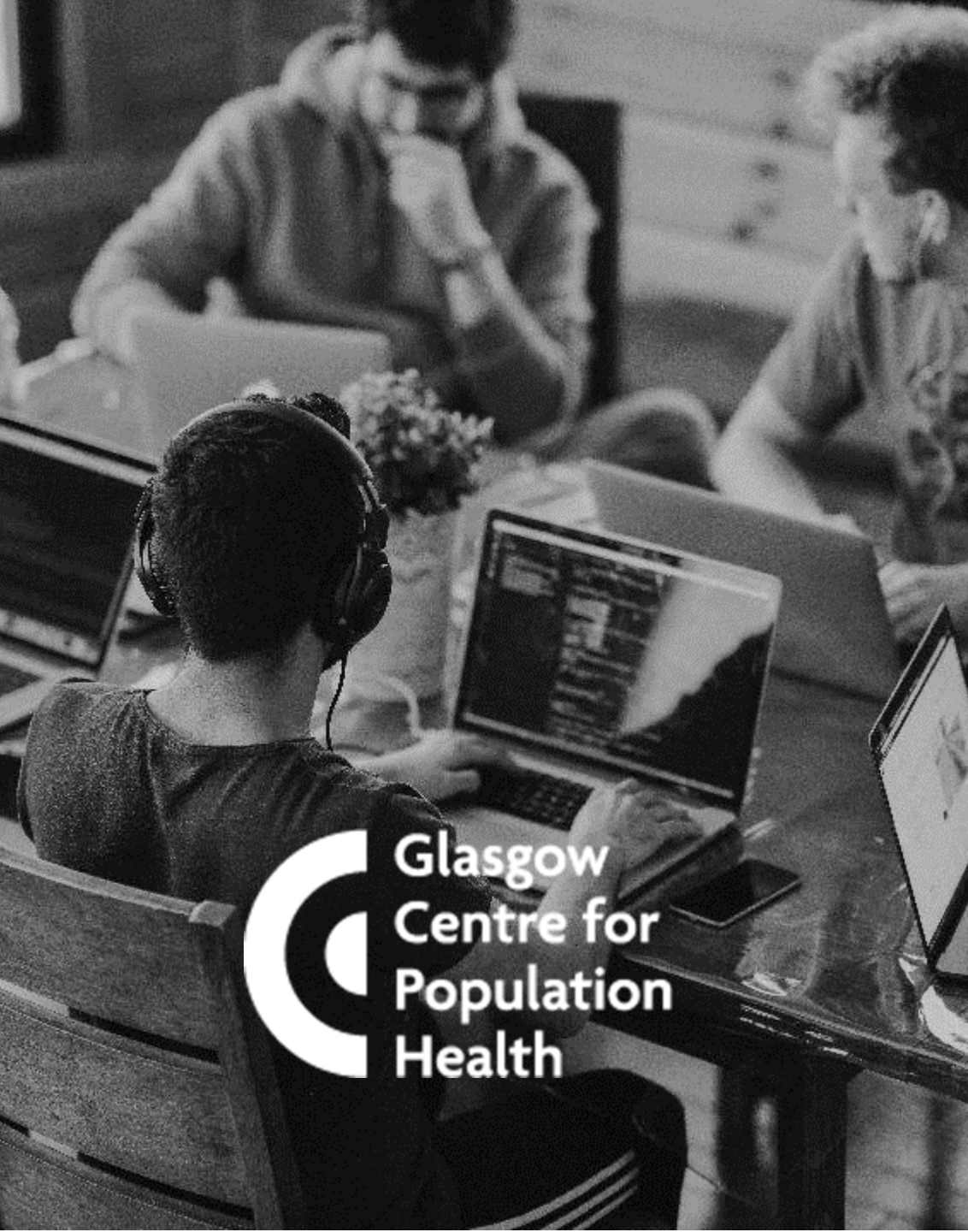


SESSION C: INTRODUCING THE POTENTIAL OF AI WITHIN PUBLIC HEALTH AND HEALTHCARE SYSTEMS IN SCOTLAND

Chris Harkins





TODAY

- Introductory session
- Down-to-earth
- Assumes no prior knowledge
- Equip you with some AI insights
- Stimulate engagement and conversation
- Your reflections

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Artificial Intelligence (AI) – The simulation of human intelligence in machines, enabling them to perform tasks such as learning, reasoning, problem-solving, and decision-making.

General Purpose Technology (GPT) – A transformative technology with widespread applications across industries, significantly impacting economic and social progress, such as the steam engine, electricity, the internet, **or AI**.

