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## Motivational interviewing may resolve vaccine hesitancy

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## Motivational interviewing may resolve vaccine hesitancy

### Cover Page Footnote

Thank you to Drs. Marissa Elias, Shoshanna Gordon, and Jordan Kridler for input on the manuscript.

# Motivational interviewing may resolve vaccine hesitancy

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**ABSTRACT** A clinical decision report using:

Gagneur A, Lemaître T, Gosselin V, et al. A postpartum vaccination promotion intervention using motivational interviewing techniques improves short-term vaccine coverage: PromoVac study. *BMC public health*. 2018;18(1):811.  
<https://doi.org/10.1186/s12889-018-5724-y>

for a juvenile patient with a caregiver who is skeptical about the safety of routine vaccinations.

**Keywords:** *Motivational interviewing, vaccine hesitancy*

## Clinical-Social Context

Chloe Harrison [pseudonym] is a 2-year-old girl who presented at her primary care clinic for a visit with her mother Vicky Harrison [pseudonym] with a concern for bowing of her legs. After reassuring Ms. Harrison that her child's growth pattern was part of normal developmental progression and expected to resolve with continued growth, a health maintenance assessment was completed for the child. During the assessment, it was noticed that Chloe had received her initial infant doses of the Hep-B vaccine and the Rotavirus vaccine, but was overdue for the DTaP, HiB, PCV, Hep-A, Hep-B second dose, Influenza, and MMRV vaccinations and thus had fallen well behind schedule. When asked if the gap in vaccinations was due to lapse in primary care, Ms. Harrison responded that it wasn't and that she had decided that she "didn't trust the vaccines," and had become worried about any "new and untested vaccines being used on [her daughter]." Further interviewing revealed that she had come to question the efficacy and safety profiles of the numerous vaccines given as part of the childhood vaccination schedule, and was worried about the risks of the vaccines would pose to her daughter. Additionally, she thought the risk of severe illness for Chloe from any of the illnesses covered by the vaccines was minimal and that the risk of a vaccine related adverse event was high. It was clear from the conversation that Ms. Harrison cares deeply about the health and safety of Chloe, and no other areas of routine health maintenance were neglected. Given that both parent and clinician share the goal of maximizing the health and well-being of Chloe, we wondered what the most efficacious strategy would be to entreat with Ms. Harrison and advocate for Chloe.

## Clinical Question

How should the most effective techniques for engagement and negotiation with vaccine hesitant individuals be applied to minimize harm and maximize patient autonomy and decision making in the outpatient setting?

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## Research Article

Gagneur A, Lemaître T, Gosselin V, et al. A postpartum vaccination promotion intervention using motivational interviewing techniques improves short-term vaccine coverage: PromoVac study. *BMC public health*. 2018;18(1):811.

<https://doi.org/10.1186/s12889-018-5724-y><sup>1</sup>

## Description of Related Literature

PubMed was searched for the terms “vaccine” and “hesitancy.” The term “vaccine hesitancy” was chosen because it is recognized by the World Health Organization and commonly used in scientific and medical discourse relating to cases of reduced vaccine use and acceptance.<sup>2,3</sup> This initial search resulted in the return of numerous review and opinion articles. To explicitly find protocols that had undergone testing and shown results in real patients, the search was refined with the filters for “clinical trial” and “randomized controlled trial.” Meta-analyses were not to minimize redundancy. At the time the search was performed, the query returned 51 results. These results were screened by title and abstract, and results specific to COVID-19, adult influenza, and HPV vaccine hesitancy were excluded as these do not address the pediatric vaccine schedule, designed to prevent potentially lethal childhood infections. Additional articles not dealing specifically with communication methods between adults regarding pediatric vaccinations were likewise filtered out. Training protocol studies without efficacy analysis on rates of vaccine refusal in clinic were also removed. Finally, because vaccination refusal relies heavily on socio-cultural factors, results from outside the United States and Canada were also excluded. Of the 51 articles returned in the search, ten were suitable for in depth review to gauge utility to the clinical question.

Williams et al. performed a study of the efficacy of video and written information on the attitudes of parents with Parent Attitudes about Childhood Vaccines (PACV) survey scored above 25, suggesting vaccine hesitancy.<sup>4</sup> Of 454 parents approached in a primary care setting, 132 met criteria for vaccine hesitancy and were randomized to receive either control intervention (usual care, N = 67, mean score 37) or provision of an eight minute video from the Vanderbilt Vaccine Research Program, and pamphlet on common vaccine concerns, and instructions on finding quality medical information online (N = 55, mean score 40). After 2 months, 108 (81%) completed a follow up survey showing a small but significant decrease in PACV score (10.8 point decrease in intervention group vs. 6.8 point decrease in control group, p = 0.044 after adjustment for baseline PACV score). However, there was no difference in the receipt of vaccines in either group at 12 weeks follow up.

