

Videotape Increases Parent Knowledge About Poliovirus Vaccines and Choices of Polio Vaccination Schedules

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ABSTRACT. *Objective.* To study the effect of an educational videotape about poliovirus vaccines and choices of schedules for parents/guardians of children starting the polio vaccination series.

Design. Prospective, randomized trial comparing two educational interventions.

Setting. Five pediatric offices (two university-based, two health maintenance organization staff models, and one private practice) and a local health department immunization clinic in the greater Lansing, MI, area.

Participants. A total of 287 parents/guardians of 2- to 3-month-olds presenting for well-child care and due for the first set of immunizations including poliovirus vaccine.

Interventions. Parents/guardians were randomized to read the vaccine information statement (VIS) alone or to read the VIS and view a 15-minute videotape about polio vaccination and choices of schedules produced by Michigan State University. The intervention groups were similar by race/ethnicity, education, and relationship to the child.

Outcome Measures. Change in knowledge about the risk of poliomyelitis in the United States, transmission of poliomyelitis, characteristics of the two poliovirus vaccines, and choices of polio vaccination schedules; and parent opinion on effectiveness of the interventions, as measured by pre- and postintervention questionnaires.

Results. Both interventions resulted in increased test scores of knowledge. However, videotape viewers scored significantly higher on their posttest compared with parents/guardians assigned to VIS only. This significant increase was noted across all practice types, two of three major racial/ethnic groups, and educational levels. (The increase for Hispanic parents/guardians approached significance). Reading the VIS did not improve posttest scores for videotape viewers. Reading the VIS did improve posttest scores for those assigned to VIS only, but these scores still were not as high as for videotape viewers who did not read the VIS.

Conclusions. This study demonstrated that a complicated discussion of risks/benefits of two vaccines and their schedules of administration could be communicated effectively via a videotaped presentation. In addition, the videotape was more effective than VIS alone in increasing short-term knowledge, regardless of practice type, race/ethnicity, or educational level. As immuniza-

tion schedules increase in complexity and parents are asked to make more choices, videotaped information may be a better method to achieve the goal of truly informed consent. *Pediatrics* 1998;102(2). URL: <http://www.pediatrics.org/cgi/content/full/102/2/e26>; *poliovirus, vaccine, videotape, informed consent, parent education.*

ABBREVIATIONS. CDC, Centers for Disease Control and Prevention; AAP, American Academy of Pediatrics; IPV, inactivated poliovirus vaccine; OPV, oral poliovirus vaccine; VIS, vaccine information statement(s); HMO, health maintenance organization; CI, confidence interval; SD, standard deviation.

In January 1997, a significant change took place in the recommended routine childhood immunization schedule for polio vaccination. The Advisory Committee on Immunization Practices of the Centers for Disease Control and Prevention (CDC), the American Academy of Pediatrics (AAP), and the American Academy of Family Physicians recommended a greater role for the use of inactivated poliovirus vaccine (IPV).^{1,2} This recommendation came about because of the small risk of paralytic poliomyelitis associated with receipt of oral poliovirus vaccine (OPV), which has been the only cause of indigenous paralytic poliomyelitis in the United States since 1979. Although the three organizations differ somewhat in the recommended approach, each calls for informing parents/guardians of three choices of polio vaccination schedules: two doses of IPV followed by two doses of OPV, four doses of OPV, or four doses of IPV.

As with most new vaccines and vaccination schedule changes, health care providers have raised concerns about this change. Among them are whether it is possible in a busy office practice to include a discussion about this choice of schedule with parents/guardians; whether parents/guardians will be able to understand the choices and make a decision about which schedule they want for their child; and what effect the introduction of additional injections into the routine schedule will have on timely administration of other needed vaccines.³⁻⁷

Knowing that a change in the polio vaccination recommendation was imminent, Michigan State University Department of Pediatrics/Human Development and Extension Service wrote and produced a 15-minute videotape about polio vaccination choices, targeted to parents/guardians of 2- to 3-month-old children starting their primary vaccination series. The purpose of the videotape was to facilitate implementation of the recommendation to inform par-

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Short clips of this videotape may be viewed on the MSU extension web site (www.msue.msu.edu/msue/cyf/family/immune.html).

Received for publication Jan 1, 1998; accepted Apr 8, 1998.