Predicting the societal impacts of GPTs and their uses (and misuses) has been proven to be fraught with difficulty, or even impossible.

AI Revolution – The transformative shift in industries and society driven by AI advancements, reshaping economies, healthcare, education, and labour markets.

“AI Creep” – The gradual and often unchecked expansion of AI into various aspects of daily life, often lacking coherence and transparency, which can lead to ethical, privacy, and accountability concerns.

AI WITHIN PUBLIC HEALTH AND HEALTHCARE SYSTEMS IN SCOTLAND



The scale and range of potential uses of AI within Public Health and healthcare systems in Scotland will be discussed, however, there are potentially three overarching features of its application which are worthwhile outlining at this early stage:

- AI's ability to near-instantaneously analyse vast amounts of diverse, complex data, such as pertaining to population health, and to generate new learning and fresh insight;
- AI can supplement clinical practice and decision-making;
- The ability of AI to potentially facilitate a patient interface, that is, to simulate a limited form of healthcare interactions with patients, providing evidence-based support, information and advice.



THE POTENTIAL OF AI WITHIN PUBLIC HEALTH AND HEALTHCARE SYSTEMS IN SCOTLAND: AN INTRODUCTORY DISCUSSION PAPER

Evidence scoping review of 170 peer-reviewed publications concerning AI within Public Health and healthcare systems. Structured around 8 basic questions:

1. Why should healthcare professionals begin learning about AI?

2. What AI capacity and skills exist in Scotland currently?

3. Is AI already in use within Scotland's Public Health and healthcare systems?

4. What are the positives and negatives of using AI within Public Health and healthcare systems in Scotland?



THE POTENTIAL OF AI)WITHIN PUBLIC HEALTH AND HEALTHCARE SYSTEMS IN SCOTLAND: AN INTRODUCTORY DISCUSSION PAPER

5. Is AI used to gather data from social media to support Public Health interventions?

6. How do patients feel about the use of AI within Public Health and healthcare systems?

7. What are the policy and governance arrangements concerning the use of AI in Scotland's Public Health and healthcare systems?

8. What are the opportunities and challenges in further embedding AI within Scotland's Public Health and healthcare systems?

A wee add on... AI in palliative care.

1. WHY SHOULD PUBLIC HEALTH AND HEALTHCARE PROFESSIONALS BEGIN LEARNING ABOUT AI?



The use of AI within Public Health and healthcare systems is **developing at an extraordinary rate**.

Leaving the development of AI solely to technologists, programmers and developers risks overlooking the **context, equity, and humanity** that underpins the Public Health profession and the NHS. In Scotland – AI development in partnership.

As AI technologies develop and evolve, so must the awareness and understanding among Public Health and healthcare professionals.

AI applications will **only be as effective as the understanding, data, evidence, insights, and ethical frameworks that underpin them**. Health professionals have a vital role in identifying “**algorithmic biases**” that may exist in AI model’s “**training data**”.

Health professionals must also consider **advocating for, patients and patient families** within AI planning.

2. WHAT AI CAPACITY AND SKILLS EXIST IN SCOTLAND CURRENTLY?



Scotland has a long history of AI innovation – Glasgow’s Turing Institute was an early pioneer of AI development as early as the 1980s.

Over the past two decades, Scotland’s universities have significantly advanced their AI capabilities and capacities, galvanising the nation’s position as one of the global leaders in AI research and education.

One example - the Industrial Centre for AI Research in Digital Diagnostics (iCAIRD)

A Scotland-wide initiative which has been developing AI within, primarily, clinical digital diagnostics. iCAIRD brings together industrial technologist collaborators (*Bering, Canon, Philips, Deep Cognito, Glencoe*), and clinicians and academic partners (*the universities of Glasgow, Edinburgh, St Andrews and Aberdeen*).

3. IS AI ALREADY IN USE WITHIN SCOTLAND'S PUBLIC HEALTH AND HEALTHCARE SYSTEMS?



This question has posed challenges in answering and evidencing. This report highlights an overall lack of clarity and transparency.

In addition to being deployed in the response to COVID-19, AI is already used in a limited number of healthcare research and developmental settings in Scotland. (pandemic – AI watershed moment, public health)

Always a 'human in the loop' within the current application of AI in healthcare within Scotland – where AI assists human health professionals and clinicians, rather than undertaking tasks independently. Couple of examples...

