

Innovative Delivery of Newborn Anticipatory Guidance: A Randomized, Controlled Trial Incorporating Media-Based Learning Into Primary Care

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ABSTRACT

OBJECTIVE: Recent initiatives seek to incorporate efficient, evidence-based practices into primary care. This study tested the feasibility, impact, and acceptance of incorporating a DVD of newborn anticipatory guidance into routine well-child care.

METHODS: This randomized trial tested a 15-minute educational DVD intervention versus control condition with paper handouts on newborn anticipatory guidance. We recruited parents of newborns ≤ 1 month old presenting for their first visit. Blinded research assistants conducted telephone follow-up 2 weeks later and medical chart reviews 2 months after enrollment. Clinic staff and providers completed semistructured surveys to rate the intervention. Primary outcomes included parent knowledge of infant development, self-efficacy with infant care skills, and problem-solving competence.

RESULTS: We enrolled 137 subjects (response rate 82%). Scores on knowledge, self-efficacy, and problem solving were

high at baseline for both groups and did not significantly change. More parents in the DVD group reported feeling prepared to care for their baby after the visit (94% vs 81%, $P = .03$), feeling high confidence bathing their baby (93% vs 78%, $P = .01$), and recognizing congestion (70% vs 52%, $P = .03$) compared to the control group. Those in the DVD group also had fewer additional office visits between birth and 2 months ($P = .01$). Staff and providers agreed the DVD was useful for patients (88%) and did not disrupt patient flow (93%).

CONCLUSIONS: A DVD of newborn anticipatory guidance was feasible, well accepted, and had a positive impact in a pediatric practice. Video and other technologies represent an efficient, innovative way to reach parents as part of the office encounter.

KEYWORDS: anticipatory guidance; newborn; parents; video

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WHAT'S NEW

Incorporating a DVD of newborn anticipatory guidance into routine well-child care in a busy primary care office is feasible and effective; this intervention led to fewer additional office visits between birth and 2 months.

PEDIATRIC PRIMARY CARE providers spend up to 60% of the office day delivering well-child care, and many issues must be discussed with caregivers during these visits.¹ Bright Futures² and other preventive care guidelines suggest a myriad of topics to be covered at each visit, and the time to deliver effective anticipatory guidance is extremely limited. Hence, the current standard of care is to supplement office visits with written handouts to provide crucial information to families. Both pediatricians and parents agree that anticipatory guidance is an important component of the well-child visit.³ However, many parents report unmet needs related to parenting advice, education, or screening during their child's health supervision visit.⁴

Recent initiatives such as Bright Futures² acknowledge a critical need to demonstrate the effectiveness and impact of well-child care. Pediatricians,⁵ parents, and insurers desire value for these efforts.

Schor suggests that the office time before and after the clinician encounter should be included as a structured part of the visit.^{6,7} Handouts and other printed materials should be used thoughtfully, however, because their effectiveness is largely unknown and readability is often a concern.^{6,8} The Commonwealth Fund's vision for well-child care emphasizes the use of technology as an efficient and cost-effective strategy to aid the delivery of health care.⁹ A small number of studies have analyzed the use of video technology in the health care setting. In one study, patients who viewed health promotion programs on a waiting room television demonstrated a significant increase in knowledge and reported more health-promoting behavior changes, even when only a portion of the programming was seen.¹⁰ Other topic-specific video studies have reported gains in knowledge, self-efficacy, and high acceptance of information received, whether the video was

viewed in a structured setting or given to parents to take home.¹¹⁻¹⁴

We currently have a generation of parents who are technologically savvy and readily adopt new tools. Video and DVD technology offers an efficient, reliable, inexpensive, and transportable communication vehicle that has been underutilized in the pediatric practice setting. A personalized, appropriately timed video message may be an acceptable format for parenting education, and the information may be well retained. We hypothesized that a DVD of newborn anticipatory guidance could be easily incorporated into the newborn well-child visit, would be well accepted by both providers and parents, and would lead to improved parent knowledge of newborn development and care and help parents feel more prepared and better adjusted to the early challenges of parenting.

