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Acceptability of health information technology aimed at environmental health education in a prenatal clinic

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Abstract

Objective—To describe the acceptability of an interactive computer kiosk that provides environmental health education to low-income Latina prenatal patients.

Methods—A mixed-methods approach was used to assess the acceptability of the Prenatal Environmental Health Kiosk pregnant Latina women in Salinas, CA (n=152). The kiosk is a low literacy, interactive touch-screen computer program with an audio component and includes graphics and an interactive game.

Results—The majority had never used a kiosk before. Over 90% of women reported that they learned something new while using the kiosk. Prior to using the kiosk, 22% of women reported their preference of receiving health education from a kiosk over a pamphlet or video compared with 57% after using the kiosk (p<0.01). Qualitative data revealed: 1) benefit of exposure to

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computer use; 2) reinforcing strategy of health education; and 3) popularity of the interactive game.

Conclusion—The Prenatal Environmental Health Kiosk is an innovative patient health education modality that was shown to be acceptable among a population of low-income Latino pregnant women in a prenatal care clinic.

Practice Implications—This pilot study demonstrated that a health education kiosk was an acceptable strategy for providing Latina prenatal patients with information on pertinent environmental exposures.

Keywords

Environment Health; Prenatal; Pregnancy; Information Technology

1. Introduction

Latinos are the largest and fastest growing immigrant group in the United States (US) with nearly one-quarter of all US births to Latina mothers.¹ Low-income Latinos have poor access to health services due to under-coverage of health insurance,² language and cultural barriers, and immigration status.³ State programs, such as the California Comprehensive Perinatal Services Program (CPSP) ensure that all pregnant women (including undocumented women) have access to prenatal healthcare. As a result, prenatal healthcare providers have a unique opportunity to reach low-income Latino populations during this time.⁴ In addition, pregnant women may be particularly receptive to health education to protect their unborn child.⁵⁻⁸ Thus, pregnancy offers a unique window of opportunity to positively impact the health of women, children, and their families, especially in underserved populations.

Compared to non-Latino whites, low-income Latino families are disproportionately exposed to environmental hazards that may adversely affect their health.^{9,10} Common exposures to environmental health hazards in this population include lead, pesticides, allergens, and other air pollutants.⁹ However, there are few culturally and language-appropriate programs that healthcare providers can use to educate pregnant patients about environmental health.¹¹

Kiosks are increasingly used in waiting rooms to provide easy access to health education for patients.¹² However, kiosk programs addressing environmental health have not been studied in the prenatal care setting, especially targeting low-income Latina women. To fill this gap we developed and pilot tested an interactive computer kiosk that provides health education to low-income Latino pregnant women on common environmental exposures, related health risks, and practical strategies to reduce exposures.

2. Methods

We recruited a convenience sample of 152 pregnant patients attending prenatal care at Clinica de Salud del Valle de Salinas (CSVS), a Federally Qualified Health Center serving primarily low-income Latino farm working residents in the Salinas Valley, an agricultural area in Monterey County, CA.

We worked with a commercial kiosk developer (Winstanley and Associates) to design a program for pregnant women to use during routine prenatal healthcare visits. The educational content of the kiosk was based on relevant literature^{9,10,13-15} and research findings from the Center for Health Assessment of Mothers and Children of Salinas (CHAMACOS), a birth cohort study examining the influence of environmental chemicals on pregnancy outcomes, children's neurodevelopment, respiratory disease, and children's growth.¹⁶⁻¹⁸

The kiosk employs a touch-screen and includes text, graphics, and an interactive game. Audio of all written information plays by default (participants can turn it off) to ensure accessibility to low-literacy users. The kiosk is comprised of approximately 60 screens about environmental health organized in four chapters addressing food, home, outdoor, and work environments (Table 1). For each topic, the kiosk answered four questions: 1) What is it? 2) Why is it harmful? 3) How can you and your family be exposed? 4) What practical steps can you take to protect yourself and your family from being exposed? In addition, a game based on the popular Mexican bingo game, known as *Loteria*, was included. Similar to the traditional game, a rhyme is read and the kiosk user selects the corresponding image. For example, the idea that fruits and vegetables should be washed, was formulated into a riddle: “*hay que lavarlos bien si fueron traídos del campo o comprados en el supermercado*” (if they were brought from the fields or bought in the store, you should wash them well). To succeed, the participant had to pair the clue with the correct image, in this case “*las frutas y verduras*” (fruits and vegetables).

