Hey, I Just Met You…
Chatbots & The Family Physician

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Introduction

It is Monday morning and the clinic is packed. Henry, who needs to see a family doctor, registers from home and talks to Florence on the way to the clinic.

Henry says, "I have diarrhoea". Florence asks, "How many days has it been?"
Henry replies, "Five days," and the next response is, "Was there blood in your stools?"
Henry says "No," to which, Florence asks, "Did you have fever? Did you travel out of the country recently?"

Henry arrives in the clinic 15 minutes later and has the entire history already populated in the medical records. The red flags have been highlighted in the text. From their earlier "conversation", Florence has also determined that the patient may be depressed. She has also "discussed" with Henry on screening for colon cancer as he has just turned 50. The doctor goes on to examine and manage Henry accordingly while Florence helps to collate the bill and confirms Henry's credit card details before he collects his medications.

Henry is satisfied and feels good that there is Florence around to assist him. The doctor is also happy that he gets more time to interact with his patient.

The doctor trusts that Florence is well-trained to take clinical history like a consultant and asks the right questions every time. More importantly, she never goes on sick leave. Not only can Florence speak more than 37 languages, she is also able to sense patient's moods from the words they use.

Welcome to the world of Florence – the Chatbot – Just come to a clinic near you. Here's her number. Call her. Maybe.

A Chatbot is a computer programme that mimics conversation with users. The system that powers this Chatbot can range from a simple programme with rule-based responses to that of a more complex Artificial Intelligence (AI) system which is capable of pattern recognition, learning and formulating algorithms for managing different needs and behaviours.

Chatbots in Action

As it is, the commercial applications of Chatbots range from the provision of online customer service to product searches. Whilst not yet sophisticated enough to replicate a clinician, Chatbots have been used in healthcare in the following areas:

1. Mental Youth Health: The moderated online social therapy (MOST) project[i]
2. A virtual dietician for diabetic patients[ii]
3. An educational system for students[iii]

Woebot is the Chatbot that is being tested in a trial to help depressed college students. [iv]70 subjects, of ages 18-28 years, were recruited online and randomised to receive either two weeks (up to 20 sessions) of self-help with cognitive behavioural therapy content in a conversational format with a text-based conversational agent (Woebot) or directed to an online resource as an information-only control group. Compared to the control group, the subjects who were under the Woebot group had a significant reduction in symptoms of depression over the study period.

Woebot can "sense" the mood of the subjects (via analysis of text input) and deliver empathetic messages. It can also tailor assistance to anxious events, provide customised encouraging messages as well as allow goal setting. At the end of the week, it provides a chance for the subject to reflect on which days of the week their moods have been low or high, and so possibly help modify behavioural response or plan trigger avoidance.

Considerations for the use of Chatbots in Healthcare

While a relatively low-cost Chatbot can be touted to increase productivity, decrease reliance on clinicians' manpower and improve patient experience and outcomes, the healthcare administrators should expect a longer wait before there can be more widespread use of this technology for healthcare.

The key considerations for Chatbots in healthcare are:

1. **Privacy and safe guarding of information collected.** Sensitive data will be collected and analysed. These data should only be made available to the patient's care team.

2. **Safety of the Chatbot programmes.** What happens if the patient commits suicide after using the bot? What happens if there is a delay in treating life-threatening illnesses like meningitis after using a bot? Who is responsible if the bot fails?

3. **Interface of the Chatbot.** A text-based interface will tend to exclude seniors who may shy away from keyboards or smartphones. A conversation-based interface will be more helpful to reach out to a wider community.

4. **AI behind the Chabot.** A more intelligent AI can obviously solve more complex issues. It can even learn the habits and preferences of the patient.

5. **Integration with the electronic health records systems.** With different clusters using different systems, it is likely to be a long-drawn and expensive affair to customise a solution for Chatbots to input data to the current systems.

knowledge to create customised Chatbots for their own application. It may make the use of Chatbots so versatile that it can be used in everyday clinical practice. For example, if CDC reports that a new respiratory virus has 3 criteria for diagnosis including travel history to a certain country, the clinician can programme the Chatbot to ask these specific questions. (Above image is provided by Pastel Health)

Future

I see great potential for the use of such Chatbots in healthcare locally.

In the hospital, many P3 patients are waiting to be seen in the Emergency Department. They can "talk" to an interface and their history can be taken. It can even highlight red flags and even escalate to P2 status if deemed necessary. In the general inpatient wards, again the "history" can be taken even before the busy houseman comes to see the patient. Similarly, this can be applied in our ever-busy polyclinics, where patients can complete a health screening questionnaire and submit basic clinical information prior to consultation.