The objectives of this study were as follows: 1) to measure the feasibility of incorporating DVD technology into traditional well-child care at a busy urban pediatric practice; 2) to assess the impact of this DVD-based intervention on parent knowledge of infant development, self-efficacy, and problem-solving competence; and 3) to evaluate acceptance (by providers, staff, and parents) of using a DVD to supplement the well-child visit.

METHODS

DESIGN OVERVIEW

This randomized trial tested the incorporation of a DVD of newborn anticipatory guidance into the baby's first visit to the pediatrician's office. Participants were recruited in the waiting room, informed consent was obtained, and a baseline survey was completed. Inside the examination room, participants in the DVD group viewed the video on the desktop computer, and participants in the control group were given paper handouts to read before the visit with the provider. Both groups received anticipatory guidance materials (DVD or handouts) to take home. Outcome measures were assessed by telephone follow-up 2 weeks later and medical record review at 2 months. Additionally, staff and providers completed semistructured surveys at the end of the trial to rate feasibility and acceptance of the DVD intervention. The study protocol was approved by the Human Subjects Review Board at the University of Rochester Medical Center.

SETTING AND PARTICIPANTS

The setting was a large hospital-based primary care pediatric practice that employs attending physicians, residents, and nurse practitioners. The clinic serves approximately 750 newborns per year, with the majority born at the clinic-affiliated birthing center. Potentially eligible parents or other primary caregivers ≥ 18 years old were approached in the waiting room at the newborn's first routine visit to the practice. Additional inclusion criteria included: infant age < 1 month old (to exclude those who are premature or medically complex), parent knowledge of written and spoken English, and access to a working telephone for follow-up. If criteria were met, parents of multiple

gestations were eligible. In that case (we enrolled 7 sets of twins), one infant was randomly chosen as the target infant for enrollment.

RANDOMIZATION AND INTERVENTION

Randomization occurred by week (rather than by subject) to simplify administration of the intervention for the nursing staff. We used a random-numbers table to generate the assignment of weeks to treatment or control in blocks of 8 weeks to account for seasonal variations in the birthrate. At the beginning of each week, the principal investigator informed the nursing staff of whether DVDs or paper handouts would be used. A laminated sign by the common nursing station reminded staff of week designation, and materials (DVDs or paper packets) were switched on a week-by-week basis. The principal investigator made an additional weekly visit to the clinic to assure delivery of the appropriate assigned intervention for that week. The research staff recruiting subjects in the waiting room was unaware of the treatment assignment for each week.

The intervention video was a 15-minute locally produced DVD that depicted basic aspects of newborn care as endorsed by the American Academy of Pediatrics and Bright Futures guidelines.² Examples of topics covered included normal newborn breathing patterns, bathing and feeding, safe sleeping practices, dealing with crying, and promoting development. A local pediatrician and several ethnically diverse babies appeared throughout the video. When a parent assigned to the DVD group was brought into the examination room for their visit, a staff member would start the video on the computer monitor in the room. To avoid disruptions in clinic flow, providers were instructed to stop the DVD (if still running) when they entered the room and give the DVD to the family to take home.

The control group received an enhanced standard of care. We assembled a packet of written handout materials already available in our clinic that covered similar (though not identical) information to that shown in the video. All written handouts were at a fourth-grade readability level, and all families received this packet of handouts during control weeks.

Before the start of the intervention, the principal investigator met with clinic staff and providers to explain the study and answer questions. In addition, the staff and providers had the opportunity to preview both the DVD and the handout materials.

OUTCOMES AND MEASURES

Outcomes were assessed by research associates who were blinded to group allocation. We performed a follow-up telephone survey 2 weeks after the enrollment visit. Medical charts were also reviewed for all subjects at 2 months after enrollment using a structured data collection tool.

