

Smart PreOp

Machine Learning to support perioperative care

Dr Alwyn Kotzee

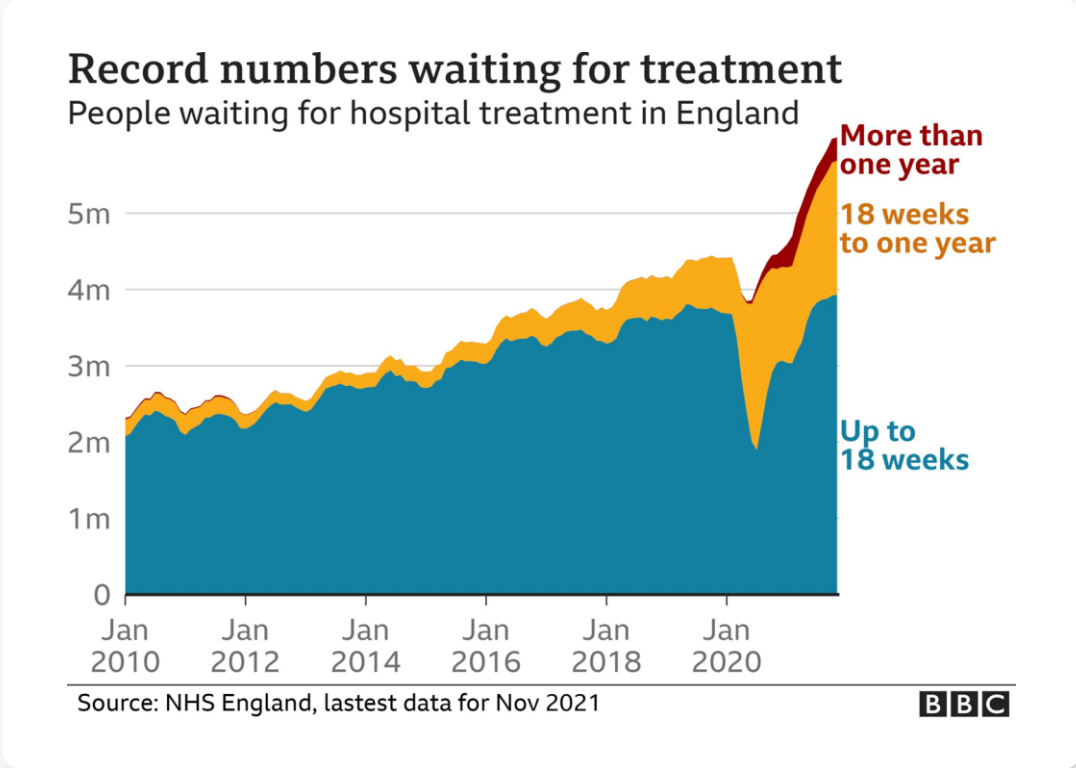
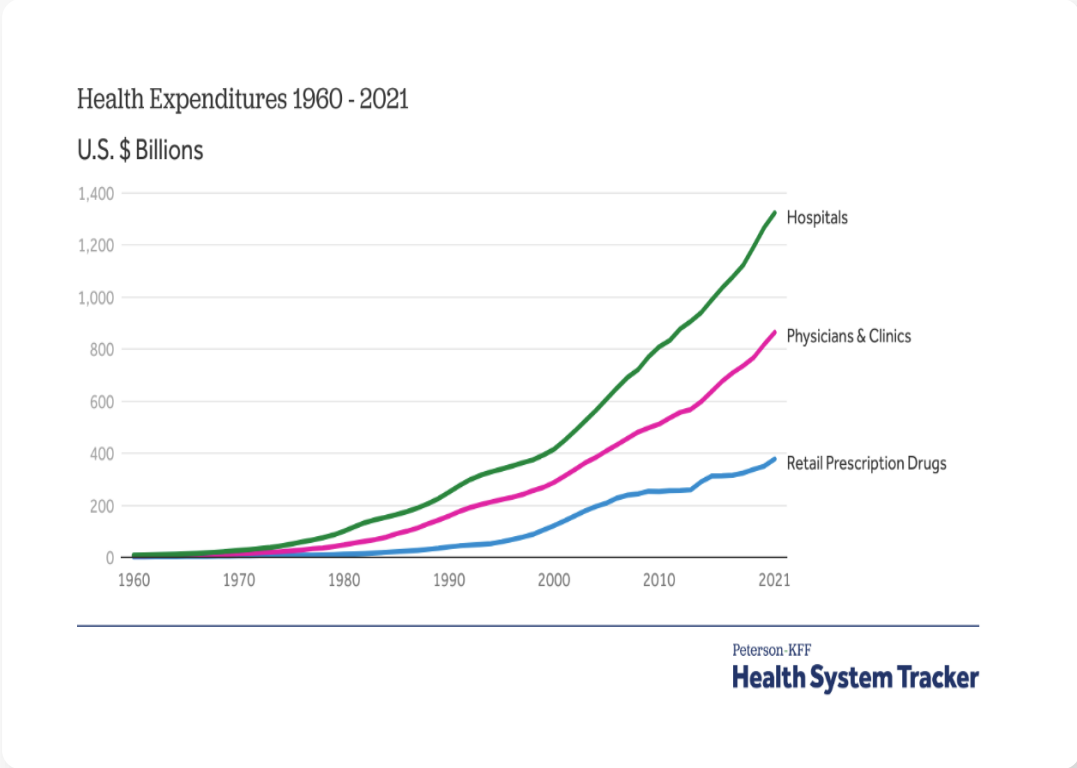
Consultant Anaesthetist, Leeds Teaching Hospitals NHS Trust & Clinical Associate, Aire Logic Limited

