Al in healthcare: overview, examples, implications

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DYNAMIC AI:

Digital Innovation with Remote Management and Predictive Modelling to Integrate COPD Care with Artificial Intelligence-based Insights: An Acceptability, Feasibility and Safety Study

Chronic Obstructive Pulmonary Disorder
 120 000 people in Scotland
 Preventative, progressive
 Exacerbations
 Frequent hospital admissions



Introduction

- Background and context > DYNAMIC AI Overview > Regulatory Framework >Informed Consent > Data privacy and Security > Trial management
- >Next steps

What do we mean when we talk about 'Al' in healthcare?

Technologies used to allow computers to perform tasks that would otherwise require human intelligence, such as visual perception, speech recognition, and language translation

Scotland's Al Strategy

Systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals

High-level Expert Group on Al, European Commission

The use of digital technology to create systems capable of performing tasks commonly thought to require human intelligence.

Office for Artificial Intelligence, UK Government





- Discussion around most accurate definitions
- Machines using statistics to recognise patterns in large amounts of data, including those not perceptible by humans
- Performs repetitive tasks with data, without the need for constant human guidance
- Mostly 'machine learning' digital systems that improve their performance at a particular task over time, through experience
- Supplements rather than supplants



Al is often a **medical** device

- If it's used to treat, diagnose, cure, mitigate, or prevent disease or other conditions – it's normally classified as a medical device
- Just like any other medical device, it needs to be regulated, calibrated, monitored, maintained and controlled

Why use Al?

The system is overloaded

Outpatients should be seen <12 weeks after referral



95%	76.9%
Target	Actual

ED admission, transfer or discharge within 4 hours of reception



Wait <12 weeks from decision to treat, to treatment



referral

Begin treatment within 18 weeks of

Chronic conditions like COPD account for a disproportionate share of healthcare resources and are tied to inequalities



ROLE FOR INNOVATION



Demand will increase by a further 60% by 2040

This demand **cannot** be met by human resource alone

Where can Al be used?

Some examples



OPERA

Results from the Optimised Pathway for Early Identification of Heart Failure in the Community (OPERA) project - a collaboration between AstraZeneca UK, NHS Greater Glasgow & Clyde, University of Glasgow, Lenus Health and West of Scotland Innovation teams

2 weeks

Waiting time reduced from 12 months to 2 weeks for a population of 1.2 million

tonths Echo analysis times reduced from 25 to 2 2 minutes by operationalising Al tools

30 % Referrals diverted by enabling active clinical referral triage (ACRT)

150%

2 minutes

Increase in diagnostic efficiency based on patients diagnosed in a 4hr clinic Breast Cancer Screening (Imaging)

Heart Failure Pathway

≻Cancer Diagnosis (Pathology)





Considerations for healthcare organisations



DYNAMIC AI

COPD Digital Transformation

Patient App

Daily symptom diary and patient reported outcomes (PROs)

Asynchronous messaging direct to clinical team

Self-management information

Clinician Dashboard

PRO and connected device data

Clinical data

PDF export to electronic health records application



Patient web application - self management information



Patient web application - symptom diary questions

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Clinician Dashboard – clinical information available during patient-clinician interaction

What is DYNAMIC AI?



Medicines & Healthcare products Regulatory Agency

SCOTLAND COPD	Patients Models Users Orga	anisations		Greater Glasgow and G	Clyde v Account	Logout
Patients					Add a pa	tient
Patient cohort % of risk					 12 month mortality 3 month hospital a Short term exacer 	admission bation
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James Moncreiff	74365380753			**		>

- MHRA Regulated Clinical Trial
- Medical Device (non- CE/CA mark)
- Al Insights Application
- Machine learning predictive models
 - ➤ 12 Month Mortality
 - ➤ 3 month re-admission
- Determine feasibility, acceptability and safety

What is DYNAMIC AI?

- Risk based stratification
- Clinical MDT Discussion
- Actionable Insights
- Decision Support
- Informed direction of resource



Planning and set up

- MHRA Clinical Trial Application
- Ethical Approval
- Document preparation
- Research Protocol
- Investigators Brochure
- Patient-facing documentation
- Patient-Public Engagement



Regulatory Framework

MHRA Regulated Trial

- Medical Device Regulations 2002
- Clinical Trial Application- 'Notice of No Objection'
 - ➤Trial document set
 - ➤Technical documentation

Experience

- Clinical trials using AI are relatively new
- Feedback from MHRA during application process
- > Dialogue between researchers and regulators ongoing





Informed Consent

Digital Consent Process

Requirement of Good Clinical Practice

Al brings additional responsibility to explain clearly

< Back	COPD	Log

out

COPD DYNAMIC-AI study Consent

Before you join the study, we need your permission to access and use your information. By providing your permission, you will automatically join the study.

If you choose to give us your permission, we will confirm you've joined the study and send you a copy of this information by email.

Reading confirmation

I confirm that:

 I have read and understand the information sheet dated <<Current
 Date>> version 1.0 for the above study. Date>> version 1.0 for the above study and have had the opportunity to ask questions which have been answered fully

- I understand that my participation is voluntary and I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.
- I understand that information I provide as part of the study and information from my medical records may be accessed by responsible individuals from NHS Greater Glasgow and Clyde, the Robertson Centre for Biostatistics at the University of Glasgow, Lenus Health Ltd, Storm ID, and regulatory bodies where it is relevant to my taking part in this research. I give permission for these individuals to access my provided information and records that are relevant to this research.
- . I agree to take part in the above study.

Data Privacy and security

How data is used in DYNAMIC AI

- Model training
- Model Inferencing
- Research datasets
- Production data from Lenus COPD (Digital Service)



Data Protection Regulations

Al falls under existing regulations
UK GDPR and Data Protection Act
Health board is data controller
Internal Information Governance
Data Protection Impact Assessment
Data Processing Agreements for data processing and transfers
Next steps

Trial management

Trial Management

> Sponsor Governance

> Compliance, Safety reporting, monitoring

> Trial Management Group

- > Independent Oversight
- > Executive function

> Model Approval Process

What next for AI in healthcare?



Making the transition

