



Reduction in primary care attendance for pediatric patients with respiratory infections

Reducción de asistencia a atención primaria de pacientes pediátricos con infecciones respiratorias

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Abstract

Introduction: Respiratory tract infections are one of the main reasons for consultation in primary care in children.

Objective: evaluate an intervention to reduce primary care attendance for pediatric respiratory tract infections patients.

Methods: An online experimental study was conducted. A representative sample of mothers (n = 806) was assigned to receive the intervention material.

Results: The mean intention to attend score was 7.29 (SD = 2.56), with the intervention group reporting lower intentions to attend (mean = 6.45, SD = 2.57).

Conclusions: The online intervention was effective in reducing primary care attendance intentions.

Keywords: respiratory infections, children, intervention, primary care source: DeCS

DOI Number: 10.14704/nq.2022.20.13.NQ88007

NeuroQuantology 2022; 20(13): 43-50

Resumen

Introducción: Las infecciones del tracto respiratorio son uno de los principales motivos de consulta en atención primaria de los niños.

Objetivo: evaluar una intervención para reducir la asistencia a la atención primaria para pacientes con infecciones pediátricas del tracto respiratorio

Método: Se realizó un estudio experimental en línea. Se asignó una muestra representativa de madres (n = 806) para recibir el material de intervención.

Resultados: La puntuación media de intención de asistir fue de 7,29 (DE = 2,56), y el grupo de intervención informó intenciones de asistencia más bajas (media = 6,45, DE = 2,57).



Conclusiones: La intervención en línea fue efectiva para reducir las intenciones de asistencia de atención primaria.

Palabras clave: infecciones respiratorias, niños ,intervención , atención primaria
fuente: DeCS

Introduction

Respiratory Tract Infections (RTIs) are one of the main reasons for primary care consultations in children. These consultations contribute to the increased workload of primary care physicians. In addition, primary care consultations for RTIs often lead to unnecessary antibiotic prescribing, which promotes antimicrobial resistance⁽¹⁾. Providing parents with actionable information can reduce the number of unnecessary consultations by up to 40%, have a significant positive impact on resources, and promote antimicrobial stewardship⁽²⁾.

When children have an RTI, parents want to know how to manage symptoms at home and which symptoms require medical attention⁽³⁾. Consulting a child with an RTI is perceived as the safest course of action and as the socially acceptable norm if parents have any doubt about a medical threat to their child⁽⁴⁾. Qualitative research investigating the value of an intervention combining real-time community-level information on locally prevalent RTIs with information on typical symptoms and duration found that, while most parents thought such an intervention was helpful and anticipated using the information to inform diagnostic laypeople, they had mixed views on whether it would influence decisions to consult primary care physicians⁽⁵⁾.

The current research is an experimental evaluation of a new online intervention informed by previous research, following recommendations for evaluating complex digital behavior change interventions⁽⁶⁾. This study aimed to investigate the effect of the intervention on primary care attendance intentions, mediating factors, and parental perceptions of the intervention material.

Method

An online experimental study was conducted. A representative sample of mothers (n = 806) was randomly assigned to receive the intervention material before (intervention) or after (control), answering questions about intentions to attend an RTI disease scenario and mediating factors in the city of Riobamba. Both groups provided feedback on the material. In addition, group comparisons, linear regression and path analysis were performed. This study was approved by the Universidad Regional Autónoma de Los Andes (UNIANDES).

The following behavior change techniques were used in the intervention: providing information, instructions on how to perform home care behaviors, encouraging social comparison, and consulting credible sources of information.

This study was approved by the Universidad Regional Autónoma de Los Andes (UNIANDES).

The study used an experimental design that randomly assigned participants, in equal numbers, to the intervention or control group. Research participants viewed the intervention and completed the online survey. They accessed the survey remotely via a hyperlink and were automatically randomized based on computer-generated sequences. Following a scenario approach adopted by Godinho et al. and McGlone et al., 30 participants were asked to imagine their youngest child experiencing symptoms consistent with rhinovirus infection (7,8). The intervention group was presented with the intervention material in a series of static pictures before answering questions about intentions for primary care attendance and factors influencing their decision. Control participants completed the same questions before being shown the intervention material. All participants provided comments on the material, demographic information (child's age and sex; parent's age, employment, education, and ethnicity; and several children) and clinical characteristics (pediatric primary care visits in the past 12 months, child's chronic health problems) potentially associated with primary care attendance.



A sample size of 800 participants was estimated to ensure 80% power to detect a statistically significant difference at $\alpha = 0.05$, assuming a small effect size of $d = 0.2$ for the main outcome, intention to attend primary care.

