

Health Consultation

Mercury Exposure Investigation Using Serial Urine Testing and
Medical Records Review

KIDDIE KOLLEGE

FRANKLINVILLE, GLOUCESTER COUNTY, NEW JERSEY

EPA FACILITY ID: NJN000206028

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

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HEALTH CONSULTATION

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Prepared By:

New Jersey Department of Health and Senior Services
Under Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

Summary

In collaboration with the Agency for Toxic Substances and Disease Registry (ATSDR), the New Jersey Department of Health and Senior Services (NJDHSS) investigated exposure to elemental mercury among staff and attendees of a day care facility in Gloucester County, New Jersey. The day care facility, which opened in 2004, was housed in a building that had been used to manufacture mercury-containing thermometers until 1994. On July 28, 2006, the NJDHSS received a report from the New Jersey Department of Environmental Protection (NJDEP) of elevated mercury levels from indoor air and surface wipe samples. Upon recommendation from the NJDHSS and NJDEP, the building was closed and day care activities ceased that day.

Once the facility was closed, the NJDHSS and ATSDR began to screen children and staff of Kiddie Kollege to get a better understanding of how much elemental mercury children and staff may have been exposed to. The screening program was developed in consultation with the Mt. Sinai Pediatric Environmental Health Specialty Unit (PEHSU) in New York City and the Centers for Disease Control and Prevention's (CDC) National Center for Environmental Health (NCEH) laboratory in Atlanta. Urine samples from 91 children and 13 staff members known to have attended Kiddie Kollege were tested for the presence of elemental mercury. Tests were offered five times between August 2006 and January 2007. Based on a review of scientific literature and information provided by the CDC/NCEH laboratory, a urinary mercury reference value of 5 micrograms of mercury per gram of creatinine was developed by the NJDHSS and CDC/NCEH for comparison purposes. Thirty-one percent of children and 33 percent of adults tested in the initial screening had a urinary concentration of mercury greater than 5 micrograms of mercury per gram of creatinine. Repeat urine testing was offered for adults and children whose initial levels were elevated. Subsequent rounds of urine testing indicate that mercury levels have returned to below the reference value in those with initially elevated levels. At the measured urine mercury levels, health impacts are not expected to occur from these exposures.

In addition, the NJDHSS and CDC offered and conducted a medical records review for staff and children who attended the Kiddie Kollege day care center. Records were reviewed for 22 participants (about 14 percent of those who were invited to participate). Of these, there was no evidence of mercury exposure-related conditions in the medical records of 21 of 22 participants. The medical records of one child showed some evidence of conditions potentially related, but not specific to, mercury exposure. These conditions resolved several months after enrollment ended.

Since the day care center closed on July 28, 2006, the NJDHSS, ATSDR and CDC/NCEH met with parents and staff on several occasions to discuss possible exposures to mercury at the day care center and potential health risks. In addition, five fact sheets summarizing urinary mercury results and health impacts have been prepared and distributed to all concerned parties. For individual medical consultations, parents, staff and their health care providers were advised to contact the Mount Sinai Medical Center's PEHSU and the University of Medicine and Dentistry of New Jersey's Environmental and Occupational Health Clinical Center in Piscataway, New Jersey.

Statement of Issues

The purpose of this health consultation is to summarize an investigation of elemental mercury exposures to children and staff at the Kiddie Kollege day care center, located at 1600 South Delsea Drive in Franklin Township, Gloucester County, New Jersey. Through a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), the New Jersey Department of Health and Senior Services (NJDHSS) prepared the following health consultation, in cooperation with the Centers for Disease Control and Prevention's (CDC) National Center for Environmental Health (NCEH) laboratory to assess the public health implications associated with these exposures. The investigation consisted of a targeted mercury exposure screening and an evaluation of medical records.

Background

Site Description and History

The single-story Kiddie Kollege building was formerly the site of Accutherm, Inc., a manufacturer of thermometers and related instruments. Elemental mercury was used in the manufacturing process. In 1994, Accutherm, Inc. notified the New Jersey Department of Environmental Protection (NJDEP) that it had ceased operations at the site. In 1995, NJDEP issued a cleanup directive to Accutherm, Inc. and when the company failed to comply, the NJDEP referred the site to the United States Environmental Protection Agency (USEPA) for an assessment. After the USEPA performed a site inspection, the agency issued a report in January 1996 indicating that the site did not pose an immediate threat to human health (USEPA 1996). The property was subsequently sold and the building was renovated and leased for use by the Kiddie Kollege day care center beginning in January 2004. Until it halted operations on July 28, 2006, Kiddie Kollege had been providing day care services for children aged 8 months to 13 years old. The day care center voluntarily halted operations after both the NJDEP and the NJDHSS determined the building was not fit for occupancy. The determination was made on the basis of air and surface wipe samples that showed elevated levels of mercury throughout the building.

