

AI in Health & Medical Research

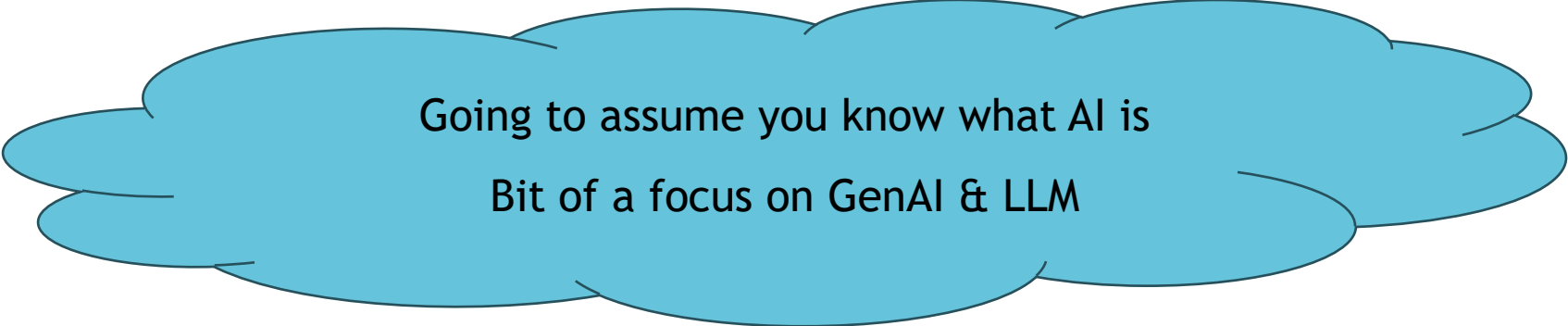
Dr Nitya Phillipson
Head of Integrity & Governance
Murdoch Children's Research Institute

Conflict of Interests declarations

- Avid user of GenAI
- Chair of MCRI AI Steering Committee
- No financial COI to disclose

Overview

- How do we know AI is being used in health & medical research?
- What opportunities does this present?
- What are the ethico-legal risks?
- What should the health & medical researchers be doing about it?

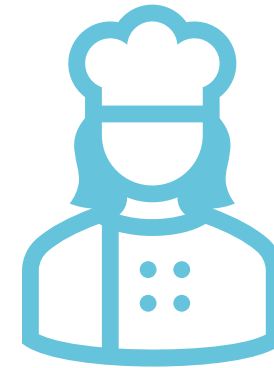


Going to assume you know what AI is
Bit of a focus on GenAI & LLM

How do we know AI is being used in health & medical research?



Using AI to support research



Developing/adapting AI as part
of our research

Using AI to support research



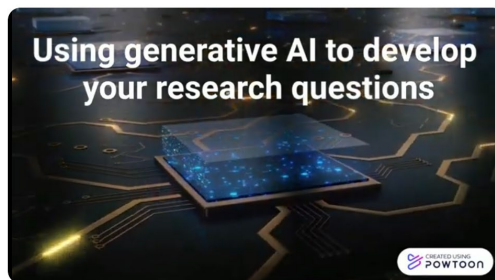
Support Research Ideation

Lit reviews

Generate research questions

Using generative AI to develop your research questions

YouTube - Lynette Pretorius: Academic Language a... - 16 Feb 2023



Related topics <https://youtu.be/bxnXggNMQYk>

In this

00:49 A

01:03 S

01:18 K

02:36 T



Write/review research applications/outputs

Ethics/grants/journal articles

Support & Do writing

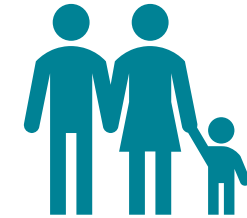
Are Australian Research Council reports being written by ChatGPT?

Multiple accounts from researchers suggest that feedback for Discovery Project grant funding was written by artificial intelligence

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Are Australian Research Council reports being written by ChatGPT? | ChatGPT | The Guardian
<https://www.arc.gov.au/sites/default/files/2023-07/Policy%20on%20Use%20of%20Generative%20Artificial%20Intelligence%20in%20the%20ARCs%20grants%20programs%202023.pdf>



Support participation

Translations

eConsent

Chatbots



International Journal of Intercultural Relations

Volume 97, November 2023, 101888



Utilizing AI questionnaire translations in cross-cultural and intercultural research: Insights and recommendations

Jonas R. Kunst^a, Kinga Bierwiazzonek^{a, b}

Show more

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<https://www.sciencedirect.com/science/article/pii/S0147176723001360>