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ents/guardians of the choice of polio vaccination schedule available to them. The script was written to closely match the language used in the CDC and AAP (interim) polio vaccine information statements (VIS), and was reviewed for accuracy and clarity by an epidemiologist in the National Immunization Program at CDC as well as by a local advisory group of health care providers and parents.

The videotape script was not written to support any one choice. The educational messages about the three polio vaccine schedules and risks and benefits are delivered in two different styles. In the first part of the videotape, the messages are delivered using narration, visual graphics, and on-camera comments. In the second part, three vignettes are presented in which parents discuss their questions and decision with their child's health care provider. A different choice of vaccine schedule is made in each of the vignettes.

The educational messages are presented in the following order:

- Acknowledgment that vaccinating a child is becoming more complicated and that choices are here and will be more plentiful in the future as new and better vaccines become available.
- Polio is a serious disease and, although nearly eliminated, still can be reintroduced into the United States. That's why we must continue to immunize against polio.
- Why are we talking about polio now? Parents now have a choice of schedules because polio is nearly eradicated from the world.
- There are three choices of polio vaccine schedules: all drops, all shots, or two shots/two drops. All require four visits to complete the series.
- All three choices are good. They provide good protection against polio and can be given along with the other vaccines needed that day. What makes them different? Pros and cons of each are then described. Vaccine-associated paralytic poliomyelitis is addressed in the all-drops segment and again in the all-drops vignette.
- The choices are reviewed again as parents are shown talking with their child's health care provider.

The objectives of the study were to address the following:

1. Does the educational videotape enhance parent knowledge of poliomyelitis, the two poliovirus vaccines, and the choices of polio vaccination schedule?
2. Does the educational videotape facilitate parents/guardians' decision-making about which polio vaccination schedule they want for their child?
3. Does use of an educational videotape for parents/guardians facilitate implementation of complex immunization protocols in a pediatric practice?
4. What is the effect of the new polio vaccination recommendation on the types and timing of immunizations that children receive during the first 2 years of life?

This article describes the results of the study pertaining to enhancement of parent knowledge.

METHODS

Study Design

The study was a prospective, randomized, nonblinded cohort design conducted in five pediatric offices and a local health department immunization clinic. The study took place between May and August 1997. The pediatric offices included two university-based practices, two health maintenance organization (HMO) staff model offices, and a private practice. Parents/guardians were eligible to participate if they were presenting their 2- to 3-month-old child for a health maintenance visit and the child was due to begin the polio vaccination series. Parents/guardians needed to be able to understand spoken English because the videotape was only available in English. If two parents/guardians accompanied the child, only one was asked to complete the study. Similarly, only one study was completed if the parent/guardian had twins.

At the five pediatric practices, parents/guardians were recruited to participate during an office visit before the 2-month health maintenance visit. Parents/guardians were told that this was a study of ways to help them understand vaccine choices. Randomization and administration of the intervention then took place at the 2-month appointment. At the local health department clinic, because patients were seen on a walk-in basis only, parents/guardians were recruited and studied on the same day.

Parents/guardians were randomized to receive the updated CDC-produced polio VIS (February 6, 1997) only or to receive the VIS and view the videotape before being seen by the practitioner. All participants completed a preintervention questionnaire in the waiting room. If randomized to videotape + VIS, parents/guardians then were taken to one of the patient examination rooms to view the videotape.

All practices distributed the CDC polio VIS during the 2-month health maintenance visit, but five used an additional information sheet. At university-based practices A and B, a practice-developed information page on polio vaccination and pertussis vaccination choices was handed out at the time of registration to be seen at the 2-month health maintenance visit. At HMO staff models A and B, the interim AAP VIS (November 1996) was provided at the 2-week health maintenance visit. The private practice provided the AAP and CDC VIS during the 2-month visit. Because the intention was to study the use of the interventions in "real-life practice," offices were permitted to carry on their usual routines with respect to presentation of VIS and vaccine discussions and recommendations with the parent/guardian.

For both interventions, the parent/guardian was asked to complete a postintervention questionnaire after the practitioner had met with the parent/guardian and child, but before leaving the office.

Randomization schedules were created by designating half-days as "videotape + VIS" or "VIS only"; ie, all patients for a given half-day were assigned to one intervention arm or the other. This scheme was developed to optimize assignment of approximately equal numbers of subjects in each study arm and to simplify the study process for the participating practices. To minimize assignment bias by the office scheduling staff, randomization schedules differed week by week and were stored in a file away from the registration area. Staff were requested not to schedule appointments based on anticipation of the randomization scheme. All clinics indicated that there were no important differences in types of patients scheduled for a particular day or half-day of the week.

