USING EDUCATION TO IMPROVE THE HANDWASHING HABITS OF PRESCHOOL CHILDREN

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Thesis

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## TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIST OF TABLES</td>
<td>viii</td>
</tr>
<tr>
<td>LIST OF GRAPHS</td>
<td>ix</td>
</tr>
<tr>
<td>CHAPTER</td>
<td></td>
</tr>
<tr>
<td>I. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Objectives of the Study</td>
<td>3</td>
</tr>
<tr>
<td>Handwashing Education</td>
<td>3</td>
</tr>
<tr>
<td>Handwashing Activities</td>
<td>4</td>
</tr>
<tr>
<td>Child Life Intervention</td>
<td>5</td>
</tr>
<tr>
<td>Evaluation</td>
<td>5</td>
</tr>
<tr>
<td>Committee Members</td>
<td>6</td>
</tr>
<tr>
<td>II. LITERATURE REVIEW</td>
<td>7</td>
</tr>
<tr>
<td>Handwashing Habits of Adults</td>
<td>7</td>
</tr>
<tr>
<td>Handwashing Habits of School-Age Children</td>
<td>9</td>
</tr>
<tr>
<td>Handwashing Interventions for Children</td>
<td>10</td>
</tr>
<tr>
<td>Handwashing Interventions for Child Care Staff</td>
<td>16</td>
</tr>
<tr>
<td>Handwashing Habits and Interventions for Hospital Staff</td>
<td>19</td>
</tr>
<tr>
<td>Child Development Learning Theories</td>
<td>21</td>
</tr>
<tr>
<td>Summary</td>
<td>23</td>
</tr>
</tbody>
</table>
III. METHODOLOGY ................................................................. 26
   Introduction ........................................................................ 26
   Research Question and Hypotheses ..................................... 26
   Methods ............................................................................. 27
      Design ............................................................................. 27
      Subjects .......................................................................... 27
      Instruments ...................................................................... 28
      Procedure ........................................................................ 28
   Data Analysis .................................................................... 34
IV. RESULTS ........................................................................... 36
   Description of Participants .................................................. 36
   Data Analysis ..................................................................... 38
      Pre-intervention Data -- Parent Report ............................... 38
      Pre-intervention Data – Observations ................................. 41
      Post-intervention Data – Observations ................................. 42
      Post-intervention Data -- Parent Report ............................... 44
V. DISCUSSION ....................................................................... 49
   Statement of the Problem ..................................................... 49
   Summary of the Hypotheses .................................................. 49
   Discussion of Findings .......................................................... 50
APPENDIX O. ACTIVITY FOUR ........................................... 76
APPENDIX P. SOAP AND SUDSY STORY .............................. 77
APPENDIX Q. COLORING SHEET ......................................... 79
APPENDIX R. ACTIVITY FIVE ........................................... 80
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Percent of Adults Observed Washing Their Hands</td>
</tr>
<tr>
<td>3.1</td>
<td>Demographic Characteristics</td>
</tr>
<tr>
<td>4.1</td>
<td>Subject Characteristics</td>
</tr>
<tr>
<td>4.2</td>
<td>Handwashing Information. Pre-intervention Parent Report</td>
</tr>
<tr>
<td>4.3</td>
<td>Children’s Understanding of Handwashing in Relation to Germs and Lead</td>
</tr>
<tr>
<td>4.4</td>
<td>Observations of Handwashing Habits. Pre-intervention</td>
</tr>
<tr>
<td>4.5</td>
<td>Observations of Handwashing Habits. Post-intervention</td>
</tr>
<tr>
<td>4.6</td>
<td>Handwashing Information. Post-intervention Parent Report</td>
</tr>
<tr>
<td>4.7</td>
<td>Children’s Understanding of Handwashing in Relation to Germs and Lead Poisoning Prevention. Post-intervention</td>
</tr>
<tr>
<td>Graph</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>4.1</td>
<td>Prompting Required for Handwashing</td>
</tr>
<tr>
<td>4.2</td>
<td>Use of Soap During Handwashing</td>
</tr>
<tr>
<td>4.3</td>
<td>Washing Hands Greater than Than 10 Seconds</td>
</tr>
<tr>
<td>4.4</td>
<td>Frequency of Handwashing - Parent Report</td>
</tr>
<tr>
<td>4.5</td>
<td>Duration of Handwashing - Parent Report</td>
</tr>
<tr>
<td>4.6</td>
<td>Prompting Required for Handwashing - Parent Report</td>
</tr>
</tbody>
</table>
CHAPTER I
INTRODUCTION

During the mid-nineteenth century, Dr. Ignaz Semmelweis discovered that routine and proper handwashing could prevent the spread of infectious diseases. Dr. Semmelweis made this discovery when he recognized a commonality among his maternity patients. Dr. Semmelweis realized that his medical students worked with cadavers during their morning anatomy class, and then proceeded to make rounds with him in the afternoon seeing maternity patients. During the transition between working with cadavers and seeing patients, Dr. Semmelweis hypothesized that his students were spreading infections to his healthy patients because his students were not washing their hands between handling the cadavers and seeing the patients. Once the connection was made, and proper and routine handwashing was implemented, the 25-30% mortality rate of Dr. Semmelweis’ patients decreased to 1.27% (Britannica.com, 2000).

Still today, individuals of all ages carry a great amount of bacteria and viruses on their hands. When hands are not washed at appropriate times, or if they are not washed properly, bacteria and viruses may be spread to others. These bacteria and viruses may cause illnesses such as colds or diarrhea, or may lead to serious, even life-threatening diseases. When performed correctly and at appropriate times, handwashing may help to prevent some illnesses by stopping the spread of bacteria and viruses.
In 2000, The Center for Disease Control and Prevention (CDC) in Atlanta, GA, developed standard guidelines for when individuals should wash their hands. All individuals should wash their hands before preparing or eating food, treating cuts or wounds, and caring for someone who is ill. Hands should be washed after using the restroom, handling uncooked foods, changing a diaper, coughing or sneezing, playing with pets, handling garbage, and caring for someone who is ill. The CDC has also established guidelines for proper handwashing techniques:

1. Use soap and warm, running water.
2. Wash all surfaces thoroughly, including wrists, palms, back of hands, fingers, and under fingernails.
3. Rub hands together for at least 10 to 15 seconds.
4. When drying hands, use a clean or disposable towel. Pat skin dry rather than rubbing to avoid chapping and cracking.
5. Apply hand lotion after washing to help prevent and soothe dry skin.

(Center for Disease Control, Atlanta, 2000).

Proper handwashing has been credited for reducing illnesses in child care centers, school settings, and the workplace (Master, Longe, & Dickson, 1997; Niffenegger, 1997; Krilov, Barone, Mandel, Cusak, Gaber, & Rubino, 1996; Kotch, Weigle, Weber, Clifford, Harms, Loda, Gallagher, Edwards, Laborde, McMurray, Rolandelli, & Faircloth, 1994; Black, Dykes, Anderson, Wells, Gary, Hatch, & Gangarosa, 1981). This reduction in illness then leads to a reduction of absenteeism and missed days of work by the staff. Not only is proper handwashing important in the school, home, and community setting, it is
also important in the hospital setting. Though the rate for acquiring an infection from the hospital is extremely high, particularly in the pediatric setting due to immature immune systems of the pediatric population, handwashing provides a significant means for preventing the spread of germs that may lead to illness (Pittet, Hugonnet, Harbarth, Mourouga, Sauvan, Touveneau, & Perneger, 2000).

Objectives of the Study

Handwashing Education

Handwashing education was one objective of this study. This study consisted of designing developmentally appropriate educational activities on the importance of handwashing and proper handwashing techniques for preschool children. The study was conducted to see if handwashing education, activities about the importance of handwashing, and reinforcement for handwashing in the preschool setting, would change the child’s handwashing habits at home and in the preschool.

Preschool classrooms were randomly assigned to one of three groups: a control group, test group one, and test group two. The children could participate in up to five educational activities about handwashing depending on the group to which they were assigned. A brief description of each activity is listed below. The goal of all the activities was the same: to teach children about the importance of handwashing and proper handwashing techniques.
Handwashing Activities

*Activity one:* This activity stressed the basic concept of handwashing. The researcher, through the use of visual aids, discussed with the children when, why, and how to properly wash their hands (Appendix J).

*Activity two:* This activity was used to reinforce the five steps of handwashing. The children saw how to get “germs” off their hands (using petroleum jelly and nutmeg) by using warm water and soap (Appendix K).

*Activity three:* This activity showed the children that even though they could not see “germs,” they were nonetheless present on their hands. In this activity Glogerm® was used to represent “germs” on the children’s hands. Each child had three drops of Glogerm® placed on his or her hands. The child rubbed his or her hands together to make the Glogerm® disappear. The child then washed his or her hands. The child placed his or her hands on a table. The researcher then held an ultraviolet (UV) light six inches above the child’s hands. Any Glogerm® that was not removed glowed orange. The child saw the “germs” that he or she did not wash off. The child washed the remaining Glogerm® off (Appendix M).

*Activity four:* This activity was used to stress the importance of handwashing in reducing the spread of infectious diseases. The children listened to a story about “Soap and Sudsy.” This story stressed the importance of proper handwashing in reducing illnesses (Appendix O).
*Activity five:* This activity focused on lead poisoning prevention. The children watched a five-minute video produced by Sesame Street. This video explained to the children what lead is, and what they can do to avoid getting sick from the lead (Appendix R).

**Child Life Intervention**

The role of the Child Life Specialist in the pediatric health care setting is to care for the psychosocial needs of hospitalized children and their families. As a means of promoting the optimal development of children in the health care setting, Child Life Specialists provide age-appropriate activities for children and also engage children in activities that may help to reduce psychological stress. Participating in fun, educational activities about the importance of handwashing and proper handwashing techniques may be one option for children. Results from this study indicated that the handwashing habits of preschool children are positively influenced by educational activities, and those activities may be used to positively influence the handwashing habits of preschool children in the hospital setting.