Using AI to support research

Especially helpful when simplifying
language/English is not your first language

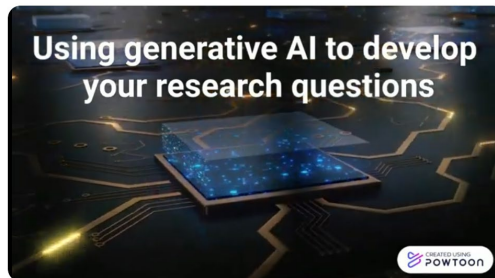


Support Research Ideation

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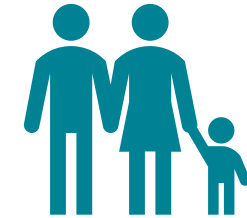
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Are Australian Research Council reports being written by ChatGPT? | ChatGPT | The Guardian
<https://www.arc.gov.au/sites/default/files/2023-07/Policy%20on%20Use%20of%20Generative%20Artificial%20Intelligence%20in%20the%20ARCs%20grants%20programs%202023.pdf>



Support participation

Translations

eConsent

Chatbots



<https://www.sciencedirect.com/science/article/pii/S0147176723001360>

A live-ish demo

What can I help with?

 Message ChatGPT



 Create image

 Surprise me

 Summarize text

 Code

 Analyze data

More

A live-ish demo

From NHMRC Participant Information & Consent form template

Your health records and any information obtained during the research project are subject to inspection (for the purpose of verifying the procedures and the data) by the relevant authorities and authorised representatives of the Sponsor, Fauxsponsor, the institution relevant to this Participant Information Sheet, Australian Research Institute, or as required by law. By signing the Consent Form, you authorise release of, or access to, this confidential information to the relevant study personnel and regulatory authorities as noted above.

A live-ish demo

please re-write to a reading age of 12



Here's a simplified version suitable for a reading age of around 12:

"Your health records and any information collected during the research project may be checked by the people in charge, the Sponsor (Fauxsponsor), the Australian Research Institute, or others who need to see it by law. By signing the Consent Form, you agree that these people can look at your information to make sure the study is done properly."

This version uses simpler words and shorter sentences, making it easier for a 12-year-old to understand.

A live-ish demo

Translate this into the top 3 most common languages spoken in Melbourne that isn't english

"Your health records and any information collected during the research project may be checked by the people in charge, the Sponsor (Fauxsponsor), the Australian Research Institute, or others who need to see it by law. By signing the Consent Form, you agree that these people can look at your information to make sure the study is done properly."



The top three most common languages spoken in Melbourne, apart from English, are Mandarin, Greek, and Italian. Here are translations into each:

Mandarin:

您的健康记录和在研究项目期间收集的任何信息可能会由负责人员、赞助方（Fauxsponsor）、澳大利亚研究所或法律要求查看的人进行检查。通过签署同意书，您同意这些人可以查看您的信息，以确保研究正确进行。

Greek:

Τα αρχεία υγείας σας και οποιαδήποτε πληροφορία συλλέγεται κατά τη διάρκεια του ερευνητικού προγράμματος ενδέχεται να ελεγχθούν από τους υπεύθυνους, τον Χορηγό (Fauxsponsor), το Αυστραλιανό Ινστιτούτο Έρευνας, ή άλλους που έχουν νόμιμο δικαίωμα να τα δουν. Με την υπογραφή της Φόρμας Συγκατάθεσης, συμφωνείτε ότι αυτοί οι άνθρωποι μπορούν να δουν τις πληροφορίες σας για να διασφαλίσουν ότι η μελέτη πραγματοποιείται σωστά.

Italian:

I tuoi dati sanitari e le informazioni raccolte durante il progetto di ricerca possono essere controllati dalle persone responsabili, dallo Sponsor (Fauxsponsor), dall'Istituto di Ricerca Australiano o da altri che hanno diritto di accedervi per legge. Firmando il modulo di consenso, autorizzi queste persone a controllare le tue informazioni per assicurarsi che lo studio venga svolto correttamente.

A live-ish demo

make an image or cartoon of this information

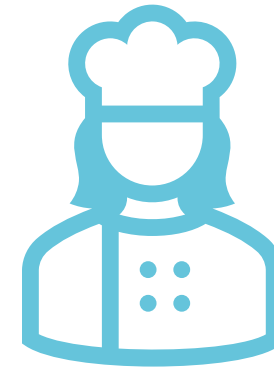


Here is a cartoon-style image illustrating the explanation of research participation to a young child named Alex. It shows the friendly doctor, the health records, and characters representing Fauxsponsor and the Australian Research Institute. Let me know if you'd like any adjustments!