In the patients' homes, the Chatbots can assist in monitoring mood and motivation. When linked to devices like BP sets, it can even provide instant feedback. "Your BP is slightly high today! Please go easy on the salt." Chatbots on the
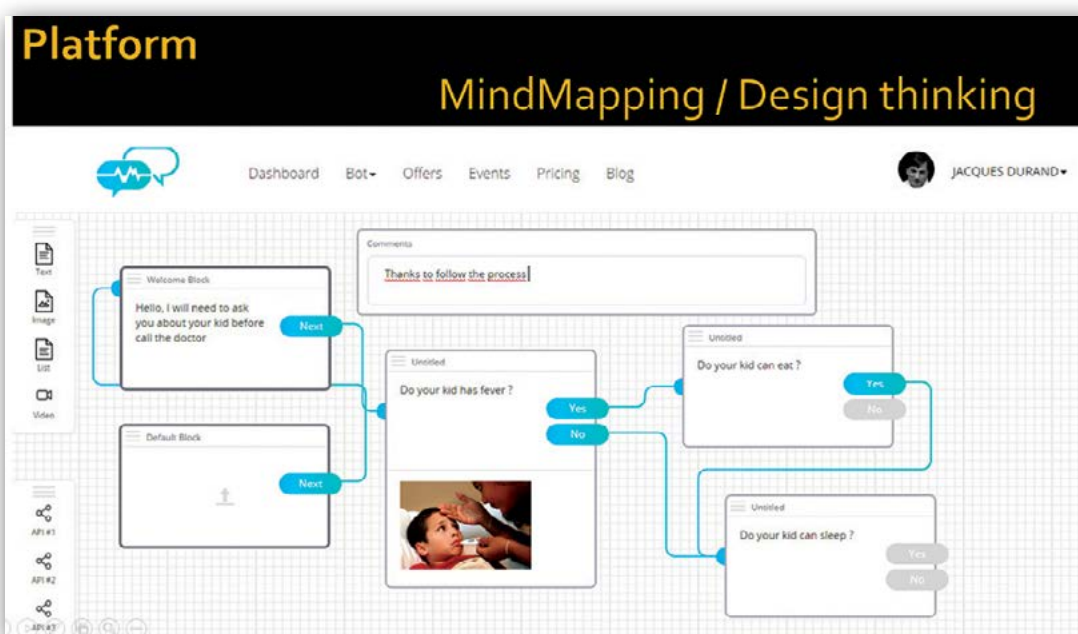
Platforms for Design of Chatbots

Pastel Health, a French-based company, has created a software that acts as a platform for the creation of new Chatbots. It supports third-party Application Programming Interface (API), multiple messaging platforms as well as multi-language. It can allow clinicians with little programming

phone can be geo-tagged and remind the patient that he is near a cake shop and tell him "Do not choose the sweet cakes, watch your sugars!"

In the busy polyclinics, a Chatbot may optimize the registration process and assign queue numbers based on

how many doctors are available that day. Another Chatbot can be used for screening of mental illness. One can be created for diabetic patients asking them about their eye and foot screening as well as any hypoglycemic symptoms. These are automatically captured in the electronic medical records with the appropriate interventions suggested for the doctors. A nurse may create one with appropriate screening tests and vaccinations recommendation for each age group and profile. The best part is that all these Chatbots can be combined in voice and language, and individualised to each user's comfort and linguistic ability, and the patient will not even realise that he is "talking" to a different Chatbot.

Chatbots can and will be used in a wide range of services in healthcare. The challenges are not insurmountable. How well we can embrace the technology will decide how soon and how much of the daily grind can be placed in the hands of these bots.

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The State of Managed Care in Singapore

by Dr Lim Khong Jin Michael, Editorial Board Member

Concern regarding how Managed Care operates in Singapore is not new. As we look at the ideas and expectations expressed in publications as early as 1994, we can sense the concerns of various stakeholders regarding the way Managed Care was developing in Singapore even at that time, and which called for legislation to monitor and control this new healthcare delivery model.

A certain Dr Chern who was then with the Ministry of Health pointed out in an article published in the Singapore Medical Journal (SMJ) in 1994 that the rise of the HMO (Health Maintenance Organisation) model in the United States was a result of escalating healthcare costs and the indiscriminate use of healthcare services by the insured. In other words, Managed Care grew in the United States as a strategy against the failure of the insurance system to control utilisation and cost. He then pointed out that within primary care in Singapore, the access to polyclinics and private general practitioners was widely available and at reasonable cost. Likewise in hospital care, he noted that domination by the government as public healthcare provider had been cost-conscious and effective in keeping prices affordable. Dr Chern contended that Singapore needed more time to establish legislation for the monitoring and controlling of these new healthcare financing products and also address potential ethical issues involved.

Fast forward to 2001, concerns and important take home points on Managed Care were again raised at the Practice Management Seminar and reported by the SMA News. One of the concerns surfaced was that certain HMOs had been offering doctors contracts with unreasonably low payments. The speaker asserted that the payment to the doctor had to be adequate for delivery of sustainable care with reasonable quality that would not put both the doctor and the patient at risk of maltreatment. He went on to caution that the risk of being complained against and charged for poor quality care was a very real danger. Secondly, he pointed out that doctors needed to unite in rejecting participation in schemes that were clearly exploitative and so put both the doctors and patients at risk. A proposal was also made by seminar participants to set up an SMA Standing Committee on Managed Care to unite doctors and provide professional guidelines.