



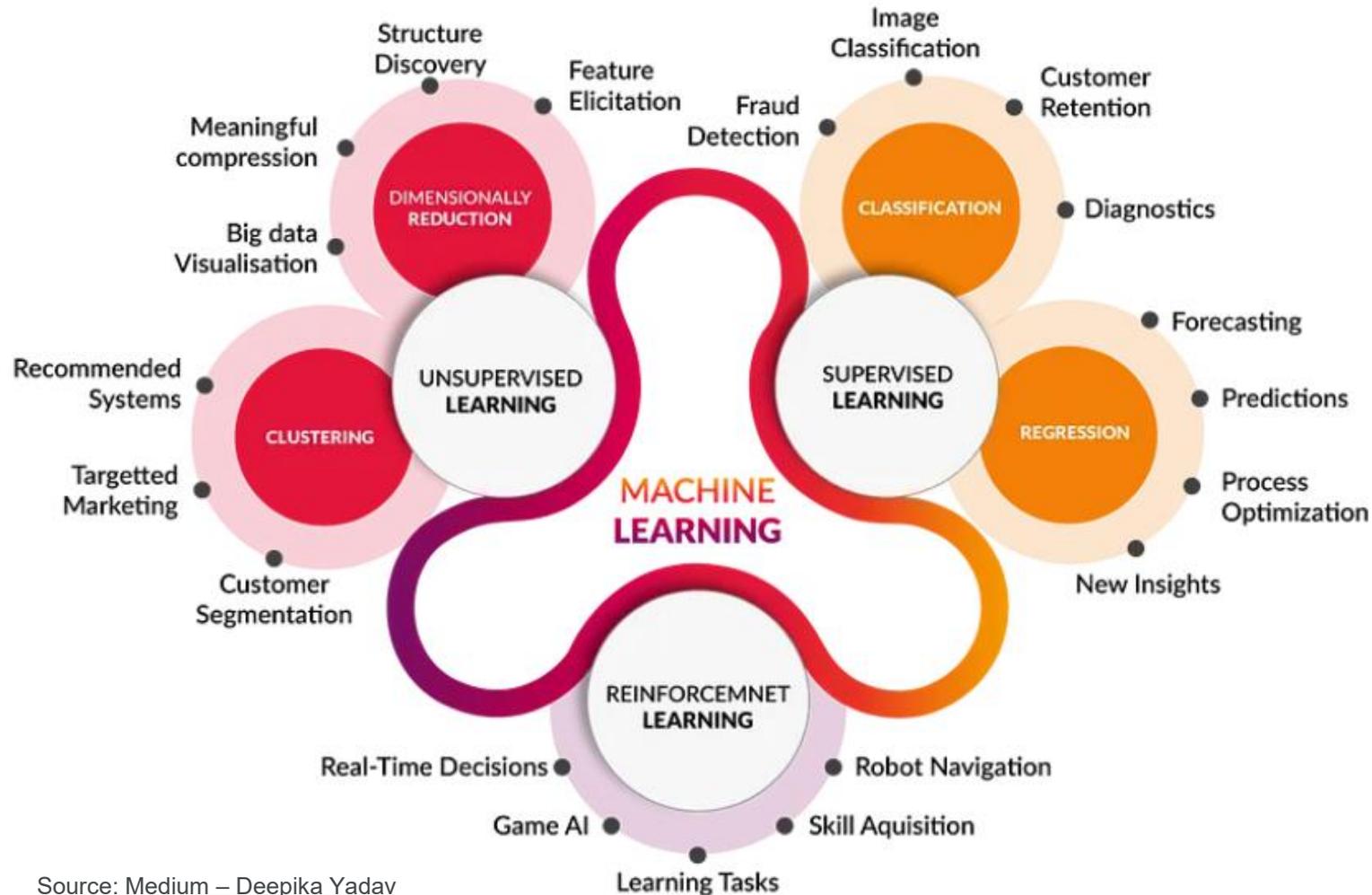
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Transforming mortality research through Artificial Intelligence

