



Artificial intelligence and immediacy: Designing health communication to personally engage consumers and providers

Gary L. Kreps^{a,*}, Linda Neuhauser^b

^a George Mason University, Fairfax, VA, USA

^b University of California, Berkeley, Berkeley, CA, USA

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ABSTRACT

Objective: We describe how ehealth communication programs can be improved by using artificial intelligence (AI) to increase immediacy.

Methods: We analyzed major deficiencies in ehealth communication programs, illustrating how programs often fail to fully engage audiences and can even have negative consequences by undermining the effective delivery of information intended to guide health decision-making and influence adoption of health-promoting behaviors. We examined the use of AI in ehealth practices to promote immediacy and provided examples from the ChronologyMD project.

Results: Strategic use of AI is shown to help enhance immediacy in ehealth programs by making health communication more engaging, relevant, exciting, and actionable.

Conclusion: AI can enhance the “immediacy” of ehealth by humanizing health promotion efforts, promoting physical and emotional closeness, increasing authenticity and enthusiasm in health promotion efforts, supporting personal involvement in communication interactions, increasing exposure to relevant messages, reducing demands on healthcare staff, improving program efficiency, and minimizing costs.

Practice implications: User-centered AI approaches, such as the use of personally involving verbal and nonverbal cues, natural language translation, virtual coaches, and comfortable human–computer interfaces can promote active information processing and adoption of new ideas. Immediacy can improve information access, trust, sharing, motivation, and behavior changes.

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1. Introduction

Communication is central to the delivery of health care and promotion of well-being. Yet, to be effective, health communication efforts have to actively capture the attention and personally engage health care participants to influence health decisions and behaviors. This is not easy to accomplish, and frankly many health communication efforts fail to accomplish their goals because they are not designed to be sufficiently involving and engaging. Decades of research show that many health communication efforts have failed because the approaches used have been overly generic, impersonal, confusing, and boring [1–5]. Health communication efforts may even have unintended negative (“boomerang”) consequences when audience members do not respond to messages as intended, often because they find the messages

to be alienating, insensitive or intimidating [6]. For example, the National Youth Anti-drug Media Campaign was designed to discourage drug abuse by emphasizing harmful effects of illegal drugs on the brain, but was perceived by at-risk youth as daring them to experiment with using illegal drugs [7]. Problematic health communication programs, like this one, fail to effectively deliver relevant health information as intended to guide informed health decisions, and do not achieve intended goals for promoting the adoption of healthy behaviors.

Fortunately, the use of artificial intelligence (AI) in e-health communication offers exceptional opportunities to increase the effectiveness of health promotion programs by enhancing immediacy and making ehealth communication engaging, relevant, involving, exciting, and actionable. Immediacy is a set of communication features that promote physical and emotional closeness, engaging and caring relationships, as well as authenticity and enthusiasm [2]. AI, which has become central to designing many ehealth programs, has been described as the science and engineering of intelligent machines [8]. AI helps to incorporate human intelligence capacities in computing, enabling the development of sophisticated ehealth communication

* Corresponding author at: George Mason University, Department of Communication, 4400 University Drive, MS 3D6, Fairfax, VA 22030, USA.
Tel.: +1 703 993 1094; fax: +1 703 993 1096.

E-mail address: gkreps@gmu.edu (G.L. Kreps).

features, including intuitive human–computer interfaces, congruent interaction responses, customized reminders to meet specific user needs, responsive monitors that record and adapt to users' experiences and physical/psychological states (such as movement, respiration, heartbeat, and brain waves), and engaging relational agents that can interact meaningfully with consumers as advisers, educators, and even therapists. In essence, AI can be used to make ehealth applications more human, adaptive, interactive, emotionally expressive, and can dramatically enhance immediacy.

Health communication is central to health promotion and is pervasive in most, if not all, health situations and contexts (such as hospital emergency rooms, surgical suites, medical offices, workplaces, schools, and homes) [9,10]. Designers of health communication programs must leverage the unique uses of various channels of communication with particular regard for access, preference, and utilization by key audiences in different health contexts. They must recognize that health communication situations are often fast-paced, highly charged, intense, and emotional due to many uncertainties about health risks and intervention strategies. They must design health communication program to meet the urgent needs of consumers (e.g., patients, caregivers, survivors, support group members) and providers (e.g., physicians, nurses, therapists, pharmacists, nutritionists, social workers, health educators) for relevant health information to guide complex, time-sensitive, and challenging health decisions for reducing health risks, selecting treatment options, and adopting sometimes difficult healthy lifestyle choices. However, effective health communication is not easy to accomplish. The quality of health communication programs is crucial to achieving desired health outcomes [11–13].

