HEALTH INFORMATION TECHNOLOGY: CAREGIVERS' CHARACTERISTICS AFFECTING USE AND PREFERENCES

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ABSTRACT

Maggie W. Fetner: Health Information Technology: Caregivers' Characteristics Affecting Use and Preferences
(Under the direction of Jessica Y. Lee)

BACKGROUND: Social media and information technology offer a potential avenue to communicate positive messages regarding young children's health, but little is known about caregivers' information-seeking behaviors and preferences.

METHODS: Caregivers of healthy children ages 6 and younger in a community clinic completed an in-person, verbally-administered interview that assessed information-seeking behaviors and preferences, health literacy, and other domains. Differences in preferred methods of receiving child dental health-related information were examined according to caregivers' characteristics by comparing methods' rank of preference.

RESULTS: Caregivers (mean age=28.5 years) reported a high level of access to electronic communications including computer access (93%), cell phones (91%), email (91%), and Facebook (75%). When asked to rank their preferred method for receiving child dental health-related information, 31% preferred email, 24% phone, 21% US mail, and 21% text-messages.

CONCLUSIONS: It is important to consider caregiver characteristics and caregiver's preference for both information-seeking and receiving when delivering child health information.

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Introduction

Messages tailored to the characteristics of one's audience are more effective at changing health behavior than generic messages.[1] In an environment of cellular phones and rapid, instant communication, it is important to tailor communication mode in addition to content. [2] Without attention to mode, we risk that a message will be missed, deleted, or skipped for another that more effectively captures the attention of the receiver. As pediatric health care providers, it is important to understand the communication preferences, health literacy levels, and other characteristics of caregivers of young children in order to better design preventive health messages and improve adoption of positive health behaviors. Due to widespread use of the internet, text messaging, social networking, and other information technologies, there are potential opportunities for conveying health information to caregivers of young children in innovative ways.

The internet and mobile technology have revolutionized methods of communication and created new modes for message delivery. In 1995, only 10% of US adults had internet access, but currently this figure is 85% for adults and 95% for teenagers.[3,4] Because of ongoing and rapidly evolving trends in electronic communication, most Americans today rely upon the internet for information about many aspects of life, including health care. As one example, approximately 60% of American adults obtain health information online.[5] Similarly, social networking is a concept that has followed the emergence of wide-spread internet access. Roughly three quarters of online American adults use a social networking site, mainly Facebook. [6] The primary clients of these sites

are women aged 18-29, a significant finding because it is this demographic group that includes a significant number of those who care for young children.[7]

The increased use of text messaging is another recent change in the communication culture of people in the United States. Recent surveys show that 31% of cell phone users prefer a text, *versus* a phone call.[8] Young adults are the primary demographic group currently utilizing text messaging; indeed, 97% of cell phone owners aged 18-24 use texting and rely heavily upon this technology.[8] In further describing the demography of text message use, non-whites, particularly African Americans, use texting more often than whites, as do those with lower levels of income and education.[8] DeMartini and colleagues recently discovered that a majority of caregivers of young children in an urban pediatric primary care setting used home internet, email, Facebook, and smartphones. Accordingly, over 70% were open to receiving digital health care information.[9]

Understanding communication behaviors and preferences of child caregivers will enable dentists and pediatricians to create more effective outreach with public health messages. We sought to understand access to digital technologies and caregiver characteristics, such as age and health literacy, affecting health information-seeking behaviors and preferences.

Methods

We used an IRB-approved, cross-sectional study design to examine the primary caregivers' health information-seeking behaviors and preferences, as well as their association with caregivers' characteristics, such as health literacy and age. We recruited 149 caregiver/child dyads that presented to WIC Clinic and enrolled them using a consecutive convenience sample. We defined primary caregiver as the adult responsible for coordinating the child's oral health. When multiple individuals accompanied the child for the visit, we identified the individual who considered himself or herself the child's primary caregiver for oral health-related matters.

Eligible caregivers had to speak English because the instrument used to measure health literacy at the time of the study had been validated in English only. Eligible children were healthy (American Society of Anesthesiologists Physical Status Classification I or II) and ages 2-6. Trained interviewers invited caregivers to participate. After providing written informed consent, eligible caregivers were asked to complete in-person verbally-administered surveys by the study interviewers in a quiet waiting room or private setting. If the caregiver experienced any difficulty reading the consent or HIPAA forms, the interviewer read them aloud. Each interview took approximately 20 minutes.