Funder:

Innovate UK – Smart Grants Programme
AK declares receiving personal income from this work



Surgical demand & complexity increasing



New contractual responsibilities for providers:

- Early screening
- Liaison with General Practice
- Regular follow-up

<https://www.england.nhs.uk/long-read/earlier-screening-risk-assessment-and-health-optimisation-in-perioperative-pathways/>



In the first instance, providers are asked to screen all adult patients waiting for inpatient surgery and where necessary begin their optimisation as early as possible in the patient pathway. Section 3.20 of the 2023/24 NHS Standard Contract sets out that providers “must, by no later than 31 March 2024, implement a system of early screening, risk assessment and health optimisation for all adult service users waiting for inpatient surgery, in accordance with the requirements on perioperative care co-ordination set out in the NHS Elective Recovery Plan”.

Date published: 2 May, 2023

Date last updated: 23 May, 2023



ML in other fields

Bank of England

Machine learning in UK financial services

The Bank of England and Financial Conduct Authority conducted a second survey into the state of machine learning in UK financial services.

Published on 11 October 2022

<https://www.bankofengland.co.uk/report/2022/machine-learning-in-uk-financial-services>

BBC News

AI could predict hurricane landfall sooner - report

A new AI tool from Google DeepMind predicted where September's hurricane Lee would make landfall in Canada three days ahead of existing methods.

But AI's speed and ability to analyse past events to make predictions make it a game-changer, say scientists.

Published on 14 November 2023

<https://www.bbc.co.uk/news/science-environment-67383755>



No shortage of prediction models...