**Evaluation**

The effectiveness of the educational activities on positively changing the handwashing habits of preschool children was evaluated using parental surveys and direct observations. Parents of children participating in the handwashing study were asked to complete two surveys: one before the implementation of the interventions, and one after the completion of the interventions. Observations of the handwashing habits of the preschool children were collected one week prior to the implementation of the interventions and one week after the completion of the interventions. The data were
analyzed for differences in the handwashing habits of the preschool children across the
groups pre and post intervention.

Committee Members

The members of the project committee were Dr. Susan Witt, Chairperson,
Assistant Professor, The University of Akron; Dr. Helen Cleminshaw, Professor
Emeritus, The University of Akron; and Dr. Barbara Polivka, Associate Professor, The
Ohio State University.
CHAPTER II

LITERATURE REVIEW

Handwashing Habits of Adults

A review of the literature suggests that, in general, individuals of all ages have not implemented the handwashing practices that Dr. Semmelweis advocated over one hundred and fifty years ago. In 2000, Wirthlin Worldwide conducted two different types of surveys on the handwashing habits of adults. One type was observational, the other type was completed via telephone. In the observational survey, researchers observed the handwashing practices of 7,836 individuals (3,589 males and 4,247 females age 18 years and older) in five major metropolitan areas: Grand Central/Penn Station, New York City; Navy Pier, Chicago; Golden Gate Park, San Francisco; Braves’ Baseball Game, Atlanta; and a casino, New Orleans. The observations took place in public restrooms where soap, water, and paper towels were readily available. The observers recorded whether or not the individuals washed their hands after using the restroom. After the data were collected, they were compared to a similar observational study that was completed by Wirthlin Worldwide in 1996. Table 2.1, which follows, shows the results of that study (American Society for Microbiology, 2000).
Table 2.1
Percent of Adults Observed Washing Their Hands

<table>
<thead>
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<th>Males</th>
<th>Females</th>
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<tr>
<td>Chicago</td>
<td>60%</td>
<td>78%</td>
<td>93%</td>
</tr>
<tr>
<td>Atlanta</td>
<td>46%</td>
<td>36%</td>
<td>89%</td>
</tr>
<tr>
<td>New York City</td>
<td>62%</td>
<td>43%</td>
<td>58%</td>
</tr>
<tr>
<td>New Orleans</td>
<td>73%</td>
<td>55%</td>
<td>70%</td>
</tr>
<tr>
<td>San Francisco</td>
<td>62%</td>
<td>71%</td>
<td>78%</td>
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Observers found that men in Atlanta were the least likely to wash their hands after using the restroom. Women in San Francisco were the most likely to wash their hands after using the restroom. Though the average rate of handwashing shifted between the cities when comparing the 1996 observations to the 2000 observations, overall an average of 68% of adults observed in public restrooms washed their hands before leaving in 1996 and in 2000 (American Society for Microbiology, 2000).

The second survey completed by Wirthlin World Wide was done via telephone. The survey consisted of asking 1,021 adults about their handwashing habits in several different situations. Women who were surveyed were significantly more likely to say that they washed their hands more often after several different activities as compared to men. For example, 40% of women said they wash their hands after coughing or sneezing, compared to 22% of men. Fifty-four percent of women said that they wash their hands
after petting a dog or cat, while only 36% of men said that they wash their hands after petting a dog or a cat. When asked about changing a diaper, 86% of women said they wash their hands after handling a diaper, whereas 70% of men said they wash their hands after handling a diaper (American Society for Microbiology, 2000).

Handwashing Habits of School-Age Children

The handwashing habits of high school students have been examined through several research studies. Guinan, McGuckin-Guinan, & Sevareid, (1997) conducted a descriptive observational study to determine the handwashing habits of high school students after using the restroom. The study observed, measured, and compared the duration and techniques of male and female high school students. The researchers recorded the following observational data: sex of the student, location, use of soap, and whether or not the length of handwashing was greater than five seconds. The data showed that 58% of female students washed their hands after using the restroom, compared with only 48% of male students. Twenty-eight percent of female students used soap versus only 8% of males. Female students also washed their hands for a longer duration than did the male students, with 50% of female students washing their hands longer than five seconds, and only 23% of male students washing their hands longer than five seconds (Guinan et al, 1997).

Pete (1997) also conducted an observational study that examined the handwashing practices of high school students. The observers recorded the number of students who washed their hands after using the restroom. The data showed that a total of 40% of high school students were observed washing their hands after using the restroom (32% female
and 8% male). The study was limited, however, in that it did not examine the duration of the handwashing, or if proper handwashing techniques were being used by the students. The study was also limited due to a relatively small sample size.

Handwashing habits of elementary school students have also been studied. Using the same observational tool as in the high school study, the data showed that both female and male students had a 100% handwashing rate after using the restroom (Pete, 1997). This study, however, observed students in the elementary school where handwashing was mandatory after using the restroom. The children were accompanied to the restroom by their teachers, and were instructed to wash their hands when they were finished. This study was also limited because it did not examine the duration of the children’s handwashing or the children’s handwashing techniques.

**Handwashing Interventions for Children**

Several studies have been completed that examine the effectiveness of various handwashing interventions on the handwashing habits of preschool and elementary school children, and incidences of communicable illnesses in the school or child care settings (Early, Battle, Cantwell, English, Lavin, & Larson, 1998; Master, 1997; Niffenegger, 1997).

Early et al., (1998) examined the handwashing habits of elementary school-age children. The purpose of this study was to determine whether or not handwashing education interventions had the potential to positively change the handwashing practices of elementary school-age children. This study covered several factors regarding handwashing in six different elementary schools before and after handwashing
interventions were implemented. The trained observers recorded the following information: 1.) when the handwashing was occurring (before lunch or after restroom use), 2.) if soap was used, and 3.) if hands were dried with a paper towel before the student left the restroom. The baseline data showed 58% of all of the students washed their hands after using the restroom.

The Early et al. study also tested four handwashing interventions that were tested in five schools. The first intervention was a peer education program. The peer education program consisted of fourth grade students teaching first grade students about different aspects of handwashing based on materials developed by Procter and Gamble (Healthy Hygiene, Cincinnati, Ohio, 1998). This educational program aimed to teach first grade students about germs, where germs live, how they are transmitted, and when, why, and how to properly wash hands. The fourth graders taught the first-graders this information by using storyboards, video presentations, and teaching them interactive songs that emphasized the steps of proper handwashing. The fourth graders also gave out stickers to the first grade students who participated in the educational program.

The second intervention consisted of having alcohol-based hand wipes installed in the restrooms of the school. The students were instructed on how to use the hand wipes, and large posters were hung in the restrooms as a reminder of how to use the hand wipes properly. Two schools received the peer education handwashing program intervention, one school received the hand wipe intervention, one school received the peer education handwashing program and the hand wipes interventions, and one school acted as the control group and did not receive any handwashing interventions. After the completion of
the interventions, the handwashing rate increased from 42% to 45% for the control group; 64% to 72% for the two schools that received the education intervention; 50% to 66% for the school that received the hand wipe intervention; and 45% to 67% for the school that received both the handwashing education and the hand wipe intervention (Early, et al., 1998). This study did not, however, record the duration of the handwashing and did not differentiate between female and male students’ handwashing occurrences.

Master et al., (1997) designed a quasi-experimental study to examine the effect of a scheduled handwashing program on school absenteeism due to acute communicable illnesses. The ages of the children who participated in this study ranged from 5 to 12 years. The children were divided into two groups: control group and handwashing group. The children in the control group washed their hands as usual with no required times for handwashing and no prompting from adults. The children in the handwashing group were instructed to wash their hands at scheduled times including after arriving at school, before eating lunch, after lunch recess, and before going home, in addition to other appropriate times (such as after using the restroom). Three weeks prior to the intervention, both groups were taught proper handwashing techniques and appropriate times for handwashing. The researchers monitored the rate of absenteeism of both groups for 37 school days. The results of the data showed that there were 116.5 days of absence in the handwashing group compared to 175 days of absenteeism by the control group. This data indicated that scheduled handwashing times contributed to a 25% lower rate of absenteeism from school. This study was limited, however, in that it did not collect any baseline data on the handwashing habits of the children before the intervention. This
study also did not monitor the technique or duration of handwashing of both of the
groups during the intervention period. The study also did not indicate the overall health
of the students before they were assigned to either the control or handwashing group.

Niffenegger (1997) designed an experimental study to determine the effectiveness
of an instructional program on bacteria, viruses, and handwashing on reducing the
incidence of communicable illnesses in child care settings. This study was 21 weeks in
duration and took place in the field setting. The ages of the children ranged from three to
five years. Two child care centers participated in this study. One center was the control
group, the other center was the test group. The parents and teachers of the children at
both centers completed a “Child Health Assessment Checklist” which monitored each
child’s health on a weekly basis. The children in the control group did not receive any
education on handwashing or bacteria and viruses, and were instructed to continue their
handwashing practices as usual. The test group received a developmentally appropriate 3-
day unit plan on handwashing at 3-week intervals. The handwashing education was based
on the “Hooray for Handwashing” curriculum developed by the Soap and Detergent
Association (1990). This included reading stories to the children about the importance of
handwashing, displaying posters that reminded children and staff to wash their hands, and
using tapes that contained jingles set to music that encouraged children to sing while
washing their hands. The teachers at the child care centers devoted 15 to 20 minutes per
day to handwashing education. The data showed that, at the end of the study, the
incidence of colds in the test groups was significantly lower than the incidence of colds in
the control group. From weeks 1 to 11, the control group had an incidence of colds at the
rate of 12.7%. That rate increased to 27.8% in weeks 12 to 21. The incidence of colds in
the test group had a rate of 19.4% during weeks 1 to 11, and remained almost constant at
a rate of 18.9% during weeks 12 to 21. This data influenced the researcher’s hypothesis
that handwashing education can have a significant impact on the incidence of colds in the
child care setting.

A small pilot study was completed by the researcher of this study on the
handwashing habits of preschool children prior to the final project. The purpose of this
pilot study was to determine if handwashing education, activities about the importance of
proper handwashing, and reinforcement for handwashing in the preschool setting would
change the child’s handwashing habits at the preschool and at home. The pilot study used
3 different preschool classes. Each class was randomly assigned to the control group, test
group one, or test group two. The control group consisted of 11 preschool children, and
only received information on the basic concepts of handwashing. Test group one
consisted of 10 preschool children. They participated in five activities about proper
handwashing. Test group two consisted of 6 preschool children. They participated in
three activities about proper handwashing. Baseline observational handwashing data and
pre-intervention parental surveys on the preschoolers handwashing habits at home were
collected from all of the groups before the activities began. Observational handwashing
data and post-interventional parental surveys on the preschooler’s handwashing habits at
home were also collected at the conclusion of the activities.