The Northeast of Scotland Breast Screening Programme has partnered with iCAIRD and Kheiron Medical Technologies to explore the potential for AI to further improve the existing high standards of breast screening programmes in detecting cancers. (AI within digital imaging – evidence of strong outcomes, healthcare)

A partnership between tech company Voxsio, NHS Forth Valley and groups of young people from Stirlingshire, has developed an AI-powered chatbot called Allichat, which is designed for and with young people to discuss mental health issues. (cannot find any evaluation output)

4. WHAT ARE THE POSITIVES AND NEGATIVES OF USING AI WITHIN PUBLIC HEALTH AND HEALTHCARE SYSTEMS IN SCOTLAND?



Public Health surveillance appears particularly suited to several characteristics of AI analytical and processing power, not least that Public Health surveillance is intrinsically data driven.

Public Health surveillance has three distinct challenges: first, sourcing robust data; second, developing and applying reliable analytic frameworks; and third must become faster and more responsive to rapidly changing global health issues and crises. AI is well suited to support all 3.

AI unlocks the potential to utilise a variety of novel or underexplored data sources within health surveillance purposes,

Including those not intentionally designed to answer epidemiological questions . For example, internet search data, social media platforms (discussed specifically in Question 5) and device geographical sensing capabilities.

4. WHAT ARE THE POSITIVES AND NEGATIVES OF USING AI WITHIN PUBLIC HEALTH AND HEALTHCARE SYSTEMS IN SCOTLAND? (CONT)

COVID-19 pandemic, AI technologies have been cited as leading to a better understanding of predicted disease spread, infection rates and patient outcomes, public attitudes and behaviours in relation to lockdown measures, when to seek medical help, and vaccination uptake. (I'm skeptical!)

The type of AI generally used to incorporate and analyse diverse and complex forms of data during the pandemic, is known as “**generative AI**” (generates new content) – popular forms of which include ChatGPT, and Co-pilot.

Generative AI is susceptible to the algorithmic biases, “**AI hallucinations**”, to external attacks or “**data poisoning**” – essentially, a cyberattack. Has been shown to provide false information to support user being happy.

By contrast, AI within healthcare systems and clinical settings, in general, uses contained, often “**nongenerative AI**” form of Supervised Machine Learning which repetitively utilise narrower fields of specialised data . Often-cited in supporting clinical interpretation of medical imaging, and subsequent treatment decisions, and even related administration and appointment planning.

Nongenerative AI techniques - simplicity of use with much higher interpretability incl statistical – “**explainable AI**”, “**black box AI**”, “**white box AI**”

5. IS AI CURRENTLY USED TO GATHER DATA FROM SOCIAL MEDIA TO SUPPORT PUBLIC HEALTH INTERVENTIONS?



Yes, it is beyond the scope of this paper to accurately characterise the extent to which AI has been used to gather and analyse social media data.

It appears that applications of this approach have been limited in the UK to date, and almost entirely related to the COVID-19 pandemic response.

These forms of data have sometimes been referred to as “**social big data**” – and are cited as being a real-time and cost-effective data source within Public Health surveillance. Analysis integrated with existing approaches.

“**Sentiment analysis**” – lockdown measures, vaccine hesitancy refers to the use of AI to identify and categorize the emotional tone or attitude expressed within a piece of text, whether it be positive, negative, or neutral.

Bias – older people, disabled people, those in poverty. Ethics and transparency?

6. HOW DO PATIENTS FEEL ABOUT THE USE OF AI WITHIN PUBLIC HEALTH AND HEALTHCARE SYSTEMS?



Within the scope of this paper, we find **limited engagement with UK patient groups, or indeed the general public** – both of whom will be impacted by applications of AI in Public Health healthcare.

Furthermore, the limited range of studies that have assessed patient views have **focused on a very limited array of AI developments with explicit patient awareness and consent**, which restricts their utility as a benchmark in anticipating wider patient opinion and engagement with other AI applications in healthcare.

2021 US-based study - **respondents emphasised transparency, patient choice, the costs of AI developments, questions about data quality, security, also urged caution in developing and implementing AI tools**. They reported a need for a careful transition phase to ensure that any AI tool used in their care is well-tested and precise.

Patients are forced to accept the hypothetical risks associated with novel applications of AI in NHS, there is therefore an **ethical obligation** to ensure that patient views, values and needs are incorporated into implementation plans.

7. WHAT ARE THE POLICY AND GOVERNANCE ARRANGEMENTS CONCERNING THE USE OF AI IN SCOTLAND'S PUBLIC HEALTH AND HEALTHCARE SYSTEMS?



At the time of writing, the UK followed the US in refusing to sign the **Paris Summit (February 2025) global declaration on the regulation and governance and use of AI**. The declaration sets out an ambition to reduce digital divides by promoting AI accessibility and ensuring the development is “transparent”, “safe”, as well as “secure and trustworthy”.