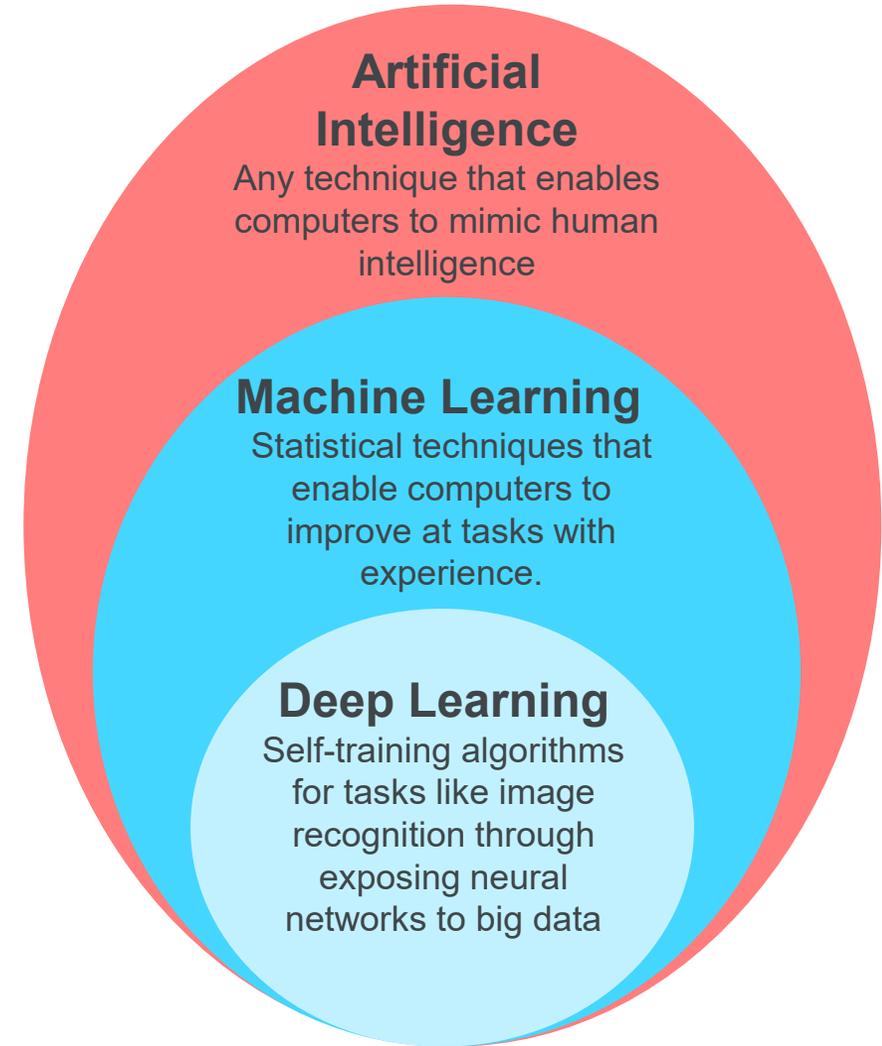
Dan Ryan
Director of Demographic Science
Just Group

6 October 2025

Artificial Intelligence & Machine Learning



Source: [Medium – Deepika Yadav](#)

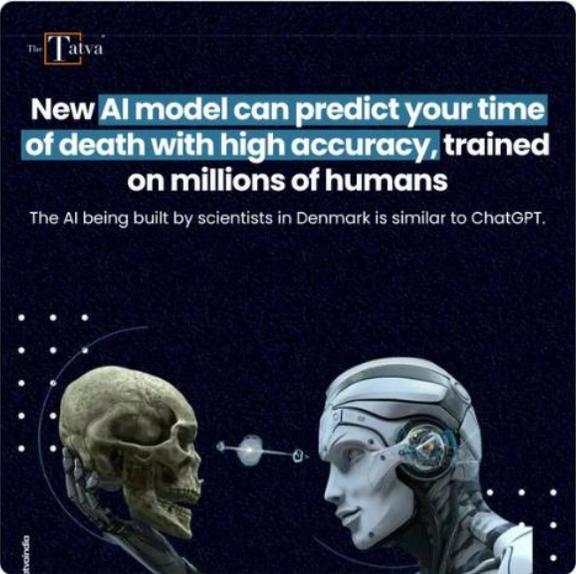


Introducing AI into mortality prediction

The Tatva @thetatvaindia · Follow

A groundbreaking new ChatGPT-like artificial intelligence system trained with the life stories of over a million people is highly accurate in predicting the lives of individuals as well as their risk of early death, according to a new study.

This AI system, named "life2vec," [Show more](#)



6:42 AM · Dec 21, 2023

276 Reply Copy link

Source: [Life2vec-ai](#)

Neuroscience News @NeuroscienceNew · Follow

A new study unveils AI's power to forecast personal futures. Life2vec model analyzes millions of data points, pushing ethical boundaries in AI's role in society.

[neurosciencenews.com/ai-life-event-...](#)

1/2



9:05 PM · Dec 18, 2023

LIFE2VEC

OFFICIAL SOURCE

USING SEQUENCES OF

LIFE-EVENTS TO

PREDICT HUMAN LIVES [1]



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Obstacles, hype & fakes

Our Statement

The *only* official webpage (i.e., *maintained by the paper's authors*) for the **life2vec** model described in Nature Computational Science. The paper has gone viral, and it is essential to clarify that much of the viral coverage misrepresents the model's capabilities, including claims that the model can *predict the time of death, financial status, or health condition*. Additionally, many sources *falsely* claim that the model is publicly available online.

We, the paper's authors, aim to clarify certain aspects of our model and prevent the public from being misled by counterfeit services, such as the so-called AI Doom Calculator, Telecharger, Intelligent Death AI, Death Predictor, etc. In the [FAQ](#) below, we try to explain what the paper actually says.

But first, a warning: We are aware of social media accounts and at least one fraudulent website claiming to be associated with the life2vec model.