Information from pre- and post-intervention parental surveys and pre- and post-
observational data indicated that the handwashing habits of the preschool children did
improve within the two test groups. Children in test group one increased their use of soap when washing their hands from 80% before the interventions to 100% after the interventions were completed. Children in that group also increased the duration of their handwashing to greater than 10 seconds per handwashing episode from 10% before the interventions to 77.8% after the interventions had been completed. The data from test group two also showed some significant differences in handwashing habits before and after the handwashing education. Test group two increased their use of soap during handwashing from 33.3% before the intervention to 100% after the completion of the interventions. The data from that group also showed a significant increase in the duration of handwashing. Before the implementation of the interventions, 33.3% of the children washed their hands for a 10 second duration. After the completion of the interventions, 100% of the children washed their hands for 10 seconds or more during each handwashing episode.

There were some limitations to this pilot study. The first limitation of the study was the relatively small sample size. More preschool children participating in the study would have improved the significance of the data. The second limitation was a lack of parental response from the post-intervention surveys. Again, a larger number of parents completing the post-intervention surveys would have improved the significance of the data. The third limitation of the study was that some of the participants missed some interventions due to their absence from the preschool during vacation months. The post-intervention data may also have been skewed by the recency effect. Because the post-intervention observations were completed shortly after the fifth intervention, it was
not possible to determine whether the improvements observed and reported about the preschoolers’ handwashing habits were due to successful education and subsequent behavior changes, or due to the observations being completed the week after the fifth intervention.

Handwashing Interventions for Child Care Staff

Krilov, Barone, Mandel, Cusak, Gaber, & Rubino, (1996) also researched factors that may have a positive impact on decreasing the rate of respiratory illnesses in the child care setting. Basing their research on the premise that the number of preschool children enrolled in school-based educational programs and child care centers has dramatically increased, Krilov et al., designed a two-year experimental study. This study involved developing and implementing a comprehensive infection control program at a specialized preschool program, and then measuring the effects of that program on the incidence of respiratory and other illnesses. The researchers gathered preliminary data on the health status of the children attending the preschool, and then continued to monitor the children’s health through health assessment surveys completed at 3-month intervals by the children’s parents. The infection control program that was initiated consisted of several in-service educational topics. Proper handwashing was emphasized among the several in-services that were offered. The data from this study showed that compared to the baseline data, the incidence of respiratory infections decreased significantly (0.67 to 0.42 with a p Value <0.05) when the infection control program was implemented. This indicates that an infection control program that emphasizes the importance of proper
handwashing has the potential to decrease the incidence of respiratory illnesses in the preschool setting.

A similar study evaluating hygienic interventions in the child care setting was conducted by Kotch, et al., (1994). The researchers collected baseline data on the incidence of enteric illnesses at 72 child care centers. Thirty-six child care centers participated as control groups, and 36 child care centers participated as the intervention groups. Parents of participating children in both groups were contacted biweekly by the researchers to assess their child’s health. The staff in the intervention group received training on hygienic practices for child care centers during a 3-hour training seminar. Among several hygienic practices that were discussed, proper handwashing of the children and the staff at the child care centers was highly emphasized. The staff at the intervention centers received follow-up training a week following the initial training and then at 5-week intervals for the duration of the study. The data at the conclusion of the study showed that there was a moderately significant reduction in the incidence of enteric illnesses in the child care centers that received the hygienic interventions. The study noted, however, that the effectiveness of the intervention may not have been strongly supported due to some physical barriers at the child care centers including a large distance between the diapering area and the sink, and poor access to sinks in the rooms. The moderate decrease in the incidence of enteric illnesses at the centers where the handwashing program had been implemented does indicate, however, that handwashing is an important factor in hygiene education.
Black, et al., (1981) developed an experimental study to evaluate the effectiveness of a handwashing program in decreasing the incidence of enteric illnesses in the child care setting. Four child care centers participated in this study; two child care centers were in the test group (handwashing group) and two child care centers were in the control group. During a two-month baseline period, data were gathered on the incidence of enteric illnesses in the child care centers. During the intervention phase of the study the staff members at the test group centers were given instructions on when to wash their hands: before handling food, after arriving at the child care center, after helping a child use the restroom, after using the restroom themselves, and after changing a diaper. Data on the incidence of enteric illnesses were collected over a 35-week period of time. The data showed that the incidence of enteric illness in the handwashing group was only 52% of that in the control groups. This strongly suggests that a handwashing program implemented in the child care setting may significantly reduce the incidence of enteric illnesses. This study was limited, however, in that the handwashing education was not formally presented to the children in the centers. The information was focused on educating the staff of the child care centers about the importance of proper handwashing. Perhaps the incidence of enteric illnesses may have been significantly lower if the children in the child care centers had received some handwashing education also. Another limitation of this study was in the structure of the handwashing education that was implemented. The researchers did not provide a description of the information on handwashing that was presented to the staff at the child care centers. A description of the
handwashing education would have provided evidence that proper handwashing techniques had been explained by the researchers and implemented by the staff.

Handwashing Habits and Interventions for Hospital Staff

Because handwashing is the most effective means of preventing and controlling cross-infections in the community and in the hospital settings, the handwashing habits of hospital staff have also been studied. Earl (2001) observed the handwashing habits of hospital staff in two hospital intensive care units. Handwashing observations were made over a course of 30 days for a total of 134 hours. During that time, the observers indicated that there were 1,090 patient care episodes where hospital staff should have washed their hands. The hospital staff were observed washing their hands for 432 of those episodes (39.6%). The data collected also indicated that there were significant differences in the frequency of handwashing between the employment status of the hospital staff and times of day that the observations were made. During the observational period, nursing personnel (registered nurses, licensed practical nurses and nursing assistants) should have washed their hands 760 times. Of those 760 times, the nursing personnel washed their hands 313 times (41.2%). Ancillary personnel (such as radiation technicians, physical therapists, and occupational therapists) should have washed their hands 86 times during the observations. The data showed that they washed their hands 44 times (51.2%). Physicians should have washed their hands 222 times. The data showed that they washed their hands 65 times (29.3%). The frequency of handwashing during different times of day was also examined. During the morning hours, there were 647 times when handwashing should have taken place. Handwashing took place 251 times
(38.8%). During the evening hours, 428 opportunities for handwashing were available. Handwashing took place 174 times (40.7%). Overnight, handwashing should have taken place 15 times; 7 episodes of handwashing were observed (46.7%).

Gallagher (1999) also examined the handwashing habits of hospital staff. Based on an observation tool developed by Gould and Chamberlain (1997), the researcher described the overall handwashing compliance of various hospital staff. The data showed the following compliance rates: nurses, 36%; health care assistants, 43%; domestic workers, 33%; physicians, 33%; physiotherapists, 50%; phlebotomists, 33%.

Pittet et al., (2000) studied the handwashing habits of hospital staff to obtain baseline data for a study developed to examine the effects of a handwashing campaign on the incidence rates of nosocomial infections and meticillin-resistant staphylococcus aureus (MRSA). The researchers collected baseline handwashing data on various hospital staff prior to the implementation of the handwashing campaign and then every six months for three years during the handwashing campaign. The handwashing campaign consisted of displaying large colorful posters that emphasized several topics related to handwashing. These topics included: nosocomial infections, cross transmission of bacteria and viruses, hand carriage of bacteria and viruses, hand hygiene, hand disinfection, and hand protection using creams. The posters were displayed in 250 areas within the hospital and were rotated weekly to different areas. Overall compliance of handwashing improved from 47.6% in 1994 to 66.2% in 1997. During that time, the prevalence of nosocomial infections decreased from 16.9% in 1994 to 9.9% in 1997. The rate of newly detected MRSA positive patients decreased from 2.16% in 1994 to .93% in
1997. This study indicated that the implementation of a handwashing campaign has the potential to increase staff compliance of handwashing and also has the potential to decrease the incidence rates of nosocomial infections and MRSA in the hospital setting.

**Child Development Learning Theories**

The information presented indicates that proper handwashing is important for the prevention and spread of various germs in the home, the community, child care settings, and hospital settings. Because proper handwashing has the potential to decrease the incidences of illnesses, it is important that proper handwashing education is taught to children at a young age.

Many child developmental theorists agree that children are capable of learning habits at an early age. Albert Bandura concluded that modeling or observational learning is the basis for a great deal of children’s behaviors (Bandura, 1977). There are five main factors of modeling. The first factor is paying attention. The child must pay attention to the information that is being presented. To facilitate this, only relevant information should be presented to the child during teaching episodes.

The second factor of modeling is coding for memory. Children code for memory by forming visual images or semantic codes of what they have just observed. This process of coding allows children to store the information that they have just observed and recall it after a period of time.

The third factor of modeling is memory permanence. Little is understood about memory as a whole, but researchers do know that memories do fade or disappear over time. One way of keeping memories readily available for recall is by establishing
memory permanence. Memory permanence is established by using techniques such as review and practice. The more that information is reviewed and practiced, the more likely that it will be available for recall when needed. For example; the more the steps involved in proper handwashing are reviewed and practiced, the more likely it is that children are going to be able to recall those steps on later occasions.

The fourth factor in modeling is behavioral production. Behavioral production occurs when a child thinks about a task and formulates a plan on how to accomplish that task using different forms of previously stored information. For example, a child may have observed proper handwashing, created visual images about proper handwashing, and reviewed and practiced the steps of proper handwashing. Behavioral production would be seen when a child is able to perform comparable handwashing procedures at appropriate times as opposed to replicating exactly what he or she observed during the formal education on proper handwashing.

The fifth factor in modeling is motivation. The child must be motivated to learn. Motivation may stem from several sources. Young children, for example, may see receiving a reward for proper handwashing as motivation for continuing proper handwashing. Older children may view that washing hands as a mode to keep healthy is motivation enough to keep hands clean. Bandura’s modeling theory is a strong indicator that young children have the potential to learn new behaviors, such as handwashing, simply by watching other adults and children wash their hands.

