The Influence of Provider Communication Behaviors on Parental Vaccine Acceptance and Visit Experience

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Objectives. We investigated how provider vaccine communication behaviors influence parental vaccination acceptance and visit experience.

Methods. In a cross-sectional observational study, we videotaped provider–parent vaccine discussions (n = 111). We coded visits for the format providers used for initiating the vaccine discussion (participatory vs presumptive), parental verbal resistance to vaccines after provider initiation (yes vs no), and provider pursuit of recommendations in the face of parental resistance (pursuit vs mitigated or no pursuit). Main outcomes were parental verbal acceptance of recommended vaccines at visit's end (all vs ≥1 refusal) and parental visit experience (highly vs lower rated).

Results. In multivariable models, participatory (vs presumptive) initiation formats were associated with decreased odds of accepting all vaccines at visit's end (adjusted odds ratio [AOR] = 0.04; 95% confidence interval [CI] = 0.01, 0.15) and increased odds of a highly rated visit experience (AOR = 17.3; 95% CI = 1.5, 200.3).

Conclusions. In the context of 2 general communication formats used by providers to initiate vaccine discussions, there appears to be an inverse relationship between parental acceptance of vaccines and visit experience. Further exploration of this inverse relationship in longitudinal studies is needed. (*Am J Public Health.* 2015;105: 1998–2004. doi:10.2105/AJPH.2014.302425)

Parental refusal or delay of childhood vaccines is a growing public health concern.[1–3] It is an important contributor to underimmunization[4] and raises the risk of a child developing and transmitting vaccine-preventable disease.[5–7] However, little is known about how to increase vaccine acceptance among vaccine-hesitant parents.[8]

Evidence suggests that improving provider–parent communication about vaccines may increase parental vaccine acceptance. Provider–parent communication is a key factor in parental decision making about childhood vaccines[9,10] and presents opportunities for improvement.[11–14] Although some general communication guidelines have been disseminated for providers to use with vaccine-hesitant parents,[15–18] improvement efforts have been complicated by minimal data on the effectiveness of specific vaccine communication strategies.[19,20]

We previously identified 2 provider communication behaviors that appear to influence parental vaccine decision making.[21] When providers used participatory formats to initiate vaccine discussions (e.g., "What do you want to do about shots?"), parents were more likely to voice initial resistance to vaccines (e.g., "I don't want him vaccinated today") than when providers used presumptive formats (e.g., "Well we have to do some shots"). In addition, if patients voiced resistance, providers' pursuit of their original vaccine recommendations (e.g., "He really needs these shots") changed nearly half of parents' vaccination decisions.

However, important questions remain. First, how is provider initiation format associated with parental vaccination acceptance at visit's end? It is unclear whether provider initiation format is associated with the more clinically relevant end outcome of parental vaccination acceptance at visit's end. Furthermore, if there is an association between provider initiation format and parental vaccination acceptance, how much of this association is explained by parents' initial verbal resistance to vaccines during the discussion and by providers' pursuit of vaccine recommendations despite parental verbal resistance? For instance, if providers pursue their original vaccine recommendations,[21] initial resistance may independently predict parental vaccine decisions at visits' end and mediate the relationship between provider initiation format and parental vaccination acceptance.

Second, how do these communication behaviors influence other pertinent outcomes, such as parents' ratings of their visit experience? Patient experience is a widely recognized quality-of-care indicator, reflecting the Institute of Medicine's health care quality aim of patient centeredness[22] and being linked to annual reimbursement payments by the Centers for Medicare and Medicaid Services.[23] There is concern that providers' use of presumptive formats to initiate vaccine discussions, despite precipitating less verbal resistance from parents during visits, may negatively affect parents' experiences.[24] This, in turn, may result in decreased vaccine uptake over time.[25]

We sought to (1) determine the relationship between provider initiation format and parental vaccine acceptance at visit's end and whether parental verbal resistance during the vaccine discussion or provider pursuit mediated this relationship, and (2) determine the association of provider initiation and pursuit behaviors with parental visit experience. We hypothesized that participatory formats would be associated with decreased parental acceptance of vaccines at visit's end but a highly rated parental visit experience and that parental verbal resistance would both predict decreased parental acceptance of vaccines and mediate the association of provider initiation format and parental vaccine acceptance.