Environmental Samples

On July 28, 2006, NJDEP received results of mercury analyses of indoor air and surface wipe samples taken inside the Kiddie Kollege day care center on July 14. Mercury vapor concentrations in two areas occupied by children and in the kitchen ranged from 7.0 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) up to $11.4 \mu\text{g}/\text{m}^3$ (NJDEP 2006). An additional air sample collected in the basement (not accessed by children and accessed infrequently by staff) contained mercury at a concentration of $42.7 \mu\text{g}/\text{m}^3$. These levels exceeded ATSDR's Minimal Risk Level of $0.2 \mu\text{g}/\text{m}^3$ for chronic exposure to elemental mercury vapor, and the USEPA's Reference Concentration of $0.3 \mu\text{g}/\text{m}^3$. Surface wipe sampling results ranged from <0.02 to 0.25 micrograms per wipe in child-occupied areas and the kitchen, with a higher level ($7.4 \mu\text{g}/\text{wipe}$)

in the basement (NJDEP 2006). Comparison values for mercury in wipe samples are not available, but these values indicate that mercury was present on some surfaces.

Based on these results which became available on July 28, 2006, the NJDHSS and the NJDEP immediately advised the property owner and the day care operator that the building should not be occupied until further notice and the day care center was shut down.

Environmental testing was repeated on August 9, 2006 by Brinkerhoff Environmental Services. The range of mercury vapor in samples obtained during this second round of testing was less than 0.67 up to 13.0 $\mu\text{g}/\text{m}^3$ in occupied areas and 180 to 200 $\mu\text{g}/\text{m}^3$ in infrequently occupied basement areas. The range of mercury concentrations in wipe samples was less than 0.02 up to 9 $\mu\text{g}/\text{wipe}$ (EMSL Analytical 2006).

In September, October and November 2006 and April 2007, the USEPA Region 2 Environmental Response Team performed indoor air monitoring for mercury vapor in 38 residences of former students and staff from Kiddie Kollege (Lockheed Martin 2007). A Lumex RA-915⁺ Mercury Analyzer was used to monitor the mercury vapor concentration in residences. The USEPA action level for elemental mercury vapor of 0.3 $\mu\text{g}/\text{m}^3$ was used for this investigation. Mercury was not detected in all but one residence. Mercury vapor monitoring at one residence yielded a low level concentration (less than 0.3 $\mu\text{g}/\text{m}^3$) and further investigation revealed that the child's blanket was the source of this reading. When follow-up monitoring of this residence was done two weeks later, the blanket had been washed multiple times and mercury was no longer detected at this residence.

Mercury Exposure Investigation

Methods

Biological testing may be used to measure human exposure to mercury. Urine mercury testing is considered the most appropriate way to estimate recent exposure to elemental mercury vapors (ATSDR 1999; WHO 2003).

In response to the need to investigate mercury exposures at Kiddie Kollege, NJDHSS and ATSDR collaborated with scientists within the CDC/NCEH laboratory as well as experts from the Mount Sinai (New York City) Medical Center's Pediatric Environmental Health Specialty Unit (PEHSU), to develop an exposure screening approach.

Participants

The Kiddie Kollege day care center provided NJDHSS with a list of children attending the center as of the closure on July 28, 2006. Initially, eligible participants included children and adults who had attended or worked at Kiddie Kollege any time after June 8, 2006. This date was chosen as the initial cut-off date for urine specimen collection eligibility because it was 60 days

prior to the planned specimen collection date, and elemental mercury has a biological half-life of approximately 60 days (CDC 2005; Counter et al., 2004; WHO 1991, 2003).