The preintervention questionnaire was the same for both intervention groups and included six questions of knowledge about poliomyelitis, poliovirus vaccines, and choices of schedule; two questions about decision of polio vaccination schedule; and three demographic questions. The postintervention questionnaire for both groups included the same knowledge and decision-making questions. (See Appendix for list of knowledge questions.) In addition, all participants were asked whether they read the VIS and what their opinion was of the intervention(s) to which they were exposed.

TABLE 1. Demographic Characteristics of Parents/Guardians by Intervention Group

	Videotape + VIS N = 143	VIS Only N = 144	P Value
Race/ethnicity	<i>n</i> (%)	<i>n</i> (%)	.15
African-American	15 (11)	10 (7)	
Hispanic	6 (2)	12 (8)	
White	110 (77)	108 (75)	
Other (Asian, Native American, Multiracial, Other)	9 (6)	11 (8)	
Education			.38
8th Grade or less	0	0	
Some high school	14 (10)	13 (9)	
High school graduate	19 (13)	29 (20)	
Some college	42 (29)	48 (33)	
College graduate	65 (45)	51 (34)	
Relationship to child			.50
Parent	139 (97)	140 (97)	
Grandparent	1 (1)	1 (1)	
Foster parent	2 (1)	1 (1)	
Other relative	1 (1)	0	

Analysis

Sample size was calculated based on the results of previous comparison studies of video versus nonvideo interventions. To detect at least a 20% difference between intervention groups with 95% confidence interval (CI) ($\alpha < 0.05$) and 80% power ($\beta = 0.20$), an enrollment of at least 182 parents/guardians, 91 in each group, was required. Because we were interested in evaluating differences within groups, we targeted enrollment to at least 250, 125 in each group.

Data from the questionnaires were entered into and analyzed using Epi Info.⁸ A mean score was calculated for questions dealing with knowledge of poliomyelitis, poliovirus vaccines, and vaccination schedules. (The highest score possible was 15.) Differences between mean test scores were calculated using analysis of variance. Where variances of the means were not homogeneous, the Kruskal-Wallis *H* test was used.

RESULTS

A total of 399 parents/guardians were recruited to participate in the study. Of these, 318 (79.7%) consented to participate and 287 (90.3%) completed the study. Reasons for noncompletion included not keeping the scheduled 2-month health maintenance

visit and no rescheduled appointment during the study period; leaving the practice before the 2-month health maintenance visit; previous poliovirus vaccine administration to the child; difficulty understanding spoken English; or failure to complete the second questionnaire.

There were no significant differences of race/ethnicity, education, or relationship to the child between the two randomized groups (Table 1). There were differences in the distribution of race/ethnicity and educational level among parents/guardians in the six practices (Table 2).

Mean preintervention test scores did not differ significantly by practice, race/ethnicity, or education between the two intervention groups. All groups but one had better test scores after the intervention (Table 3). Posttest improvement was significantly greater for the videotape + VIS group compared with the VIS group for all practices.

Among African-American and white parents/guardians, postintervention test scores were increased for both interventions, but were significantly greater for the videotape + VIS group (Table 3). Postintervention test scores also significantly increased among Hispanic parents/guardians, with the mean difference among videotape + VIS versus VIS approaching significance ($P = .07$).

Improvements in posttest scores were noted across all educational levels, and the mean postintervention test score increased with increasing educational level for both intervention groups. Mean differences did not differ significantly between educational levels for either intervention.

Data were available from the private practice to examine the effect on test scores of having older children. The mean difference in scores for first-time parents versus parents with other children was not statistically significant for either intervention group.

