Delivering Structured, Multi-modal Clinical Guidelines via Cell Phones

Jose F. Florez-Arango
M. Sriram Iyengar

jose.f.florez.arango@uth.tmc.edu

Abstract

The University of Texas
Health Science Center at Houston

- Cellular (mobile) telephones are powerful computing and communications devices potentially useful for Telehealth
- Cell phones are cheap and ubiquitous world wide, including in developing countries
- GuideView is a technology designed to deliver structured, interactive multi-modal clinical guidelines to assist non-physician care providers (NPCPs)
- Cellphone-GuideView (C-GV) is an implementation of GuideView on mobile phones
- Cellphone-GuideView supports a model of telehealth in which synchronous assistance of experts is requested only when needed, thus decreasing costs and enhancing productivity.

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Introduction

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- In many areas of the word health care is typically provided by non physician care providers (NPCPs)[1]
  - Includes developing countries such as India, Colombia
  - Also remote and rural areas of developed countries
- These individuals often end up providing non-standard care due to uneven quality of training
- Clinical guidelines, if adhered to strictly, can alleviate this problem and improve quality of care
- However, clinical guidelines are complex and many NPCPs find them difficult to understand and implement

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- GuideView was designed to overcome these issues and enforce standardization of care.
- GuideView has two main components:
  - GuideView Author
  - GuideView Viewer
- GuideView system enforces clear separation between presentation and content. A benefit of this approach is that content can be integrated in multiple languages.
- GuideView delivers the presents guidelines in a rich and easy-to-use multi-modal format that includes voiced instructions, text, images, video and animations simultaneously. [2,3]

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Mobile Phones Worldwide

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- Worldwide adoption of cellular phones is without precedent in the history of technology.
- In Western Europe there are 380 million.[4]
- Cellular phone usage in developing countries in Latin America, Asia, and Africa is growing around 17% per year. [5]
- Media reports have documented the innovative ways in which rural and economically disadvantaged populations utilize cellular phones to improve their daily lives.[6]
- It has been observed that digital media tends to benefit already privileged users, but that cell phones can help to close the gap.[7]
- The mobile phone is rapidly becoming a ubiquitous and portable computing device, in addition to communications capabilities
- For example: In Colombia people with income levels below the country's mean represent 72% of those with cellular phones[8]

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Mobile Phones and Healthcare

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- The number of cellular phone subscribers worldwide is estimated at 2 Billion (32.2% of world population). These subscribers give access to mobile telephony to to more than 5 billion people (80.6% of world population)
- Cellular phones can potentially contribute to telehealth and health care delivery in general:[9]
  - In many countries healthcare providers often travel and approach the needy
    - This happens even in developed countries where NPCPs visit elderly populations in their homes
  - Healthcare is community based.
- Portability, easy communications with specialists, and availability of medical information at the point of care is highly desirable.

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Use of Mobile Phones in Healthcare

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- In healthcare, mobile phones have been used for
  - Data transmission
    - Example: monitor cardiac function for occurrences of arrhythmias that are then transmitted to medical experts.[10]
  - Communication of small snippets of information
    - short messages services for data exchange between nurses and patients.[11]
  - Synchronous voice communication
    - on-demand direct voice connection between caregivers and patients.[9]
- However, the use of cell phones to deliver clinical guidelines appears to be novel.

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Methods

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- In this paper we present a technology called C-GuideView (CGV) that enables delivery of clinical guidelines using cellular phones.
- This is an extension of GuideView that supports decision-making and treatment by non-physician care providers (NPCPs) using clinical guidelines presented in an effective, easy-to-use format
- Notable feature: If the guideline (developed previously by physicians and nurses) determines that the medical condition being treated is beyond locally available facilities and expertise, it will automatically seek help by telephoning the pre-programmed phone number of a clinic or physician

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Results

- In 4th quarter of 2006, several cellular phones based on Windows Mobile, such as the Cingular 3125 and T-Mobile SDA have appeared.
- Same form-factor as conventional mobile phones and significantly cheaper than PDAs
- C-GV targets such cell phones and has been tested on the Cingular 3125

When C-GV was evaluated we found that

- Quality of voice,
- Image display,
- and video playback

Are comparable with PDAs or lap/desktop machines. However, small screen size is a challenge

C-GV in action

General Aspect
Multimodal
display
Softkey navigation

Video Playback

C-GV automatically calls
remote specialists and clinics
as & when needed

Conclusions and Future Work

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- Cellphone-GuideView enables better utilization of all care providers, ensuring that routine care is handled in an appropriate and standardized form locally by the NPCP.
- Expert assistance from physicians and specialists is called upon only if and when necessary, thus optimizing resources and minimizing costs.
- The technology is being improved in several directions such as improving screen formatting, voice commands, data compression, documentation of care in a simple EMR, porting to Symbian OS, and others.
- Usability and field testing studies are also being planned currently.

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