Anesthesiology

Trusted Evidence: Discovery to Practice

Prediction of Complications and Prognostication in Perioperative Medicine: A Systematic Review and PROBAST Assessment of Machine Learning Tools

Perioperative Medicine | January 2024

<https://pubs.asahq.org/anesthesiology/article/140/1/85/139384/Prediction-of-Complications-and-Prognostication-in>

Anesthesia

Peri-operative medicine, critical care and pain

Performance and usability of pre-operative prediction models for 30-day peri-operative mortality risk: a systematic review

First published: J23 February ,2023

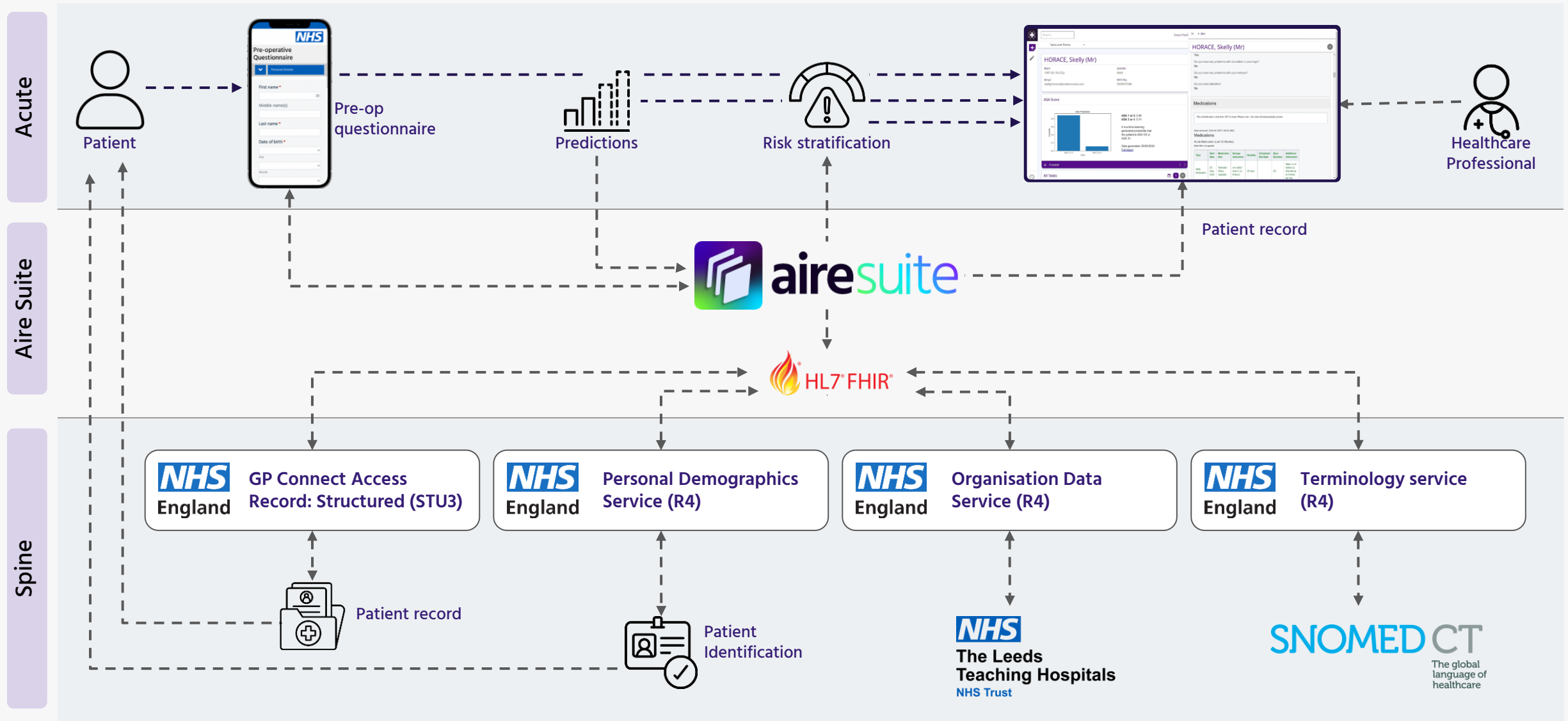
<http://www.sortsurgery.com/>
[doi/10.1111/anae.15988](https://doi.org/10.1111/anae.15988)