In developing a curriculum to teach preschool children about handwashing, it is important to understand their cognitive abilities at that age. Jean Piaget theorized that
young children are in the preoperational stage of cognitive development. During this stage, children do not yet have the ability to think abstractly. They need to be able to observe concretely what they are being taught. For example, young children may believe that bacteria and viruses do not exist on their hands because they cannot see them. It is not until a young child can “see” bacteria and viruses that he or she realizes that germs do exist on his or her hands even though he or she cannot see them. Because children cannot think abstractly, they need to observe actual events, such as proper handwashing, instead of just listening to how proper handwashing should take place (Piaget, 1952). Congruent with Piaget’s propositions, in order to effectively teach young children about bacteria, viruses, and handwashing, concrete material must be presented.

B.F. Skinner proposed that young children’s positive behaviors may be increased with the use of reinforcers (Skinner, 1974). When a young child completes a task, such as handwashing, he or she is more likely to repeat the task if a reward is provided. That reward acts like a reinforcer, encouraging the child to repeat the desired behavior. Rewards for proper handwashing may range from verbal praise to giving a young child his or her own bar of soap.

Summary

This review of literature indicated that both children and adults do not engage in effective or appropriate handwashing practices (American Society for Microbiology, 2000; Early, et al., 1998; Guinan, et al., 1997; Pete, 1997). This review of literature also offered an examination of the connection between handwashing and the incidence of

The review of the literature indicates that there is a strong need for handwashing education among various age groups and in many different settings. The literature also suggested that proper handwashing has the potential to prevent cross-infections and decrease the incidences of several illnesses. Many studies have been conducted in preschool or elementary schools and concluded that the handwashing habits of children were directly related to the incidences of communicable illnesses in these settings (Early, et al., 1997; Master, 1997; Niffeneggar, 1997). Several other studies concluded that increased frequency of handwashing and proper handwashing techniques have a positive impact on decreasing the rate of respiratory illnesses at child care centers (Krilov, et al., 1996; Kotch, et al., 1994; Black, et al., 19891).

There has been research conducted on the relationship between the handwashing habits of hospital staff and the incidence of cross-infections (Earl, 2001; Gallagher, 1999; Pettet, 2000). These studies all concluded that cross-infections between hospital staff and patients in the hospital setting decreased dramatically when hospital staff increased the frequency of proper handwashing.

The literature indicated that there is an overwhelmingly strong need for handwashing education among children and adults in a variety of settings. This study was designed to expand on previous work by examining the effectiveness of handwashing education and reinforcement on preschool children’s handwashing in the
school and home. Previous studies have examined the handwashing habits of children, but few studies have examined the handwashing habits of preschool children. Other studies have examined the relationship between handwashing education and the incidence of illnesses in schools, but few studies have indicated how much education is needed to effectively change the handwashing habits of preschool children in the preschool setting and at home.

The purpose of this study was to see if handwashing education, activities about the importance of proper handwashing, and reinforcement for handwashing in the preschool would change the child’s handwashing habits at the preschool and at home. This study was also designed to see how much handwashing education and reinforcement was needed to effectively change the handwashing habits of preschool children in the preschool setting and at home.
CHAPTER III

METHODOLOGY

Introduction

Individuals of all ages carry a great amount of bacteria and viruses on their hands. When hands are not washed at appropriate times, or if they are not washed properly, bacteria and viruses may spread to others. These bacteria and viruses may cause illnesses such as colds and diarrhea, or may lead to serious, even life-threatening diseases. When performed correctly and at appropriate times, handwashing may help to prevent some illnesses by stopping the spread of bacteria and viruses. As previously stated in chapter I, the purpose of this study was to examine the effects of handwashing education on the handwashing habits of preschool children.

Research Question and Hypotheses

This study was designed to expand on previous work by examining the effectiveness of handwashing education and reinforcement on children’s handwashing habits at preschool and at home.

The research question and hypotheses addressed in this thesis were as follows:

Research Question 1: Do weekly handwashing educational activities improve the handwashing practices of preschool children?
Hypothesis 1: Children receiving three educational activities on proper handwashing will increase their handwashing practices at preschool and at home compared with children receiving only one educational activity.

Hypothesis 2: Children receiving five educational activities on proper handwashing will increase their handwashing practices at preschool and at home compared with those children receiving one educational activity and those children receiving three educational activities.

The literature indicates that children receiving some educational activities about handwashing improve their handwashing behaviors. It is not clear, however, how much handwashing education is needed to improve a child’s handwashing behavior. This study was conducted to assess the effects of one, three, and five educational activities on the handwashing habits of children at preschool and at home.

Methods

Design

This study used an experimental pre- and post-control group design. Three groups were included: the control group and two experimental groups.

Subjects

The Ohio State University Child Care Center agreed to participate in this study (Appendix A). The subjects for this study were preschool children from four preschool classrooms at the child care center. Thirty-five children participated in this study. The children ranged in age from three and a half to five years. As reflected in Table 2.1, the children were split almost equally between males and females, and were all
predominantly white. Parents of the children were students, faculty, or staff at the Ohio State University. This study was approved by the Human Subjects Review Boards at the University of Akron and the Ohio State University (Appendices B and C).

Table 3.1
Demographic Characteristics

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(n=10) (n=10) (n=15) (n=35)

Variable n (%) n (%) n (%) n (%)

C = Control Group (one intervention)
T1 = Test Group One (five interventions)
T2 = Test Group Two (three interventions)

Instruments

Pre- and post-surveys developed by the researcher were completed by the parents of the participating children. The “Handwashing Habits of Preschool Children” pre-test survey consisted of five demographic questions and seven questions about the handwashing habits and knowledge of their child (Appendix D). Only the children of parents returning the survey participated in the study. During the week after the educational activities, the parents also completed the “Handwashing Habits of Preschool
Children” post-test survey regarding the handwashing habits and knowledge of their child at home. The post-test survey included the same seven questions concerning the handwashing habits and knowledge of their child as well as three questions related to perceived changes in their child’s handwashing habits at home (Appendix E). To increase participation in this study, parents received a notepad for writing information for babysitters as an incentive for completing the consent form and pre-survey. Parents were also given an Ohio State magnet as an incentive to complete their post-survey.

The participating children were observed at the preschool for baseline handwashing data one week before the intervention activities began. Each child was observed one time either before a meal or after using the restroom. During the observations, a trained graduate student, unknown to the children, completed a check list identifying whether the child was a male or female, why the child was washing his or her hands, whether the child used soap and water, and whether or not the child washed his or her hands for at least ten seconds. This observation tool was piloted in a non-participating preschool room and worked well (Appendix F).

Procedure

The procedure for the study was carried out over an eight-week period (Appendix G). During the first week, a letter explaining the purpose of the study and information about the educational activities about handwashing (Appendix H), including a consent form and short survey, were sent home to parents in the four participating classrooms. All parents who agreed to have their child participate in the study completed the consent
form (Appendix I) and a short survey (Appendix D). The survey focused on their child’s handwashing habits at home.

During the second week, all the children of parents who returned the completed consent form and the survey were observed by a trained observer at the preschool for baseline handwashing data. After all observations were completed, the classrooms were randomly assigned to be in either the control group, test group one, or test group two. The control group participated in only activity one. Test group one participated in all five intervention activities; test group two participated in intervention activities one, three and five.

The intervention occurred between weeks three and seven. Prior to the start of each of the intervention activities, the participating children were gathered together in a separate portion of the classroom. Those not participating continued with the regularly scheduled classroom activities. In order to gain assent from the child, the children were asked to raise their hands if they would like to participate and have fun learning about handwashing (Appendix J). Those not wishing to participate rejoined their classmates in the routine activity. Children participating in the handwashing activities received a small reward for properly washing their hands. Rewards related to handwashing, such as soap, coloring sheets, and activity sheets were given to reinforce their healthy handwashing habits.

The first intervention activity was conducted during the third week of the study. All three groups participated in this activity. This activity focused on the basic concept of handwashing (Appendix K). The children were asked when, why, and how they
washed their hands. After a brief discussion, the children were shown the proper way to wash their hands. After the children were shown the correct way to wash their hands, they were asked to demonstrate how to properly wash their hands. Once they demonstrated this, they received a small bar of soap as a reward for properly washing their hands. This activity took approximately fifteen minutes when working with groups of three to six children and was repeated until it was completed with all participating children in each classroom.

During the fourth week, those children in test group one participated in the second intervention activity (Appendix L). The purpose of this activity was to reinforce the five steps of handwashing. The children saw how to get “germs” off their hands (using petroleum jelly and nutmeg) by using warm water and soap. First, the children were asked what they remembered from the first activity. This was reviewed with them using visual aids. When, why and how to properly wash hands was discussed. The researcher initially gave a demonstration of the activity, which used petroleum jelly and nutmeg, to demonstrate the need to use both soap and water when washing hands. After the demonstration, the children rubbed a dime size amount of petroleum jelly on their hands. A small amount of nutmeg was added to each child’s hands. The children were asked to pretend that the nutmeg is dirt. They were then asked to wash their hands using two different methods. The first method involved putting their hands under cold water. The children saw that the “dirt” did not come off. The children were then asked to wash their hands using a second method, using soap and warm water. The children were asked to rub their hands together for ten seconds while singing the “A, B, C’s” before they rinsed
their hands. After the children completely washed their hands, a short discussion followed about why soap and water is needed to effectively clean hands. At the end of the activity, the children received a coloring sheet as a reward for properly washing their hands (Appendix M). This activity took approximately twenty minutes when working with groups of three to six children.

