Overview:

We are the Centre for Health Exercise and Sports Medicine (CHESM) at the University of Melbourne, a research centre dedicated to the prevention and management of musculoskeletal conditions such as osteoarthritis (OA). A particular focus of ours is on translating evidence into practice by developing, evaluating, and disseminating digital patient resources that help people with OA self-manage their joint pain. One of our recent projects is the "Taking Control of Your Hip and Knee Osteoarthritis" eLearning course which is available on FutureLearn platform (1243 enrolled learners globally). This course provides comprehensive and up-to-date information about OA and its management to patients.

Building on this work, we are now looking for a software solution that can offer people with OA 'on demand' information that is reliable, relevant, and personalized to their specific needs/questions.

We want to create a virtual agent that can provide conversational responses to patient questions about OA, using only pre-selected open access resources, including our eLearning course. The agent should use a friendly, empathetic, and professional tone (feels like a human not a computer chatbot) and should also avoid using language that can cause unnecessary concern or anxiety, such as "wear and tear" or "degeneration".

Background:

There is a lot of misinformation and confusion about OA and its management online. Current AI models, such as ChatGPT and Copilot, often generate responses that are not from reputable medical sources and/or that contain inaccuracies that can mislead or harm patients. For example, when asked "What is osteoarthritis caused by?" on 4th March 2024, Copilot (creative) gave the following answer: "Osteoarthritis (OA) is a condition that causes the cartilage in your joints to wear away over time, leading to pain, stiffness, and reduced mobility." This answer is not consistent with the current scientific understanding of OA, which recognizes that OA pain is not solely caused by cartilage loss. Moreover, the answer is sourced from "msn.com", which is not a credible source for medical information and contains many more errors and myths about OA diagnosis and treatment. Therefore, we see a need for a virtual agent that can provide accurate and trustworthy information about OA on demand.

Essential Features and Requirements:

Dataset

- Draw from a pre-set dataset only (see below page 4 for data sources)
- Ability for us to easily add to the dataset in the future as needed.

Integration into Multiple Platforms/Interfaces:

- Inserted into a website as a page (what could that look like? Copilot/ChatGPT style?) (within webpage https://healthsciences.unimelb.edu.au/departments/physiotherapy/chesm)
- Inserted into a website as an Avatar (what could that look like?)
- Provided as a WhatsApp chat
- Potential for future integration into Smartphone apps.

- Storage of responses from different platforms in a unified backend database that has simple navigation and data management to enable easy upload of new data sources and download of user responses for future analysis.

Tone and Language:
- Friendly, empathetic, and professional tone (feels like a human not a computer).
- Avoidance of language causing unnecessary concern or anxiety (e.g., wear and tear, degeneration).

Exclusion of Specific Medical Advice & Medical Disclaimer:
- Provide general advice and options but avoids specific prescriptions (e.g., not provide explicit instructions of how to perform one specific exercise).
- Include a medical disclaimer, encouraging users to consult healthcare professionals for personalized guidance.
- Re-direct (in a friendly manner) people wanting specific treatment prescription (e.g. personalised medication, exercise, weight loss regimens). Inform them that this is not the role of the agent and recommend they seek tailored advice from a health professional.
- Clearly communicate (in a friendly way) that the agent is not a substitute for professional medical advice.

Privacy and Security considerations:
- Discourage and, if possible, avoid storing personal data provided by users.
- Adhere to data protection regulations (what are these?)
- Clearly communicate (in a friendly way) how user data will be handled.
- Are there any other privacy and security considerations we need to be aware of?

Fast Response Time:
- Minimal lag to ensure quick responses.

Catchy name suggestions:
- for example, Versus Arthritis have AVA (see https://versusarthritis.org/get-help/arthritis-virtual-assistant/). Can't copy that but provides an example of what we are looking to create.

Desired features:

Multilingual Support:
- Provide multilingual support for users who speak different languages.