There was a total of five urine sample collection rounds: Round 1 (August 7 and 17, 2006), Round 2 (August 30 and September 6, 2006), Round 3 (October 10 and 17, 2006), Round 4 (December 5, 2006), and Round 5 (January 17 and 25, 2007). Specimens were collected from 79 participants (70 children, 9 adults) in Round 1. The number of participants in Rounds 2, 3, 4, and 5 were as follows: 23 participants (20 children, 3 adults), 13 participants (12 children, 1 adult), 68 participants (55 children, 13 adults) and 4 participants (3 children, 1 adult), respectively. Based on information collected via phone calls, enrollment records provided by the owner of the day care facility, and public meetings, the NJDHSS believes a high percentage of eligible children and staff was tested.

Urine Specimen Collection and Handling

The NJDHSS made arrangements with parents in order to collect urine specimens from children, and to provide results directly to the parents. Instructions given to the parents and staff for collection of specimens are attached in Appendix A.

The CDC/NCEH laboratory provided all materials needed to collect, process and ship urine samples for mercury testing to the NJDHSS. Materials included:

- urine sample cups
- U-Bags® (for collection of urine from children in diapers)
- gloves
- pipettes
- 4 milliliter (mL) cryovials with preservative for urine mercury
- 2 mL cryovials for urine creatinine
- bar-coded labels (six or nine individual labels per uniquely numbered sheet that could be used for the sample log, urine cup, each cryovial, and additional labels for use as needed)
- bench/table protective materials
- shipping materials (cryovial boxes, Teflon® envelopes, ice chests)
- sample processing instructions.

For the first round of sample collection, collection cups and/or U-Bags® and instructions were handed out individually to parents and staff initially on August 4, 2006. In addition, a fact sheet describing the purpose of the testing, analyses to be completed, and data handling was provided (see Appendix B). NJDHSS and ATSDR Region 2 office representatives were available at the Franklinville Community Center between the hours of noon and 8:00 p.m. to distribute materials and to speak with parents and staff about health concerns. Each collection cup and its corresponding intake form were provided with bar-coded labels to ensure that each participant's sample result could be correlated to the individual and for privacy protection of each participant and his/her result; however, the laboratory personnel were blinded to the identity of the participants.

Parents and staff collected urine samples (first morning void, where possible) and NJDHSS personnel received and logged in each sample. The labels on the sample cup were cross-checked with the intake form and samples were placed in a cooler with ice.

Staff transported the samples to the NJDHSS for processing. Samples were kept cold throughout the sample preparation process. For each sample, bar-code labels matching the intake form and specimen cup were placed in the mercury and creatinine cryovials. A 3 mL aliquot was transferred to the preserved mercury cryovial, and a 1 mL aliquot was transferred to the creatinine cryovial. After transfer the mercury cryovials were gently shaken to ensure that preservative was mixed into the sample. Upon completion, staff placed the cryovials into boxes, placed the boxes into bags and placed the bags into an ice chest. Ten pounds of dry ice pellets were then placed into the ice chest, which was then placed in a shipping box. The box was then shipped for overnight, early morning delivery to the CDC/NCEH laboratory by a commercial carrier.

For subsequent collection events, urine cups and /or U-Bags® and labels were mailed to households (for follow-up testing of earlier elevations), or in person at meetings or pre-arranged distribution points. All other sampling handling procedures, including pick-up, preparation and shipment to the laboratory were the same as the initial round.

Data Handling

Prior to screening, a database was developed by NJDHSS to store contact information as well as demographic and screening data for individual children and adults from Kiddie Kollege. Initially, information obtained from sign-in sheets at the public meeting was entered into the database and used to generate forms with empty fields for additional information for each person. The forms were completed at the pre-screening contact with parents and staff, when the urine specimen instructions and containers were distributed.

Urine Mercury Analysis

Mercury in urine was measured with a PerkinElmer ELAN® DRC II ICP-MS instrument equipped with a Meinhard quartz nebulizer (Type TQ-30-A3), a quartz cyclonic spray chamber, a 2.0 mm I.D. quartz injector, and nickel sampler and skimmer cones. Samples were stored prior to analysis for short term (less than 4 weeks) at less than or equal to -20°C and long term (greater than 4 weeks) at less than or equal to -70°C. The accuracy of the method was validated using standard reference materials from the National Institute for Standards and Technology (NIST) and reference materials from the Centre de Toxicology du Quebec (CTQ). The method limit of detection was 0.08 micrograms per liter (Robert L. Jones, NCEH laboratory, personal communication, 2006).