METHODS

We conducted a cross-sectional observational study in which we videotaped provider–parent

vaccine discussions during health supervision visits at primary care pediatric practices. We have described the study design, participants, videotaping data collection procedures, and coding elsewhere and therefore only briefly describe them here.[21]

Participants

Pediatric providers were eligible if they either practiced primary care in the Puget Sound area in Washington State or belonged to the Puget Sound Pediatric Research Network—a regional practice-based research network of community pediatricians—and had not participated in our preliminary study.[26] Parents of children whose pediatric provider had agreed to participate in the study were approached in providers' waiting rooms from September 27, 2011, through August 31, 2012. Parents were eligible if they were aged 18 years or older, were English speaking, and had a child aged 1 to 19 months being seen for a health supervision visit.

We screened eligible parents for vaccine hesitancy with the validated Parent Attitudes About Childhood Vaccines survey[27–29] to oversample vaccine-hesitant parents. To minimize the chance that participants altered their behavior to meet observer expectations (i.e., the Hawthorne effect),[30] we described our study objective generally to all participants as one seeking to better understand parent–provider communication. In addition, for parent participants, we embedded the Parent Attitudes About Childhood Vaccines survey into a larger survey about parental perceptions of common childhood topics.

Data Collection

We videotaped all study visits. After their visits and before leaving the clinic, participating parents completed a self-administered survey that included demographic items (birth order of their child, parent age, household income, marital status, parent self-designated race/ethnicity, gender, and number of children in their household), an item regarding whether this was the parent's first vaccine discussion with the child's provider, and 15 items pertaining to their visit experience (Table 1). We adapted the parental experience items from the Outpatient Satisfaction Questionnaire[31] and the Satisfaction With Immunization Service Questionnaire,[32] and all used a response scale from 1 (very poor) to 7 (outstanding).

TABLE 1—Parent Visit Experience Survey: Washington, 2011–2012

Thinking about the visit you just had with your child's doctor, how would you rate each of the following? (very poor = 1, poor = 2, fair = 3, good = 4, very good = 5, excellent = 6, outstanding = 7)	No.	Mean (SD)
Friendliness, warmth, and personal manner of the doctor who treated your child	111	6.5 (0.8)
Explanation of immunizations	110	5.7 (1.2)
Willingness to listen to what you had to say	110	6.5 (0.9)
Support and understanding about immunizations	110	6.1 (1.1)
Answers given to your questions	111	6.4 (0.8)
Amount of time spent with you and your child	111	6.3 (0.9)
Amount of information you received about immunizations	111	5.6 (1.3)
Knowledge of immunization of the doctor	108	6.2 (1.0)
Courtesy, politeness, and respect shown by the doctor	111	6.7 (0.7)
Respect for your decisions about immunizations	110	6.4 (0.9)
Understanding of your child's health problems	110	6.4 (0.8)
Skill and ability of the doctor	111	6.5 (0.8)
Ability of the doctor to put you and your child at ease	111	6.5 (0.9)
Interest shown in you and your child	111	6.6 (0.7)
Care received overall	111	6.6 (0.7)
Total score (15–105)		94.6 (10.7)

Data Analysis

Coding. With an interaction coding scheme that was previously developed[21,26] using conversation analysis,[33–35] 2 investigators (D. J. O. and H. S. S.) who were blinded to the parents' hesitancy status independently coded all visits for 3 communication behaviors: (1) the communication format providers used to initiate the vaccine discussion, (2) how parents responded to providers' initiation formats, and (3) whether providers pursued their original vaccine recommendations if parents voiced resistance to initiation formats. We measured intercoder reliability using 20% of the data at the outset of coding, with κ scores for these 3 communication behaviors ranging from 0.70 to 0.75. We resolved all discrepancies through discussion with 2 additional investigators who had conversation analysis expertise and were involved in the development of the coding scheme (J. D. R. and J. H.).