How do we know AI is being used in research?

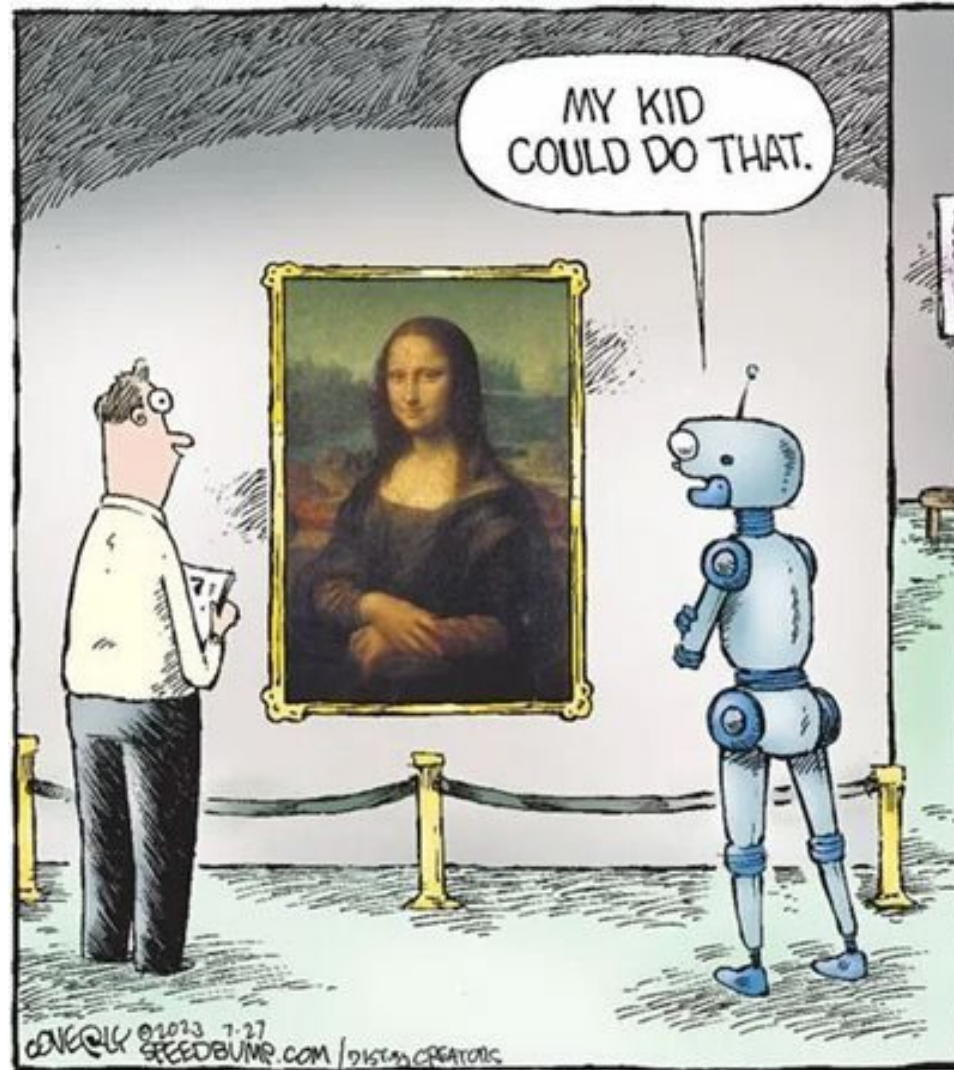
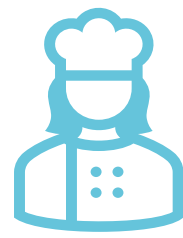


Using AI support/research tools



We are developing/adapting AI
as part of our research

Developing/Adapting AI



Detecting Suicidality on Twitter



- 2014: 14,701 suicide-related Twitter posts collected using public API.
- Use human coders & machine learning (ML) to assess whether a “strongly concerning suicide-related Twitter post” could be detected automatically and in real time.
- 14% of the suicide-related tweets were deemed ‘strongly concerning’ by the human coders. Machine learned classifier correctly identified 80% of same tweets and got better with more data.
- Study demonstrated that strongly concerning suicide-related Twitter posts have unique linguistic profiles.
- ML can scan Twitter data for the presence of such features direct services/advertising.