Test Groups One and Two participated in intervention activity three during the fifth week (Appendix N). This activity showed the children that even though they cannot see bacteria and viruses, those bacteria and viruses are still on their hands. In this activity Glogerm® was used to represent “germs” on the children’s hands. Initially, material on the handwashing technique previously presented was briefly reviewed. Afterward, the researcher demonstrated the ‘Glogerm®’ activity. Glogerm®, ultraviolet light, and a substance containing mineral oil and plastics were used to demonstrate effective handwashing technique. The children were instructed concerning ultraviolet (UV) light safety. The children were told that they were not allowed to hold, touch, or look at the ultraviolet light. Three drops of Glogerm® were placed on the palms of the children’s hands. They were asked to pretend that they had “germs” on their hands. The children were told to rub their hands together to make the “germs” disappear. The children were then asked to wash their hands to get rid of the “germs.” After the children washed their hands, the lights in the room were dimmed. The children were reminded to not look directly at the light. Also, the children were told that they had to keep their hands on the table, which was two feet high, in order for the light to be shown on them. The light was held at least six inches away from the child’s hands. The ultraviolet light was then shown
on the children’s hands. The children were able to see the “germs” that they did not wash off. The children were asked to wash their hands again. When the Glogerm® was completely washed off the children’s hands, the researcher and the children discussed what they had learned. The children received a small box of crayons and a coloring sheet as a reward for properly washing their hands (Appendix O). This activity took approximately twenty minutes when working with groups of three to six children.

During week six, Test Group One participated in the fourth intervention activity (Appendix P). This activity was used to stress the importance of handwashing in reducing the spread of infectious diseases. Initially, a review of the previous material occurred. The children then listened to a short story of “Soap and Sudsy.” This story stressed the importance of handwashing (Appendix Q). The children also listened to a tape that contained jingles set to music. These jingles encouraged the children to sing while they washed their hands. The children were asked what “Soap and Sudsy” taught them. After a brief discussion about what they had learned, they were asked to demonstrate how to properly wash their hands. When the children finished washing their hands, they received an activity sheet as a reward (Appendix R). This activity took approximately ten minutes when working with groups of three to six children.

Test Groups One and Two participated in intervention activity five during the seventh week of the project (Appendix S). This activity focused on the importance of handwashing in preventing lead poisoning in preschoolers. The activity began with a review of the previous activities. Visual aids were used to review previously covered material. The children were asked what they knew about lead and lead poisoning. The
children watched a five-minute video, produced by Sesame Street, about lead and lead poisoning prevention. After the video, the contents were reviewed (what lead is, why it is dangerous, and how children can prevent lead from entering their bodies). This activity took approximately thirty minutes when working with five to ten children. The children received an activity booklet and crayons with a lead-free message at the end of the discussion.

During the eighth week of the study, a second survey was sent home for the parents to complete. This survey asked questions about their child’s handwashing habits at home and any changes in handwashing habits or knowledge (Appendix E). During this week the handwashing habits of the children were again observed at the child care center by a data collector unfamiliar to the children. Using a data collector unfamiliar to the children helped to show that the children’s handwashing habits were not influenced by the presence of the researcher.

Data Analysis

Data collected from the parental surveys and the observations were analyzed for pre- and post-test differences across the groups. Data were entered into a data base created in SPSS-PC. Differences in pre and post scores on questions 5, 6, 7, 8 and 9 on the pre survey and identical questions 1, 2, 3, 4, and 7 on the post survey were analyzed using appropriate parametric and non-parametric statistical tests (e.g., ANOVA, chi-square). Between-groups differences in response to post-survey questions 5 a, b, c were analyzed using appropriate non-parameter statistical tests (e.g., chi-square).
From the data analysis, a determination was made as to whether or not hypothesis 1, which states that children receiving three educational activities on proper handwashing will increase their handwashing practices at preschool and at home, compared with children receiving only one educational activity, was supported. A determination was also made as to whether or not hypothesis 2, which states that children receiving five educational activities on proper handwashing will increase their handwashing practices at preschool and at home, compared with those children receiving one educational activity and those children receiving three educational activities, was supported. Results are discussed in Chapter 4.
CHAPTER IV
RESULTS

This chapter focuses on the results of the data collected from this study. A descriptive analysis of the participants in this study is initially presented. This is followed by the results of the pre- and post-intervention data collected from the parents of the participating preschool children as well as observational data collected by a trained observer unknown to the preschool children.

Description of Participants

Thirty-five children participated in this study with an average age of four years. Approximately one-half of the children were males, and one-half females. While the participants’ ethnic descent varied between Asian American, African American, Hispanic American, and Indian American, the majority of the participants were Caucasian (Table 4.1). Overall, the majority of the children had two sinks in their homes, with at least one of them easily accessible to them. Of the easily accessible sinks, all had soap available (Table 4.1).
### Table 4.1
Subject Characteristics

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C = Control Group (one intervention)
T1= Test Group One (five interventions)
T2= Test Group Two (three interventions)
Data Analysis

Pre-intervention Data--Parent Report

Handwashing habits of the children at home were reported by their parents on the pre-intervention survey (Table 4.2). The majority of the children (74%) used soap at least most of the time when washing their hands. Parents also reported the majority (92%) of the children did not consistently rub their hands together for ten seconds while they wash. Most of the children (97%) required prompting for washing their hands before they ate; however, most parents (83%) reported their child at least sometimes washed his/her hands without prompting after using the restroom.
### Table 4.2
Handwashing Information. Pre-intervention Parent Report

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<tr>
<td>Most of the time</td>
<td>2 (20)</td>
<td>3 (30)</td>
<td>4 (27)</td>
<td>9 (26)</td>
</tr>
<tr>
<td>Sometimes</td>
<td>6 (60)</td>
<td>5 (50)</td>
<td>6 (40)</td>
<td>17 (49)</td>
</tr>
<tr>
<td>Never</td>
<td>1 (10)</td>
<td>2 (20)</td>
<td>3 (20)</td>
<td>6 (17)</td>
</tr>
<tr>
<td>Wash hands without prompting before eating</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (7)</td>
<td>1 (3)</td>
</tr>
<tr>
<td>Most of the time</td>
<td>1 (10)</td>
<td>0 (0)</td>
<td>1 (7)</td>
<td>2 (6)</td>
</tr>
<tr>
<td>Sometimes</td>
<td>3 (30)</td>
<td>4 (40)</td>
<td>5 (33)</td>
<td>12 (4)</td>
</tr>
<tr>
<td>Never</td>
<td>6 (60)</td>
<td>6 (60)</td>
<td>8 (53)</td>
<td>20 (57)</td>
</tr>
<tr>
<td>Wash hands without prompting after restroom</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (7)</td>
<td>1 (3)</td>
</tr>
<tr>
<td>Most of the time</td>
<td>6 (60)</td>
<td>2 (20)</td>
<td>6 (40)</td>
<td>14 (40)</td>
</tr>
<tr>
<td>Sometimes</td>
<td>2 (20)</td>
<td>5 (50)</td>
<td>7 (47)</td>
<td>14 (40)</td>
</tr>
<tr>
<td>Never</td>
<td>2 (20)</td>
<td>3 (30)</td>
<td>1 (7)</td>
<td>6 (17)</td>
</tr>
</tbody>
</table>

C = Control Group (one intervention)
T1 = Test Group One (five interventions)
T2 = Test Group Two (three interventions)

Parents were also asked to answer questions about their child’s knowledge about the relationship between germs, handwashing, and lead poisoning (Table 4.3). Most of the parents (63%) reported either that they did not know whether or not their child understood the relationship between germs and handwashing or their child did not
understand the concept. Less than half (40%) of the children understood that
handwashing decreases the amount of bacteria and viruses on hands. All of the parents
reported their child either did not know about the relationship between handwashing and
lead poisoning prevention or their child did not understand the relationship between
handwashing and lead poisoning prevention.

Table 4.3
Children’s Understanding of Handwashing in Relation to Germs and Lead

<table>
<thead>
<tr>
<th>Variable</th>
<th>C (n=10)</th>
<th>T1 (n=10)</th>
<th>T2 (n=15)</th>
<th>Total (n=35)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand germs make you sick</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>5 (50)</td>
<td>2 (20)</td>
<td>6 (40)</td>
<td>13 (37)</td>
</tr>
<tr>
<td>No</td>
<td>4 (40)</td>
<td>2 (20)</td>
<td>7 (47)</td>
<td>13 (37)</td>
</tr>
<tr>
<td>Don’t know</td>
<td>1 (10)</td>
<td>6 (60)</td>
<td>2 (13)</td>
<td>9 (26)</td>
</tr>
</tbody>
</table>

| Understand handwashing decreases germs on hands |          |           |           |              |
| Yes                                                 | 5 (50)   | 5 (50)    | 4 (27)    | 14 (40)      |
| No                                                  | 3 (30)   | 1 (10)    | 5 (33)    | 9 (26)       |
| Don’t know                                          | 2 (20)   | 4 (40)    | 6 (40)    | 12 (34)      |

| Understand handwashing decreases chance of lead poisoning |          |           |           |              |
| Yes                                                          | 0 (0)    | 0 (0)     | 0 (0)     | 0 (0)        |
| No                                                           | 6 (60)   | 8 (80)    | 14 (93)   | 28 (80)      |
| Don’t know                                                   | 4 (40)   | 2 (20)    | 1 (7)     | 7 (20)       |

C = Control Group   (one intervention)
T1= Test Group One  (five interventions)
T2= Test Group Two (three interventions)
Pre-intervention Data—Observations

The handwashing habits of the preschool children were observed by a trained observer unknown to the children (Table 4.4). Five children were not observed post-intervention due to their absence from the child care center during the observation period. The majority of the children (89%) were observed washing their hands before lunchtime. The other children were observed washing their hands either after using the restroom or after coming inside from playing outside. Most of the children (89%) required prompting before they washed their hands. Slightly over half of the children used soap while washing their hands. The majority of the children (80%) did not rub their hands together for ten seconds while they washed.