Information-seeking preferences and behaviors were examined using a survey instrument covering 12 domains. Health Information Technology (HIT) use was captured by asking caregivers to rank various methods of communication, including phone, email, Facebook, Twitter, and U.S. Mail, depending on their desire to receive information related to their child's oral health via each

method. Among other HIT questions, caregivers were also questioned about the nature of their social media use by asking, "How often do you read others' posts on Facebook?" and "How often do you write (post) on Facebook?" Each caregiver also completed surveys that included questions to assess caregivers' oral health knowledge (6 items, 1-5 scale), children's oral health behaviors (7 items), reported oral health status of the child (one item taken from the National Health and Nutrition Examination Survey[10]), and socio-demographic characteristics (age, education, race, and marital status). The survey questions have been derived from previously developed and tested questionnaires used in pediatric oral health research.[10-12]

We measured caregiver health literacy using the Rapid Estimate of Adult Literacy in Dentistry (REALD-30).[13] This previously validated instrument includes 30 words arranged in order of increasing difficulty. Using REALD-30, the words were read aloud by the caregiver to the interviewers. Because REALD-30 is a word recognition test, subjects were asked not to try and pronounce unknown words but rather skip the words they did not know. For REALD-30 scoring, one point is given for each word pronounced correctly and summed to get an overall score; thus REALD-30's range is 0 (lowest literacy) to 30 (highest literacy). In previous studies, it has been noted that a REALD score of 13 or above delineates adequate literacy level.[14, 15] After the completion of the interview, an incentive ($10 gift card) was given to the caregiver.

Descriptive methods were used to report percentages and frequency distributions of socio-demographic characteristics, sources of oral health information, and preferences. To examine the association between caregivers' health literacy and age with their preferred methods of receiving child dental health-related information, we examined ranks and differences in rank order of these methods between corresponding caregiver strata, specifically low (REALD-30 score <13) vs. adequate (REALD-30 score ≥13) health literacy and younger (under 27 years, the median) vs.

older (27 years or older) participants. We additionally explored the variation in preferences by children's reported oral health status contrasting better (excellent or very good) vs. worse (good/fair/poor) oral health. Data analyses were conducted using the STATA 13.1 statistical software (STATA Corporation LP, College Station, Texas).

Results

Our sample included 74 female and 75 male children. African American was the predominant racial/ethnic group (n=93, 62%), followed by Whites (n=21, 14%) and Hispanics (n=11, 7%). The majority (84%) of the children were covered by Medicaid insurance. Approximately half (52%) of the caregivers had a high school education or less, and the majority (70%) was single or never married. Virtually all (n=142/149) of the caregivers were mothers. Other caregiver types included father and grandmother (Table 1).

Over 90% of the caregivers reported having computer access (93%), owned a cell phone (91%) and had an email account (91%). Notably, 80% had a Facebook account and 75% used texting daily (Tables 2, 3).

We assessed caregiver preference for receipt of dental health information for their child by asking caregivers to rank all the methods of communication in the order of preference, with "1" being the method most preferred. 31% of caregivers ranked email first, followed by 24% who chose phone, 21% who chose US mail, and 21% who chose text message. Those who preferred receiving dental health information through Facebook, Twitter, or blog post made up less than 5% of the sample (Table 4).

We examined caregivers' preferred means of communication stratified by their literacy level (adequate or not). This analysis showed that caregivers with adequate literacy levels preferred email, whereas those with low literacy most often preferred phone calls or text messages (Table

4). A similar pattern emerged for caregivers' age, with older participants preferring email vs. younger participants who preferred phone, as well as children's reported oral health, with caregivers' of children with better oral health preferring email vs. those of children with worse oral health preferring phone.

The survey instrument assessed how frequently caregivers used the Internet to search for general health and dental health information. The majority (83%) of the caregivers use the Internet to search for general health information, but just over half (54%) reported searching for dental health information online. Caregivers who reported using the internet to search for dental health information almost always also sought general health information online. However, 6 caregivers reported only searching for online dental health information and not general health information. Similarly, of those caregivers who owned computers (n=110), a great majority (n=101) also reported cell phone ownership.

Discussion

Our findings indicate that caregivers who were younger and had low literacy were most likely to choose receiving a phone call, which we considered a more traditional option, as their preferred method of communication. This contrasted findings among older and higher literacy caregivers, who most frequently chose email as their preferred means of communication. Interestingly, although many caregivers reported using the popular social networking site, Facebook, few noted that they would like to use the site as a vehicle for oral health information. Overall, this population of low-income caregivers of young children had a high level of oral health knowledge and many of the caregivers reported regular use of technology; most of the sample reported having computer access, owning a cell phone, and/or having an email account.