Of parents/guardians assigned to videotape + VIS, 58 (41%) stated that they read the VIS (Table 4). There were no differences across practice, race/ethnicity, or educational level in the proportion of par-

TABLE 2. Demographic Characteristics of Parents/Guardians by Office Practice or Clinic

	HMO Staff Model A N = 28	HMO Staff Model B N = 26	Private Practice N = 76	Public Health Department Clinic N = 90	University-based Practice A N = 44	University-based Practice B N = 23
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Race/ethnicity						
African-American	6 (21)	1 (4)	5 (7)	11 (12)	1 (2)	1 (4)
Hispanic	3 (11)	1 (4)	2 (3)	11 (12)	0	1 (4)
White	18 (64)	23 (89)	61 (80)	56 (62)	39 (89)	21 (91)
Other (Asian, Native American, Multiracial, Other)	1 (4)	1 (4)	7 (9)	8 (9)	3 (7)	0
Education						
8th Grade or less	0	0	0	0	0	0
Some high school	3 (11)	1 (4)	2 (3)	21 (23)	0	0
High school graduate	8 (29)	7 (27)	11 (15)	19 (21)	1 (2)	2 (9)
Some college	8 (29)	9 (35)	24 (32)	25 (28)	10 (23)	14 (61)
College graduate	9 (32)	9 (35)	38 (50)	21 (23)	32 (73)	7 (31)
Relationship to child						
Parent	27 (96)	26 (100)	75 (99)	85 (94)	43 (98)	23 (100)
Grandparent	0	0	1 (1)	1 (1)	0	0
Foster parent	1 (4)	0	0	1 (1)	1 (2)	0
Other relative	0	0	0	1 (1)	0	0

TABLE 3. Results of Pre- and Postintervention Tests by Intervention for Practice Group, Race/Ethnicity, and Education

	Videotape + VIS (N = 143)				VIS Only (N = 144)				P Value*
	n	Pre-intervention Test Mean (SD)	Post-intervention Test Mean (SD)	Mean Difference (95% CI)	n	Pre-intervention Test Mean (SD)	Post-intervention Test Mean (SD)	Mean Difference (95% CI)	
Clinic									
HMO staff model A	13	7.1 (3.8)	12.5 (1.7)	5.5 (3.6–7.3)**	15	6.1 (3.1)	7.9 (2.7)	1.7 (0.3–3.1)	.003
HMO staff model B	10	7.3 (3.7)	12.9 (1.2)	5.6 (3.6–7.5)**	16	7.4 (3.5)	6.4 (3.4)	−0.9 (−2.6–0.8)	<.001
Public health department clinic	41	4.7 (3.3)	12.0 (2.5)	7.2 (6.2–8.3)**	49	4.2 (2.5)	7.0 (3.2)	2.7 (1.7–3.7)**	<.001
Private practice	46	5.4 (2.8)	12.5 (1.5)	7.0 (6.1–8.0)**	30	6.3 (3.2)	10.7 (2.3)	4.4 (3.2–5.5)**	.001
University-based clinic A	21	6.9 (4.3)	13.1 (1.1)	6.3 (4.5–8.1)**	23	7.1 (3.8)	10.3 (3.3)	3.2 (1.6–4.8)**	.015
University-based clinic B	12	5.7 (3.2)	13.4 (1.2)	7.7 (6.1–9.3)**	11	4.8 (2.7)	5.6 (3.2)	0.8 (−0.6–2.2)	<.001
Race/ethnicity									
African-American	15	3.5 (3.1)	11.5 (2.5)	8.0 (6.3–9.6)**	10	4.1 (1.7)	6.7 (3.5)	2.6 (0.9–4.3)**	<.001
Hispanic	6	6.7 (3.1)	11.8 (2.1)	5.2 (2.7–7.6)**	12	4.2 (2.5)	6.9 (2.6)	2.7 (1.5–4.0)**	.07
White	110	6.1 (3.5)	12.7 (1.8)	6.6 (6.0–7.3)**	108	6.1 (3.3)	8.3 (3.7)	2.2 (1.4–2.9)**	<.001
Education									
Some high school	14	4.9 (2.5)	10.2 (3.2)	5.3 (3.5–7.2)**	13	3.8 (2.4)	6.5 (3.1)	2.7 (0.7–4.7)**	.07
High school graduate	19	3.8 (3.5)	12.2 (1.7)	8.3 (6.9–9.7)**	29	5.3 (2.9)	6.8 (3.3)	1.5 (0.0–2.9)	<.001
Some college	42	5.6 (3.2)	12.8 (1.4)	7.2 (6.3–8.1)**	48	5.5 (3.0)	7.8 (3.7)	2.3 (1.4–3.2)**	<.001
College graduate	65	6.5 (3.5)	13.1 (0.9)	6.5 (5.7–7.4)**	51	6.7 (3.7)	9.8 (3.0)	3.1 (2.0–4.2)**	<.001

* For comparison of mean difference (videotape + VIS) versus mean difference (VIS only).