The CDC/NCEH laboratory provided results back to the NJDHSS in units of micrograms of mercury per liter ($\mu\text{g Hg/L}$) and in micrograms of mercury per gram of creatinine ($\mu\text{g Hg/g}$). Creatinine is a waste product produced by the body and the excretion rate fluctuates little in most normal people over long periods of time. Since it is produced and removed at a relatively

constant rate, the amount of urine creatinine can be compared to the amount of the other substance, mercury in this instance, being measured. The creatinine-adjusted concentration is considered the better estimate of mercury exposure, because it accounts for how dilute the urine sample may have been (Watanabe et al. 2005).

Communication of Results to Participants

For Rounds 1 and 2, all parents and staff were contacted by telephone by NJDHSS and were provided individual urine analysis results. Individuals not at home were contacted the following morning. This was followed up with individual letters to parents and staff with results that had been previously provided by telephone. All parents and staff were notified by letter informing them of their results for subsequent rounds; many individuals were also notified by telephone.

Results of Urine Analysis for Mercury

There were two main groups of participants in urine screenings for mercury: 1) children and staff who had attended or worked at Kiddie Kollege any time after June 8, 2006, and 2) those who left Kiddie Kollege prior to June 8, 2006. Individuals in the latter group were only tested in December 2006 (Round 4).

Initial Screening of Eligible Participants

Urine specimens were collected and analyzed for mercury and creatinine from 81 eligible individuals: 72 children and 9 adults. The following statistics are based on $\mu\text{g Hg/g}$ of creatinine. One staff participant had a missing creatinine level and was excluded from this analysis.

The following table summarizes the statistical analyses for initial urinary mercury levels from eligible participants:

Urine Mercury Levels ($\mu\text{g Hg/g}$ creatinine)

	No. of Samples	Arithmetic Average (Standard Deviation)	Minimum	Maximum
All	81	4.01 (3.17)	0.34	17.54
Adults	9	4.45 (3.17)	0.61	11.36
Children	72	3.96 (3.20)	0.34	17.54

- The average level of urine mercury for children and adults was $4.01 \mu\text{g Hg/g}$ creatinine. The lowest level was $0.34 \mu\text{g Hg/g}$ creatinine. The highest level was $17.54 \mu\text{g Hg/g}$ creatinine.

- For children only, the average level was 3.96 µg Hg/g creatinine, with a range of 0.34 to 17.54 µg Hg/g creatinine.
- For adults only, the average level was 4.45 µg Hg/g creatinine, with a range of 0.61 to 11.36 µg Hg/g creatinine.
- Among the 72 children tested, 22 (31%) had first urine specimens with mercury levels above 5 µg Hg/g creatinine.
- Among the 9 adults tested, 3 (33%) had first urine specimens with mercury levels above 5 µg Hg/g creatinine.

Follow-up Screening of Eligible Participants

The NJDHSS and ATSDR offered follow-up urine mercury testing to eligible children and staff whose initial urinary mercury result exceeded 5 µg Hg/g creatinine. All staff members, and all but one child participated in the follow-up testing through January 2007, or until their urine mercury levels dropped to below 5 µg Hg/g creatinine. By January 2007, every child whose initial urinary mercury level was elevated now had a urine mercury level of less than 5 µg Hg/g creatinine.

The following table displays results of 109 urine mercury tests from 43 children who had two or more tests from Rounds 1 through 5. Test results are grouped according to the number of days elapsed since the child last attended Kiddie Kollege, or in other words, days since exposure ceased.

Days since last exposure	No. of child urinary Hg samples	No. (%) of urinary Hg samples above 5 µg Hg/g creatinine	Average urinary Hg level (µg Hg/g creatinine)
0 – 30	27	19 (70%)	6.6
31 – 60	25	7 (28%)	4.1
61 – 90	17	5 (29%)	3.9
Over 90	40	0 (0%)	1.6

The results indicate that the urine mercury results have declined over time away from Kiddie Kollege. The percent of urine specimens exceeding 5 µg Hg/g creatinine decreased from 70% to 0%, and the average level declined from 6.6 to 1.6 µg Hg/g creatinine.

Other Participants

In December 2006 (Round 4), the NJDHSS and ATSDR offered urine testing for mercury exposure to any child or staff member who ever attended or worked at Kiddie Kollege. The purpose of this testing was to confirm that urine mercury levels in children and staff were below the reference level of 5 µg Hg/g creatinine, and to address parents' concerns about their

children's exposures. Twenty-three individuals, who had been previously ineligible for screening (that is, those who left Kiddie Kollege prior to June 8, 2006), participated. Of this group, all results were less than 5 µg Hg/g creatinine.