Smart PreOp development



Architecture



Endpoints

ASA category: 1/2 versus 3-5

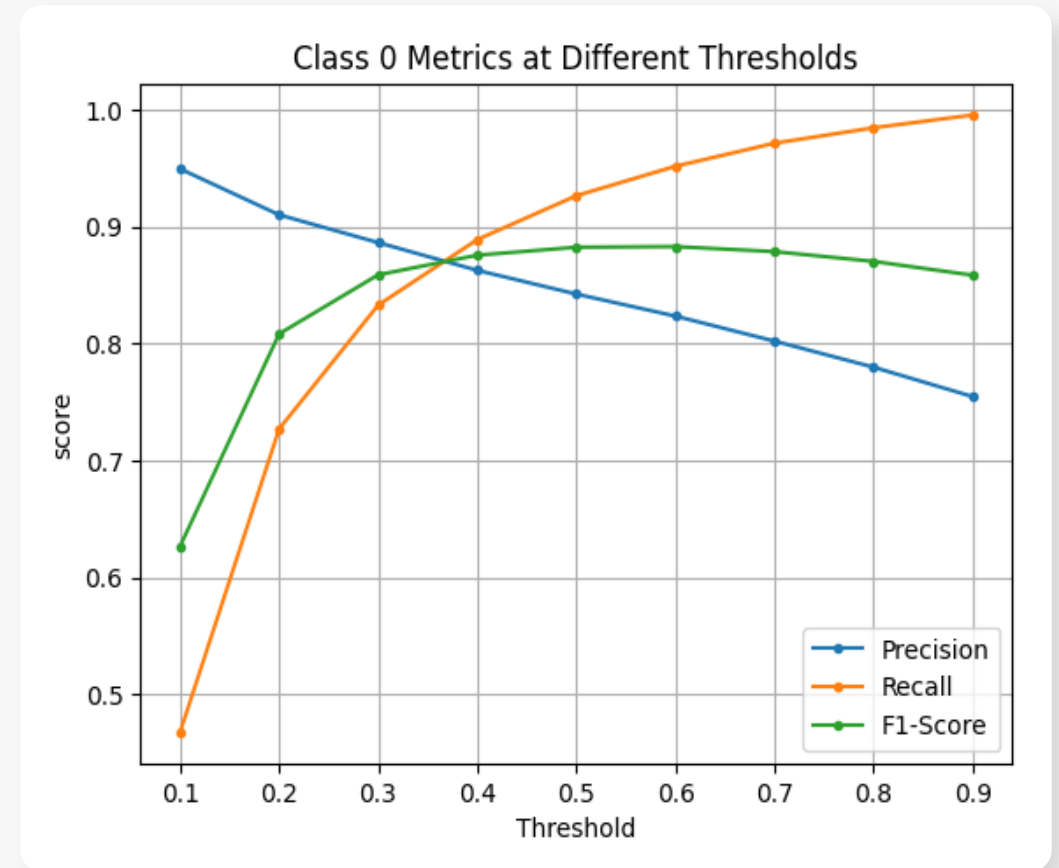