Table 4.4
Observations of Handwashing Habits. Pre-intervention

<table>
<thead>
<tr>
<th>Variable</th>
<th>C (n=10)</th>
<th>T1 (n=10)</th>
<th>T2 (n=15)</th>
<th>Total (n=35)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Prompting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7 (70)</td>
<td>10 (100)</td>
<td>14 (93)</td>
<td>31 (89)</td>
</tr>
<tr>
<td>No</td>
<td>3 (30)</td>
<td>0 (0)</td>
<td>1 (7)</td>
<td>4 (11)</td>
</tr>
<tr>
<td>Use soap</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4 (40)</td>
<td>9 (90)</td>
<td>6 (40)</td>
<td>19 (54)</td>
</tr>
<tr>
<td>No</td>
<td>6 (60)</td>
<td>1 (10)</td>
<td>9 (60)</td>
<td>16 (46)</td>
</tr>
<tr>
<td>Rub hands&gt;10 seconds</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>3 (30)</td>
<td>3 (30)</td>
<td>1 (7)</td>
<td>7 (20)</td>
</tr>
<tr>
<td>No</td>
<td>7 (70)</td>
<td>7 (70)</td>
<td>14 (93)</td>
<td>28 (80)</td>
</tr>
</tbody>
</table>

C = Control Group (one intervention)
T1= Test Group One (five interventions)
T2= Test Group Two (three interventions)
Post-intervention Data--Observations

The information in Table 4.5 summarizes the observational data collected from a trained observer unknown to the children after all of the handwashing interventions were completed per protocol. There was a difference in prompting needed between the three groups. All of the children in the control group required prompting to wash their hands. Fifty-four percent of children in test group two and 22% of children in test group one required prompting. All of the children in test group one used soap when washing their hands. Eighty-six percent of the children in the control group and 77% of the children in test group two used soap. Slightly over half (53%) of the total number of children washed their hands longer than ten seconds.

Table 4.5
Observations of Handwashing Habits. Post-intervention

<table>
<thead>
<tr>
<th>Variable</th>
<th>C (n=8)</th>
<th>T1 (n=9)</th>
<th>T2 (n=13)</th>
<th>Total (n=30)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prompting</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8 (100)</td>
<td>2 (22)</td>
<td>7 (54)</td>
<td>17 (57)</td>
</tr>
<tr>
<td>No</td>
<td>0 (0)</td>
<td>7 (78)</td>
<td>6 (46)</td>
<td>13 (43)</td>
</tr>
<tr>
<td>Use soap</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>7 (86)</td>
<td>9 (100)</td>
<td>10 (77)</td>
<td>26 (87)</td>
</tr>
<tr>
<td>No</td>
<td>1 (13)</td>
<td>0 (0)</td>
<td>3 (23)</td>
<td>4 (13)</td>
</tr>
<tr>
<td>Rub hands&gt;10 seconds</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>3 (38)</td>
<td>6 (67)</td>
<td>7 (54)</td>
<td>16 (53)</td>
</tr>
<tr>
<td>No</td>
<td>5 (63)</td>
<td>3 (34)</td>
<td>6 (46)</td>
<td>14 (47)</td>
</tr>
</tbody>
</table>

C = Control Group  (one intervention)
T1= Test Group One (five interventions)
T2= Test Group Two (three interventions)
Graphs 4.1, 4.2, and 4.3 illustrate the differences observed in the need for prompting for handwashing, the use of soap during handwashing, and the length of time the children spent washing their hands before and after the handwashing interventions.

Graph 4.1 indicates that the number of children in both test groups one and two decreased in the need for prompting to wash hands after receiving the handwashing education. Test group one had the greatest decrease in the need for prompting to wash hands. There was virtually no change in the control group.

Graph 4.1
Prompting Required for Handwashing

Graph 4.2 shows that the total number of children increased their use of soap when handwashing after receiving handwashing interventions. Test group two showed the most increase in the use of soap, followed by the control group. There were no pre- or post-differences in test group one.

Graph 4.3 illustrates that there was an increase in the number of children in both Test Groups who washed their hands for at least ten seconds, with Test Group One showing the most increase in the duration of handwashing. There was no difference in the Control Group.
Graph 4.2
Use of Soap During Handwashing

Graph 4.3
Washing Hands Greater Than 10 Seconds

Post-intervention Data--Parent Report

Table 4.6 summarizes the data collected from parents after the completion of the interventions. The majority of the children (97%) used soap at least most of the time when washing their hands. Parents also reported the majority of the children (64%)
consistently rubbed their hands together for ten seconds while they wash. Most of the children (84%) required prompting for washing their hands before they ate; however, most parents (78%) reported that their child most of the time washed their hands without prompting after they used the restroom.

Table 4.6
Handwashing Information. Post-intervention Parent Report

<table>
<thead>
<tr>
<th>Variable</th>
<th>C (n=9)</th>
<th>T1 (n=10)</th>
<th>T2 (n=12)</th>
<th>Total (n=31)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Understand germs make you sick</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>9 (100)</td>
<td>8 (80)</td>
<td>10 (83)</td>
<td>27 (68)</td>
</tr>
<tr>
<td>No</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Don’t know</td>
<td>0 (0)</td>
<td>2 (0)</td>
<td>2 (17)</td>
<td>4 (13)</td>
</tr>
<tr>
<td>Understand handwashing decreases germs on hands</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>9 (100)</td>
<td>7 (70)</td>
<td>11 (92)</td>
<td>27 (68)</td>
</tr>
<tr>
<td>No</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Don’t know</td>
<td>0 (0)</td>
<td>3 (30)</td>
<td>1 (8)</td>
<td>4 (13)</td>
</tr>
<tr>
<td>Understand handwashing decreases chance of lead poisoning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>2 (22)</td>
<td>4 (40)</td>
<td>4 (33)</td>
<td>10 (32)</td>
</tr>
<tr>
<td>No</td>
<td>2 (22)</td>
<td>0 (0)</td>
<td>2 (17)</td>
<td>4 (13)</td>
</tr>
<tr>
<td>Don’t know</td>
<td>5 (56)</td>
<td>6 (60)</td>
<td>6 (50)</td>
<td>17 (55)</td>
</tr>
</tbody>
</table>

C = Control Group     (one intervention)
T1= Test Group One   (five interventions)
T2= Test Group Two (three interventions)

Parents also reported on their child’s knowledge about the relationship between germs, handwashing, and lead poisoning (Table 4.7). Most of the parents (68%) reported their child understood the relationship between germs and handwashing, and the children understood that handwashing decreases the amount of bacteria and viruses on hands.
Thirty-two percent of parents reported that their child did understand the relationship between lead poisoning prevention; however, the majority of parents (55%) reported they did not know if their child understood the relationship between handwashing and lead poisoning prevention.

Table 4.7
Children’s Understanding of Handwashing in Relation to Germs and Lead Poisoning Prevention. Post-intervention

<table>
<thead>
<tr>
<th>Variable</th>
<th>C (n=9)</th>
<th>T1 (n=10)</th>
<th>T2 (n=12)</th>
<th>Total (n=31)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Use soap</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>1 (11)</td>
<td>5 (50)</td>
<td>3 (25)</td>
<td>9 (29)</td>
</tr>
<tr>
<td>Most of the time</td>
<td>8 (89)</td>
<td>5 (50)</td>
<td>8 (67)</td>
<td>21 (68)</td>
</tr>
<tr>
<td>Sometimes</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (8)</td>
<td>1 (3)</td>
</tr>
<tr>
<td>Never</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>0 (0)</td>
</tr>
<tr>
<td>Rub hands&gt;10 seconds</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>4 (44)</td>
<td>0 (0)</td>
<td>2 (17)</td>
<td>6 (19)</td>
</tr>
<tr>
<td>Most of the time</td>
<td>2 (22)</td>
<td>6 (60)</td>
<td>6 (50)</td>
<td>14 (45)</td>
</tr>
<tr>
<td>Sometimes</td>
<td>2 (22)</td>
<td>4 (40)</td>
<td>4 (33)</td>
<td>10 (32)</td>
</tr>
<tr>
<td>Never</td>
<td>1 (11)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (3)</td>
</tr>
<tr>
<td>Wash hands without prompting before eating</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>2 (22)</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>2 (6)</td>
</tr>
<tr>
<td>Most of the time</td>
<td>0 (0)</td>
<td>1 (10)</td>
<td>2 (17)</td>
<td>3 (10)</td>
</tr>
<tr>
<td>Sometimes</td>
<td>6 (67)</td>
<td>8 (80)</td>
<td>7 (58)</td>
<td>21 (68)</td>
</tr>
<tr>
<td>Never</td>
<td>1 (11)</td>
<td>1 (10)</td>
<td>3 (25)</td>
<td>5 (16)</td>
</tr>
<tr>
<td>Wash hands without prompting after restroom</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>4 (44)</td>
<td>1 (10)</td>
<td>2 (17)</td>
<td>7 (23)</td>
</tr>
<tr>
<td>Most of the time</td>
<td>2 (22)</td>
<td>8 (80)</td>
<td>8 (67)</td>
<td>18 (58)</td>
</tr>
<tr>
<td>Sometimes</td>
<td>3 (33)</td>
<td>1 (10)</td>
<td>1 (8)</td>
<td>5 (16)</td>
</tr>
<tr>
<td>Never</td>
<td>0 (0)</td>
<td>0 (0)</td>
<td>1 (8)</td>
<td>1 (3)</td>
</tr>
</tbody>
</table>

C = Control Group (one intervention)
T1= Test Group One (five interventions)
T2= Test Group Two (three interventions)
Graphs 4.4, 4.5, and 4.6 illustrate the differences reported by parents on their child’s handwashing habits including frequency, duration, and need for prompting before and after the handwashing interventions. Most parents (77%) reported an increase in their child’s frequency of handwashing with test groups one and two reporting the most increase. Eighty-four percent of parents reported an increase in the duration of their child’s handwashing. The majority of parents (77%) also reported a decrease in prompting needed for their child to wash his or her hands. Test group two reported the most increase in the duration of handwashing and the most decrease in the need for prompting.

Graph 4.4
Frequency of Handwashing--Parent Report
Graph 4.5
Duration of Handwashing--Parent Report

Graph 4.6
Prompting Required for Handwashing--Parent Report

Data from this chapter are summarized and discussed in the following chapter.

Chapter Five also offers suggestions for future research regarding the information in this chapter and previous chapters.
CHAPTER V
DISCUSSION

Statement of the Problem

Over one hundred and fifty years ago, Dr. Ignaz Semmelweis discovered that routine and proper handwashing could prevent the spread of infectious diseases. Still today, individuals of all ages carry a great amount of bacteria and viruses on their hands. When hands are not washed at appropriate times, or if they are not washed properly, bacteria and viruses may be spread to others. These bacteria and viruses may cause illnesses such as colds or diarrhea, or may lead to serious, even life-threatening diseases. Areas of higher susceptibility to infections and cross-contamination from bacteria and viruses include schools, child care centers, and hospitals. When performed correctly and at appropriate times, handwashing may help to prevent some illnesses by stopping the spread of bacteria and viruses.