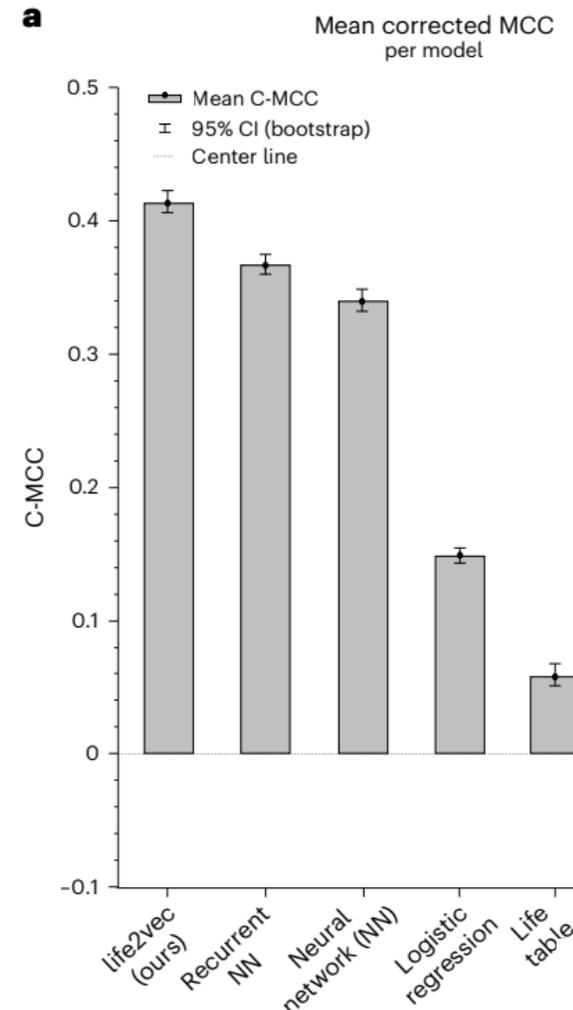
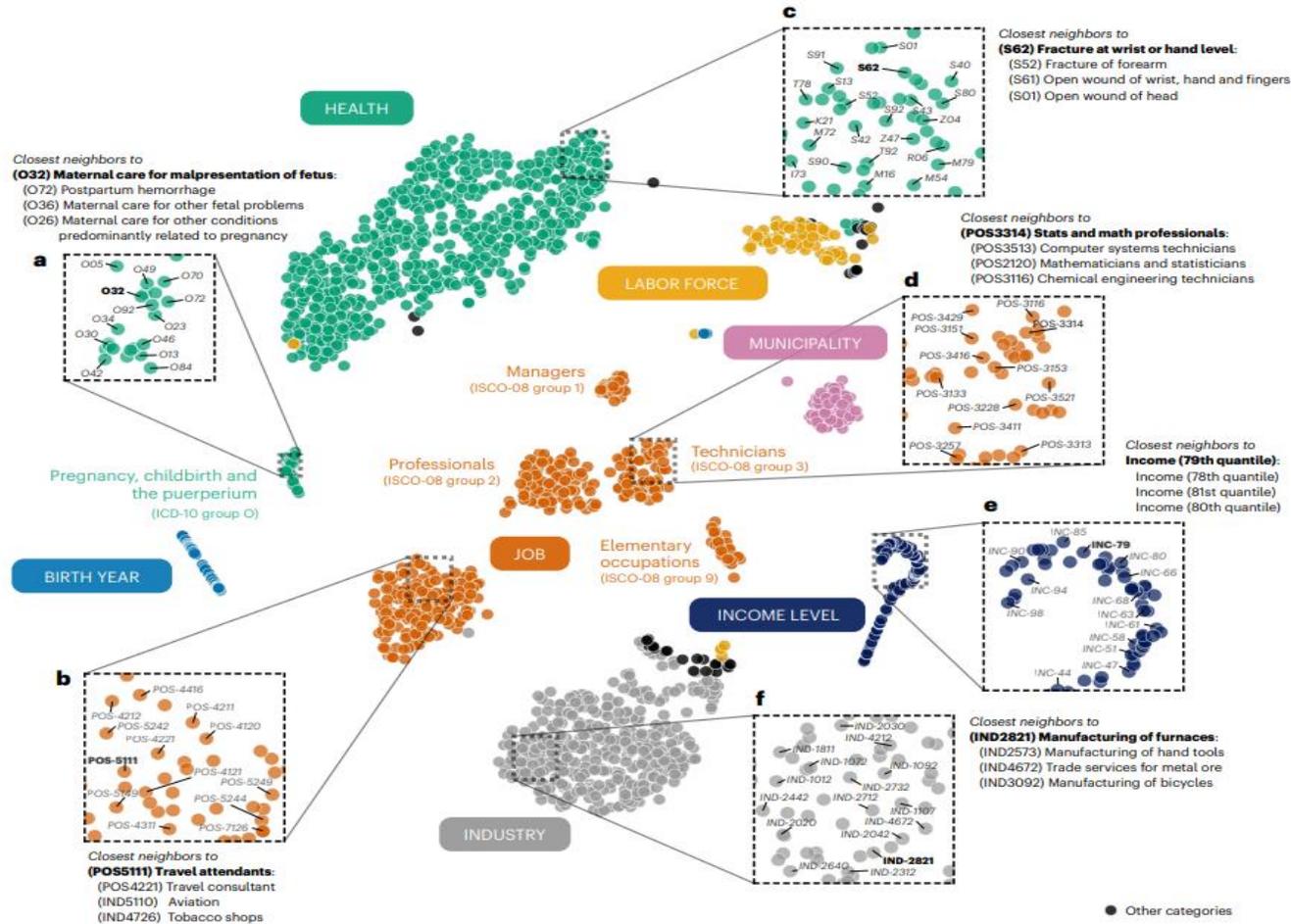
We are not affiliated with these or any other entities that claim to use our technology.