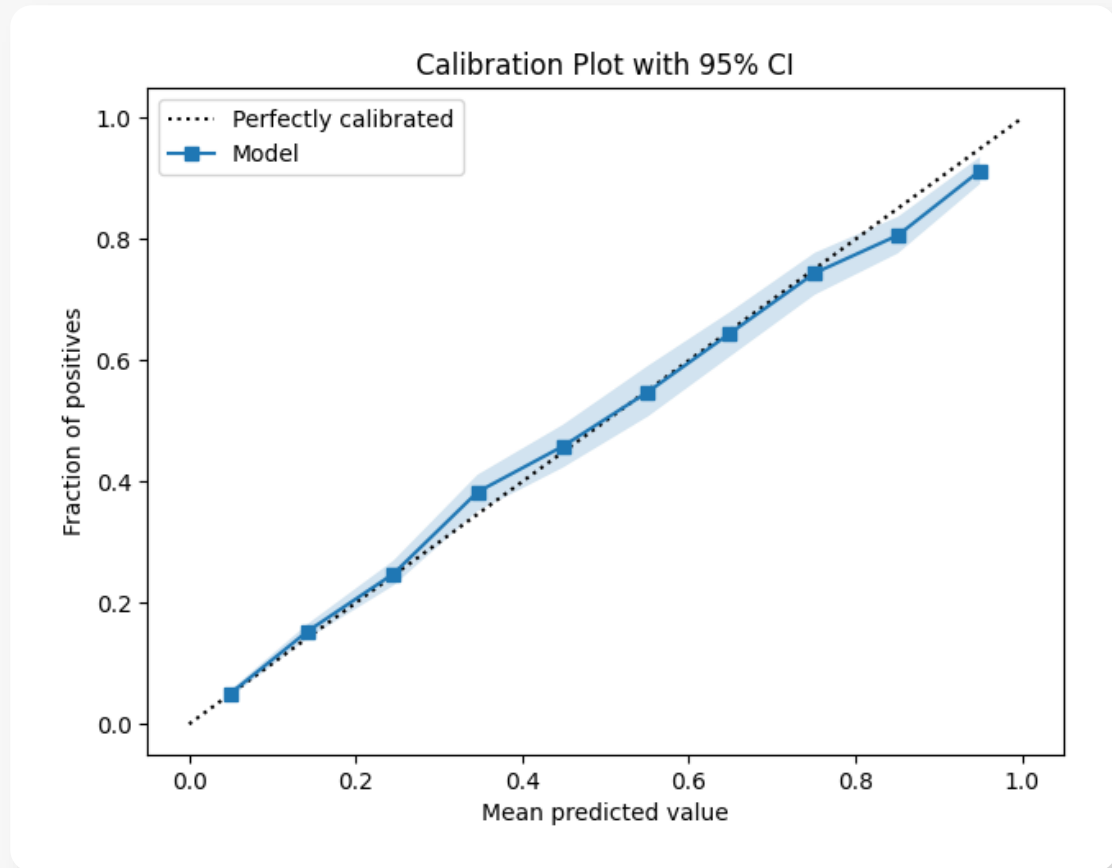
- Stratification
- Independent sector
- Anaesthesia Associates