PRIMARY OUTCOMES

The primary outcomes of this trial were parent scores on each of 3 measures to assess knowledge of infant

development, self-efficacy with infant care skills, and problem-solving competence. Validated measures were used; 2 of these (knowledge and self-efficacy) scales were shortened after pilot testing for feasibility of completion in the allotted waiting room time. Parent knowledge of infant development was measured using a subset of 14 questions from the 58-item Knowledge of Infant Development Inventory.¹⁵ We chose those questions that pertained most to newborns, and answers were scored as either correct or incorrect. An example of one statement was, “The more you soothe a crying baby by holding and talking to it, the more you spoil them.” Parents could answer each statement with “agree,” “disagree,” or “not sure,” with uncertain answers considered incorrect. Infant Care Self-Efficacy was assessed using 20 items from the 52-item Infant Care Survey.¹⁶ These included knowledge items such as recognizing gas pains and knowing regular breathing sounds of babies, and skill items such as treating diaper rash and taking the baby’s temperature. Each item was rated on a 5-point scale, from 1 (very little confidence) to 5 (quite a lot of confidence). Problem-solving competence was based on the 15-item How I Deal with Problems Regarding Care of My Baby Questionnaire.^{17,18} This validated scale gives a summary score of parental problem solving based on answers to 10 separate Likert-like statements, giving a maximum parental problem solving score of 90. An example is, “[The] extent to which I notice things about the baby that are likely to be important,” with answers ranging from 1 (never) to 9 (always). Another is, “How well I plan or think through how to deal with a baby concern,” with answers from 1 (not well) to 9 (very well). Parents of infants in both groups were administered these 3 measures at both baseline and follow-up.

SECONDARY OUTCOMES AND OTHER DATA COLLECTED

The secondary outcome for this study was health care utilization, assessed by blinded chart reviews. We documented all clinic visits, parent-initiated phone calls, and emergency department visits between the enrollment visit and the 2 month well-child visit, using a structured data collection instrument. We considered the combination of clinic visits and parent-initiated phone calls to constitute “professional consultations” because they involved solicitation of advice or care from a nurse, nurse practitioner, or physician. We considered additional office visits as any (problem-related) visit outside of the usual well-child schedule. Thus, we expected the first clinic visit to occur during the baby’s first week of life and for one routine visit (the 2-week well-child visit) between enrollment and the 2-month well-child visit.

Additional information collected included self-reported demographic information such as age, race, education, and insurance, as well as infant gestational age and feeding type. These were included as common correlates of child health status. All mothers were also administered the 10-item Edinburgh Postnatal Depression Scale at baseline and follow-up.^{19,20} We used the clinical cutoff of 10 or greater to indicate those mothers with depressive symptoms. Finally, we asked a representative sample of

key staff and providers to complete semistructured surveys to rate feasibility and acceptance of the intervention. We asked about satisfaction with the program, burden of implementing the intervention, and perceived importance of the intervention.

ANALYSIS

We performed an intention-to-treat analysis for all participants. Descriptive statistics were used to define demographics of the study groups at baseline. Bivariate analyses compared group characteristics and outcomes (χ^2 tests for categorical variables and *t* tests for continuous variables). Significant outcomes were confirmed using logistic regression analysis while controlling for group differences at baseline. All analyses were performed using SPSS version 17.0 (SPSS, Chicago, IL). *P* values of $<.05$ were considered statistically significant.

We powered our trial for analysis on the primary outcome measure, parent knowledge. On the basis of data from a previous national sample of socioeconomically disadvantaged new parents, a sample size of 120 (60 in each group) would give $>80\%$ power to detect a meaningful 20% difference between groups, based on a 2-sided *t* test ($\alpha = 0.05$). Thus, our enrollment target was 135 persons to allow for a 10% attrition rate.