During the screening rounds, three household members of children and staff attending Kiddie Kollege were tested for urinary mercury levels. All three had results less than 5 µg Hg/g creatinine.

Medical Records Review

To gauge the potential health effects of historical exposure to mercury among Kiddie Kollege attendees and staff, a standardized medical record review was conducted. Everyone who spent time at Kiddie Kollege was invited to participate, including those who were not initially eligible for the mercury exposure screening. The medical records review was performed by a CDC epidemiologist working at the NJDHSS under the supervision of New Jersey's State Epidemiologist and Deputy Commissioner for Public Health Services. If further medical follow-up was indicated after each review, the CDC epidemiologist consulted with the child's parents and physician and referred them to Mt. Sinai's PEHSU or to the University of Medicine and Dentistry of New Jersey's Environmental and Occupational Health Clinical Center.

Methods

In total, 12 staff and the parents of 150 children who attended the daycare were invited to participate. Invitation letters and medical records release forms were disseminated during community meetings, offered during urine testing results phone calls, and were mailed with fact sheets.

The medical record review involved a comprehensive, standardized abstraction of all records received. The abstraction tool includes detailed qualitative descriptions of all illness events and a specific checklist of possible mercury related symptoms, organized by body system. All records were abstracted immediately upon receipt. As needed, referrals to specialty care were made upon consensus between the CDC epidemiologist and the State Epidemiologist. Results of the medical records reviews were shared with participants during individual, private phone calls.

Results of Medical Records Reviews

Medical records for 22 persons from Kiddie Kollege have been reviewed from a wide range of sources, representing about 14 percent of the 162 building occupants. Among all persons who participated in the medical record review, there was no evidence to suggest mercury-related health effects in 21 of the 22 participants. The medical records of one child showed some evidence of conditions potentially related, but not specific to, mercury exposure. These conditions resolved several months after enrollment ended, but it is not possible to infer a

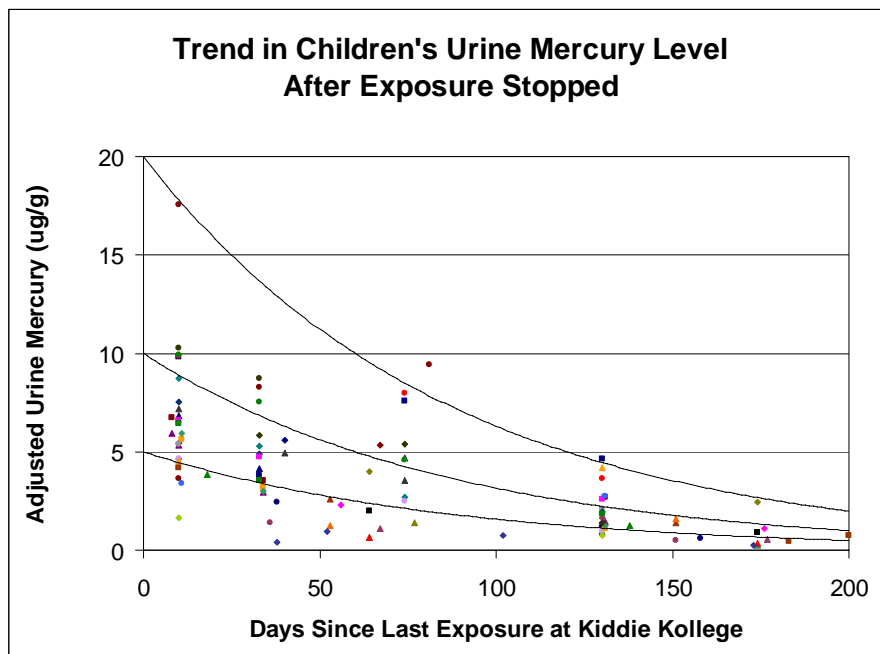
cause-effect relationship. The only urine mercury test from this child was below the reference level, but this test occurred several months after the child last attended Kiddie Kollege.

Discussion

The children and staff of Kiddie Kollege may have been exposed to elemental mercury at the day care center in three ways: inhalation of mercury vapor, skin absorption, and incidental ingestion. Inhaled elemental mercury is readily absorbed through the lung, while there is little absorption through the skin or digestive tract. Therefore, inhalation is the most likely way that Kiddie Kollege children and staff would have taken mercury into the body. Much of the mercury vapor that is inhaled enters the bloodstream, and from there it is carried to other parts of the body. Elemental mercury is slowly removed from the body through urine.