Source: Life2vec.dk



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Mapping life determinants in concept space



Source: [Life2vec-ai](#)



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The world of data - electronic health records (eHR)



Data to build better population health outcomes and a foundation for research



GENERATING NEW KNOWLEDGE TO IMPROVE PATIENT CARE



OpenSAFELY



OpenSAFELY is a collaboration between TPP, London School of Hygiene & Tropical Medicine, and Oxford University DataLab. The initial aim of the project was to design a way to analyse pseudonimised patient data without moving it from TPP's servers, allowing researchers to identify risk factors which contribute to Covid deaths. Research using this method is ongoing, with a particular focus on Covid during the pandemic.

Read more about OpenSAFELY [here](#).

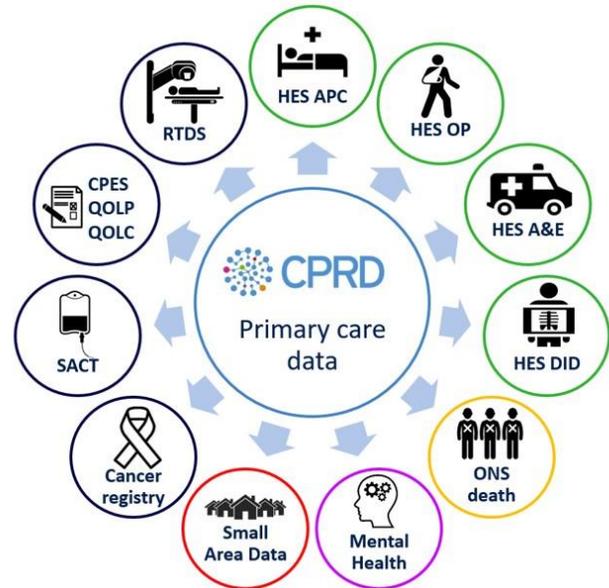


UK data driving real-world evidence



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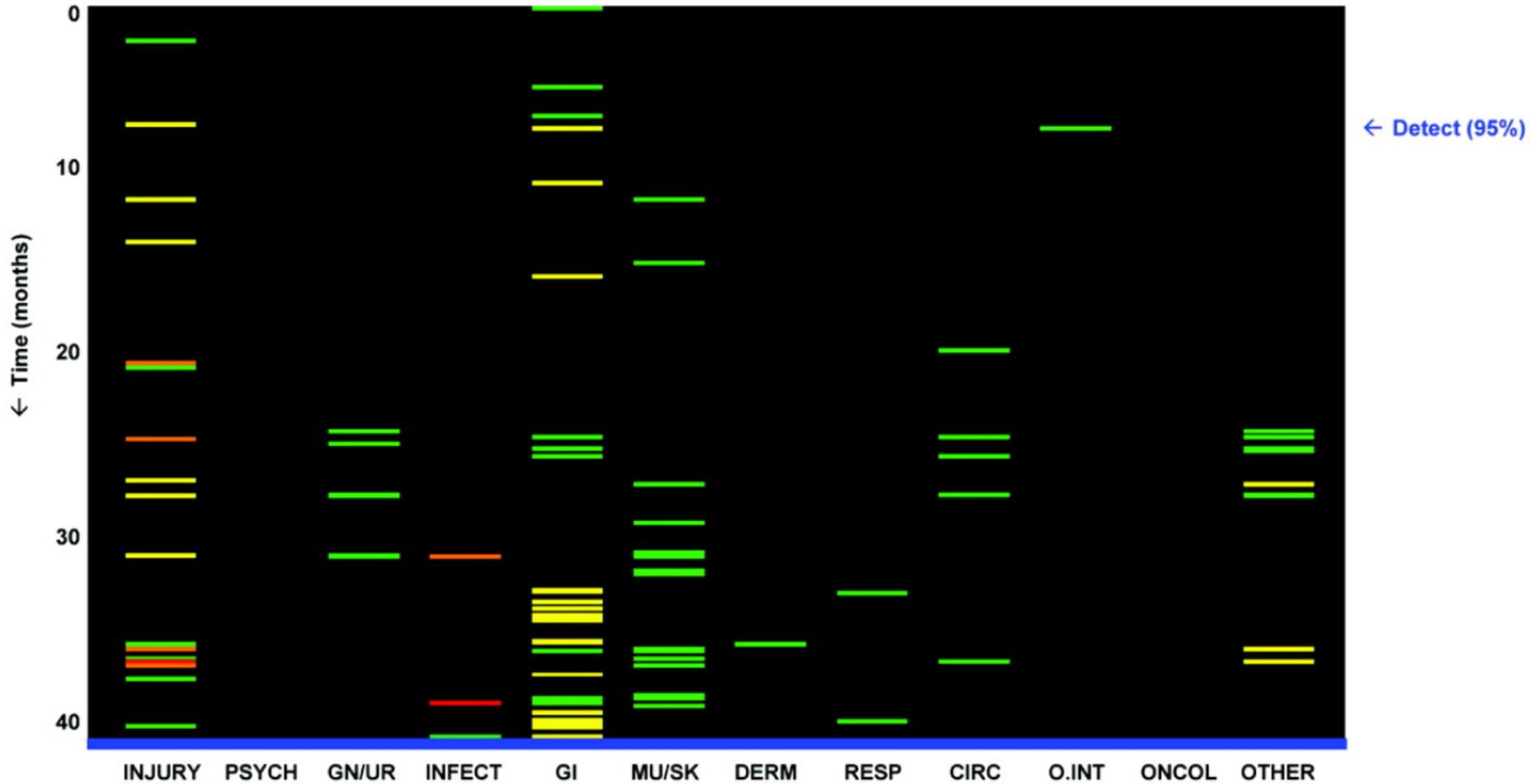
Evolving structure of eHR databases