Health information technologies (ehealth programs) are being increasingly used to support the communication demands of health care delivery and health promotion, helping both to provide consumers with relevant health information and gather information from consumers. Yet, the quality of communication with these technologies is crucial for providing consumers and providers with the accurate, timely, sensitive, and adaptive health information they need. If there is a breakdown in the ways health risks, treatment regimens, and recommended health behaviors are communicated, there will be problems with encouraging consumers to accept and incorporate health recommendations (such as following therapeutic procedures, taking prescribed medications, and adopting health promotion strategies) [14]. It is not easy to explain complex health information to lay audiences, and even more difficult to motivate consumers to faithfully follow health recommendations. It is also a challenge to elicit interprofessional cooperation between health team members to deliver coordinated care. There are many instances in the delivery of care when communication is not ideal, providers and consumers do not have access to or understanding of the best information for guiding health decisions, leading to breakdowns in the health care/promotion process [15–17]. Smart, adaptive, interactive, and immediate ehealth programs can help supplement and enhance health information sharing to achieve health goals [4].

Patients are often intimidated by the health care system, have difficulties expressing their health concerns, and feel challenged to participate fully in directing their own health care [15–19]. It is critically important to equalize the communication dynamics between consumers and providers in the delivery of care and promotion of health to encourage active exchange of information and cooperation to accomplish complex health goals. Ehealth programs are often advantageous channels to communicate with consumers, since they are often easily available wherever and whenever consumers may need to interact, are perceived by consumers as being more private and less judgmental than interacting directly with health care providers, can reduce

relational power discrepancies encouraging information sharing and participation, and have infinite patience for listening, recording, and repeating/explaining information when necessary [3,20]. Care must be taken in health promotion efforts to craft messages that are appropriate and compelling to target audiences, deliver these messages through the most effective communication channels, and reinforce adoption of healthy behaviors over time. We will describe the design and evaluation of two mobile ehealth applications – the ChronologyMD system – that enhances the immediacy of health communication by using AI to provide consumers confronting Crohn's disease with personal, engaging, and dynamic narrative-based health information to help them monitor their conditions and direct their care.

2. Problems with the quality of current health communication practices

Close attention needs to be paid to the quality of communication in the delivery of care and promotion of health. Health care and promotion efforts typically focus on health care procedures and technologies, and not on the communication of health information. This often results in poor quality health communication that inhibits, rather than facilitates, achievement of desired health outcomes. Several qualitative factors in the delivery of health care and promotion of health need greater attention. How engaging are health communication efforts? Do health communication efforts capture audience attention (exposure)? Do they communicate clearly (taking into account individual audience differences and levels of health literacy)? Do they communicate humanely (sensitivity)? Do they communicate persuasively? Do they adapt well to unique individuals? Do they promote immediacy (relational closeness and dynamism)? Unfortunately, the answers to these questions about the quality of health communication processes are often very disappointing.

Too often, health communication efforts are boring, unimaginative, and intimidating. Health care providers and educators often appear emotionally unattached to consumers. There is a mind-numbing amount of repetition, regulation, and bureaucracy within modern health systems. Health care personnel often have limited time to treat many different patients, which makes them rush and appear to be superficial when communicating with patients. Health promotion efforts often focus more on presenting scientific facts and directives than on connecting the information in personally engaging ways to consumers.

There is common overuse of technical medical jargon that is difficult for laypeople to understand. This can alienate consumers, creating psychological distance between health care professionals and the consumers they serve. Jargon is often overused in delivering information about health risks, diagnoses, intervention options, and health promotion recommendations. The overuse of jargon is also widespread in written health information on websites, pamphlets, handouts, and medication package inserts. The overuse of jargon leads to patient confusion and disengagement that impedes health education and informed consent for care. Medical jargon can make the entire health care system appear overly complex, bureaucratic and constraining, rather than facilitating, health promotion efforts [19]. Reductions in jargon use can help increase immediacy for consumers by enhancing understanding and personal involvement.

Sometimes, the messages sent to consumers can be disempowering, suggesting that consumers are to blame for their health problems. These messages alienate consumers and make them feel badly about themselves. The ways that questions are asked of consumers about their health behaviors and health histories can be intimidating and insulting. (Are you still smoking? How much exercise do you get? How often do you bathe? How much alcohol

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