** $P < .05$.

TABLE 4. Results of Pre- and Postintervention Tests According to VIS Reading

	Videotape + VIS (N = 143)			
	n (%)	Preintervention Test Mean (SD)	Postintervention Test Mean (SD)	Mean Difference (95% CI)
Read VIS before viewing videotape	43 (30)	7.0 (3.8)	12.8 (1.4)	5.7 (4.6–6.8)**
Read VIS after viewing videotape	15 (10)	5.1 (2.5)	12.6 (1.2)	7.5 (6.2–8.8)**
Did not read VIS	61 (43)	5.2 (3.4)	12.8 (1.2)	7.6 (6.8–8.4)**
Unsure	7 (5)	6.3 (2.6)	12.1 (2.5)	5.9 (2.5–9.3)**
				$P = .08^*$
	VIS only (N = 144)			
	n (%)	Preintervention Test Mean (SD)	Postintervention Test Mean (SD)	Mean difference (95% CI)
Read VIS	89 (62)	6.0 (3.8)	10.5 (2.6)	3.6 (2.9–4.3)**
Did not read VIS	39 (27)	4.6 (2.9)	5.3 (1.6)	0.3 (−0.4–1.0)
Unsure	8 (5)	4.1 (3.6)	3.8 (1.9)	0.0 (−1.9–1.9)
				$P < .001^*$

* For comparison of mean differences by reading status.

** $P < .05$.

ents/guardians in this intervention group who read the VIS. VIS readers did not have statistically different posttest scores or mean difference in scores compared with nonreaders.

Among participants in the VIS-only group, 89 (62%) read the VIS. The proportion of participants who read the VIS was similar by race/ethnicity and educational level. Overall, parents/guardians in the VIS-only group who read the VIS had a significant increase in their posttest score compared with nonreaders, but the mean difference was less than that for parents in the videotape + VIS group, including those who had not read the VIS.

In the videotape + VIS group, 95 participants (66%) provided written comments about the videotape. Parents/guardians stated most often that the videotape was “clear,” “concise,” “easy to understand,” “very informative,” or “explained every-

thing.” Of 58 (41%) parents/guardians in the videotape + VIS group who read the VIS, 25 (43%) stated that the videotape was more helpful than the VIS, and 31 (53%) said videotape and VIS were equally helpful. An additional 11 (9%) parents/guardians who did not read the VIS stated that they preferred the videotape. Of 89 (62%) parents/guardians in the VIS-only group who read the VIS, 83 (93%) indicated that the VIS was an effective means of providing information.

DISCUSSION

Published studies have reported on the use of videotape for increasing patient knowledge in disease prevention, health behavior change, diagnostics, and home care; for reducing anxiety about treatments, tests, or test results; and for providing informed consent for invasive procedures.^{9–19} In most

1. Polio disease is still a threat in the United States. [Check one.]
 - True
 - False
 - Not sure
2. Cases of polio caused by polio vaccine occur in the United States. [Check one.]
 - True
 - False
 - Not sure
3. How is polio spread? [Check one.]
 - From infected person to the mouth
 - From coughing or sneezing
 - From contact with blood
 - None of the above
 - Not sure
4. What are some true statements about polio vaccines? [Check the box or boxes that apply for each statement. One, both, or neither may be checked.]

	TRUE	TRUE
a) It is given as drops.	<input type="checkbox"/> Oral polio vaccine	<input type="checkbox"/> Injected polio vaccine
b) It is given as a shot.	<input type="checkbox"/> Oral polio vaccine	<input type="checkbox"/> Injected polio vaccine
c) Vaccine can spread to others.	<input type="checkbox"/> Oral polio vaccine	<input type="checkbox"/> Injected polio vaccine
d) Provides good protection against polio.	<input type="checkbox"/> Oral polio vaccine	<input type="checkbox"/> Injected polio vaccine
e) A good choice for people with weakened immune systems.	<input type="checkbox"/> Oral polio vaccine	<input type="checkbox"/> Injected polio vaccine
f) Can be given at the same time as other vaccines.	<input type="checkbox"/> Oral polio vaccine	<input type="checkbox"/> Injected polio vaccine