The database and statistical processing of the data were performed and analyzed in the SPSS 26 statistical program (SPSS Inc., Chicago, IL, USA). Descriptive statistics were used for the results collection, presentation and interpretation. The model was evaluated using the χ statistical test², the comparative fit index (CFI) and the root mean square error of approximation (RMAE). Considering that a nonsignificant χ value², $IAC > 0.90$ and $ECMA < 0.06$ indicate a good fit, the model, as specified according to the assumed intervention behavior change pathway, was not an acceptable fit to the data ($\chi^2 = 320.396$, $df = 12$, $P < .001$; $IAC = 0.785$; $ECMA = 0.179$). Post hoc model fitting was performed by examining modification indices that pointed to possible model specification errors to identify a model that best represented the data. The model fit significantly improved its fit on both indices ($CAR = 0.99$, $ECMA = 0.02$) and resulted in a significant χ test result² ($\chi^2 = 6.445$, $df = 5$, $P = .265$).

Results

Of 2,451 respondents to the survey invitation, 806 were included in the final sample (32.9%). Excluded participants belonged to a sampling quota that was already full ($n = 911$), dropped out before randomization ($n = 341$) or were in the middle of the survey ($n = 363$), or did not meet data quality requirements ($n = 30$) according to the algorithms established to identify linear (choosing only onerresponse option for each question and completing the survey in less than half the mean completion time). Most participants (70 %) were primary caregivers and had attended primary care with their minor child at least once in the past year (76 %). A minority of participants (10 %) reported that their child had chronic health problems, most often asthma ($n = 13$), allergies ($n = 7$), or eczema ($n = 3$).

Scores on the 2-item intention-to-attend primary care scale ranged from 2 to 10 in the sample (possible range from 2 to 10). The mean intention-to-attend score was 7.29 ($SD = 2.56$), with the intervention group reporting lower intentions to attend (mean = 6.45, $SD = 2.57$) than the control group (mean = 8.12, $SD = 2.28$). The mean difference of 1.67 between the intervention and control groups represents a medium-sized effect ($d = 0.69$, 95 % CI, 0.55-0.83).

According to this analysis, participants in the intervention group had lower attendance intentions than those in the control group when adjusting for demographic and clinical characteristics associated with attendance intentions ($R^2 = 0.17$, $F_{20,785} = 8.175$, $P < .001$). The intervention effect remained significant ($f^2 = 0.08$) although small when adjusting for these characteristics, with a difference of 0.04 between the regression coefficient of the adjusted ($B = -1.66$, 95 % CI, -1.99 to -1.32) and unadjusted ($B = -1.62$, 95 % CI, -1.97 to -1.30) intervention.

The a priori hypothesis was that the effect of the intervention on primary care attendance would be indirect and completely mediated by assessed ability, opportunity, and motivational factors. This model was not an acceptable fit to the data ($\chi^2 = 320.396$, $df = 12$, $P < .001$, $CAR = 0.79$, $ECMA = 0.18$). Post hoc model fitting resulted in the fitted model ($\chi^2 = 6.445$, $df = 5$, $P = .265$, $IAC = 0.99$, $ECMA = 0.02$), which explains 56.9% of the variance in primary care attendance intentions. According to the rescaling model, most of the effect of the intervention on intentions to attend ($B = -0.33$, $SE = 0.03$, 95 % CI, -0.40 to -0.26) was still mediated by participants' abilities, motivation, and opportunities ($B = -0.231$, $SE = 0.025$, 95 % CI, -0.279 to -0.180). The intervention specifically increased knowledge about infections and antibiotics, reduced concerns about symptom severity, and countered perceptions of care as an accepted and expected social norm (Table 1). These factors were directly associated with lower intention to attend. Other direct effects



included (1) a small but significant negative effect of the intervention on intentions to attend and several resources consulted, (2) a negative effect of the sufficiency of information about care seen as a social norm, (3) a negative effect of infection and antibiotic knowledge on care seen as a social norm but with a positive effect on

some resources mentioned, and (4) a negative effect of confidence in home care capabilities on concerns. There was no direct effect of the intervention on the perceived adequacy of available information or the number or confidence in self-care capabilities.

Table 1. Start-up effects of the intervention on mediating factors and primary care attendance intentions.

Effectsoftheintervention	B (95% CI)	EE	P-value
directeffects			
Knowledge of infections and antibiotics.	0,18 (0,12 a 0,24)	0.03	.002
Concern/perceivedseriousness	-0,14 (-0,20 a - 0,08)	0.03	.002
Social norms related to primary care attendance	Social norms related to primary care attendance	-0,23 (-0,30 a - 0,17)	.002
Numberofresourcesmentioned	-0,13 (-0,19 a - 0,06)	0.03	.002
Primary care attendanceintentions	-0,09 (-0,14 a - 0,04)	0.03	.003
Indirecteffects			
Confidence in home care capabilities	0,04 (0,01 a 0,07)	0.02	.008
Concern/perceivedseriousness	-0,15 (-0,19 a - 0,11)	0.02	.002
Social norms related to primary care attendance	-0,02 (-0,04 a - 0,01)	0.01	.003
Numberofresourcesmentioned	0,03 (0,02 a 0,05)	0.01	.001b_
Primary care attendanceintentions	-0,23 (-0,28 a - 0,18)	0.03	.002

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Source: statistical analysis, $p \leq 0.05$, B = regression coefficient; SE = standard error.