The screenshot shows the EMIS Web Health Care System interface for a patient named DUMMY, Dum (Mr). The interface displays a date navigator on the left and a consultation text table on the right.

Date	Consultation Text	Consultant
13-Nov-2014	GP Surgery (WHETSTONE LANE MED CTR_SHAH N)	KIDD, Susan (Dr)
	Empty consultation	
11-Nov-2014	GP Surgery (WHETSTONE LANE MED CTR_SHAH N)	SHAH, Nicholas (Dr)
	Problem: Upper respiratory tract infection NOS (New)	
	History: xxxojo	
	Examination: efefcv	
	Medication: O/E - blood pressure reading 129/89 mmHg	
	Amoxicillin 500mg capsules One To Be Taken Three Times A Day 15 capsule	
	Olanzapine 5mg tablets One To Be Taken Each Day not 70 tablet	
	Problem: bnhjrn	
11-Nov-2014	GP Surgery (WHETSTONE LANE MED CTR_SHAH N)	SHAH, Nicholas (Dr)
	History: cgnvmbj,hnkgj;:/	
	MSU sent for C/S	
	Examination: v	
	Medication: O/E - blood pressure reading 111/53 mmHg • Urine dipstick test	
	Amoxicillin 500mg capsules Three Times A Day 21 capsule	
10-Sep-2013	GP Surgery (WHETSTONE LANE MED CTR_SHAH N)	LOCKYER, Mark W (Dr)
	Empty consultation	
10-Sep-2013	GP Surgery (WHETSTONE LANE MED CTR_SHAH N)	LOCKYER, Mark W (Dr)
	Problem: Rheumatoid arthritis (First)	
25-Jul-2013	GP Surgery (WHETSTONE LANE MED CTR_SHAH N)	BURCHALL, Frankie (Sister)
	Social: Gong to travel abroad egypt	
	Foreign travel advice re nathnac form	
	Hepatitis A vaccination, unspecified Manufacturer: havix mono, Expiry Date: Jun-2014, Batch Number: ahavb123, GMS: GMS, Injection site: Left arm • Booster hepatitis A vaccin.	
	Medication: Sildenafil 100mg tablets One To Be Taken As Directed 4 tablet	
03-Jun-2013	GP Surgery (WHETSTONE LANE MED CTR_SHAH N)	BEALE, Anthony (Mr)
	Social: Never smoked tobacco • Alcohol consumption 6 U/week • Alcohol use disorders identification test 4 /40 • Alcohol use disorder id	