Machine learning for real-time aggregated prediction of hospital admission for emergency patients

[Zella King](#) , [Joseph Farrington](#), [Martin Utley](#), [Enoch Kung](#), [Samer Elkhodair](#), [Steve Harris](#), [Richard Sekula](#), [Jonathan Gillham](#), [Kezhi Li](#) & [Sonya Crowe](#)

- AI tool using data from more than 200,000 A&E visits to a busy London teaching hospital, before and during COVID-19.
- Data on a person's age, test results, how they arrived at A&E, and other factors to predict whether they will be admitted to hospital.
- Tool predicted how many hospital beds were needed in 4 and 8 hours' time.
- Estimates outperformed the hospital's usual planning of emergency admissions, which is based on the number of beds needed in the previous 6 weeks
- Research was co-designed with bed managers so the tool met their needs.

How are we using it at MCRI?



Home > News stories > Social media surveillance by artificial intelligence improves detection of vaccine adverse events

Social media surveillance by artificial intelligence improves detection of vaccine adverse events

Article published \\ 22 November 2022



• 25 JUN 2024

Significant MRFF funding to spearhead AI in rare disease diagnosis

A team led by Professor Daniel MacArthur has received MRFF funding to investigate safer use of advanced analytics, including AI, to improve the diagnosis of genetic diseases.



• Professor Daniel MacArthur

AI technology helps identify cerebral palsy in babies

Article published \\ 20 March 2024



Cutting-edge technology that analyses clips of babies' movements can help speed up detection of cerebral palsy, according to a new study

Using human stem cells, genomics and AI to solve childhood heart disease

Article published \\ 30 October 2024



How are we using it at MCRI..



Use of Large Language Model Tools at Melbourne Children's Campus

On behalf of the Melbourne Children's Campus Working Group on Large Language Models

We invite you to help us in some early discovery work on the current and potential future use of Large Language Models on our campus.

Large Language Models include tools such as Open AI ChatGPT (or other tools that use the ChatGPT engine); Google Bard; Microsoft Bing Chat; Jasper.ai and Perplexity.

Currently the campus partners have no policies/ positions on the use of these tools. We are aware that some tools are in use already – mostly by staff who are trying them out but also some more intensive use. We recognise that there may be both benefits and risks in using the methods.

You can answer this survey anonymously or provide your contact details if you wish for any follow ups.

[This survey will take 5-8 mins to complete](#)

**Melbourne
Children's**
A world leader
in child and
adolescent health



Supported by The Royal Children's Hospital Foundation

Load unfinished survey

Next

Exit and clear survey

But there are risks



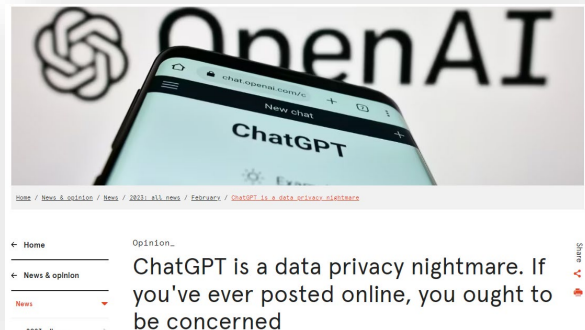
<https://hcpl.net/blogs/post/the-terminator-turns-40-how-close-are-we-to-an-ai-doomsday/>

Ethico-legal risks of AI in research



Privacy

Who owns the information/IP fed into AI?



<https://www.sydney.edu.au/news-opinion/news/2023/02/08/chatgpt-is-a-data-privacy-nightmare.html>



Consent

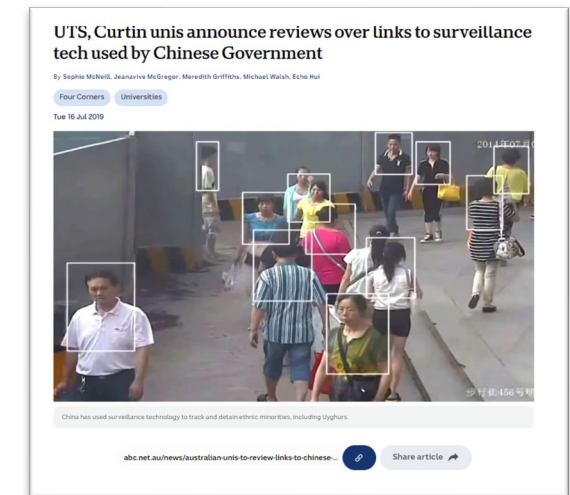
Can T&C = Informed consent?