We dichotomized initiation formats into "presumptive" and "participatory." Presumptive formats presupposed that parents would vaccinate,[36,37] whereas participatory formats provided parents more decision-making latitude (data available as a supplement to the online version of this article at http://www.ajph.org). Parental resistance was binary and coded as yes if, in response to the providers' initiation formats, parents either explicitly rejected the recommendation or voiced less explicit rejections, such as citing contingencies, raising concerns about vaccination, or otherwise demurring. We dichotomized provider pursuit of original vaccine recommendations after initial parental resistance. We considered providers to have pursued if they continued to advocate their original recommendations immediately after parents verbalized resistance. We considered providers not to have pursued if they accepted parents' resistance or pursued mitigated versions of their original recommendations.

Variables. Our outcomes of interest were parental acceptance of recommended vaccines at visit's end and parental visit experience. Parental acceptance was binary and determined at the time of coding by assessing parents' verbal acceptance of all (yes) or refusal of 1 or more (no) vaccines at visit's end. The κ score for coding parental vaccine acceptance at visit's end was 1.0.

We determined parental visit experience using scores on the 15-item postvisit parental experience measure. We calculated raw scores by scoring individual item responses from 1 to 7 and summing them in an unweighted fashion. The total possible raw score therefore ranged from 15 to 105. There were 8 missing responses from 5% (n = 6) of parents. There was no change in our results when restricting our analysis of parental experience to only those with complete data, so we have presented results from the total study population.

Because parental visit experience ratings represent an ordinal (vs continuous) scale—that is, the order from 15 to 105 has meaning but the intervals between each number do not—we chose to dichotomize parental experience. We considered parents who had a total raw score of 90 or more out of 105 to have had a highly rated visit experience and those who had a score of less than 90 to have had a lower-rated visit experience. We chose a threshold score of 90 because it represented parents having average scores of 6 or more (representing "excellent" or "outstanding" responses) across the 15 items. Other investigators have used similar dichotomization thresholds in research on patient satisfaction in outpatient settings.[38–41]

In a secondary analysis, we summarized parental experience using 2 additional methods to determine whether our results changed. One method involved analyzing parental experience as a continuous variable and using linear regression with Box–Cox transformation of the skewed data. A second method involved using a different dichotomization threshold in which we coded parents who rated all 15 items using the highest response category (i.e., a score of 7 ["outstanding"] on all 15 items) as having highly rated visit experiences and parents who rated any of the 15 items less than 7 as having lower-rated experiences. This threshold is consistent with the top-box scoring method that has been used in previous research on parent–patient experience[39,42,43] and is the scoring method for the Consumer Assessment of Health Care Provider and Systems measures.[44]

Analysis. We used the Pearson χ^2 test (or the Fisher exact test) and logistic regression to test the bivariate relationship between the 2 predictor variables of provider initiation and pursuit behaviors and our 2 outcome variables among the total study population. We also explored the bivariate association between parental verbal resistance during vaccine discussions (and the type of resistance—explicit or nonexplicit) and parental acceptance at visit's end.

We used a supervised approach for selecting variables to include in multivariable logistic regression models. Our goal was a parsimonious model that was not overfitted. We started with a priori hypotheses relevant to provider–parent communication and vaccination status[10,45–48] with our primary variable of interest being vaccine hesitancy status.[21] We considered other variables for inclusion if they were significant in bivariate analyses, not narrowly distributed,[49] and not collinear with existing predictors. We conducted backward stepwise logistic regression using a significance level for removal of more than 0.2 and for addition of less than 0.1 to further help guide variable selection.

Our final model included 3 covariates: parent hesitancy status, child age, and household income. We did not include the clinic or practice categorical variable or first-time vaccine discussion binary variable in our modeling because we did not find their association with our main outcomes and predictors to be significant in bivariate analyses ($P > .1$). For all regression analyses, we obtained clustered robust SEs to account for within-provider correlation.[50]

We considered parental verbal resistance or provider pursuit as potential mediators of the association between provider initiation format and parental vaccine acceptance. We performed a mediation analysis using the causal inference approach proposed by Imai et al. to estimate the proportion of this association (and confidence intervals [CIs] based on 1000 simulations) that was mediated by each variable.[51,52] We limited the covariates used in the mediation models to parental vaccine hesitancy status and child age.

