Adherence, Avatars and Where to from here

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Medication Adherence

• **Non-adherence**: One of the major causes of morbidity, mortality and health care costs (WHO)

• **Factors affecting adherence**: complex regimens, fear of adverse effects, diminished cognitive ability, lack of health knowledge and beliefs, patient-doctor relationship etc.

• Current strategies lacks **personalised** interaction and communication

"My diabetic research shows that test subjects are 98% more likely to take their diabetic pills if the pills are covered in chocolate."
Patient-Doctor Relationship

• Main goals in patient communication:
  • To create good trusting interpersonal relationship
  • Facilitating exchange of information
  • Include patients in the decision-making process

• Good communication skills in doctors can improve transmission and retrieval of clinical information

• Well-educated patients with trusting doctor-patient relationship → improved patient knowledge → positively affects adherence

It's not just WHAT you say, but HOW you say it.
Avatar-based Reminder Application

- **Aim**: increase adherence and improve overall user satisfaction
- **Avatar**: Life-like simulation of a virtual assistant
  - Persuasive, Arousing, Engaging, Elicit feelings of trust, Provide a sense of personalised experience
- Use of avatar in areas e.g. interactive learning/teaching, behavior counselling etc
Avatar-based Reminder Application (cont.)

- **Our App:**
  - **PhoneGap:** Javascript, HTML (Hypertext Markup Language), CSS (Cascading Style Sheets)
  - **Text-to-speech:** existing plugins
  - **iOS** devices only
Initial Trial

• Simple version:
  • Limited interaction
  • Individual supplement information pre-loaded into application
  • Avatar **verbally** reminded users to take their supplements and provide simple supplement information
  • Students and staff within Western Sydney University (WSU)
  • Participants taking **health supplements** as a surrogate to medication
Initial Trial - Recruitment

• **43** participants registered (age 18-70):
  • **4** didn’t match inclusion criteria
  • **10** didn’t respond
  • **2** left university
  • **3** dropped out

• **24** participants completed the 3-week trial
Initial Trial: Process

• Randomly allocated to either:
  • Control group: electronic pillbox with built-in alarm functions and built-in compartments
  • Intervention group: iPad with application installed; Zip-lock bags provided to put supplements
Initial Trial: Process (cont.)

• Out of 24 participants:
  • 11 allocated the iPad (intervention group)
  • 13 allocated the Electronic Pillbox (control group)

• Block Randomization Technique
Data Gathered

• Quantitative Data:
  - Adherence Rate (weekly):
    - \(((\text{Pills at the start of the week} - \text{Pills at the end of the week}) / (\text{Pills at the start of the week})) \times 100\)
  - Score (out of 5) given by participants during post-interview

• Qualitative Data:
  - Face-to-face interviews
    - Quirkos: Qualitative data analysis software tool that help to sort and manage textual data gathered from interviews
Results

• Intervention Group (iPad)
  • Average baseline adherence rate = 81%
  • At the end of 3-week trial, average adherence rate = 98%
  • Increased adherence rate of 17%

• Control Group (Electronic Pillbox)
  • Average baseline adherence rate = 86%
  • At the end of 3-week trial, average adherence rate = 95%
  • Increased adherence rate of 9%

• Participants in Intervention group have a slightly higher adherence rate improvement
Intervention Group Interview Results

• Advantages:
  • Avatar reminds **verbally** exactly what supplement to take and dosage
  • **Text-based** dosage information displayed at bottom of the screen
  • Incorporation of **personalized** information favored by most participants
    • Avatar knows participant’s name
    • Provide personalized supplement information
Intervention Group Interview Results (cont.)

• Disadvantages
  • iPad too **big** to carry around
  • Technical issue: text-to-speech function within the app will **not** work without internet connection
  • 82% of participants said it will be better if it could run on their mobile devices
    • Technical issue:: only runs on **iOS**, incompatible iOS versions
  • Verbal information: **hard to hear**, **easily missed** with distractions around
    • More detailed **text-based** information should be provided
  • More than half of participants stated talking avatar function were **not significant** to them/**unnecessary**
    • Most important aspects were the **dialogue** and **interactions**
  • “Avatar become quite **annoying** since the second week and I think it will be better if there is the option of text-only reminder”
Average score for the avatar application (based on usefulness and overall satisfaction) was **4.5 out of 5**
Control Group Interview Results

• Advantages:
  • Small and portable
  • Built-in compartments
Control Group Interview Results (cont.)

• Disadvantages:
  • 77% reported compartments are too small for their supplements
  • “I can only fit one-day worth of supplements in the compartments, and then have to refill every night”
  • Doesn’t tell participants which supplement they should take and how much to take when alarm goes off
    • Creates confusion for those that take multiple supplements
    • Possible lead to health complications if used on participants that take multiple medications
  • Soft alarm sound: easily missed, annoying
  • Need to change batteries
Average score for the Electronic pillbox (based on usefulness and overall satisfaction) was 3.5 out of 5
Next Step: Facebook Messenger Chatbot

Original plan:
Second trial: Complex version
• Avatar interacts with user, answer questions, provide possible solutions and health suggestions
• Text-to-speech, voice recognition
• Knowledge base created by researching online articles on patient-doctor communication
• Attentive, Knowledgeable, Smart/Interactive, Convincing, Supportive

New Plan:
• Based from results from initial trial → modify second trial to allow participants to use their own mobile devices
• To achieve this without limiting to iOS devices → incorporate avatar knowledge scripts into Facebook Messenger Chatbot
Facebook Messenger Chatbot

- Created using Chatfuel
- Remind participants via Facebook Messenger notification
- Participants can ask health-related questions and interact with the chatbot
- Subscribe to daily health tips
- Communicate with users using text, video, audio and images
thank you