Gowda et al. assessed the change in attitude toward vaccination of 77 vaccine hesitant parents of children under 6 years of age.<sup>5</sup> These individuals were randomized to receive either educational webpages with information specific to their concerns underlying their hesitancy, or similar webpages containing untailored information. Assessment of change in attitude showed that those receiving the tailored information had more positive vaccine intentions and a greater magnitude of change after intervention. However, neither metric met statistical significance.

Henrikson et al. investigated the effect of communication training for physicians on changing maternal attitudes regarding vaccination.<sup>6</sup> The efficacy of this training was assessed by change in PACV scores of the mothers after communication. A total of 56 clinics and 347 mothers were enrolled and these were randomized into two groups, with the physicians at 30 of the clinics receiving communication training and those of the remaining 26 clinics serving as the control group. The intervention had no effect on maternal vaccine hesitancy as assessed by PACV score or physician perception of communication ability.

A randomized controlled trial using an incentivized behavioral vaccination game by Betsch and Böhm showed conclusively that compulsory vaccination increased the level of anger among individuals with a negative attitude toward vaccines, leading to a significant 39% decrease in uptake.<sup>7</sup> This study has implications for public and hospital policy but is not applicable to the individual physician-caregiver interactions in clinic.

Several studies stem from the REDIVAC trial which provided a large scale framework for the assessment of vaccine hesitancy and methods to overcome it.<sup>8</sup>

Glanz et al. conducted a randomized control trial of pregnant women from 2013 to 2016 in which the participants (n = 888) were randomized to receive webpage information regarding vaccines with social media components, website with vaccine information only, or standard care.<sup>9</sup> Vaccination of the women’s infants was then assessed for 200 days post-partum as the primary outcome of



the study. The average number of days unvaccinated for infants whose mothers received vaccine information with social media components was significantly lower than infants of those receiving information alone or standard care ( $p = .02$ ), with no difference between the latter two groups ( $p = .08$ ). Furthermore, those infants were nearly twice as likely to be up to date in vaccination status compared to the standard care group (OR = 1.96, 95% CI 1.07-3.00). Kwan et al. explored the effects of these interventions in a secondary analysis, showing that parental values are stable over time.<sup>10</sup> Both tailored and untailored interventions increased intention to vaccinate, with positive changes in intention associated with lower rates of vaccine delay. However, despite the positive effect of all interventions on intention to vaccinate, none were sufficient to increase overall vaccination rates. Lastly, analysis by Daley et al. showed that the web-based interventions with and without social media components were associated with significant improvement in parental attitudes toward vaccines.<sup>11</sup>

Steffens et al. addressed whether the repetition of myths concerning vaccines while addressing concerns could inadvertently strengthen parents' agreement with these myths.<sup>12</sup> 788 parents of children ages 0 to 5 years old were randomized to receive a text intervention either repeating common vaccine myths, posing questions, making factual statements, or a control text, which the participants summarized afterward as a quality control assessment. Of these, 454 parents completed the study. Agreement with the myths presented in the text and intention to vaccinate were assessed immediately post intervention and one week post intervention. The study showed no evidence that repeating a myth when addressing it increased agreement with the myth, indicating that clinicians can freely address these beliefs. Furthermore, posing questions appeared to spark critical thinking, significantly decreasing myth agreement relative to the control text ( $p = .004$ ). However, none of the interventions changed parents' intention to vaccinate.

Finally, a 2018 study by Gagneur et al. investigated the use of motivational interviewing techniques to improve short term vaccine coverage for parents in the maternity ward.<sup>1</sup> This study involved the use of readily available techniques, unlike others that required lengthy counseling sessions, online materials, or training classes, and was assessed for children receiving the same vaccine schedule that Chloe Harrison was overdue for. Thus, this article was considered the best fit for the patient.