Mortality:

- Comparison with previous work
- Care decisions, consent & critical care allocation

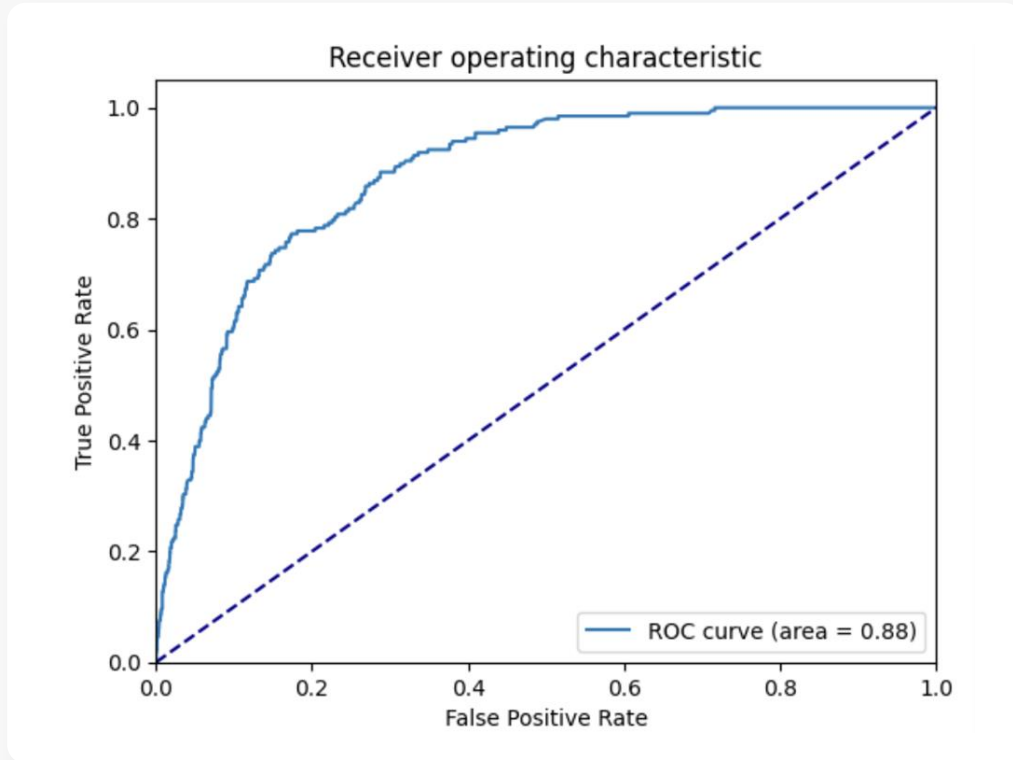


Primary result: ASA stratification



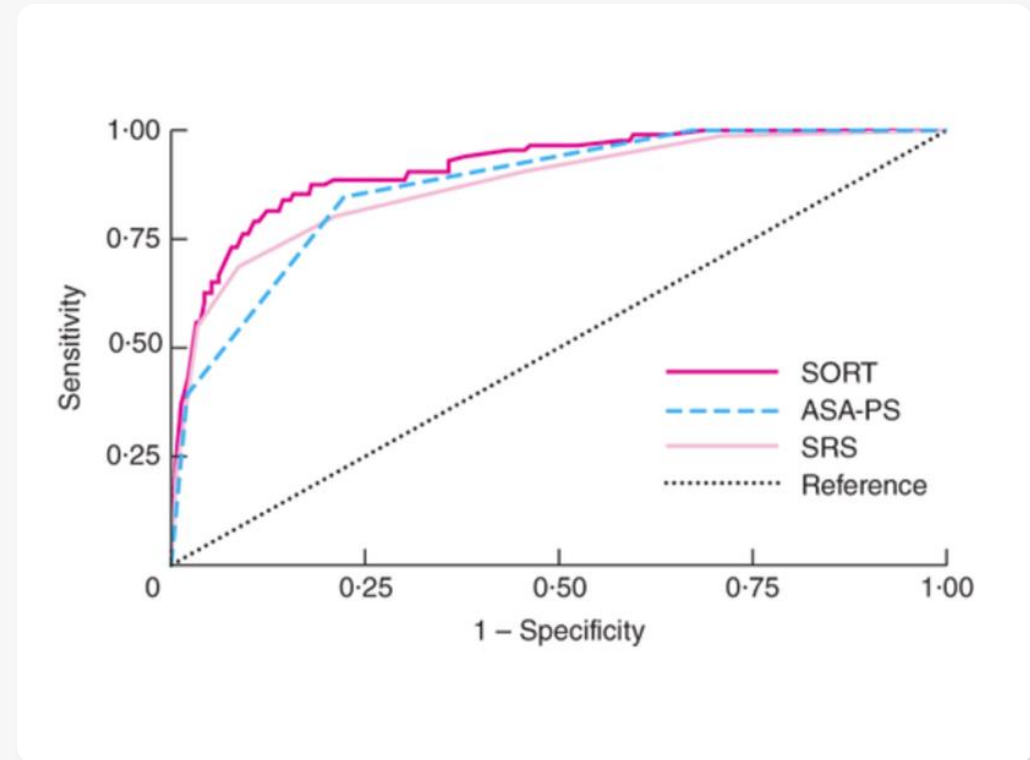
Secondary result: Mortality prediction

“Smart PreOp” model



- No human input / interpretation
- Requires only demographics, medications, listing details
- Suitable for automation

Current gold-standard risk stratification models



- Requires human input / interpretation
- Demographics, medications, listing details, physical examination, tests, medical history



Only useful if incorporated into workflows...

