reducing exposures. Providers were asked if they would discuss specific topics with parents based on three blood lead levels (BLL was above 10 mcg/dl, less than 10 mcg/dl but greater than or equal to 5 mcg/dl and less than 5 mcg/dl. While these items were designed to be hypothetical, about 1/3 of providers noted that the items were not applicable as they have not treated children with the specific blood lead level and did not respond. Table 3 reports the percentage of providers who responded “yes” that they would discuss the topic. Across all potential BLLs the most frequently discussed topics were lead in paint, ways to avoid and reduce exposure, nutrition, traditional medicines, pottery and cook ware, recalled toys and family history of exposure.

<table>
<thead>
<tr>
<th>Table 3: Percentage of Providers who would discuss topic with Parents</th>
</tr>
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<tbody>
<tr>
<td>Topic</td>
</tr>
<tr>
<td>Lead in Paint</td>
</tr>
<tr>
<td>Nutrition</td>
</tr>
<tr>
<td>Avoid and Reduce Exposure</td>
</tr>
<tr>
<td>Family Exposure History</td>
</tr>
<tr>
<td>Lead in pottery/cookware</td>
</tr>
<tr>
<td>Knowledge of recalled toys</td>
</tr>
<tr>
<td>Washing hands and toys</td>
</tr>
<tr>
<td>Lead in Traditional Medicines</td>
</tr>
</tbody>
</table>

When communicating with non English speaking parents, 62.5% (40) providers reported that they are likely to use an interpreter, 18.8% (12) providers selected that they use a translation of the results and 12.5% (8) providers reported using educational materials in languages other than English. Almost one fifth of providers (21.9% or 14)
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reported this was not applicable as they had no non-English speaking parents. A few providers wrote in that they speak Spanish with parents as needed.

Provider Perceptions

One question was asked to assess the providers’ awareness of current CDC guidelines for lead exposure. The item was “At what blood lead level is a child’s development at risk of being negatively affected?” Over about 20% of providers reported if the level was greater than 20 mcg/dl the child’s development would be adversely affected, while 42.4% selected over 10, 16.7% over 5, 1.5% over 3 while about 20% replied “not sure.” This suggests providers are unsure about what levels affect a child’s development and rely on older guidelines for decision making.

A key motivation for screening for BLL may be providers’ perceived seriousness of lead exposure in their patient population. In response to a question which asked the respondent to rate the seriousness of EBLLs, 44.8% (26) of respondents selected not serious (0, on a 0 to 10 scale ) while only 5 respondents rated the problem over 5 on this 0 to 10 scale where 10 was extremely serious (10). Provider written comments at the end of the survey illustrate their resistance to and lack of motivation for testing. Sample comments include: “lack of time to report to parents on screening questions”; “13 yrs of testing w/o a positive result”; “Our office never has a positive test,” “Medicaid is only insurance to request, not parents” ; “Required BLL test for children in Head Start regardless of risk factors, waste of resources”.

Barriers and Resources

Providers responding to the survey identified many barriers to BLL testing. Barriers to BLL screening were identified by providers from a list provided as well as in
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written comments. Barriers, from most to least frequently endorsed, were: 17.4% (12) of respondents felt lead is not a problem in the state of Idaho; 16.2% (11) noted parent refusal was the issue for not completing blood lead testing; 13.0% (9) of respondents listed the cost of lab collection as a factor; 11.6% (8) selected „no access to capillary blood testing’; 4.3% (3) of respondents felt they had inadequate time to complete blood lead testing during the Well Child visit and 27.5% selected “other” but did not specify the barrier in the space provided, perhaps because they felt their earlier comments answered this question.

In examining factors which could increased BLL screenings, 36.4% (24) of providers selected that having more data on rates of BLL screening in Idaho would encourage them decide to screen more, suggesting that receiving more data may change health care practices. 16.7% (11) selected that increased knowledge of Medicaid reimbursement would help them decide to increase screenings for BLL. Addressing this system issue may increase screenings but the majority of respondents are knowledgeable. 27.3% (18) selected the option that a parent requesting the test would increase BLL screenings. 13.6% (9) of respondents felt having the office staff able to draw the blood sample would increase the number of BLL screenings. Having “in office” BLL equipment and staff trained to screen may not increase screenings. 21.2% (14) of respondents felt a reminder in the Well child records would increase the BLL screening. 22.7% (15) of respondents checked “other” with one comment which was “pay me to do it.” Responses to this question suggest a range of actions which may increase screenings and that some are easier to implement than others and less costly. It will take multiple strategies with providers to increase BLL screenings.
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When queried about preferences for continuing education, the majority, 59.7%, of providers preferred in person conferences and educational classes, 43.5% of providers preferred to complete continuing education online, and 29% preferred reading printed materials (respondents selected multiple categories). More than half, 58.3% (35), of providers responded that they would appreciate more education about lead exposure and prevention.

When asked about availability of educational flyers or brochures in their practices for parents about prevention of lead exposure and poisoning, 61.9% (39) responded that materials are not available. Providers reported other types of materials were also not available including posters 84.1% coloring books 87.3%, and videos or DVDs 90%.

Table 4 below reports the percentage of providers who report they that they do have materials, as well as the percentage who said they would use them if they were available.