Based on Strength of Recommendation Taxonomy (SORT) guidelines the overall level of evidence present in the literature review is grade A, with multiple, high quality randomized controlled trials of interventions showing consistent results in modifying vaccine hesitancy.<sup>13</sup>

## Critical Appraisal

The PromoVac study, published by Gagneur and colleagues was a quasi-experimental cohort study using a static group comparison with multiple post-test measurements aiming to determine the efficacy of a motivational interviewing style intervention for vaccine hesitancy. The study was conducted in Quebec, Canada, at the maternity ward of the Centre Hospitalier Universitaire de Sherbrooke. Study participants were recruited over a one-year period from the population of post-partum, French or English speaking mothers, who were approached and screened by the researchers during the 48 hour hospital stay following birth. The individuals who agreed to participate signed an informed consent. The children of mothers who agreed to participate were assigned to the experimental group, while the control group was comprised of those from mothers who did not participate in the study and were not approached by the researchers. Additional secondary analysis groups were created from those who refused to be included in the intervention group and those who withdrew consent to participate before receiving the intervention.

The intervention consisted of information regarding the six vaccine preventable illnesses for which vaccinations are given at 2, 4, and 6 months of age for infants (diphtheria, tetanus, poliomyelitis, pertussis, H. Influenzae B, and pneumococcal conjugate). This information included the vaccine efficacy, importance of the immunization schedule, side effects, and fears often associated with the vaccines. The manner in which the intervention was given was based on the Health Belief Model<sup>14</sup>, which seeks to understand the failure to adopt disease prevention strategies, and the transtheoretical model of behavior change<sup>15</sup>, which categorizes the behaviors and processes of patient behavior change into a cohesive framework. In accordance with motivational interviewing interventions, the framework was adapted to each individual family with respect to intention to vaccinate. The intervention was performed by a research assistant trained to study standards in motivational interviewing and the vaccine information to be given and administered 24 to 48 hours post-partum in the patient's room, lasting approximately 20 minutes. Follow-up was conducted over the next seven months, and the primary outcome measurement was the vaccine coverage of the infants at 3, 5, and 7 months,

obtained from the government immunization registry, LOGIVAC, after a one month delay for data entry. The secondary outcome was an efficacy measurement, which was defined as the acceptance rate of the mothers who received the intervention. The study was computed to require 943 mothers per group to discern a significant change of 5% in vaccine coverage and achieve a power of 80% and a 5% chance of type 1 error with a vaccine coverage baseline of 80%. Statistical comparison between groups was completed with  $\chi^2$  for categorical variables and t-test or Mann-Whitney U test for continuous variables, depending on distribution. Relative risk was computed using logistic regression. Analysis was done for both per-protocol and intention to treat. Additional multivariate regression analysis was completed for these assessments to investigate the impact of motivational interviewing on vaccine coverage with respect to the mother's age, birth procedure, birth order, and hospitalization status. Presence of selection bias was assessed through  $\chi^2$  comparison of three different groups who did not receive the intervention (control group, primary refusal group, and secondary refusal group) and found no evidence of selection bias. All statistical comparisons used IBM SPSS software.

The control group was made up of 1,225 mothers of 1249 infants. These were not approached for study inclusion; thus their decision would accurately represent the conditions of the population with no intervention. Of the 1,492 mothers approached for study consent 1,329 (89%), with 1,343 infants, agreed to participate in the study. Of these 1,128 mothers of 1,140 infants agreed to receive the intervention and these were included in the experimental group. The 201 mothers who refused the intervention after agreeing to participate were not included in the comparisons. The experimental and control populations did not differ significantly with respect to postpartum stay or mother's age, but the experimental group was less likely to receive Caesarean birth ( $p = .002$ , 187 vs. 267), have another child in the family ( $p = .001$ , 587 vs. 725), and have a newborn hospitalized during the postpartum stay ( $p < .001$ , 51 vs. 172). It is unclear how these differences may predispose either group to bias concerning vaccinations, but it is possible that those receiving C-sections or having newborns hospitalized for intensive care may be less skeptical of medical intervention. Alternatively, it is possible that these mothers may become overprotective because of emotional duress associated with significant medical interventions. Regardless of the reasoning, presence of neonatal hospitalization conferred a negative relative risk of vaccine coverage at the end of the study (0.89, 95% C.I. 0.80-0.99,  $p = .027$ , per protocol analysis,  $p = .066$  intention to treat analysis) more significant in magnitude than that associated with the motivational interviewing intervention (see below). Presence of another child conferred a similarly decreased relative risk of vaccine coverage (0.89, 0.85-0.93,  $p < .001$ , equal for both analyses).