Using patient histories to predict the future

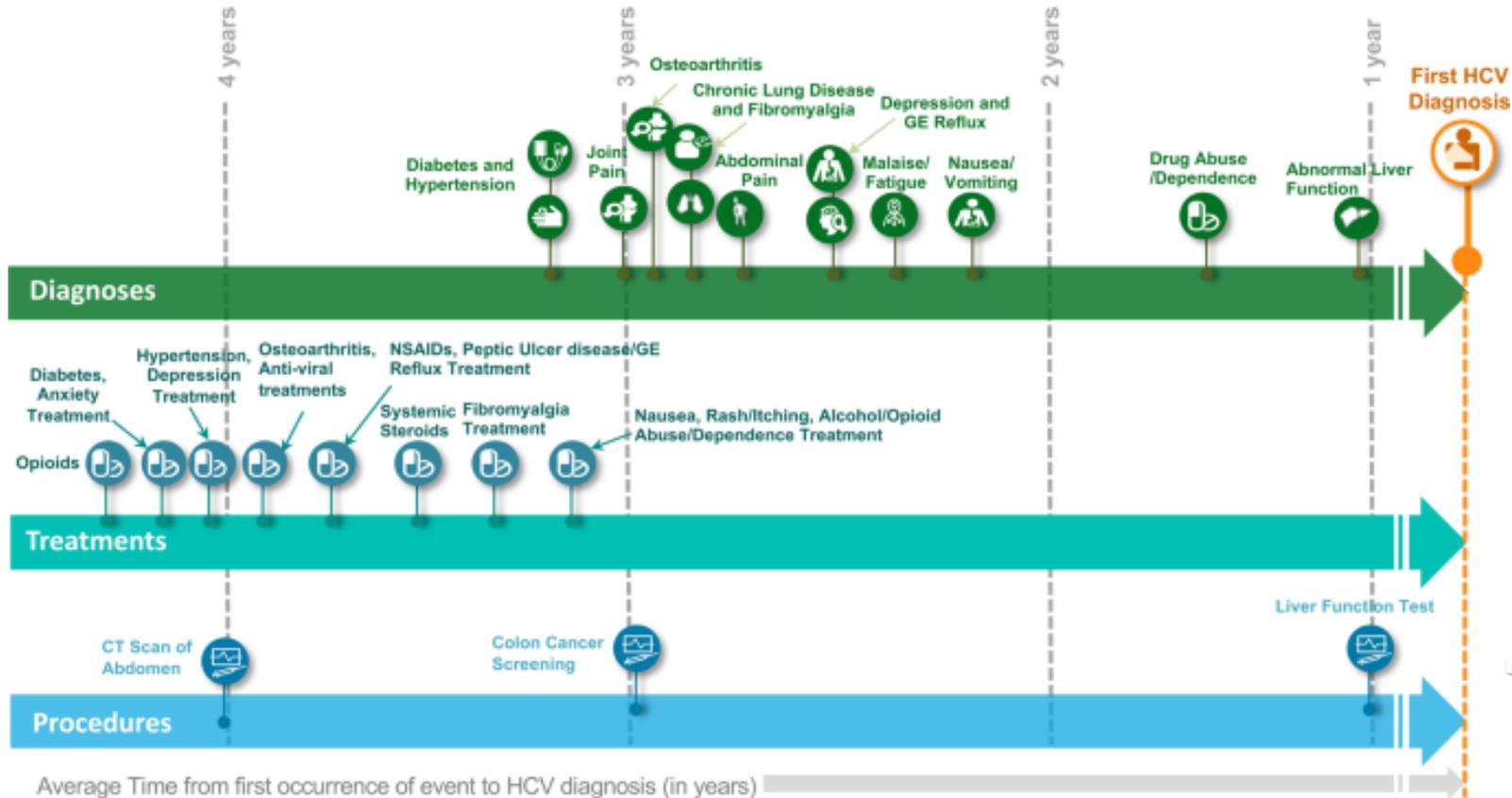


Source: [Longitudinal histories as predictors of future diagnoses of domestic abuse: modelling study](#). 2009



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Using eHR to build patient journeys & treatment pathways



Source: IQVIA Patient Journeys



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Benefits of machine learning to clinicians

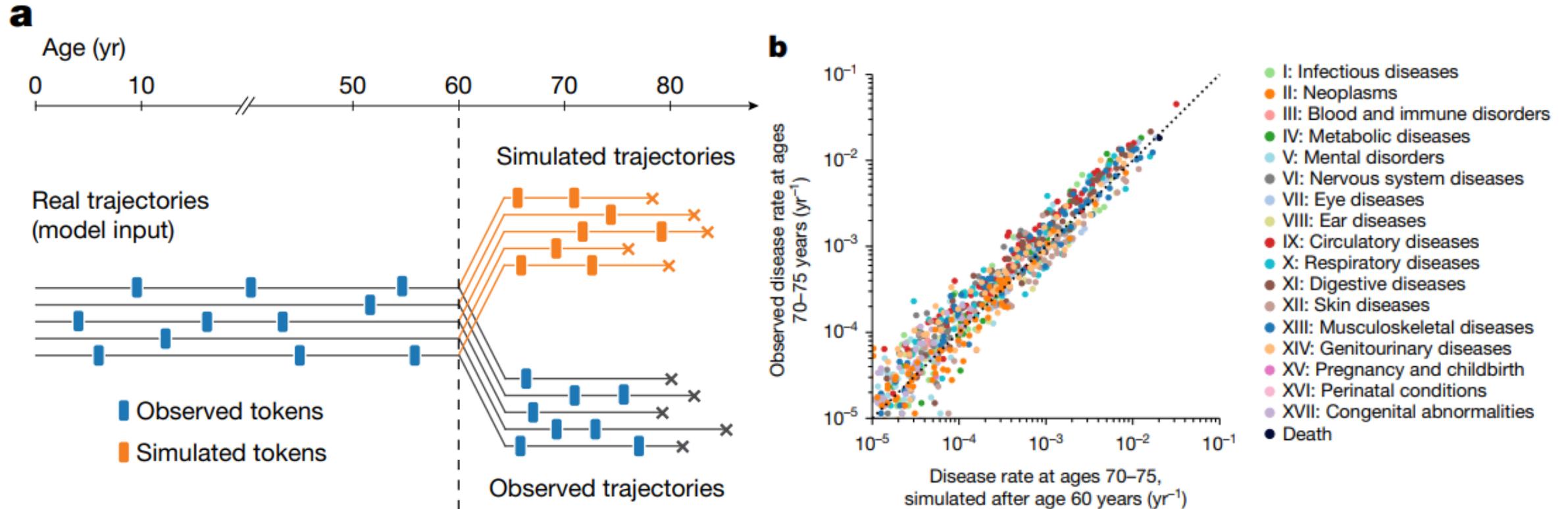
- AI Voice Assistants
 - Voice notes uploaded directly to eHR in real time
 - Capture all audio in room and use NLP to focus on medical terms
- Clinical Decision Support & Predictive Analytics
 - Google's DeepMind project with US Department of Veteran Affairs to predict Acute Kidney Injury up to 48 hours earlier with 90% accuracy
- Clinical Trial Matching
 - Using NLP text mining to identify relevant patient cohorts within minutes, whereas previously clinical research co-ordinators used to take months to manually compare eHR