This information is useful for all health care providers, as they seek to communicate with patients in the most effective manner possible. It is especially important to communicate successfully with high-risk groups, such as the one studied here. When opportunities for delivery of positive health messages are rare, one must capitalize on chances to share information with an attentive patient. As we better understand patient and caregiver preferences for receiving information, we can work to design general and oral health interventions that are tailored to their literacy level and current communication habits.

As Americans develop more and more virtual connections, they are also finding other ways to integrate technology and electronic media into their everyday lifestyles and evidence is emerging that the medical profession has embraced this trend. For example, several recent studies

describe using texting to remind patients of appointments or educate them about medical topics of interest.[16,17] Medical electronic devices are relied upon for tracking daily personal health information, such as blood sugar levels for diabetics.[18] Finally, an abundance of websites[19,20] are available to search for health information. Collectively, this technological platform use is a part of the HIT umbrella.

A 2010 systematic review examined how current HIT interventions are affecting the care of low-income children, concluding that despite great improvements in HIT in recent years, some low-income groups have been negatively affected because of barriers to accessing HIT.[21] Provider-patient communication is challenged in low-income populations by frequent language barriers, differences in cultural beliefs, differing understanding of illness, differing education levels of provider and patient, and low health literacy.[21]

Successful pediatric HIT interventions have been described, including a web-based asthma video game that reduced hospitalizations, and an interactive website for families and physicians to help families understand results and prognosis after their child's admission to a pediatric intensive care unit.[22,23] Office-based kiosks offer promise in educating children and parents interactively.[21] Also promising are television and mobile phones, which are often more accessible than traditional communication methods to low-income children, adolescents, and their families.[21]

Although still a rather new concept, there have been several reports related to dental health information-seeking behaviors. In one study[24], focus groups of low-income mothers suggested that distributing oral health information using sources like email, text messaging, and Facebook could be effective to reach pregnant women, mothers, and their children. These parents reported that most of their oral health information came not from printed materials, but from internet searches,

advice from family and friends, and participation in social and health programs. Nelson[25] compared voicemails *versus* texting for appointment reminders, finding that voicemails were more effective at increasing appointment attendance; however, this study was reported in 2011 and may be behind the curve for today's caregivers. At the same time, the caregivers in the Nelson study did not choose the type of reminder they preferred, a factor that may have affected the study outcome.[25] Sharma[26] compared text messaging with printed brochures among 143 caregivers, finding that texting was more effective in improving oral health knowledge, education, and self-reported practices among the caregivers. Plaque scores were reduced by both interventions, but there was not a significant difference between the printed brochure and the text message groups.

Caregivers' adoption of positive oral health behaviors is critical to improving their children's oral health status. Although there is evidence that oral health education can be effective in reducing dental disease in young children, these studies were completed in controlled environments and were time-intensive for both families and providers. The considerable time commitment required with traditional educational methods of sharing information and communicating with caregivers may be impractical for daily provider-patient interactions.

Until now, studies have investigated practitioners' use of technology but few have investigated patient preferences for receipt of oral health information. This report describes the preferences of caregivers of young children regarding the receipt of information related their child's oral health. We were surprised that even with the accelerated development of mobile technologies and the recent advent of social media, many caregivers still preferred traditional methods of communication, such as a phone call or a mailed letter. A similar finding was noted by Stephens et al., who studied a group of adolescent orthodontic patients, finding that participants preferred verbal information to audiovisual, written, and internet sources, despite their high

reported use of the internet for social networking.[27] Perhaps healthcare providers and educators can better serve their patient audiences by asking how they would like to receive information. Hopefully, this tailored approach to information delivery would in turn be more effective in changing health outcomes.

The major limitation of this study is our reliance on a sample of predominantly female, low-income, English-speaking caregivers, who were clients of one NC-WIC Clinic. To address the issue of limited generalizability of our findings, future studies could assess communication preferences of Spanish-speaking caregivers of young children, and consider multiple data collection sites. Future studies could be designed to track communication preferences over time to follow-up study participants over time longitudinally. Despite these limitations, our study was enhanced through face-to-face interviews with caregivers, a design feature that is essential in studying a low literacy population.

Conclusion

Low income caregivers are frequent users of information technology, including email, cell phones, and text messaging; therefore, these communicative-concepts offer potential for the provision of dental health information about children. When conceptualizing and developing methods of communication related to children's oral health, it is important to consider caregiver characteristics, including age, health literacy level and the individual caregiver's preference for both information-seeking and receiving.

