Simulating human carer with an avatar to improve medication adherence

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Medication adherence

• The ability and willingness to abide by a prescribed therapeutic regimen
• Non-adherence can lead to negative consequences
• Rate of adherence in developed countries is only about 50%

• Factors affecting adherence: Medication-related; Patient-related; Other factors
Strategies to improve adherence

- **Weekly pillbox**: with separate compartments for medications

- **Dose modification**: planning medication schedule that best suits the needs and lifestyle of individual patient

- **Reminders**:
  - Automated- Rapid development in technology > newer products and tools utilising computer technology to improve adherence
Strategies to improve adherence (cont.)

- **Mobile phone reminders**
  - Allow *constant access* to communication and information
  - Provide ubiquity, accessibility, and familiarity

- **In-home electronic reminders**
  - For better health management and monitoring purposes
  - Automatic pill dispensers

- **Portable reminders**
  - Electronic pillbox
  - *Portability* makes them popular amongst busy individuals
Patient communication

- **Personalised interaction** has been found to be a crucial aspect in improving adherence

- **Relationship with patients**
  - Based on patient’s trust in the healthcare professionals
  - Emotionally supportive, giving reassurance or respect, and treating patients as equal partner
  - Good communication of instructions and information
Patient communication (cont.)

• What’s important to patients?
  • Healthcare professional’s friendliness and approachability, encouragement of patient co-operation, enhancement of patient-centeredness, improvement of health professional’s teaching skills
  • *Well-educated* patients are more willing to follow regimens
    • Patient’s understanding of conditions & treatments is positively related to adherence
    • Use simple and everyday language
Simulating human with avatars

- An **avatar** is a life-like simulation of a virtual assistant created with computing technologies
- Persuasive, arousing, engaging, and can elicit feelings of trust
- Create feelings of friendliness and provide a sense of *personalised experience*
- Express **verbal information** and convey **non-verbal cues**
- People often mindlessly & automatically resort to human-human interaction which in turn encourage the formation of a human-avatar relationship
Simulating human with avatars (cont.)

- Human-avatar relationship
  - When considered irreplaceable > scarce source > more valuable, attractive and favourable > people will be inclines to have more frequency interactions
  - Elderly population can benefit from an avatar as they often live alone, which can lead to isolation or social-disconnection
Simulating human with avatars (cont.)

• Avatars have been successfully applied in other areas
  • Interactive learning/teaching
  • Behaviour counselling
• In health sector, the use of avatar that’s engaging, motivating, empathising and knowledgeable resulted in a better user satisfaction and cooperation
Simulating human with avatars (cont.)

- Example: A study using an animated agent showed that it encourages and persuade learners to continue reading and complete exercises

<table>
<thead>
<tr>
<th>Negative emotions</th>
<th>Positive emotions</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Status: Distress)</td>
<td>(Status: Joy)</td>
</tr>
<tr>
<td>Voice: I feel sad when I hear that you are distressed. Cheer up, never give up. Facial emotion: from Sadness to Neutral</td>
<td>Voice: I am glad to see you so happy. I am very happy. Facial emotion: from Surprise to Happiness</td>
</tr>
<tr>
<td>(Status: Fear)</td>
<td>(Status: Confidence)</td>
</tr>
<tr>
<td>Voice: I feel sad to see that you have fear. But don’t worry too much. Remember to keep learning. Facial emotion: from Sadness to Fear, and then Neutral</td>
<td>Voice: You are great. I am glad to see you so confident. Facial emotion: from Surprise to Happiness</td>
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<table>
<thead>
<tr>
<th>Quality of healthcare professionals</th>
<th>Characteristics needed in an avatar</th>
<th>Effects on patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Answer patient’s concerns/questions</td>
<td>Attentive</td>
<td>Make patient feel more at ease with adhering to regimen</td>
</tr>
<tr>
<td>Educate patients</td>
<td>Knowledgable</td>
<td>Provide knowledge and confidence</td>
</tr>
<tr>
<td>Communicate with patients/doctor-patient relationship</td>
<td>Smart/Interactive</td>
<td>Encourage the formation of relationship</td>
</tr>
<tr>
<td>Provide motivation and encouragement</td>
<td>Motivative, convincing</td>
<td>Adhere to medication and increase interaction</td>
</tr>
<tr>
<td>Friendly, emotionally supportive</td>
<td>Friendly, supportive</td>
<td>Increase satisfaction, make patient feel comfortable</td>
</tr>
<tr>
<td>Treating patients as equal partner</td>
<td>Personalised</td>
<td>Feel special</td>
</tr>
<tr>
<td>Use simple language</td>
<td>Simple language</td>
<td>More likely to understand instruction</td>
</tr>
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Avatar-based reminder application

- Initial study currently underway to test the effectiveness of an interactive avatar-based reminder application to improve adherence and user satisfaction

Conclusion

• Avatars have the potential to simulate a human carer or healthcare professionals in providing effective communication to patients & ultimately improve their attitude towards medication adherence

• Use of interactive avatar has the ability to achieve comparable outcomes as characteristics recognised as important in a human can also be implemented into an avatar
Thank You!