Final analysis of vaccine coverage showed 91.3% coverage in the experimental (motivationally interviewed group) vs. 88.1% in the control group. Thus, at three months with relative risk of the child being vaccinated was 1.04 (95% C.I. 1.01-1.06,  $p = .011$ ) after the intervention (per protocol analysis). This relative risk increased to 1.06 (1.02-1.10,  $p = .003$ ) at 5 months, and 1.11 (1.05-1.16,  $p < .001$ ) at the end of the study 7 months postpartum. The analysis results were equal in significance and similar magnitude for intention to treat analysis. This increasing coverage gap suggests that the mothers receiving the intervention were less likely to decline future vaccinations as well and that the use of motivational interviewing may provide long term benefits in terms of medical literacy, confidence in scientific medical practice, or other factors influencing future healthcare acceptance. Future study would be needed to assess the exact changes in reasoning accompanying the increased vaccine acceptance over time. From the relative uptake of 75.9% vaccine coverage in the intervention group and coverage of 68.6% in the control group at 7 months, it can be calculated that the absolute risk reduction of the intervention for vaccination is -7.3%, representing an increase in vaccination. The number needed to treat is therefore 13.69. With an adequate population size, intention to treat analysis, and greater than 80% follow-up, this study represents a high quality randomized controlled trial for a treatment approach, and therefore has a SORT grade of level 1 evidence<sup>13</sup>. Demographic characteristics such as ethnicity, marriage, education, and socioeconomic status, however, are unreported, which may limit application of these data to patients with niche backgrounds with unique beliefs enforcing vaccine hesitancy.

## Clinical Application

The racial makeup of the study population was not assessed, and the racial demographics of our patient and parent were likewise not reported here as her vaccination concerns were not unique to any particular racial or cultural group and did not appear to be informed by racial or political grievances. Our patient and guardian were from a suburban population in the Midwest U.S.A., which is economically and demographically similar to the study population in eastern Canada. One major difference is the time of intervention, which for study patients took place immediately postpartum, before any vaccinations would be given (exception of HepB in at risk patients). Our patient presented instead as a two-year-old lost to follow-up for an extended period due to the COVID-19



pandemic. However, the subject matter of the intervention, being the early childhood vaccines would be the same. Furthermore, the motivational interviewing strategy of intervention assessed in the paper possessed a considerable strength when compared to other interventions found in the literature in that it required no outside resources or additional training on behalf of the clinician administering the intervention in the outpatient setting. This, coupled with the very low likelihood of harm from motivational interviewing, rendered the studied intervention suitable for our patient.

Motivational interviewing is taught as part of general medical curriculum, and therefore has a low barrier of entry for use in the clinic in a novel fashion (i.e. for vaccine hesitancy), and is a readily available tool in the physician's counseling kit. Physicians frequently apply the principles of motivational interviewing when counseling patients on personal decisions with a medical outcome, such as alcohol and drug use. The practice of motivational interviewing is guided by four main principles: empathy with the patient, delineating the difference between the patient's current habits or behavior and those more optimal for health, confronting and managing resistance using effective communication without antagonism and exploring the patient's own thoughts and beliefs concerning the behavior, and supporting the patient's beliefs and motivations toward changing the desired behavior.<sup>16</sup> Thus, the clinician and patient form a partnership to further the desired outcome as opposed to an authoritative model, with the physician ordering or directing the patient's behavior with no input from the patient. Motivational interviewing thus results in a cooperative environment and is applied in a way that neither shames, nor coerces the patient and invites the patient to exercise their own autonomy and decision making to arrive at optimal decisions regarding their health and care with the impetus to follow the decisions they have made.

For our patient, the process began with the asking of open-ended questions to ascertain the reasoning and feelings underlying Ms. Harrison's resistance to vaccination. The reasons behind Ms. Harrison's resistance to vaccines for Chloe were explored in depth during her visit and she was questioned in a neutral framework about her thoughts and, more critically, her feelings toward Chloe's vaccinations. After listening to her story, the care team and the patient's mother affirmed the common goal of maximizing the health and wellbeing of her daughter. To gauge her current knowledge and thinking about the childhood vaccines, Ms. Harrison was asked what she knew or thought she knew regarding the clinical data on childhood vaccinations, what each was used for, how they work, and what the consequences could be if Chloe continued to be unvaccinated, especially as her socialization with other children increased. It was revealed that Ms. Harrison 1) thought that most of the vaccines given in the pediatric schedule were new technology, and had been poorly tested in clinical settings, 2) that she believed the risk of side effects from the vaccines was high, and that a mild fever her daughter had had after a previous vaccination constituted a severe adverse reaction, and 3) that she did not understand which diseases the vaccines were designed to protect Chloe against, or the possible sequelae of Chloe contracting such an illness. Information was then provided regarding the vaccines in a neutral manner, without attempt to frighten the patient's mother. While still skeptical after discussion on when the vaccines on the list entered routine clinical use and what the expected side-effect profile was, conversation regarding the details of the illnesses the vaccines were designed to protect against was successful in eliciting movement of Ms. Harrison's attitude from her original position. In particular, she was taken aback by the disease course of Tetanus and the risk of such an infection to her daughter, who routinely plays outside. Furthermore, she seemed particularly alarmed by the pathophysiology of H. influenza B infections, infection with which could lead to epiglottitis or meningitis. These concerns overcame her initial doubts, and she agreed to begin Chloe on a modified vaccine schedule, beginning with the DTaP and HiB vaccines, which were given at the visit. In discussion afterward by the clinical care team, it was agreed that the outcome of the visit was a success, as the parent's vaccine hesitancy was reduced and the child began her DTaP series and HiB series, with, at minimum, some protection being better than no protection. The course of care for Chloe will likely continue to be complicated by vaccine hesitancy from her mother, and this will require continued intervention, negotiation, and reassurance on the part of her primary care physician.