RESULTS

We enrolled 16 pediatric providers from 9 primary care practices located in 3 Washington State counties and videotaped 111 of their vaccine discussions with parents at health supervision visits.[21] Most participating parents were mothers (89%), married (92%), White (81%), and aged 30 years or older (77%) and had a household income greater than $75 000 (62%); 50% were vaccine-hesitant parents, and 26% were discussing vaccines for the first time with their child's provider. In 84% of encounters (n = 93), providers initiated the vaccine discussion; there was no initiation behavior in 3% (n = 3) and parents initiated in 13% (n = 15). Providers used presumptive formats to initiate vaccine discussions in 74% (n = 69) of encounters and participatory formats in 26% (n = 24). Parents voiced resistance after providers' initiation formats in 41% (n = 38) of encounters, and among these, providers pursued their original vaccine recommendations in 50% (n = 19).

Overall, 64% of participating parents accepted all recommended vaccines at visits' end and 72% rated their visit experience highly. The total mean parental experience score was 94.6 out of 105.0 (SD = 10.7). Mean scores on individual parental experience items are reported in Table 1.

Provider Initiation Format and Pursuit

In a bivariate analysis of provider-initiated vaccine discussions, significantly fewer parents accepted all vaccines at visit's end when providers initiated vaccine discussions with participatory (vs presumptive) formats (Table 2). However, significantly more parents rated their visit experience highly when providers initiated with participatory (vs presumptive) formats. In bivariate analysis of encounters in which parents voiced resistance after providers initiated the vaccine discussion, significantly more parents accepted all vaccines at visit's end if providers pursued (vs did not pursue) their original vaccine recommendation. There was no statistical difference in the proportion of parents who rated their visit experience highly by provider pursuit behavior.

In a multivariable analysis adjusting for parent and child characteristics, the association between providers' participatory (vs presumptive) initiation formats and both reduced parental acceptance of all vaccines and highly rated parental visit experience remained statistically significant (Table 2). In our secondary analysis, we found similar significant results when parental experience was analyzed as a continuous variable (b = 5.7; 95% CI = 2.2, 9.1) or when we used the alternative dichotomization method

TABLE 2—Relationship of Key Provider Communication Behaviors to Outcomes Among All Parents: Washington, 2011–2012

Provider Behavior	Accepted All Vaccines at End of Visit			Highly Rated Visit Experience		
	%	OR[a] (95% CI)	AOR[b] (95% CI)	%	OR[a] (95% CI)	AOR[b] (95% CI)
Provider initiation format						
Participatory (n = 24)	16.7	0.02 (0.01, 0.08)	0.04 (0.01, 0.15)	95.8	13.07 (1.71, 99.93)	17.25 (1.49, 200.32)
Presumptive (n = 69)	89.9	1.00 (Ref)	1.00 (Ref)	63.8	1.00 (Ref)	1.00 (Ref)
Parent verbal resistance						
Resistance (n = 38)	36.8	0.03 (0.01, 0.11)	0.06 (0.02, 0.24)	79.0	1.82 (0.91, 3.67)	2.13 (0.82, 5.51)
No resistance (n = 55)	94.6	1.00 (Ref)	1.00 (Ref)	67.3	1.00 (Ref)	1.00 (Ref)
Provider pursuit of original vaccine recommendation						
Pursuit (n = 19)	68.4	39.00 (4.65, 327.11)	. . .[c]	79.0	1.00 (0.19, 5.19)	0.80 (0.06, 11.61)
No pursuit (n = 19)	5.3	1.00 (Ref)	. . .[c]	79.0	1.00 (Ref)	1.00 (Ref)

Note. AOR = adjusted odds ratio; CI = confidence interval; OR = odds ratio.
[a]Logistic regression using clustered robust SEs to account for within-provider clustering.
[b]Adjusted for parent's vaccine hesitancy status, child age, and household income.
[c]Too few observations.

(adjusted odds ratio [AOR] = 3.5; 95% CI = 1.2, 10.7). There was no significant association between provider pursuit and parental vaccine acceptance or parental visit experience.