Source: [Google DeepMind using AI to give doctors a 48-hour head start on life-threatening illness](#), 2019



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Learning about human disease – Delphi-2M & UK Biobank

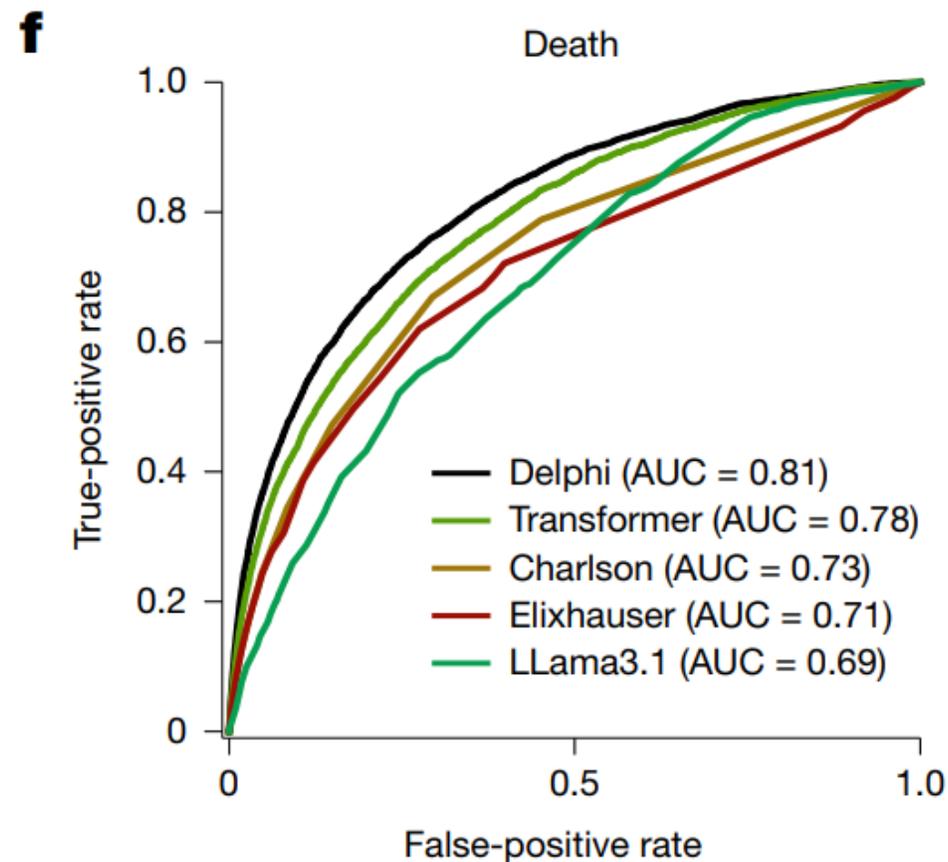
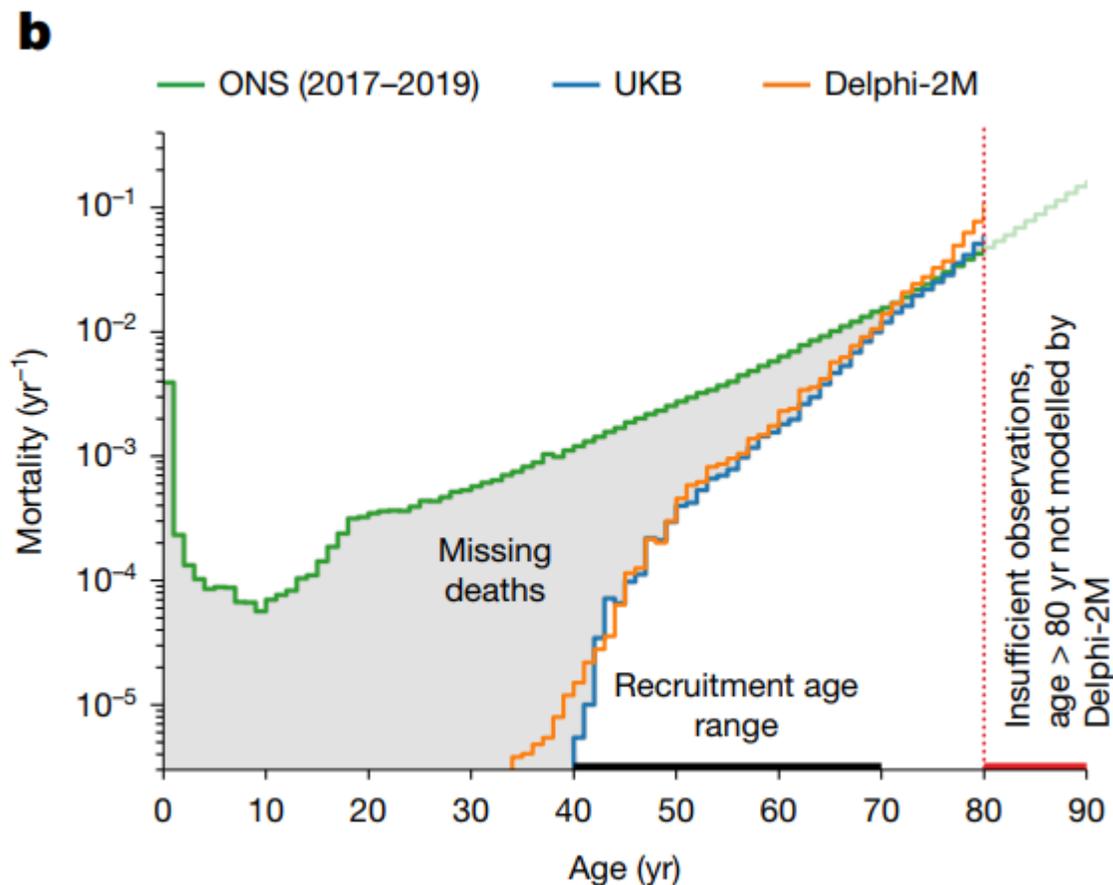