<https://ovic.vic.gov.au/privacy/resources-for-organisations/artificial-intelligence-and-privacy-issues-and-challenges/>



Propagating unethical research



<https://www.businessinsider.in/technology/news/story/elon-musk-paints-a-future-of-ai-abundance-and-an-existential-crisis-of-meaning-433961-2024-06-20>

Propagating unethical research

- Black box AI- HRECs/peer reviewers can't understand how its developed
- Certain AI (neural networks)- researchers can't track how it learns
- Unimaginable risk assessments/use/ consequences
- Compounded by lack of ethics guidelines/expertise

PODCASTS / UNEXPLAINABLE

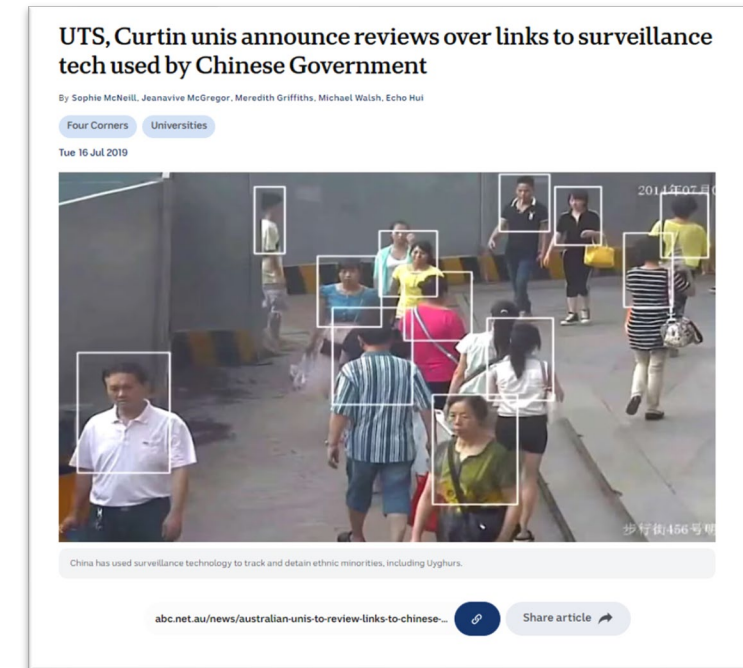
Even the scientists who build AI can't tell you how it works

"We built it, we trained it, but we don't know what it's doing."



Propagating unethical research

- UTS/Curtin collaborate with CETC, the Chinese state-owned military research conglomerate
- Curtin Uni academic involved in developing methods to detect the faces of Uyghurs and how their features could be better picked up in facial scanning.
- This was likely used to racially profile and track Uyghurs and support state-sanctioned persecution of this ethnic minority
- UTS, Curtin unis launched reviews
- Curtin "unequivocally condemns the use of artificial intelligence, including facial recognition technology, for any form of ethnic profiling to negatively impact and/or persecute any person or group."



Ethico-legal risks of AI in research



Researcher risks

Reputational
Professional



Research integrity

Fabrication & falsification
Plagiarism & misinformation



Bias

Training data =
bias in, bias out

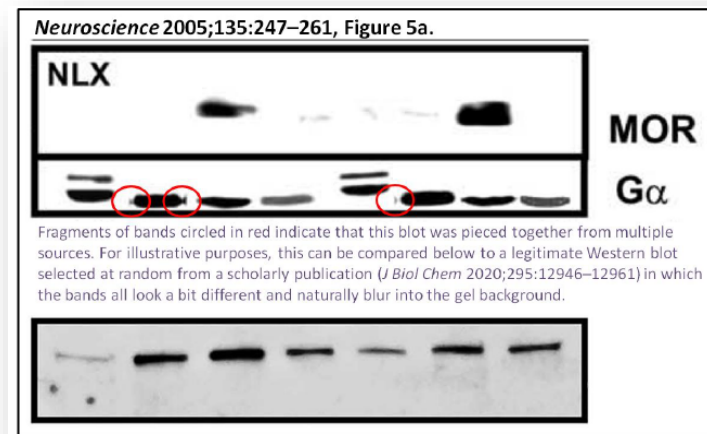
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<https://www.theguardian.com/technology/2023/jul/08/australian-research-council-scrutiny-allegations-chatgpt-artificial-intelligence>