Summary of the Hypotheses

Early childhood is an important time period for the development of healthy habits such as thorough and consistent handwashing. This study was conducted to see if handwashing education, activities about the importance of handwashing, and reinforcement for handwashing in the preschool setting, would change the children’s handwashing habits at home and in the preschool. This study answered the research
question: Does weekly handwashing educational activities improve the handwashing practices of preschool children? This study also addressed the following hypotheses:

1. Children receiving three educational activities on proper handwashing will increase their handwashing practices at preschool and at home compared with children receiving only one educational activity.

2. Children receiving five educational activities on proper handwashing will increase their handwashing practices at preschool and at home compared with those children receiving one educational activity and those children receiving three educational activities.

Discussion of Findings

Findings from this study indicate the handwashing habits of preschool children can be positively influenced by the use of developmentally appropriate teaching tools for educating preschool children on the importance of handwashing; the relationship between germs, lead, and handwashing; and proper handwashing techniques. Data collected from a trained observer unknown to the preschool children before and after the handwashing interventions and from parent surveys completed before and after the interventions indicated several changes in the handwashing habits of the children at the child care center and at home.

Test Group One, that received all five interventions, showed a higher rate of improvements over the Control Group and Test Group Two in eight areas. Children in Test Group One required less prompting by the preschool teachers to wash their hands at necessary times, and demonstrated the most increase in the frequency and duration of
their handwashing habits at home. Children in Test Group One also showed the most increase in the use of soap at home, and a decrease in the need for prompting for handwashing before eating and after using the restroom. Parents also indicated that children in Test Group One increased their knowledge of germs and understood the relationship between lead poisoning prevention and handwashing more than those in the Control Group and Test Group Two.

Children in Test Group Two, who received three handwashing interventions, showed improvements in four areas over Test Group One and the Control Group. This group showed the most increase in the use of soap and duration of handwashing at the child care center, and also the highest decrease in the need for prompting for handwashing at home. Parent reports also indicated this group showed the most increase in children’s understanding that handwashing decreases the number of germs on hands.

Implications

The results of this study indicate that the handwashing habits of preschool children can be positively influenced by the use of developmentally appropriate education and positive reinforcement for proper handwashing demonstration. This study also indicated that children who received the most frequent and variable education on handwashing and germs showed the most improvement in their handwashing habits at the child care center and at home. Children in Test Group Two, who received three handwashing interventions, showed improvements in their handwashing habits over those the Control Group, but in fewer areas than those in Test Group One.
Possibilities for Future Research

There are several possibilities for future research based on the findings of this study. One possibility may be to expand the study to several child care centers. This would allow for more participants in the study and thus a higher degree of reliability in the data. Future research may also investigate the possible correlation between the implementation of handwashing programs and the incidence of illness at child care centers. Educational interventions developed for this study may also be used to teach pediatric patients about the importance of proper handwashing. Future research may investigate the possible relationship between the incidence of nosocomial infections in pediatric hospital settings and the implementation of handwashing programs for pediatric patients.

Summary

Both children and adults carry a great amount of bacteria and viruses on their hands. When hands are not washed at appropriate times, or if they are not washed properly, bacteria and viruses may spread to others. These bacteria and viruses may cause serious illnesses, or may lead to life-threatening diseases. When performed correctly and at appropriate times, handwashing may help to prevent some illnesses by stopping the spread of bacteria and viruses. Because proper handwashing has the potential to decrease the incidence of illnesses, it is important that proper handwashing education be taught to children at a young age.

It is common knowledge among those who study and work with young children that children are capable of learning habits at an early age. This study was conducted to
see if handwashing education, activities about the importance of handwashing, and reinforcement for handwashing in the preschool setting, would change the child’s handwashing habits at home and in the preschool.

This study consisted of designing developmentally appropriate educational activities on the importance of handwashing and proper handwashing techniques for preschool children. The findings from this study indicated children’s handwashing habits can be positively influenced by the use of developmentally appropriate educational activities and rewards for proper handwashing demonstration, and that continuous education on handwashing and reinforcement for proper handwashing technique is important for developing healthy handwashing habits in the preschool child.
REFERENCES

American Society for Microbiology, (2000). (http://www.amsusa.org)


Gallagher, R. (1999) This is the way we wash our hands. Nursing Times, 95, (10), 62-65.


APPENDICES
May 25, 2001

To Whom It May Concern:

I have reviewed the project, Using Education to Improve Handwashing Habits of Preschool Children, and agree to participate in the project.

If you have any questions, feel free to contact me at anytime.

Sincerely,

Becky Wilkins
Program Director
APPENDIX B

THE UNIVERSITY OF AKRON INSTITUTIONAL REVIEW BOARD

June 1, 2001

Holly Spencer
8189 Longhorn Road
Powell, OH 43065

Dear Ms. Spencer:

The University of Akron’s Institutional Review Board for the Protection of Human Subjects (IRB) completed a review of the protocol entitled “Handwashing Research - OSU.”

The protocol qualified for Expedited Review and was approved on May 31, 2001. The protocol represented minimal risk to subjects. Additionally, the protocol matched the following federal category for expedited review:

research on individual or group characteristics or behavior or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies

This approval is valid for up to one year or until modifications are proposed to the project protocol, whichever may occur first. In either instance, an Application for Continuing Review must be completed and submitted to the IRB.

Please retain this letter for your files. If the research is being conducted for a master’s thesis or doctoral dissertation, you must file a copy of this letter with the thesis or dissertation.

Sincerely,

Rochelle R. Athey
Associate Director
Research Services & Sponsored Programs

Assigned Research # 20010527

Cc: Virginia Gunn, Director
Susan Witt, Advisor
N. Margaret Wineman, IRB Chair
APPENDIX C

PRE-INTERVENTION SURVEY

Your child’s name:_________________

Your child’s preschool room:_______________

What is your child’s birthdate?_______

Please circle the best response.

1. What sex is your child?
   a. male
   b. female

2. How many sinks are in your home?
   a. two
   b. three
   c. four
   d. five or more

3. How many sinks does your child have easy access to?
   a. one
   b. two
   c. three
   d. four or more

4. Of those sinks that your child has easy access, how many have soap available?
   a. one
   b. two
   c. three
   d. four or more

5. Does your child use soap when washing his/her hands?
   a. always
   b. most of the time
   c. sometimes
   d. never
6. Does your child rub his/her hands together for at least ten seconds when washing hands?
   a. always
   b. most of the time
   c. sometimes
   d. never

7. Does your child wash his/her hands before eating at home **without** prompting from an adult?
   a. always
   b. most of the time
   c. sometimes
   d. never

8. Does your child wash his/her hands after using the restroom at home **without** prompting from an adult?
   a. always
   b. most of the time
   c. sometimes
   d. never

9. Does your child understand that:
   a) “germs” (bacteria and viruses) can make you sick?
      _____ yes
      _____ no
      _____ don’t know
   b) Handwashing can get rid of “germs”?  
      _____ yes
      _____ no
      _____ don’t know
   c) Proper handwashing can decrease the chances of lead poisoning?
      _____ yes
      _____ no
      _____ don’t know

10. Is there anything else you can tell me about your child’s handwashing habits?

    ________________________________________________________________
    ________________________________________________________________
Your child’s name __________________

Please circle the best response.

1. Does your child use soap when washing his/her hands?
   a. always
   b. most of the time
   c. sometimes
   d. never

2. Does your child rub his/her hands together for at least ten seconds when washing hands?
   a. always
   b. most of the time
   c. sometimes
   d. never

3. Does your child wash his/her hands before eating at home without prompting from an adult?
   a. always
   b. most of the time
   c. sometimes
   d. never

4. Does your child wash his/her hands after using the restroom at home without the prompting of an adult?
   a. always
   b. most of the time
   c. sometimes
   d. never
5. During the past six weeks have you noticed any changes in the following:

   a) Frequency of handwashing:
      _____ increase
      _____ decrease
      _____ no change

   b) Duration of handwashing:
      _____ increase
      _____ decrease
      _____ no change

   c) Prompting by parent to wash hands:
      _____ increase
      _____ decrease
      _____ no change

6. Does your child understand that:

   a) “germs” (bacteria and viruses) can make you sick?
      _____ yes
      _____ no
      _____ don’t know

   b) Handwashing can get rid of “germs”?
      _____ yes
      _____ no
      _____ don’t know

   c) Proper handwashing can decrease the chance of lead poisoning?
      _____ yes
      _____ no
      _____ don’t know

7. Is there anything else you can tell me about your child’s handwashing habits?

   ___________________________________________________________
   ___________________________________________________________
### APPENDIX E

#### OBSERVATIONAL TOOL

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<td></td>
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<tr>
<td>After Lunch</td>
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<tr>
<td>Time&gt;10 Seconds</td>
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<tr>
<td>Sing</td>
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</table>
APPENDIX F

TIME LINE

Week One

- Preschool classrooms were randomly assigned to control group, test group one, or test group two. Classroom teachers were notified of their assignments and arrangements were made for intervention sessions.
- Letters explaining the study, pre-intervention surveys, and consent forms were given to parents of all three groups of preschool children
- Completed consent forms and surveys were collected at the child care center

Week Two

- Observations of the handwashing habits of all three groups of preschool children who had signed consent forms were completed at the child care center.

Week Three

- All three groups participated in activity one

Week Four

- Test group one participated in activity two

Week Five

- Test groups one and two participated in activity three
Week Six

- Test group one participated in activity four

Week Seven

- Test groups one and two participated in activity five

Week Eight

- Post intervention surveys were sent home for parents of participating children to complete and return
- Observations of the handwashing habits of participating preschool children were completed for all groups by a trained observer unfamiliar to the children.
APPENDIX G  

LETTER TO PARENTS

August 27, 2001

Dear Parent,

My name is Holly Spencer and I am a graduate student studying Child Life at the University of Akron, in Akron, Ohio. I am conducting a research project regarding the handwashing habits of preschool children along with Dr. Barbara Polivka, Associate Professor, College of Nursing, The Ohio State University. I am interested in the handwashing habits of children in the preschool and at home. This study is designed to see if handwashing education, various educational activities about the importance of handwashing, and reinforcement for handwashing in the preschool, will change the child’s handwashing habits at the preschool and at home.