Mediating Roles of Parental Verbal Resistance and Provider Pursuit

Fewer parents accepted all vaccines at visit's end if they had voiced resistance to providers' initiations than if they had not (Table 2). Among encounters in which parents voiced initial resistance but accepted all vaccines at visit's end (n = 14), providers pursued their original vaccine recommendations in all but 1 (93%), and all parents had voiced nonexplicit, rather than explicit, resistance to the provider's initiation. More providers pursued their original vaccine recommendations if they had used presumptive (vs participatory) formats to initiate vaccine discussions (74% vs 26%; $P = .003$).

In mediation analyses, 23% (95% CI = 18%, 41%) of the association between provider initiation format and parental vaccine acceptance of all vaccines at visit's end was mediated by parental verbal resistance. The proportion mediated by provider pursuit was 52% (95% CI = 34%, 159%).

DISCUSSION

Our results increase the understanding of specific provider communication behaviors that ultimately affect the likelihood of parents accepting vaccination and rating their visit experiences highly. In a previous study, we reported an association between providers' use of participatory (vs presumptive) communication formats to initiate vaccine recommendations and parental verbal resistance to these recommendations.[21] In this study, we have substantiated the importance of the initiation format by demonstrating an association between participatory formats and 2 new outcomes: parental vaccine acceptance and parent-rated visit experience at visit's end.

Within the context of 2 general communication formats used by providers to initiate vaccine discussions, there appears to be an inverse relationship between parental acceptance of vaccines and visit experience. Using presumptive formats that assume vaccination seems to increase acceptance but decrease visit experience, whereas using participatory formats that provide parents more decision-making latitude appears to do the opposite.

On the one hand, this finding is in line with previous theory and research suggesting that subtle modifications of the wording of questions can affect response outcomes,[53] including the use of statements that presume a preference rather than require respondents to make a choice.[54] In addition, it is consistent with evidence suggesting that question formats that provide patients with more agency tend to promote parent–patient satisfaction.[41,46,55] Overall, it may be that participatory initiation formats are a better match for the development of an open, trusting relationship that parents—particularly vaccine-hesitant parents—desire to have with their children's' providers.[16,17] Providers may perceive a need to leverage the inherent value of participatory approaches in cultivating strong provider–parent relationships to help ensure parental vaccine acceptance over time at the expense of acceptance short term.

On the other hand, our findings are provocative because they suggest that 2 desirable outcomes—vaccination acceptance and parent satisfaction—may be mutually exclusive, or at least difficult to achieve simultaneously in the context of a single visit. Indeed, in other contexts, patient satisfaction has been found to be inversely related to health outcomes, health care utilization, and expenditures.[56] Although this illustrates the importance of balancing measures, it also appears to present a challenge: which outcome should be prioritized if emphasizing one may be to the detriment of the other?

Alternatively, it may be that our finding of an inverse relationship between vaccine acceptance and visit experience stems primarily from an inadequate understanding of and ability to accurately measure the construct of parental experience in the vaccination context. Although we adapted parental experience items from 2 validated measures, there is no standard instrument or approach for assessing parental experience in the context of discussing vaccinations.

Manary et al. recently lamented the heterogeneity that generally exists in measuring patient satisfaction and called for standardization to facilitate cross-study comparisons.[57]

It is also noteworthy that parental verbal resistance early in vaccine discussions is neither a perfect predictor of decreased acceptance of vaccines at visit's end nor a significant mediator of the association between participatory initiation formats and decreased vaccine acceptance. Our data suggest that the more significant mediator of the pathway between provider initiation format and parental acceptance of all vaccines at visit's end is providers' pursuit after initial parental resistance (although we were not able to perform a sensitivity analysis of our estimated mediation effects because of statistical packages' limitations in accommodating a binary outcome and a binary mediator).

Methodologically, this affirms the importance of measuring an end outcome in addition to an intermediary outcome, and clinically, it reinforces the importance of pursuing vaccine recommendations after parents' voice initial concerns. In fact, our results suggest that pursuing vaccine recommendations may temper the negative effects that participatory initiation formats have on vaccine acceptance without any concomitant negative effects on parental experience. A commitment to pursuing parental resistance following the use of participatory initiation formats may therefore represent a communication strategy that attains both vaccine acceptance and parent satisfaction. An example vaccine discussion from our data that illustrates this scenario is provided in data available as a supplement to the online version of this article at http://www.ajph.org.