Analysis of mercury in urine specimens is considered to be the best determinant of body burden of mercury from long-term exposure to elemental mercury. Based on a review of the literature, the NJDHSS, ATSDR, CDC/NCEH and Mt. Sinai's PESHU consider $5 \mu\text{g Hg/g}$ creatinine as an appropriate reference level for creatinine-adjusted urine mercury in children and adults (ATSDR 1999; Bellinger et al., 2006; CDC 2005; DeRouen et al., 2006 and WHO 2003).

In aggregate, the urine mercury results from children and staff of Kiddie Kollege indicate that exposure to elemental mercury had occurred. Overall, 33% of adults and 30% of children tested had urine mercury levels greater than $5 \mu\text{g Hg/g}$ creatinine in the initial screening.



The graph shows the urine mercury results from 43 children who had more than one test measurement. Three additional lines have been added to represent hypothetical urine mercury levels beginning at three different points (20 , 10 and $5 \mu\text{g Hg/g}$ creatinine), and their expected decreases over time, assuming a 60-day biological half-life. A biological half-life is the amount of time that it takes for the body to eliminate one-half of a

substance. In this case, if a child or adult had an initial urine mercury level of $20 \mu\text{g Hg/g}$ creatinine, after 60 days the level should decrease to $10 \mu\text{g Hg/g}$ creatinine (half of $20 \mu\text{g/g}$). In

another 60 days the level should drop to 5 µg Hg/g creatinine (half of 10 µg/g). This would continue until the amount the person eliminates from the body reaches the level he or she brings into the body from naturally occurring (or other) sources. With time, urine mercury levels in Kiddie Kollege children declined, regardless of initial test level. The chart includes every child's urine mercury results relative to the number of days since he or she last attended Kiddie Kollege. Nearly every child has had a drop in urine mercury levels, indicating that children excreted mercury through urine, as expected. All of the levels also decreased to the range of normal background.

This screening has shown that exposure to elemental mercury occurred among some children and adults at the Kiddie Kollege day care center. However, health impacts are not expected to occur in these individuals from these exposures. Urine mercury levels below approximately 20 µg Hg/g creatinine, as a result of previous exposures, are not expected to be associated with health effects. The central nervous system is likely the most sensitive target for elemental mercury vapor exposure. Symptoms such as tremors, changes in vision, deafness, personality changes, muscle incoordination, loss of sensation and difficulties with memory have been reported after high levels of mercury exposure. Every child that participated in the December 2006 and January 2007 sampling rounds had a level of less than 5 µg Hg/g creatinine. Based on the results of initial testing, serial testing and review of medical records to date, no further testing is planned. It should be noted that this exposure investigation reflects the magnitude of exposure at one period of time, and may not be representative of past exposures to children and adults at Kiddie Kollege.

Health conditions potentially related to mercury exposure were not apparent in 21 of the 22 participants in the medical records review. However, the medical records review was limited. Only about 14 percent of known building occupants participated to date, and these participants are not a representative sample of all persons exposed. It is possible that persons with potential mercury-related health conditions evident in medical records chose not to participate in the medical record review. In addition, it is possible that children or staff experienced symptoms potentially related to mercury exposure, but these symptoms were not reported to physicians or recorded.

Conclusions

Multiple rounds of urine testing were conducted to assess the magnitude of exposure to mercury among children and staff of the Kiddie Kollege day care center. Results indicated that exposure was occurring, and that after cessation of exposure, urine mercury levels decreased with time to below a reference value in all tested persons. At the measured urine mercury levels, health impacts are not expected to occur from these exposures.

Medical records were reviewed to identify whether there was evidence of mercury-related conditions attributable to past exposures at Kiddie Kollege. A total of 22 persons participated in this review. For 21 of the 22, there was no evidence to suggest mercury-related health effects. For one child, medical records indicated some evidence of conditions potentially

related, but not specific to, mercury exposure, but it is not possible to infer a cause-effect relationship.

Recommendations

Parents and staff with individual medical concerns should discuss their concerns with their pediatrician or physician. Pediatricians and parents are encouraged to contact the Mount Sinai Medical Center's PEHSU, and adults can contact the University of Medicine and Dentistry of New Jersey's Environmental and Occupational Health Clinical Center in Piscataway, New Jersey (see contact information below).