There will be three preschool rooms participating in the study. If you agree to have your child participate in the study, we would appreciate your completing the enclosed survey and returning it to your preschool teacher along with the completed permission slip within one week. The brief survey asks questions about your child’s current handwashing practices and should take only five minutes to complete. As an incentive for your participation, you will receive an Ohio State magnet upon completion of the survey and consent form!
The study will have five different educational activities that the children may participate in. One preschool room will only participate in the first activity. Only the second preschool room will participate in all five activities. The third preschool room will participate in educational activities one, three, and five. The activities will take place one time per week for five weeks. The children will be asked if they are willing to participate prior to each activity. The handwashing habits of your child will also be observed at the preschool at the beginning and end of the study.

At the end of the five weeks, you will be asked to again complete the survey about your child’s handwashing habits. Also, at the end of the study, the children in the first and third preschool rooms will receive the entire educational program so that they will have the chance to learn more about handwashing.

We will be using nutmeg, petroleum jelly, Glogerm® (which is made with mineral oil and plastic) and an ultraviolet light during some of the activities. If your child is allergic to any of these products, please indicate that on the enclosed permission slip. Your child will then not participate in the activity using that substance, but may still observe that activity. An allergic reaction to these products would involve redness and itching. If you have any questions or concerns feel free to contact either myself or Dr. Polivka.

Holly Spencer
Graduate Student
College of Fine and Applied Arts
The University of Akron

Dr. Barbara Polivka
Associate Professor
College of Nursing
The Ohio State University
I consent to my child’s participation in research entitled:

Using Education to Improve the Handwashing Habits of Preschool Children

Holly Spencer and Dr. Barbara Polivka have explained the purpose of the study, the procedures to be followed, and the expected duration of my child’s participation. Possible benefits of the study have been described as have alternative procedures, if such procedures are applicable and available.

I acknowledge that I have had the opportunity to obtain additional information regarding the study and that any questions I have raised have been answered to my full satisfaction. Furthermore, I understand that my child is free to withdraw consent at any time and to discontinue participation in the study without prejudice to my child.

If my child is allergic to any of the following, I have circled them below. My child will not participate in the activities involving that product.

Allergy to product: 1. nutmeg 2. petroleum jelly 3. Glogerm® (mineral oil and plastic) 4. ultra violet light

Finally, I acknowledge that I have read and fully understand the consent form. I sign it freely and voluntarily. A copy has been given to me.

Date:______________________________              Signed:____________________________

                          (Child’s Name)

Signed:____________________________     Signed:____________________________

                          (Dr. Barbara Polivka)

                          (Parent)

Signed:____________________________

                          (Holly Spencer)
APPENDIX I

SCRIPT

Researcher: “If you would like to have fun learning about handwashing and want to join in on this activity, raise your hand.”

Only the children who raise their hands will participate in the activity.
APPENDIX J

ACTIVITY ONE

I. This activity is about the basic concept of handwashing. There will be two parts to this activity.

A. Ask the children when, why, and how they wash their hands.
B. Discuss with the children when, why, and how they should wash their hands.

These points will be highlighted with visual aids.

1. When
   a. after using the bathroom
   b. before and after eating
   c. after playing outside
   d. before cooking activities
   e. after playing with pets

2. Why
   a. get rid of “germs” (bacteria and viruses)
   b. get rid of dirt

3. How (the researcher will demonstrate while explaining the procedure)
   a. Rinse hands with warm water
   b. Put soap on hands
   c. Rub hands together for 10 seconds
      1) Rub hands together while singing the “Alphabet song”
   d. Rinse hands with warm water
   e. Dry hands thoroughly with a paper towel.

B. In groups of three to six, ask each child to demonstrate how to properly wash their hands. After each child has appropriately demonstrated how to wash their hands, give him/her a reward, (e.g. a sticker.)

*This activity will take approximately 15 minutes when working with groups of 3-6 children.
APPENDIX K

ACTIVITY TWO

I. This activity is used to reinforce the five steps of handwashing. The children will see how to get “germs” off of their hands (using petroleum jelly and nutmeg) by using warm water and soap. This activity has four parts.

A. Ask the children what they remember from the first discussion about handwashing. Review these points with the help of visual aids.

1. When to wash hands
2. Why to wash hands
3. How to wash hands

B. Demonstrate while explaining to the children the activity. Petroleum jelly is going to be put on their hands. Nutmeg will be added to simulate dirt. The children will try two different ways to wash the “dirt” off.

1. Petroleum jelly will be put on hands.
2. Nutmeg will be put on hands
3. Two different ways will be used to wash the “dirt” off.
   1) rinse hands under cold water
      a) the children will see that the “dirt” does not come off
   2) rinse hands under warm water, add soap, rub hand together while singing the “alphabet song,” rinse hands off, and dry them with a paper towel.
      b) the children will see that using the second method is more effective at removing the “dirt” than the first method. This will stress how important it is to use warm water AND soap to wash hands.

C. After the children have completely washed their hands, discuss why warm water and soap is needed to effectively cleanse hands.

D. Give each child a reward, (e.g. a coloring book) for properly washing his/her hands.

*This activity will take approximately 20 minutes when working with groups of 3-6 children.
APPENDIX L

COLORING SHEET

COLORING SHEET

Color me, cut out to make a puzzle.

Name:

I pledge to wash my hands
APPENDIX M

ACTIVITY THREE

I. This activity will show the children that even though they cannot see “germs”, they are still on their hands. In this activity Glogerm® is used to represent “germs” on the children’s hands. This activity has four parts.

A. Ask the children what they remember about washing their hands. Use the visual aids to reinforce what they have learned.

1. When to wash hands
2. Why we wash hands
3. How to wash hands
4. “Germs”
   a. they can make you sick
   b. they are too small to see
   c. handwashing will get rid of the germs

B. Explain to the children what they are going to be doing. Demonstrate to the children as you explain the activity.

1. Put three drops of Glogerm® on your hands. Explain to the children that they are going to pretend that it is germs. Rub your hands together to make the Glogerm® disappear.
2. Explain to the children that you are going to wash the “germs” off.
3. Explain to the children that you are going to look at your hands with a special light to see if any “germs” were left on your hands.
   a. dim the lights and shine the ultraviolet light on your hands
4. Ask the children if they can see any “germs” on your hands.
5. Explain to the children that they are going to be doing the same thing. Remind them that they are not to look into the light or touch the light. The children will also need to keep their hands on the table. The ultraviolet light will be held six inches above their hands at all times.
6. While the children participate in the activity:
   a. remind them that even though they cannot see them, “germs” are still on their hands.
b. remind the children to sing the “alphabet song” while washing their hands

c. the children will see what parts of their hands they did not get clean

C. After the remaining Glogerm® has been washed off, discuss with the children what they have learned.
   1. “Germs” are on their hands even though they cannot see them.

D. Give the children a reward, (e.g. a coloring book) for properly washing their hands.

* This activity will take approximately 20 minutes when working with groups of 3-6 children.
APPENDIX N

COLORING SHEET

COLORING SHEET

Name: ____________________________

I pledge to wash my hands

Color me.
APPENDIX O

ACTIVITY FOUR

I. This activity is used to stress the importance of handwashing in reducing the spread of infectious diseases. The material is from the “Hooray for Handwashing” program. This activity has five parts.

A. Ask the children what they remember about handwashing Use the visual aids to reinforce what they learned.

1. When to wash hands
2. Why we wash hands
3. How to wash hands
4. “Germs”
   a. they can make you sick
   b. they are too small to see
   c. handwashing will get rid of them

B. Explain to the children what they are going to do.

1. The children will watch a video about “Soap and Sudsy” This story stresses the importance of handwashing.
   2. The children will listen a tape that contains jingles set to music. These jingles encourage them to sing while they wash their hands.

C. Ask the children what “Soapsy and Sudsy” have taught them

1. Importance of handwashing
2. A new song to sing while washing hands

D. In groups of three, have the children demonstrate proper handwashing.

E. Give each child a reward, (e.g. a picture to color to take home.)

*This activity will take approximately 10 minutes when working with groups of 3-6 children.
SOAP AND SUDSY STORY

Sudsy and Soapy were sad. No one had visited them.

Our friends are outside playing.

Our friends need to wash their hands. Sudsy and Soapy made bubbles to remind their friends to wash their hands.
The bubbles taught the children when to wash their hands.

They heard footsteps and laughing.

Hooray for clean hands!
Hooray for handwashing!
APPENDIX Q
COLORING SHEET

COLORING SHEET

Connect the dots, then color.

I pledge to wash my hands
APPENDIX R

ACTIVITY FIVE

I. This activity is focused on lead poisoning prevention. The children will watch a five minute video produced by Sesame Street. This video explains to the children what lead is, and what they can do to avoid getting sick from the lead. This activity has six parts.

A. Ask the children what they remember about handwashing. Use the visual aids to reinforce what they have learned.

1. When to wash hands
2. Why we wash hands
3. How to wash hands

B. Ask the children what they know about lead. Tell them that they are going to watch a Sesame Street video. The video will tell them a lot of things about lead.

C. The children will watch the video.

D. Discuss with the children the important points in the video.
   1. What is lead?
      a. Lead is a harmful substance that can hurt your body.
   2. What can you do to keep lead out of your body?
      a. Wash your hands before you eat
      b. Stay away from peeling paint
      c. Leave your shoes at the door
      d. See your doctor for a blood test
   3. Why did Elmo want everyone to wash their hands?
      a. to get rid of the lead dust
   4. When playing outside, should you wash your hands before you go or after you come back in?
      a. After you come back in
5. Should you wash your hands before or after you eat?

   a. BOTH

E. Give each child a reward (e.g. a coloring book).

F. Place a pamphlet about lead poisoning prevention in each parent’s mail slot.

* This activity will take approximately 20 minutes when working with groups of 5-10 children