Smart PreO 50%

Tasks and Forms

HORACE, Skelly (Mr)

Born 1987-02-18 (37y)	Gender Male
Email skelly.horace@aireinnovate.com	NHS No. 9690937286

ASA Score

Class	Probability
ASA 1 or 2	0.86
ASA 3 or 4	0.14

ASA 1 or 2: 0.86
ASA 3 or 4: 0.14

A machine learning generated probability that the patient is ASA 1/2 or ASA 3+

Date generated: 29/02/2024
[Full report](#)

Created

All Tasks

1

HORACE, Skelly (Mr)

Yes

Do you have any problems with circulation in your legs?
No

Do you have any problems with your kidneys?
No

Do you have diabetes?
No

Medications


This is Medications data from GP Connect. Please note - this data will automatically update

Date retrieved: 2024-02-29T11:26:52.346Z



Medications

Acute Medication (Last 12 Months)
Date filter not applied

Type	Start Date	Medication Item	Dosage Instruction	Quantity	Scheduled End Date	Days Duration	Additional Information
NHS Medication	25-Aug-2023	Tramadol 50mg capsules	one tablet every 4 to 6 hours	28 days		28	Take 1 or 2 tablets as directed up to 4 times per day



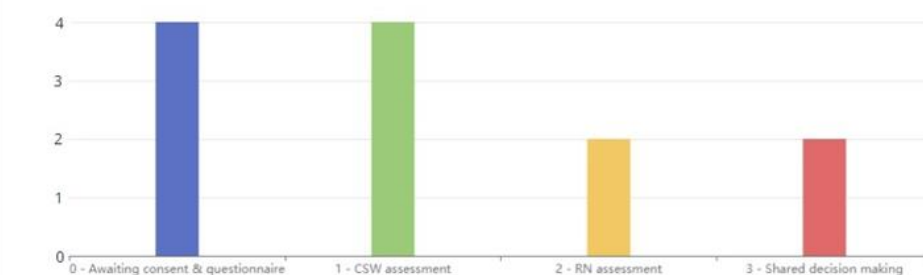
Smart PreOp Dev

 Mary Magorrian : Multiple Roles 

+

All Surgery ▾

Patient Status'
6
^



0 - Awaiting consent & questionnaire
1 - CSW assessment
2 - RN assessment
3 - Shared decision making

↑ Status

Overdue Tasks
6
^



6

Likely ASA 1-2: Low risk pathway

Full Name	Status	Procedure	View
HENDERSON, Carol ann (Ms)	CSW assessment	J18 - Laparoscopic cholecystectomy	>
BARRAL, Anton (Mr)	CSW assessment	W371 - Primary total hip replacement using cement	>
KIRBY, Toby (Mr)	CSW assessment	J18 - Laparoscopic cholecystectomy	>
BLACKBURN, Tania (Ms)	CSW assessment	Q071 - Abdominal hysterectomy	>

Likely ASA 3-5: Full assessment pathway

Full Name	Status	Procedure	View
STORE, Xander (Mr)	Shared decision making	W401 - Primary total knee replacement using cement	>
HORACE, Skelly (Mr)	RN assessment	H071 - Right hemicolectomy	>
SOWDEN, Virgil (Mr)	RN assessment	W381 - Primary total hip replacement not using cement	>
JAMES, Jen (Dr)	Shared decision making	W401 - Primary total knee replacement using cement	>

Key takeaways

- Modelling not just academic activity
- Architecture & governance preceded modelling
- High-performing models from few variables
- **75% of patients can be automatically stratified with >90% precision**
- Proof of concept, capability development