RESULTS

PRIMARY AND SECONDARY OUTCOMES

We enrolled 137 participants (70 in the DVD group and 67 in the control group) from November 2008 through May 2009, providing a response rate of 82% (Figure). Three subjects were lost to follow-up from each group, leaving 131 subjects for final analysis (96% retention rate). Baseline characteristics of study participants and of each group are shown in Table 1. Overall, nearly all subjects enrolled were the baby’s mother (92%), and the majority was of minority race and had public insurance. Nearly half of participants were primiparous. The 2 groups were balanced with respect to age, education, and race. However, the DVD group had more mothers (97% vs 87%, *P* = .03) and more infants of Hispanic ethnicity (35% vs 21%, *P* = .09), whereas the control group had significantly more babies born at outside hospitals (28% vs 7%, *P* = .001) and exclusively breastfed infants (25% vs 9%, *P* = .01). In addition, subjects in the control group had a better knowledge of infant development than subjects randomized to the DVD group. We adjusted for these baseline differences in the multivariate analyses.

Table 2 shows the primary outcomes for this trial, displayed as a change in score from baseline to follow-up. The 3 parent measures of problem-solving, self-efficacy, and knowledge were high at baseline for both groups, did not significantly change at follow-up, and were not different between the 2 groups. However, when we took a more detailed look at specific infant care items that were addressed in the video, we found differences between the 2 groups. The parents who were randomized to the DVD group were more likely to report high confidence

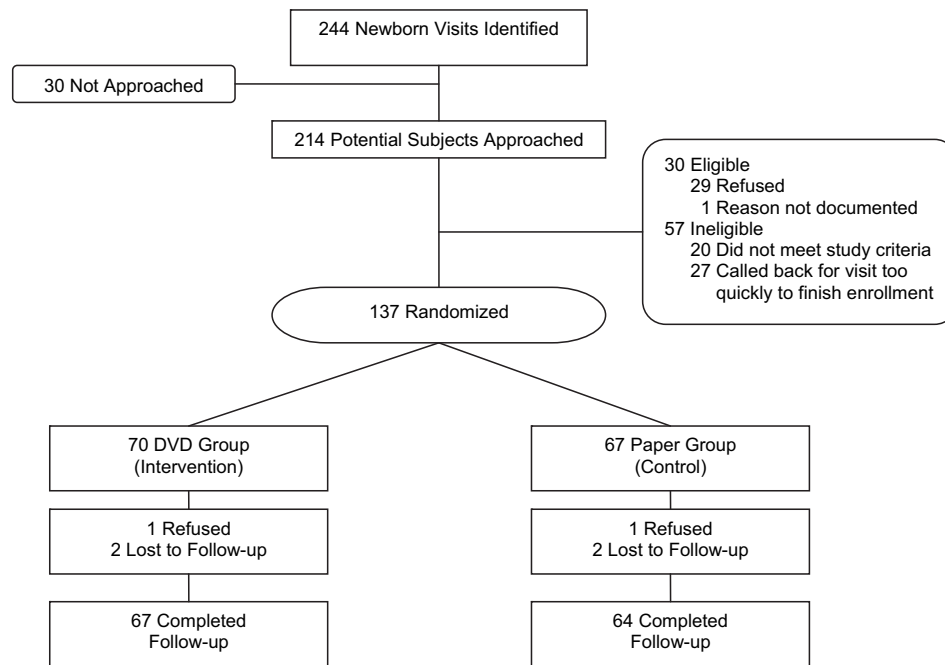


Figure. Trial enrollment flow chart.

with both bathing their baby (92.9% vs 77.6%, $P = .01$) and recognizing congestion (70.0% vs 52.2%, $P = .03$) compared to parents in the control group. There were no group differences between these items at baseline.