TABLE 1 Sociodemographic Characteristics of the Study Participants (n = 149)

Respondents' characteristics		*n*	%
	Entire sample	149	100
Primary caretaker of the child			
	Yes	141	95
	No	8	5
Relationship to child			
	Mother	142	95
	Other	7	5
Age (years)			
	<25.0	51	34
	25.0-29.9	46	31
	>30.0	52	35
Mean (sd); range		28.6 (6.5)	18-63
Education			
	Some high school or less	31	21
	High school Graduate	46	31
	Some college or more	72	48
Household income			
	< $10,000	66	44
	$10,000-29,9999	55	37
	≥ $30,000	28	19
Marital status			
	Currently married	45	30
	Never married/divorced/other	104	70
Number of children in household			
	1	34	23
	2	52	35
	3 or more	63	42
Health literacy			
	Adequate (REALD-30 score ≥13)	124	83
	Low (REALD-30 score <13)	25	17
Children's characteristics			
Age			
	2 years or younger	65	44
	3 years old	38	25
	4 years or older	46	31
Race/ethnicity			
	African American	93	62
	Non-Hispanic white	21	14
	Hispanic/Latino		
	Other*	35	23
Covered by insurance			
	Yes	137	92
	No	12	8
Type of insurance			
	None	12	8
	Medicaid	125	84
	Health Choice	8	5
	Private	4	3

*included

TABLE 2 Caregiver Access to Electronic Media

		n	%
Computer access			
	Yes	138	93
	No	11	7
Computer access at home			
	Yes	108	72
	No	41	28
Computer access at work			
	Yes	20	13
	No	129	87
Computer access at library			
	Yes	29	19
	No	120	81
Computer access at a relative's or friend's home			
	Yes	21	14
	No	128	86
Computer ownership			
	Yes	110	74
	No	39	26
Type of computer (among owners)			
	Desktop	32	29
	Laptop	57	52
	Both	21	19
Cell phone ownership			
	Yes	136	91
	No	13	9
Smart phone ownership			
	Yes	105	71
	No	43	29

TABLE 3 Caregivers' Reported Use of Online Resources

		n	%*
Use Internet to Obtain *General* Information			
	Yes	142	95
	No	7	5
Use Internet to Obtain *General Health* Information			
	Yes	123	83
	No	26	17
Use Internet to Obtain *Dental Health* Information			
	Yes	81	54.4
	No	68	46.0
Email Account			
	Yes	135	91
	No	14	9
Facebook Account			
	Yes	118	80
	No	30	20
Twitter Account			
	Yes	25	17
	No	124	83

*Calculated among non-missing responses

TABLE 4 Preferred Methods of Receiving Child-related Dental Health Information and Corresponding Health Literacy (REALD-30) Estimates among the Study Participants (n = 149), Overall and Stratified by Health Literacy, Age, and Children's Reported Oral Health Status.

	n*	%	rank	Δ_{rank}†
Entire sample				
Email	46	31	1	*referent*
Phone	36	24	2	*referent*
U.S. Mail	32	21	3.5	*referent*
Text Message	31	21	3.5	*referent*
Facebook	7	5	5	*referent*
Twitter	1	1	6	*referent*
Health literacy: adequate				
Email	42	33	1	0
Phone	26	20	3.5	**-1.5**
U.S. Mail	28	22	2	**+1.5**
Text Message	25	20	3.5	0
Facebook	5	4	5	0
Twitter	1	1	6	0
Health literacy: low				
Email	4	15	3.5	**-2.5**
Phone	10	38	1	+1
U.S. Mail	4	15	3.5	0
Text Message	6	23	2	**+1.5**
Facebook	2	8	5	0
Twitter	0	0	6	0
Age: Under 27 years old				
Email	14	19	4	**-3**
Phone	19	26	1	+1
U.S. Mail	15	21	3	+0.5
Text Message	18	25	2	**+1.5**
Facebook	5	7	5	0
Twitter	1	1	6	0
Age: 27 years or older				
Email	32	40	1	0
Phone	17	21	2.5	**-0.5**
U.S. Mail	17	21	2.5	**+1**
Text Message	13	16	4	**-0.5**
Facebook	2	2	5	0
Twitter	0	0	6	0
Child dental health: excellent/very good				
Email	36	33	1	0
Phone	21	19	4	**-2**
U.S. Mail	24	22	3	+0.5
Text Message	24	22	2	**+1.5**
Facebook	5	5	5	0
Twitter	0	0	6	0
Child dental health: good/fair/poor				
Email	10	23	2	**-1**
Phone	15	35	1	**+1**
U.S. Mail	8	19	3	+0.5
Text Message	7	16	4	-0.5
Facebook	2	5	5	0
Twitter	1	2	6	0

*Participants could select more than option as a preferred method; †corresponds to the difference in mean 'preference' rank of each communication method between the entire sample and sub-strata. Biggest changes in rank in each stratum are bold highlighted.

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