The Institutional Review Board at UC Berkeley approved all procedures and written informed consent was obtained from all participants. Women were eligible to participate if they were pregnant, Spanish-speaking, and receiving prenatal services from CSVS. Between April and June 2007, women were invited to use the kiosk in a health education room at CSVS during a routine prenatal care visit; family members including children were welcomed, however, data were collected only from the woman. Prior to using the program, participants completed a questionnaire embedded in the kiosk that collected information about familiarity with technology and knowledge about environmental health. To assess knowledge, women were presented with four case studies also embedded in the kiosk (Table 2). For each case study, three of the four solutions were appropriate. Women were then asked to visit all of the kiosk screens and were given as much time as needed. After interacting with the kiosk, women repeated the knowledge questions and answered additional questions on acceptability. The pre-and post-test did not indicate the correct choices. In addition, spontaneous comments about the experience and answers to open-ended questions assessing acceptability were recorded by a staff member after the women completed her visit. Participants received a \$10 gift card for completing the visit.

Data were analyzed using Stata 10.0. We first computed descriptive statistics and summarized participant demographics. For knowledge questions, we tested whether participants' scores significantly improved from the pre-test to post-test using the Wilcoxon signed rank sum test. Spontaneous comments and answers to open-ended questions were coded and themes were identified.

All women were pregnant and Spanish-speaking (n=152). The majority of the women had never used a kiosk before (Table 3), however, only 8% required help. Over 90% of women reported that they learned something new while using the kiosk. The majority (63%) reported that they liked listening to the voice while a slightly higher percentage (68%) liked reading the information on the screen. Prior to using the kiosk, 22% of women reported that they would prefer to get their health education from a kiosk over a pamphlet or video compared with 57% after using the kiosk ($p<0.01$).

The majority of women chose at least one correct solution to the case studies presented to them prior to and after using the kiosk (Table 2). For case studies 1, 2, and 3, women chose significantly more correct answers on the post-test compared to the pre-test ($p<0.05$).

Three main themes that emerged from the qualitative data included:

1. *Benefit of exposure to computer use:* Many women reported that they had never used a computer before, and because of their experience with the kiosk, they were inspired to look for new opportunities to use a computer. For example, one woman stated, “We have a computer at home; I am going to ask my daughter to show me how to use it.”
2. *Reinforcing strategy of health education:* While the case studies demonstrated that the majority of women had some familiarity with environmental health prior to using the kiosk, the qualitative data indicated that the kiosk reinforced this education. For example, one participant commented, “This program is very interesting. It reminded me of things that I already knew, but now I am going to do them.”
3. *Popularity of the Loteria game and its effect on involving family members:* Almost all participants reported that they enjoyed playing the game and that it was a great way to involve their partners and children.

Negative comments about the kiosk were scarce and primarily referred to the time it took to visit all screens.

4. Discussion and Conclusion

4.1. Discussion

The Prenatal Environmental Health Kiosk is an innovative patient health education modality that was positively received among a population of low-income Latina pregnant women. Innovative aspects included the topic of environmental health and the target population of low-income Latina women. We found that women liked using the kiosk and that they felt they learned something new about environmental health. The *Loteria* incorporated into the kiosk was one of the most popular aspects of the program. The negative comments regarding time were likely due to the protocol that encouraged women to visit all screens. In clinical practice, women could spend however much time they want.