Secondary outcome measures are listed in Table 3. Health care utilization after the intervention visit was lower for parents in the DVD group compared to parents in the control group. Specifically, parents in the DVD group

Table 1. Group Characteristics at Baseline*

Characteristic	Overall (n = 137)	DVD Group (n = 70)	Control Group (n = 67)	P
Subject				
First child	59 (43)	29 (41)	30 (45)	.73
Age				.16
<21 y	36 (26)	22 (31)	14 (21)	
≥21 y	101 (74)	48 (69)	53 (79)	
Education				.73
<High school	55 (40)	29 (42)	26 (39)	
≥High school	81 (60)	40 (58)	41 (61)	
Subject is mother	126 (92)	68 (97)	58 (87)	.03
Maternal depressive symptoms†	13 (10)	6 (9)	7 (12)	.57
Infant				
Male sex	69 (50)	33 (47)	36 (54)	.50
Race				.47
Black	64 (47)	35 (50)	29 (43)	
White	16 (12)	6 (9)	10 (15)	
Mixed/other	57 (42)	29 (41)	28 (42)	
Hispanic	38 (28)	24 (35)	14 (21)	.09
Public insurance (Medicaid, SCHIP)	112 (82)	61 (87)	51 (76)	.10
Hospital of birth				.001
Clinic hospital	113 (82)	65 (93)	48 (72)	
Other hospital	24 (18)	5 (7)	19 (28)	
Age at enrollment, d, mean (SD)	8.0 (6.3)	8.9 (7.9)	7.1 (3.7)	.09
Gestational age, wk, mean (SD)	39 (2)	38 (2)	39 (2)	.11
Exclusively breastfed	23 (17)	6 (9)	17 (25)	.01
Primary Outcomes				
Dealing with problems (max 90), mean competence score (SD)	82.5 (7.6)	82.6 (7.7)	84.6 (5.7)	.92
Infant care self-efficacy (max 5), mean confidence (SD)	4.6 (0.4)	4.6 (0.4)	4.6 (0.4)	.51
Knowledge of infant development (max 14), mean correct (SD)	9.8 (2.2)	9.4 (2.3)	10.2 (2.0)	.05

*Data are presented as n (%) displayed unless otherwise noted. SCHIP = State Children's Health Insurance Program; SD = standard deviation.

†Defined as Edinburgh Postnatal Depression Scale score of ≥10.

Table 2. Primary Outcomes

Outcome	DVD Group (n = 70)	Control Group (n = 67)	P
Parent measures—change scores, Δ mean (SD)			
Dealing with problems (competence)	2.07 (6.28)	0.98 (5.37)	.29
Infant care skills (self-efficacy)	0.16 (0.32)	0.14 (0.26)	.60
Knowledge of infant development	−0.06 (2.99)	0.00 (2.53)	.90
Parent confidence on specific self-efficacy items, proportion very confident, n (%) [*]			
Bathing your baby	65 (92.9)	52 (77.6)	.01
Knowing regular breathing sounds of babies	50 (71.4)	40 (59.7)	.15
Recognizing congestion	49 (70.0)	35 (52.2)	.03
Relieving gas pains	43 (61.4)	38 (56.7)	.58
Soothing your crying baby	55 (78.6)	46 (68.7)	.19
Breast- or bottle-feeding your baby	62 (88.6)	54 (80.6)	.20

^{*}Subset of items from the Infant Care Survey. Items chosen were those specifically shown in the video. There were no group differences at baseline.

had significantly fewer professional consultations (2.9 vs 4.0, $P = .04$) and were less likely to have additional office visits, beyond their normally scheduled visit (39% vs 63%, $P = .01$) between birth and 2 months. These findings were supported by multivariate analyses that controlled for demographics and baseline differences between groups, including breastfeeding status and hospital of birth. In fact, parents in the control group were 2.6 times more likely to have more than 1 additional office visit between birth and 2 months compared to parents in the DVD group (OR 2.6, 95%CI 1.3 to 5.5).