5. Have you heard about choices of polio vaccine schedules for children? [Check one.]
 - Yes [If yes, go to question 6.]
 - No [If no, go to question 7.]
 - Not sure [If not sure, go to question 7.]
6. Which polio vaccine schedules for children have you heard about? [Check all that apply.]
 - Four doses of oral polio vaccine (all drops)
 - Four doses of injected polio vaccine (all shots)
 - Two doses of injected polio vaccine followed by two doses of oral polio vaccine (two shots, two drops)
 - Two doses of oral polio vaccine followed by two doses of injected polio vaccine (two drops, two shots)
 - Other: _____ (please describe)
 - Not sure

studies, videotape was found to be more effective, either alone or in combination with other educational interventions, compared with nonvideo interventions in improving patient short-term knowledge. The use of role modeling seems to be a strength of educational videotape because it enhances viewer knowledge while decreasing anxiety.⁹ Additionally, its use in the polio videotape was intended to reinforce important messages that may have been missed or unclear during the first segment. This study appears to be the first that evaluates videotape for education or informed consent about vaccination.

VIS that describe the risks/benefits of each vaccine and its recommended schedule are intended to assist the practitioner in providing informed consent. They are required by federal law to be distributed to parents/guardians or recipients for each vaccine given. Studies have found that parents' reading ability is lower than that required for many patient information materials, including the VIS.²⁰⁻²² One study to evaluate a university-prepared VIS for poliovirus vaccines showed that shorter, simpler materials written at a 6th-grade level did not ensure good comprehension, even among parents/guardians who could read above that level.²²

There may be other reasons that parents do not read the VIS. Anecdotal information provided by parents in this study suggested that they are not given adequate time to read the VIS before being asked to consent to vaccinations, they cannot read and attend to their child or children at the same time,

they feel they know the information already because they have been through the process before with an older child, or they rely on the practitioner to inform them verbally and consider the VIS a back-up document should they have questions later. Regardless of the reason, this study showed that a significant number of parents did not read the VIS, which puts into question whether this is the optimal means of providing adequate informed consent.

One aspect of this study design limits some of the conclusions that can be drawn. To facilitate office practice participation in this study, we did not restrict practitioners in how they chose to discuss poliovirus vaccines and vaccine choices with parents/guardians, nor did we regulate when or how the VIS or other written materials were presented. It is not clear how or whether these differences affected parent motivation to read the VIS or to seek clarification from the practitioner on points discussed in the VIS. This variability in information-sharing could account for practice-level differences in the proportion of parents who read the VIS or what they learned from the reading. However, this lack of regulation may enhance the generalizability of these study results to most pediatric practices.

In conclusion, this study demonstrated that a complicated discussion of the risks/benefits of two poliovirus vaccines and three polio vaccination schedules could be effectively communicated via a videotape presentation. In addition, the videotape—with or without having read the VIS—was univer-

sally more effective than the VIS alone in increasing knowledge across different practice types, racial/ethnic groups, and educational levels of parents/guardians. Given the variability in which VIS are used by parents and office practices and clinics, a videotaped presentation appears to be a more consistent, informative, and enjoyable source of information about childhood vaccines and vaccine choices.

ACKNOWLEDGMENTS

This project was funded by a grant from the Associate Dean for Research and Graduate Programs and the Office of Medical Education, Research, and Development, Michigan State University, and support from the Michigan Department of Community Health and the Gerber Foundation of Fremont, MI.

We gratefully acknowledge the participation of the following clinical practices: Blue Care Network Mid-Michigan Cedar Street; Blue Care Network Mid-Michigan West; Ingham County Health Department; Meridian Pediatric Associates; Okemos Pediatric Associates; and Westside Pediatric Associates. We also acknowledge the contribution of on-site research assistants Leigh Ann Bremer, Chris Donnelly, Eric Duffy, Breanna Gauthier, Sean Grimes, Jason Grove, Anthony Howard, Nijuanna Irby, Tammon Nash, Shannon Sykes, and Delphine Walker. Candy Decker, RN, provided assistance and consultation with protocol development and training. Karen Pace (MSU Extension 4-H Youth Programs) produced the videotape, assisted by Dawn Contreras (MSU Extension Children, Youth, and Family Program). D. Rebecca Prevots, PhD, MPH (CDC) provided critical review of the videotape script and the manuscript. Jane L. Turner, MD, and Marsha D. Rappley, MD, also provided critical review of the manuscript.

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