<table>
<thead>
<tr>
<th>Types of Materials</th>
<th>Available in your practice? (% providers responding yes)</th>
<th>You would use if available? (% providers responding yes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutrition Information</td>
<td>33.3</td>
<td>66.7</td>
</tr>
<tr>
<td>Flyers/Brochures</td>
<td>34.9</td>
<td>69.2</td>
</tr>
<tr>
<td>Coloring Books</td>
<td>9.5</td>
<td>36.5</td>
</tr>
<tr>
<td>Posters</td>
<td>11.1</td>
<td>44.0</td>
</tr>
<tr>
<td>Videos or DVDs</td>
<td>6.7</td>
<td>26.0</td>
</tr>
</tbody>
</table>

**Limitations**

The primary limitation of this study is the small number of responses available due to the low response rate. This prevents the subgroup analyses that would be need to answer some of the research questions. For example, the largest currently identified area in Idaho for lead contamination is the Bunker Hill mining site.
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(http:www.phd1.idaho.gov/) located in Health District 1 which had 8 respondents.

Given the small number of responses it is difficult to determine if more testing is being done in areas with known lead contamination. Likewise, given the number of responses and the only geographic identifier was health district, we could not determine if there was more or less BLL testing in rural versus urban locations.

The low response rate also means that the ability to apply the results to all Medicaid providers in Idaho (generalizability) is limited. Despite these limitations, the survey results suggest options for both additional research and policies that merit further consideration.

Discussion and Recommendations

This descriptive study provided a “snap shot” of Idaho Medicaid providers’ current practices for BLL screenings. The survey provides information about barriers to and facilitators of BLL. Based on these, we have preliminary recommendations to improve screening of children in Idaho through policies that promote the education of professionals, as well as parents about lead risks and exposures.

Experience and Perceptions as Barriers to Screening

Elevated blood lead levels may be rare, but the impact is serious and costly to the child, family and society. This situation makes screening important, but difficult to promote. The majority of the providers who responded to this survey have not identified or cared for a single child with elevated BLL over 10 mcg/dl and very few have seen any cases of elevated BLL between 5 and 10mcg/dl. Survey responses and comments confirm that this lack of personal experience translates into a perception that there is little risk of lead exposure, and therefore, blood lead screening is not necessary. Requirements
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for BLL testing by programs such as Head Start and Medicaid do not appear to be sufficient to motivate providers. While current Center for Disease Control and Prevention (CDC) guidelines require reporting levels above 10 mcg/dl and emphasize that there is no safe level established for BLL given studies demonstrating neurological damage at levels lower than 10 mcg/dl (Bellinger, 2008; Gould, 2009), most providers do not consider lead exposure a serious problem.

Some comments and responses suggest providers would respond to data about lead exposure and screening if that data were relevant to them. Data has been used to influence provider behavior in other areas of health care and may have an impact on screening for EBLL as well. The challenge is that without adequate screening it is impossible to know the true prevalence in the state or smaller regions. A comprehensive prevalence study to determine the actual extent of elevated BLL is needed. Results of the study could help direct resources and policy in the state.

*Facilitating BLL Screenings*

Experiences in Idaho, other states and response to this survey suggest several strategies that could increase BLL screenings. Increased availability of a capillary testing machines and Medicaid reimbursement to cover the costs are likely to facilitate screening. However the machines are not widely available and require trained office staff. In this situation depending solely on physician offices for testing is unlikely to reach all children and different venues for screening children and educating parents need to be considered.
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Some providers report using a screening questionnaire, but with this short survey we were unable to collect information about the actual questionnaire or more detail about how it is used. Providers may need updated questionnaires for parents or caregivers to complete to use for assessing risks for infants, toddlers and children less than 5 years of age. A standardized risk assessment, such as developed by the Centers for Disease Control and Prevention (CDC), could be promoted among providers and parents and included in the well child records. Information on how to target high risk areas or populations and what should be assessed, such as age and condition of housing, and mining sites (Hill-Jackson, 2004; Vaidyanathan et al, 2009) needs to be communicated to providers.

**Providing Resources and Education**

Respondents to our survey report a lack of educational materials to use in their practices. The majority of the providers don’t have any information material on lead exposure, such as flyers, brochures, posters or videos at their clinic to aid in their efforts to educate the parents of their patients. However, most indicate that they would use materials if they were available. The Idaho Department of Environmental Quality (IDEQ) supports educational materials and Lead Awareness week activities. Improved distribution of these prepared materials to practices throughout the state could begin to respond to this need. Additionally, follow up with practices should monitor whether materials are useful, appropriate to parents and if the materials address local and common sources of exposures. Customizing materials may be helpful to address low literacy, and language and cultural distinctions among patient populations. Many parents could benefit by a reminder to have their child’s BLL tested and to receive educational
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materials in multiple media, such as brochures, discussion, videos, and public service announcements (Polivka, 2006).

Professional continuing education could include updates on child development and lead, best practices and ways to increase BLL screening, as well as changing demographics and environmental hazards in the providers’ geographic regions. Providers may benefit from continuing education about ways to discuss preventing and reducing lead exposure with parents. While more providers prefer conferences and workshops for continuing education, online studies and reading materials are used as well. Perhaps a state wide plan would include coordination with professional associations in order to provide education and supporting materials in multiple formats about prevention of lead exposures, effects of lead on child development and regional issues.

Conclusion

Our descriptive study provides insight into current practices in Idaho and suggests ways to improve screenings of infants and children. Lack of educational materials and professional education opportunities may be addressed first by better distribution of available resources and later by the development of updated or customized materials. The paradoxical situation created by the fact that providers might change behavior (increase screening) in response to more data on lead exposure and screening, but the data is only available if providers screen for ELL is more difficult to resolve. Data may need to come from a statewide study or screening may need to be expanded to other venues until enough data are available. We hope that use of the study results will benefit the children in Idaho.
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For more information or if you have questions about this study please contact Dr.
Ingrid Brudenell ibruden@boisestate.edu or another of the authors.
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Idaho Medicaid Lead Advisory Meeting Minutes for October, 2009.
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