FEASIBILITY AND ACCEPTANCE

To assess feasibility, we asked parents to self-disclose their group allocation at the end of the follow-up telephone call, and answer questions that were specific to the intervention. We found that 60% of parents randomized to the DVD group remembered watching the video at the time of their visit and 78% reported taking the DVD home. Nearly half watched the DVD at home (45%) or shared it with someone else (42%). Among all subjects (both DVD and control groups), 84% were interested in receiving information by video from their medical provider.

At the time of the follow-up interview we also asked parents to rate their satisfaction with the first office visit (Table 4). Visit satisfaction was very high among participants in both groups; however, a significantly higher percentage of parents in the DVD group said that they felt better prepared to care for their baby after their first office visit compared to parents in the control group

(94% vs 81%, $P = .03$). In addition, feedback from 33 key clinical staff and providers showed that the intervention was widely accepted, did not interfere with clinic functioning, and was viewed as a benefit for the patients and families (Table 5). All (100%) of the staff agreed that it was not difficult to incorporate the video into the daily routine, and almost all (86%) of the providers felt the video was helpful to cover pertinent topics and deliver anticipatory guidance.

DISCUSSION

We found that media-based learning in the primary care office is feasible and well accepted, and can have a positive impact on its target audience. Parents receiving the video intervention rated higher confidence with specific infant care skills and reported feeling better prepared to care for their baby compared to parents in the control group. Perhaps the most significant and surprising finding from this study was its impact on health care utilization: families in the DVD group had significantly fewer additional office visits to the primary care practice compared to control families.

Other studies that have evaluated the impact of brief parenting interventions have shown mixed results. A recent video-based trial designed to teach parents how to swaddle and calm their crying baby did not show any differences in total daily crying up to 12 weeks of age, as assessed by behavioral diaries.²¹ However, that study had small numbers of participants (only 51 were randomized and

Table 3. Health Care Utilization Outcomes

Health Care Contacts [*]	DVD Group	Control Group	P	95% Confidence Interval [†]
No. of additional clinic visits, mean (SD)	1.6 (1.2)	2.0 (1.1)	.05	−0.80 to −0.01
No. of parent-initiated phone calls, mean (SD)	1.1 (1.8)	1.8 (1.9)	.05	−1.22 to −0.01
Total professional consultations, mean (SD)	2.9 (2.8)	4.0 (3.0)	.04	−2.00 to −0.03
Proportion with >1 additional visit, n (%)	27 (39)	42 (63)	.01	NA
No. of emergency department visits, mean (SD)	0.2 (0.5)	0.2 (0.6)	.91	−0.20 to 0.18

^{*}Measured from birth to 2-month well-child visit.

[†]The 95% confidence interval of the difference in means between treatment (DVD) and control groups. The negative confidence interval indicates the range of fewer visits or calls in the DVD group compared to control.

Table 4. Feasibility and Acceptance by Parents

Parent Satisfaction With Enrollment Visit*	DVD Group	Control Group	P
I was satisfied with the information I received at the visit.	96%	97%	.69
I found the information I received at the visit to be useful.	96%	94%	.65
My questions and concerns were answered at the visit.	97%	95%	.61
My needs were met at the visit.	96%	97%	.70
I felt better prepared to care for my baby after the visit.	94%	81%	.03

*Reported as percentage who agree and strongly agree.

35 completed the study), and it only assessed parent-reported outcomes. Another CD-ROM-based primary care intervention designed to teach discipline skills and reduce toddler aggression has shown high acceptance among parents who viewed the computer modules and reports of increased parental self-efficacy with toddler discipline techniques.^{22,23} In our study, we did not find differences in our primary outcome measures, yet several other positive findings support its usefulness in this population.