## New Knowledge Related to Clinical Decision Science

One of the unique aspects of pediatric medicine is that frequently the individual making decisions on behalf of the patient is not the individual most affected by those decisions. Many parents operate on noble beliefs similar to those employed by the physician: they are attempting to minimize harm and maximize the vitality of those under their care. This is a point of common ground, and an excellent step off point for cooperation with a hesitant caregiver.

Many factors now contribute to vaccine hesitancy: low scientific literacy, poor access to information, inability to discern between misinformation and qualified scientific study, inability to formulate reasonable risk calculations, personal experience, misinterpretation of normal or benign side effect profiles, insular social and belief circles, and many more. These factors lead to vaccine hesitant individuals attempting to practice “a-la-carte” medicine for themselves and those within their care. These individuals frequently agree with and trust physicians and allopathic medical practitioners in the prescription of many care modalities including pharmaceuticals, therapy, psychiatric services, and surgery, but because of the information they have gathered and/or been exposed to, seek to eschew the employment of vaccines in the prevention of transmissible disease, believing that they have greater or special knowledge in this area when compared to their healthcare team. The morbidity and mortality resulting from these preventable diseases, many of which are severe and even life threatening, especially in children, is the greatest malady caused by this practice. Worse still, the resurgence of these once controlled pathogens threatens the health of those unable to mount an effective immune response even with the employment of vaccines. Thus, it is incumbent on the physician, no matter how difficult, to attempt to engage with vaccine hesitant patients, parents, and other caregivers in a manner of understanding and mutual respect to attempt to maximize care while minimizing the negative externalities associated with vaccine hesitancy. Caregivers and patients may agree to a modified, reduced, or partial vaccine schedule. In any case, some protection is better than no protection. Thoughtful, caring conversation has the potential to change minds and protect the generations of the future from unnecessary burden of disease.

Open respectful dialogue must take place between both the caregiver and the physician for effective engagement and negotiation. When either party feels coerced, unheard, or not given credence, the conversation can quickly become entrenched. To every decision, a rational person makes a series of calculations, leading to the “why” behind the actions. Inaccurate information or poor understanding can muddle this calculation leading to an incorrect conclusion, with no malice on the part of the caregiver. It is essential, therefore, to entreat with the caregiver on the mutually agreed upon objective of the best outcome for the patient, to understand their reasons for hesitancy, and seek to provide better information regarding any misgivings.

As discussed above, motivational interviewing strategies represent a widely available, tested strategy for physicians to effectively address patient resistance to vaccination. In the outpatient or inpatient clinical setting, the low barrier to implementation and use of this intervention combined with the negligible risk of damage from such patient engagement renders motivational interviewing an ideal choice for entreating with vaccine hesitant patients and their caregivers.

Although this report details the success and the low entry effort for providing motivational interviewing, there is always a difference between efficacy in clinical trials and effectiveness in clinical practice. A reasonable research question would be to measure the frequency with which motivational interviewing is used for Vaccine Hesitant parents or guardians. In the language of Quality Improvement, this would be identified as the Key Process Variable. Tapping into the professional value of benevolence, one wonders how much success would be required to affect physician behavior towards continued motivational interviewing with this population. Though the success rate for motivational interviewing may be low outside the clinical trial environment, the low likelihood of harm means that even if it works only infrequently, it is worth the effort.

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## Conflict Of Interest Statement

The author declares no conflicts of interest.



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