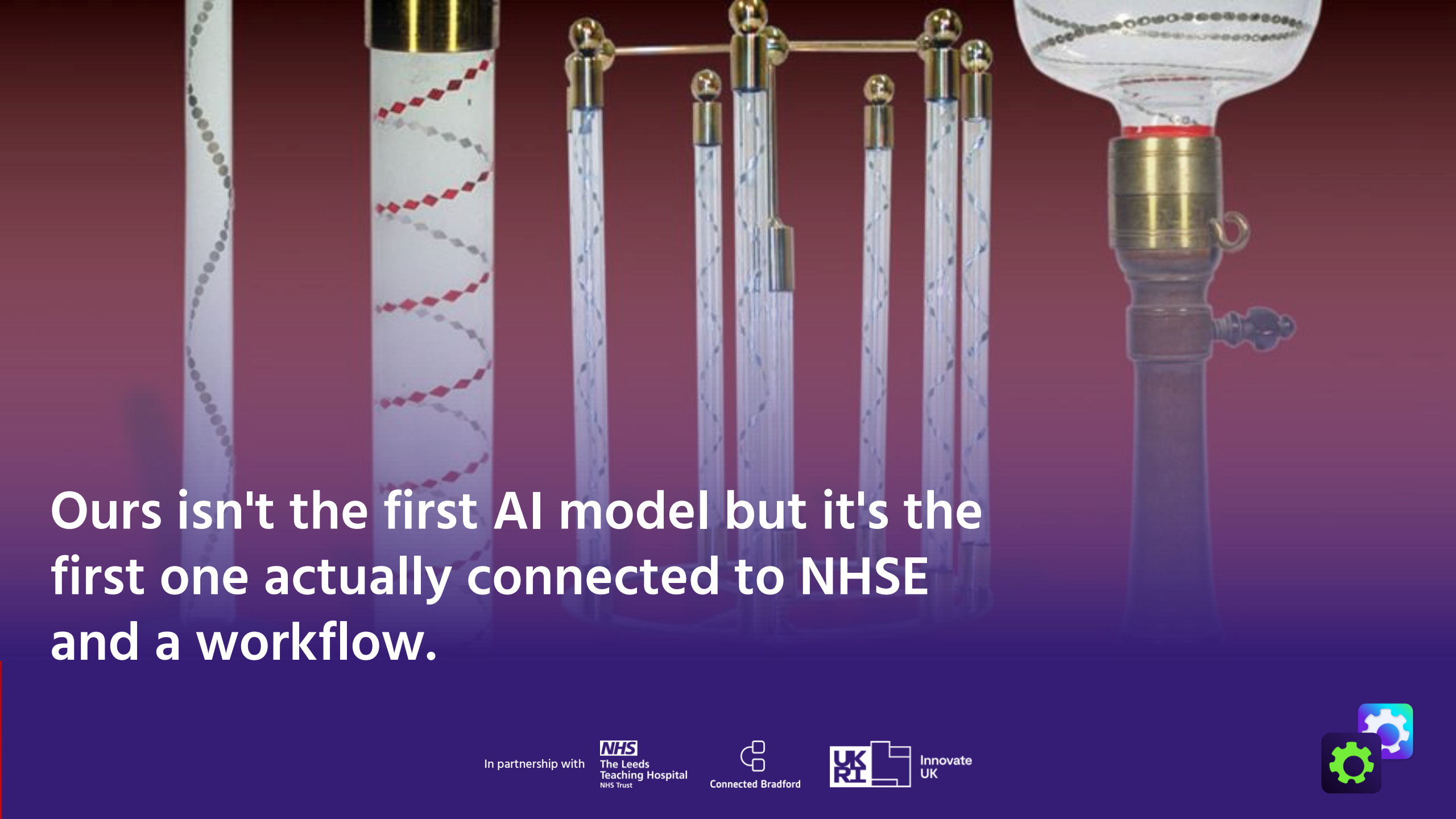


Thanks



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Ours isn't the first AI model but it's the first one actually connected to NHSE and a workflow.

In partnership with



Connected Bradford



Innovate UK