Overall, participants viewed the intervention positively in their open-ended comments, highlighting its information as valuable, practical and usable, e.g., "Excellent resource for parents. Reassures people about signs and symptoms to look out for, and in an easy format to find the exact information you are looking for."

Participants positively evaluated the content and presentation of the intervention, rating the intervention materials as generally clear (median = 30, range 5 to 35, interquartile range (IQR) is 9 = 34-29), credible (median = 17, range 3 to 21, IQR is 7 = 20-13), cognitively

challenging and stimulating (median = 25, range 5 to 35, IQR is 8 = 29-21), novel (median = 12, range 3 to 21, IQR is 3 = 14-11), and emotionally exciting (median = 33, range 7 to 49, IQR is 10 = 38-28).

Discussion

The online intervention targeting parents, combining real-time information about locally circulating RTIs with symptom information and advice, was associated with lower intention to attend primary care for a child with a hypothetical RTI. The intervention's effect on intentions was mainly indirect and mediated by increased knowledge about infections and



antibiotics, reduced concerns about symptom severity, and lower perceived social pressure to attend. Intervention material was generally well received, mainly information on when to go to primary care and symptoms.

The current research was a theory-based experimental evaluation of a novel evidence-based intervention. Such initial intervention testing and agile development approaches are important when developing eHealth interventions, particularly for complex interventions that promise considerable improvements to current practice but require substantial financial investments^(9,10).

The use of intentions as a surrogate measure of behavior and a hypothetical illness scenario rather than examining responses to actual episodes of illness is a potential limitation of this study. It should be kept in mind when interpreting the findings. Evidence from a meta-analysis suggests that intentions are likely to be good predictors of non-habitual, specific, single-action behaviors, such as primary care attendance⁽¹¹⁾. However, findings in response to real-life illnesses rather than hypothetical scenarios may show different results.

The survey itself was designed to assess all hypothesized constructs affecting attendance intentions. However, readability was average, and the survey was tested prior to data collection by a parent advisory group for comprehension and burden. In addition, by limiting the current research to Ecuadorian mothers, it cannot be said whether the intervention would be as effective in reducing intentions to attend primary care among parents or in other countries⁽¹²⁾.

The intervention affected factors shown to have an important influence on parents' decisions to consult primary care for pediatric RTIs and was associated with a reduction in intentions to attend primary care. The intervention increased, for example, knowledge of infections and antibiotic use, which is important as there are still widespread misperceptions about antibiotic use⁽¹³⁾. In addition, parents who

are part of a minority or discriminated groups may feel more pressure to consult to avoid accusations of not attending when necessary and of neglect⁽¹⁴⁾.

Overall, the intervention was well received and the information provided was rated as credible, cognitively stimulating, and emotionally appealing. This is an important finding, given that e-health research has found that ease of use, comprehensibility, credibility and visual appeal are important factors in encouraging engagement with the intervention⁽¹⁵⁾.

A key finding was that participants felt that the new intervention component, which provides information on locally circulating viruses, was less important than information on symptoms and home-based care. Adding more detail on interpreting and using dynamic surveillance information might be useful, especially for consultation decision-making⁽¹⁶⁾. This study proves that interventions that include such information can change primary care attendance intentions. Ultimately, what users like and engage with is not necessarily related to the effectiveness of intervention components in changing behaviors. Individual intervention components' effects and interactions remain to be determined⁽¹⁷⁾.

The increased use of smartphones means that web-based resources are accessible to people of all socioeconomic levels and are especially suitable for interventions with dynamic elements requiring frequent updates. Paper versions of such interventions would be less practical. Even a small intervention effect on parental attendance behavior would impact if the intervention were widely implemented, as pediatric RTIs constitute a significant reason for primary care visits with children⁽¹⁸⁾. Future research should evaluate the effects of the intervention on observed behavioral outcomes in real-world settings and also examine long-term effects and cost-effectiveness⁽¹⁹⁾. Expanding the application of the intervention to other settings, target groups, and countries requires careful analysis of the specific setting, appropriate



adaptations, and further testing, as effective behavior change is highly context- and target group-specific.⁽²⁰⁾

Conclusion

The theory- and evidence-based online intervention effectively reduced primary care attendance intentions for self-limited pediatric RTIs. Information about locally circulating viruses, a novel component of the intervention, was rated as less important than information about when to go to primary care and symptoms and their management. The effectiveness of individual intervention components in changing parental behavior requires further research.

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