The specific group differences in infant care self-efficacy and parent competence that we detected (eg, confidence in bathing the baby) may be important clues for further exploration. These specific infant care skills were directly targeted in the intervention video and may best be learned by a video or demonstration type of format. Self-perceived competence in the newborn period has been shown to be predictive of parenting confidence and the way that a parent views and interacts with their child over time.^{24,25} Thus, parental comfort during the newborn period could be expected to translate into increased satisfaction and improved parent-child interactions. Specific interventions to enhance parental self-efficacy should continue to be explored.

Our health care utilization outcomes were surprising, though not entirely unexpected. We viewed this intervention as an enhancement of the anticipatory guidance that is already provided through one-on-one office encounters and via telephone, and the reduction in additional visits (beyond routine well-child visits) may reflect that. It is possible that parents who viewed the DVD felt more comfortable caring for their baby in the first few weeks of life and had fewer questions about routine issues that arise. A review of the medical chart data showed that these additional office visits were almost exclusively for typical newborn complaints: congestion, skin rashes, and gastroin-

testinal issues (data not shown). The outcome or prescribed therapy was almost always reassurance and anticipatory guidance. Although office visits are the bread and butter of the primary care pediatrician, a reduction in extra visits could certainly be viewed positively with respect to convenience for the parent and cost-savings.

Bright Futures guidelines for well-child care visits are comprehensive with many topics to cover.² Prior studies have shown that increased quantity of anticipatory guidance during a visit does not necessarily lead to increased parental knowledge or behavior change.²⁶ However, as our study suggests, there may be specific anticipatory guidance topics that are well-retained and have more impact when watched or demonstrated. The portability of a DVD enhances its utility to deliver anticipatory guidance, and to creatively use all of the office time effectively.^{6,8}

This study has some potential limitations. We delivered an “enhanced standard of care” for control group participants by providing them with handouts already available in the clinic. Although consistent with our intent to test standard of care anticipatory guidance versus video (rather than testing the delivery of specific information via paper vs video), the DVD and control group participants were provided with information that was similar, but not identical, in content. Further, we did not tape record or observe newborn visits for oral content, and thus we cannot comment on what information was delivered verbally by the provider, or whether provider behavior changed as a result of the DVD.

On the basis of our prior research investigating knowledge of infant development, sample size calculations for this trial assumed a change of 20% in parent knowledge score.²⁷ However, the parents who participated in the trial had substantially better than expected knowledge at baseline; thus, it is possible that our study was underpowered to detect differences in knowledge. It is also likely that the impact of the intervention was limited because it was brief and only presented once. Brief interventions within primary care may require repeated exposure to demonstrate efficacy. Last, our study was conducted in a low-income urban teaching clinic, and findings ought only be generalized to similar populations.

The strengths of this study include high participation rates, its randomized trial design, and the use of an enhanced standard of care as a control condition. Because participants in the control group received more anticipatory guidance than is typical, our findings likely underestimate the true impact of the program. Further, the research associates were blinded to treatment allocation during

Table 5. Acceptance by Staff and Providers

Staff and Provider Satisfaction With DVD Intervention (n = 33)*	Agreement
The video was not disruptive to patient flow.	93%
I believe that video is a useful tool for our patients.	88%
This program fits well into our clinic.	90%
I would like to see the use of media-based learning continued in the clinic in the future.	91%
I would like to see media-based learning in the clinical setting expanded to include other ages/topics.	90%

*Reported as percentage who agree and strongly agree.

assessments, thus mitigating the potential for bias. Last, we were able to implement the intervention within the structure of the clinical practice, and the resources required to sustain this type of program are relatively minimal.

IMPLICATIONS

We found that the incorporation of a DVD of newborn anticipatory guidance in the primary care setting is feasible and can have a positive impact on its target audience. This represents a low-cost intervention that was fully integrated into the function of a busy primary care clinic. Because TV and video are increasingly popular methods to deliver consumer information, video represents an efficient way to supplement the well-child visit. This educational method could be applied to other ages of well-child care as well as specific behaviors or conditions. Future studies should seek to replicate these findings and to determine which components of the intervention are most effective.

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