Strengths and Limitations

There are several strengths and limitations to this study. This was an observational study with cross-sectional data. Therefore, we could not account for unobserved variables associated with both the predictor and outcome that may have caused us to observe only a spurious association between initiation format and vaccine acceptance. For instance, providers may have had insight into parents' vaccination preferences through knowledge of parents' previous vaccination behaviors or from past conversations parents had with providers or clinic staff; this may have made providers more likely to use particular initiation formats (e.g., presumptive formats with parents who providers knew were likely to vaccinate).

However, when we explored the association of parental vaccination acceptance and provider initiation format among only those encounters that involved first-time vaccine discussions—a subgroup in which unobserved variables, such as past provider–parent vaccination conversations, may be less likely to be present—a participatory format remained significantly associated with reduced parental acceptance of all vaccines at visit's end ($P = .013$).

A strength of our study is that we directly observed provider communication behaviors during actual vaccine discussions with parents. This, though, may have provoked different and nonnatural communication behaviors during the provider–parent interaction.[58] However, we used several maneuvers to minimize the Hawthorne effect, and most studies have found only an insignificant effect of direct observation on provider and parent behavior.[59] Also, by videotaping only a single vaccine encounter among children aged 1 to 19 months, we could not determine whether and how specific provider communication behaviors varied over time or how parental vaccine acceptance and visit experience changed over time.

Parents overall rated their visit experience highly, and therefore, the relative difference between a highly and lower-rated visit experience may not be very significant. However, a ceiling effect is typical in parental experience,[32,46] and we found no difference in the significance of our multivariable results when we dichotomized parental experience using a different threshold for a highly rated visit experience or when analyzed as a continuous variable.

We were underpowered to conduct several subgroup analyses (e.g., differences in parental experience ratings between vaccine-hesitant parents and non–vaccine-hesitant parents and differences in provider communication or parental vaccination acceptance among demographic groups within vaccine-hesitant parents) and to determine whether there was an independent association between provider pursuit and our outcomes. We may also have introduced sampling bias by enrolling a convenience sample of parents, and our results may not be representative or generalizable because our study was conducted in a single geographical location. Restricting the analysis of the association between initiation format and our outcomes to those encounters in which the provider initiated the vaccine discussion may also have introduced sample selection bias.

Conclusions

Participatory communication formats for initiating vaccine recommendations appear to be associated with a highly rated visit experience and reduced parental vaccine acceptance. These results require confirmation in longitudinal studies. ■

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This article was accepted October 26, 2014.

Contributors

D. J. Opel conceptualized and designed the study, coordinated and supervised data collection, performed data analysis, and wrote the first draft of the article. R. Mangione-Smith supervised data collection. R. Mangione-Smith, J. R. Robinson, J. Heritage, C. Zhou, and J. A. Taylor contributed to study design. J. R. Robinson performed data analyses. J. R. Robinson and J. Heritage developed the coding scheme. V. DeVere conducted and coordinated data collection. H. S. Salas conducted qualitative data analysis. C. Zhou assisted in data analysis. J. A. Taylor assisted in the coordination and supervision of data collection and supervised data analysis. All authors reviewed and revised the article and approved the final article as submitted.

Acknowledgments

This research was supported by the Eunice Kennedy Shriver National Institute of Child Health and Human Development of the National Institutes of Health (award K23HD06947 to D. J. O).

Portions of this study were presented at the 2013 and 2014 Pediatric Academic Societies Meeting in Washington, DC and Vancouver, British Columbia.

We would like to thank the pediatric providers and parents who participated in this study as well as the following individuals for their expertise and mentorship on this project: Sheryl Catz, PhD, Edgar K. Marcuse, MD, MPH, Douglas S. Diekema, MD, MPH, Thomas Gallagher, MD, MPH, Janet Englund, MD, and Benjamin Wilfond, MD.

Note. This content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. The funder had no role in designing or conducting the study; data collection, management, or analysis; interpretation of the data; or preparation, review, or approval of the article.

Human Participant Protection

The Seattle Children's Research Institute's institutional review board reviewed and approved all study protocols. We obtained written informed consent for participation in the study from both pediatric providers and parents.

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