Public Health Action Plan

Public Health Actions Undertaken by NJDHSS and CDC/ATSDR

Since the Kiddie Kollege Day Care Center was closed on July 28, NJDHSS and ATSDR have done the following:

- inspected the facility along with NJDEP representatives on July 31, 2006 to determine the source of mercury vapor;
- advised that the building should remain closed, and that additional environmental sampling should take place to characterize the building;
- collected urine samples from children and staff over the course of six months to determine mercury exposure;
- contacted parents and staff by telephone and in writing to provide individual urine analysis results;
- evaluated medical records for signs of mercury exposure-related symptoms
- met with parents and staff at three meetings to discuss possible exposures to mercury at the day care center and potential health risks;
- developed and provided five fact sheets related to mercury exposure at Kiddie Kollege;
- established a NJDHSS website updated to include relevant Kiddie Kollege information, found at: <http://www.state.nj.us/health/eoh/cehsweb/kiddiekollege/index.shtml>.

As part of the above process, conference calls took place amongst the NJDHSS, ATSDR, CDC/NCEH and Mt Sinai's PEHSU. The PEHSU fielded 49 initial telephone calls (including 35 from parents of Kiddie Kollege children and nine from health care providers), as well as 75 follow-up calls.

Public Health Actions On-going or Planned by NJDHSS and CDC/ATSDR

The NJDHSS and ATSDR will continue to respond to health concerns of parents and staff from Kiddie Kollege. NJDHSS and CDC are offering to continue to review the medical records of children and staff who spent time at Kiddie Kollege. The medical records review is

being coordinated by a CDC epidemiologist working at NJDHSS. If further medical follow-up is indicated after each review, NJDHSS staff is available to consult with the child's parents and physician and will refer them to Mt. Sinai's PEHSU or, in the case of staff, to the Environmental and Occupational Health Clinical Center in New Jersey. Contact information for these clinics is as follows:

- For children: Physicians and parents may contact the Mt. Sinai Medical Center's Pediatric Environmental Health Specialty Unit at (866) 265-6201.
- For adults: The University of Medicine and Dentistry of New Jersey's Environmental and Occupational Health Clinical Center in Piscataway, New Jersey sees adults who have been exposed to contaminants in the workplace or the environment. The Center can be reached at (732) 445-0123.

The mercury exposure at Kiddie Kollege prompted a new state law regarding the environmental conditions at day care centers in New Jersey. On January 11, 2007, Senators Fred H. Madden and Steve Sweeney, and Assemblymen David Mayer and Paul Moriarty joined with Governor Jon Corzine at Delsea Regional High School in Franklinville, for the signing of S-2261/A-3529, a new law establishing evaluation and assessment procedures for determining the safety of child care centers and schools.

Preparers of Report:

Somia Aluwalia, PhD
Research Scientist
New Jersey Department of Health and Senior Services

Jerald Fagliano, PhD, MPH
Research Scientist
New Jersey Department of Health and Senior Services

Patricia Haltmeier
Public Health Representative
New Jersey Department of Health and Senior Services

Mary T. Glenshaw, PhD, MPH, OTR/L
Lieutenant, US Public Health Service
CDC Epidemic Intelligence Service Officer

ATSDR Regional Representatives:

Arthur Block
Senior Regional Representative

Leah T. Escobar, R.S.
Associate Regional Representative

ATSDR Technical Project Officer:

Gregory V. Ulirsch, MS, PhD
Technical Project Officer
Superfund Site Assessment Branch
Division of Health Assessment and Consultation

Any questions concerning this document should be directed to:

Hazardous Site Health Evaluation Program
Consumer and Environmental Health Services
Public Health Services Branch
New Jersey Department of Health and Senior Services
3635 Quakerbridge Road
P.O. Box 369
Trenton, New Jersey 08625-0369
(609) 584-5367

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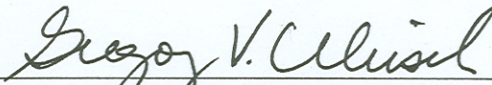
[Watanabe M](#), [Funabiki K](#), [Tsuge T](#), [Maeda K](#), [Horikoshi S](#), [Tomino Y](#). Using protein/creatinine ratios in random urine. *Journal of Clinical Laboratory Analysis* 2005; Volume 19, Issue 4, pages 160-166. July 15, 2005.