<https://www.npr.org/sections/health-shots/2023/06/06/1180314219/artificial-intelligence-racial-bias-health-care#:~:text=A%20landmark%202019%20study%20published,to%20predict%20future%20health%20needs.>

AI in medicine needs to be carefully deployed to counter bias – and not entrench it

JUNE 6, 2023 - 5:00 AM ET
By Ryan Levi, Dan Gorenstein



<https://www.npr.org/sections/health-shots/2023/06/06/1180314219/artificial-intelligence-racial-bias-health-care#:~:text=A%20landmark%202019%20study%20published,to%20predict%20future%20health%20needs.>
© Murdoch Children's Research Institute, 2021 22

Bias

- 1990 paper found that pulse oximeters overestimated oxygen saturation to a greater degree in Black patients than in white patients. Replicated in [2005](#) and [in 2007](#)
- Devices in ubiquitous use.
- Regulations have not required that the devices work well across the full range of skin tones.
- Black COVID patients were three times as likely to have a significant discrepancy between pulse oximeter and ABG readings.
- Inaccurate pulse oximeters were linked to delayed or lack of treatment for Black patients with severe COVID.



<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8515002/>

In summary

Accelerate & improve
research & make it
more accessible



Risks to the ethics &
integrity of research &
drive inequality

So how do we legislate & govern its ethical use?

In summary

The EU Artificial Intelligence Act

<https://artificialintelligenceact.eu/>

Authorship and AI tools

COPE position statement

<https://publicationethics.org/cope-position-statements/ai-author>

ChatGPT and research: some interim information

ChatGPT is an artificial intelligence (AI) language model that uses complex algorithms to generate a relevant response to users' questions. It can be used to answer questions or generate responses to most questions or inputs as the model was trained using a huge array of text from the internet from inception to 2021.

metis.melbournechildrens.com/MCTC023

Australian Government
Department of Industry,
Science and Resources

<https://consult.industry.gov.au/supporting-responsible-ai>

Safe and responsible AI in Australia

Discussion paper

June 2023



AUSTRALIA'S
CHIEF SCIENTIST

Rapid Response Information Report

Generative AI: Language models and multimodal foundation models

24 March 2023

<https://mhhttps://www.chiefscientist.gov.au/GenerativeAI>

Oslo Law Review

Universitetsforlaget

SCIENTIFIC PUBLICATION

Volume 10, No. 1-2023, p. 1-23
ISSN online: 2387-3299
DOI: <https://doi.org/10.18261/olr.10.1.1>

Doctor Chatbot: The EU's Regulatory Prescription for Generative Medical AI

<https://www.idunn.no/doi/10.18261/olr.10.1.1>



Policy on Use of Generative Artificial Intelligence in the ARC's grants programs

[ARC Policy on Use of GenAI](#)

Version: 2023.1
Issued: 7 July 2023
Owner: Research Policy Branch

Voluntary AI Safety Standard

Guiding safe and responsible use of artificial intelligence in Australia

Date published: 5 September 2024

<https://www.industry.gov.au/publications/voluntary-ai-safety-standard>

Australian Medical Association calls for national regulations around AI in health care

By Claire Moodie

Posted Sun 28 May 2023 at 4:42am

<https://www.abc.net.au/news/2023-05-28/ama-calls-for-national-regulations-for-ai-in-health/102381314>

What are our patients, families & communities expectations?

What do we tell our researchers to do..

Do	Don't
Take accountability and check all outputs generated by AI	Put personal, sensitive or commercially sensitive information into AI (unless you have approval to do so)
Disclose when and how you've used AI including to your participants	Solely rely on AI it should not replace human judgment and expertise.
Keep a log on how you are using AI in your work including prompts and data for any ML developments	Ignore Biases, be aware of potential biases in AI tools and outputs
Keep up to date: with relevant institutional policies and procedures and familiarise yourself with the limitations, risks and capabilities of the technology your using	Overlook Data Privacy, ensure that any data used with AI is handled securely and in compliance institutional data governance requirements and privacy regulations.

AI logs & acknowledging use

Date	Tool	Prompt	Use
8/11/24	ChatGPT	Give me an overview of the risks of AI in health and medical research	Used this as starting point to generate ideas. Used key words and direct sentences in powerpt presentation at ethics workshop

Declaration

I acknowledge the use of ChatGPT [<https://chat.openai.com/>] to brainstorm topics for an assessment.

I entered the following prompts: “Brainstorm ideas around the topic of [x].”

I used the output as a starting point for initial research before narrowing down the topic for my assessment.

Thank you & Questions

Integrity@mcri.edu.au