Pregnancy is an ideal time to discuss environmental health because expectant mothers may be especially receptive to education and willing to change behavior to reduce exposures to

their fetus and children.⁵⁻⁸ Furthermore, providing opportunities for health education in waiting rooms capitalizes on the fact that women attend prenatal care multiple times throughout pregnancy and often spend long periods in the waiting room. The American College of Obstetricians and Gynecologists (ACOG) recommends providing anticipatory guidance regarding environmental exposures to pregnant women, however providers often do not receive training in environmental health.¹⁹

4.2. Conclusion

Our pilot study demonstrates that waiting room kiosks are a feasible strategy to provide inexpensive environmental health education to pregnant women. Since pilot testing, the content of the kiosk has been expanded to include additional chemical exposures including phthalates, Bisphenol-A, and Polybrominated Biphenyl Ethers (PBDE) and is also available in English (Spanish at www.cerch.org/kiosco and in English at www.cerch.org/kiosk) with accompanying educational brochures. Next steps include a randomized controlled trial comparing the kiosk program to face-to-face health education as well as exploring making the program available on mobile platforms.

4.3 Practice implications

Because prenatal care providers lack time and training to address the potential risks of environmental exposures, a health education kiosk offers an acceptable and feasible alternative to provide Latina prenatal patients with information on exposures, health risks and on ways to reduce adverse exposure. With the content available online for free, prenatal care providers can offer this information to their patients at relatively low cost. Nonetheless, prenatal care providers will need training in relevant environmental health topics to answer questions that may arise with increasing patient awareness.

“I confirm all patient/personal identifiers have been removed or disguised so the patient/person(s) described are not identifiable and cannot be identified through the details of the story.”

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Table 1

Chapters and topics in the Prenatal Environmental Health Education Kiosk.

Chapter	Topics
<i>In Your Food</i>	<ul style="list-style-type: none"> • pesticides in fruits and vegetables • lead poisoning through foods and pottery • mercury exposure through seafood consumption
<i>At Home</i>	<ul style="list-style-type: none"> • toxic household products • environmental tobacco smoke • lead exposure • common allergens (e.g., mold, pets, dust mites, etc.) • indoor air pollution • childproofing the home
<i>Outside</i>	<ul style="list-style-type: none"> • outdoor air pollution • recycling • allergens • pesticides • sun exposure
<i>At work</i>	<ul style="list-style-type: none"> • repetitive stress • stress at work • chemicals at work • biohazards & universal precautions • workers' rights

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Pre- and post-questionnaire results from the Prenatal Environmental Health Kiosk. Salinas, CA n=152

Table 2

Case study	Pre-test			Post-test			p-value*
	1 correct n (%)	2 correct n (%)	1 correct n (%)	2 correct n (%)	1 correct n (%)	2 correct n (%)	
1. Lupe's kitchen is full of cockroaches, what would recommend that she could do?	124 (86)	4 (3)	123 (85)	12 (8)			0.01
2. Ana's son has asthma, what you would recommend that Ana could do in her house to decrease her son's symptoms?	132 (90)	10 (7)	126 (89)	14 (10)			0.01
Maria is worried about her and her children's lead levels, what should she avoid to prevent exposure to lead?	130 (88)	7 (4)	124 (86)	14 (10)			0.02
4. Juan works in the fields. When Juan arrives home, what should he do so that he does not bring pesticides home?	135 (91)	13 (9)	130 (90)	15 (10)			0.16

* p-value from Wilcoxon signed rank sum test

Table 3

Measures of acceptability of the Prenatal Environmental Health Kiosk.

Measure	* n	(%)
First time using a kiosk	145	(98)
Liked using the touch screen	129	(90)
Liked listening to the voice	88	(63)
Liked reading the information	94	(68)
Finds words difficult to understand	29	(20)
Had sufficient privacy	132	(94)
Needed help using the kiosk	11	(8)
Learned something new	132	(93)
Liked the graphics	122	(85)

*
n=152

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