[WHO] World Health Organization. 1991. Environmental health criteria 118: inorganic mercury. Geneva: World Health Organization. Available at URL:
<http://www.inchem.org/documents/ehc/ehc/ehc118.htm>

[WHO] World Health Organization. 2003. Elemental Mercury and Inorganic mercury Compounds: Human Health Aspects. Geneva: World Health Organization. Available at URL:
<http://www.who.int/ipcs/publications/cicad/en/cicad50.pdf>

Certification

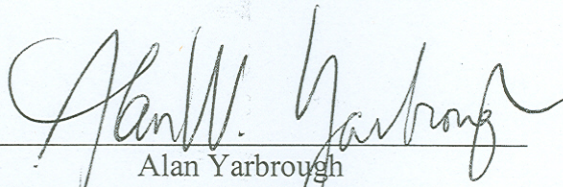
The exposure investigation for the Kiddie Kollege site, Franklinville, Gloucester County, New Jersey was prepared by the New Jersey Department of Health and Senior Services under a cooperative agreement with the Agency for Toxic Substances and Disease Registry. It is in accordance with approved methodology and procedures existing at the time the health consultation were initiated. Editorial review was conducted by the cooperative agreement partner.



Gregory V. Ulirsch, MS, PhD

Technical Project Officer, CAT, CAPEB, DHAC
Agency for Toxic Substances and Disease Registry

The Division of Health Assessment and Consultation (DHAC), ATSDR, has reviewed this health consultation and concurs with its findings.



Alan Yarbrough

Team Leader, CAT, CAPEB, DHAC
Agency for Toxic Substances and Disease Registry

Appendix A
Urine Sample Collection Instructions

Urine Collection Information

If you're using a collection cup:

Take the first urine of the morning on Monday, August 7.

1. Hands should be washed with soap and water.
2. Make sure the cap is secure on the cup before removing the wrapping.
3. Keep container closed until ready to void.
4. Fill about 2/3 full (if possible).
5. Don't touch the inside of the cup OR the cap.
6. Replace the cap and tighten to avoid leakage.
7. Put the label on the container (NOT the cap).
8. Freeze the sample until you bring it to the collection area.

If you're using a "U-Bag®:"

Collect this sample overnight Sunday night/Monday morning.

1. Hands should be washed with soap and water.
2. Remove the bag from the packaging.
3. Remove child's diaper, clean as usual.
4. Expose the tape on the U-bag®.
5. Place the bag over the child's genital area; gently press in place (tape side to skin).
6. Complete diapering as usual.
7. At the next diaper change, carefully remove the bag and allow urine to drain into the lower chamber of the bag.
8. Gently squeeze out excess air, fold top down, and place the whole bag in the collection cup.
9. Put the label on the container (NOT the cap).
10. Freeze the sample until you bring it to the collection area.

Appendix B
Participant Information

**Information for Participants in the Urine Mercury Screening for
Kiddie Kollege Day Care
August 2006**

Urine samples are being collected from staff working at and children attending the Kiddie Kollege Day Care Center in Frankinville, Gloucester County. Any staff who worked at or child who attended the day care center after June 8, 2006 is eligible to participate in this screening.

Urine samples will be tested for mercury, and for creatinine and specific gravity (two measures of the diluteness of the urine) only.

Urine samples will be collected on Thursday, August 17, 2006 by parents or the individual and brought to the Franklinville Library from 8:00 a.m. to 10:00 a.m.

Samples will be picked up from the Franklinville Library on Thursday, August 17, 2006 by staff of the New Jersey Department of Health and Senior Services.

NJDHSS will process samples according to procedures provided by the Centers for Disease Control and Prevention/National Center for Environmental Health laboratory.

NJDHSS will ship samples to the Centers for Disease Control and Prevention/National Center for Environmental Health laboratory in Atlanta, Ga. for analysis. The laboratory will not have any personal identifiers for any sample.

Results of all analyses will be provided to the NJDHSS upon completion of the analyses.

NJDHSS will evaluate and interpret the results of the analyses.

The NJDHSS will provide each individual's results and interpretation to only that individual (or to the parents of minor children) by mail. NJDHSS may also provide results by telephone.

Only staff of NJDHSS and the ATSDR who need to see results and the personal identifiers will have access to the complete data. Other individuals may be provided with summary information, or analytical results without personal identifiers.

* * *

If you have questions, please contact the New Jersey Department of Health at (609) 584-5367.