Accessibility:
- Options for text-to-speech.
- Compatibility with screen readers.
- Consider other accessibility considerations.

Feedback:
- Can user feedback be integrated to inform a continuous improvement loop?

Usability Testing (is this within the scope of this project?):

- To be conducted via online survey to inform refinement
- Surveys with academics within our Centre
- Surveys with consumers (people with OA) within our networks
- We have developed the survey templates and will not require ethics as this stage will not be published.

Our hope for a final product

- A friendly, empathetic virtual agent that is (or has the potential to be) integrated with different platforms
    - Available within UoM webpage: https://healthsciences.unimelb.edu.au/departments/physiotherapy/chesm
    - Available as a WhatsApp chat feature
    - Possible integration on My Joint Pain https://www.myjointpain.org.au/
    - Potential for integration into Smartphone apps in the future
- Maintains a professional 'human' tone, avoids anxiety-inducing language, and draws from our pre-selected reputable sources only.
- Does not 'prescribe' nor collect personal info
- An easy-to-use backend where we can update the content that the agent draws from and easily access and download responses for further analysis.

See next page for data sources.

Dataset: OA info sources

Guidelines

Nice guidelines: Osteoarthritis in over 16s: diagnosis and management https://www.nice.org.uk/guidance/ng226 include rationale/additional information regarding why the committee made each recommendation

RACGP OA guidelines: https://www.racgp.org.au/clinical-resources/clinical-guidelines/key-racgp-guidelines/view-all-racgp-guidelines/knee-and-hip-osteoarthritis

OARSI Guidelines (2024): https://oarsi.org/sites/oarsi/files/docs/2014/non_surgical_treatment_of_knee_oa_march_2014.pdf

EULAR guidelines: EULAR recommendations for the non-pharmacological core management of hip and knee osteoarthritis: 2023 update https://ard.bmj.com/content/early/2024/01/11/ard-2023-225041#DC1

EULAR physical activity guidelines: https://ard.bmj.com/content/77/9/1251

Patient resources:

Future Learn Taking Control course (with discussion board content excluded): https://www.futurelearn.com/courses/taking-control-hip-and-knee-osteoarthritis

KEELE Uni guidebook: https://jigsaw-e.com/patient-focus/guidebook/

CHESM Peak Patient Education resource: provide PDF

Arthritis Aust: Taking control of your OA: https://arthritisnsw.org.au//wp-content/uploads/2018/08/Osteoarthritis_Booklet_17.pdf

Patient videos:

Keele Uni video: Osteoarthritis and you: https://www.youtube.com/watch?v=6iz78WMm-Lo

Uni Melb video: https://www.youtube.com/watch?v=o8ZJN56aSic

Noi group: OA Wear & Repair: an Osteoarthritis knee story using healthy linguistics: https://www.youtube.com/watch?v=sUANsPdkkEU&t=23s

Consumer org websites:

https://www.arthritis.org/

https://arthritisaustralia.com.au/

https://msk.org.au/

https://versusarthritis.org/about-arthritis/

https://www.myjointpain.org.au/

https://oaaction.unc.edu/i-am-living-with-osteoarthritis/

Full text papers:

Caneiro J, O'Sullivan PB, Roos EM, et al Three steps to changing the narrative about knee osteoarthritis care: a call to action British Journal of Sports Medicine 2020;54:256-258. https://bjsm.bmj.com/content/54/5/256

Changing the narrative on osteoarthritis: A call for global action: https://www.oarsijournal.com/article/S1063-4584(24)00043-8/abstract

Osteoarthritis: https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(19)30417-9/abstract

https://pubmed.ncbi.nlm.nih.gov/32860729/

https://pubmed.ncbi.nlm.nih.gov/36367486/

https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(19)30417-9/abstract

https://jamanetwork.com/journals/jama/article-abstract/2776205

Can we draw from podcasts?

https://www.jointaction.info/podcast