The Scottish Government aspires to promote the use of “**trustworthy, ethical and inclusive AI**” across health and social care, as outlined in Scotland’s AI Strategy, the Digital Health and Care Strategy 2021 , and Scotland’s Data Strategy for Health and Social Care 2023.

Within NHS Scotland, most AI projects take place within **geographical NHS Boards**, while some national Boards, including NHS Golden Jubilee and NHS Health Improvement Scotland, also play a role. AI development is usually driven by the **NHS Regional Innovation Hubs**, in cooperation with academic and industry partners, as described in the examples provided in Question 3.

8. WHAT ARE THE OPPORTUNITIES AND CHALLENGES IN FURTHER EMBEDDING AI WITHIN SCOTLAND'S PUBLIC HEALTH AND HEALTHCARE SYSTEMS?



Contained, primarily **nongenerative forms of AI** within clinical settings, appears to be emerging as an area of **significant opportunity in Scotland**, with lower reports of risks. Lack of evaluations however.

Nongenerative AI within healthcare administration receives positive commentary across peer-reviewed journal publications.

There are **several difficulties to be resolved in terms of generative AI** within NHS overall, including ethical and legal concerns, particularly in relation to the central issues of patient data, social big data, consent, security, and privacy.

Algorithmic biases - social big data within AI, Public Health algorithms. Social media platforms can be **toxic and aggressive platforms**, where homophobic, anti-disability, sexist and racist views are expressed freely and reinforced.

The **absence of basic comprehensibility and transparency** surrounding generative AI-based systems is one of the main issues facing Public Health applications of AI. **“black box AI”**

The demand for **powerful data centres**, which require constant cooling and operation, contributes to **massive carbon-based emissions** which conflicts with Scotland's emission reduction targets within the Climate Change (Scotland) Act 2019.

AI IN PALLIATIVE CARE



Not covered in report, some activity...

A project funded by **Marie Curie** aims to use **AI to address inequalities in palliative and end-of-life care** by developing a tool to identify people nearing end of life after unscheduled care (e.g., emergency or GP out-of-hours).

A study at University of Liverpool is exploring **specialist palliative-care professionals' views on using AI methods** on healthcare data in palliative-care settings (education, safety, trust, etc.).

At University of Leeds researchers are part of a **Europe-wide project "InAdvance"** looking at using **AI to detect earlier** when older people with chronic disease might benefit from palliative care, working with UK partners.

Another project **"AI4HOPE"** looks at **dementia + palliative care scenarios using AI/digital interventions** to support advanced care planning and improve quality of life.

At a national level there are several conferences, forums and symposia dedicated to **"What might AI mean for palliative care?"**

Lots to discuss and consider

DISCUSSION



AI hype and transparency - Hype, confusion, fear and misinformation. Lacking transparency and efforts to engage/consult public.

Unpredictability within the AI revolution - AI is a powerful form of GPT, incomparable to industrial revolution - Unprecedented levels of automation/ speed of innovation/ global scale.

Engaging the public in health sector AI developments - AI rhetoric imbued with “technological arrogance” and “technocratic elitism”- pragmatic questions are essential countenance. Big Social Data, Allichat? Public set “risk bar”.

AI implementation – learning from the past - Universal Credit IT system - disaster. AI is not a silver bullet, cannot be shoehorned into over-stretched services. AI has to fit within and enhance NHS systems and patient pathways.

Inclusive and equalities-sensitive AI in healthcare - implementation of AI within healthcare systems represents an opportunity to consider bias and equalities within the whole system overall. Imaging/Screening – BME, LGBT+

AI within the wider determinants of health - income (poverty), employment, place, community, education, sustainability and travel. “How can AI be used to mitigate the impacts of poverty?”

Scotland’s AI strategy - 2021 Scottish AI strategy is broad and all encompassing, 2026 iteration must be more specific and address these issues.

RECOMMENDATIONS



Developing a central Scottish AI in health repository to store accurate and timely information on all AI in health innovations, pilots and trials, updates and evaluation outputs.

Boosting Scotland's AI evaluation and research capacity within the health sector – this would dovetail with a Scottish AI in health repository.

Delivering effective research and evaluation which is acutely focussed on AI implementation within complex NHS systems. Such appraisals must be patient-centred, incorporate the views of NHS clinical and delivery staff and be systems-focussed in response to clear efficiency, accuracy and safety objectives; rather than being overly technologically or AI-led.

THANK YOU



Chris Harkins



<https://www.linkedin.com/in/chris-harkinsph/>



christopher.harkins@glasgow.ac.uk

www.gcph.co.uk