Source: [Learning the natural history of human disease with generative transformers](#)



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Learning about human disease – Delphi-2M & UK Biobank



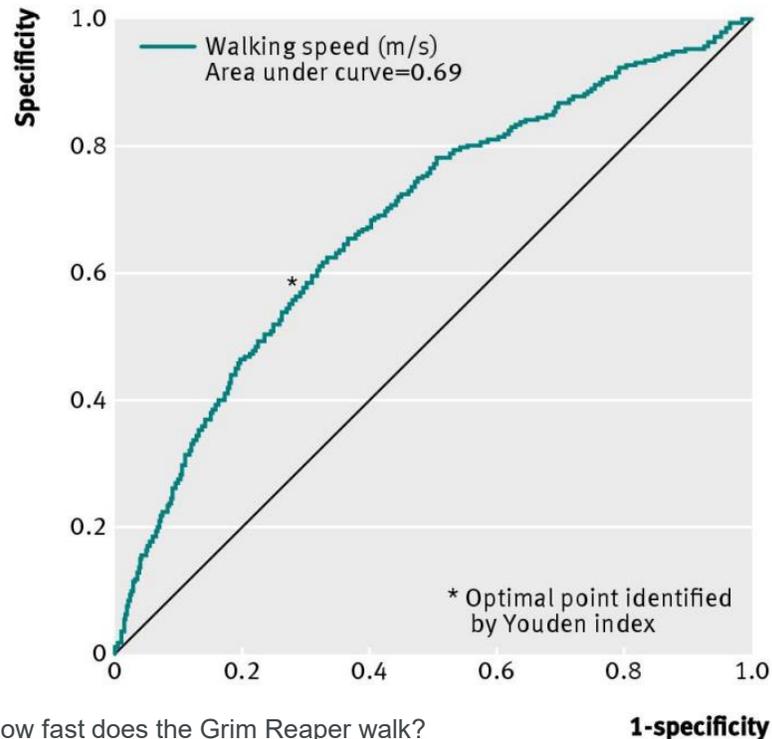
Source: [Learning the natural history of human disease with generative transformers](#)



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Predicting mortality from walking speed (2011)

RESEARCH



CHRISTMAS 2011: DEATH'S DOMINION

How fast does the Grim Reaper walk? Receiver operating characteristics curve analysis in healthy men aged 70 and over

OPEN ACCESS

Fiona F Stanaway *research fellow*¹, Danijela Gnjidic *research fellow*^{2,3,4}, Fiona M Blyth *deputy director, Concord Health and Ageing in Men Project*^{2,4,5}, David G Le Couteur *professor of geriatric medicine*^{2,4,6}, Vasi Naganathan *staff specialist, associate professor*^{2,4}, Louise Waite *staff specialist*^{2,4}, Markus J Seibel *professor of endocrinology*⁵, David J Handelsman *director, professor*^{2,6}, Philip N Sambrook *professor*^{2,7}, Robert G Cumming *professor of geriatric medicine and epidemiology*^{1,2,4}

¹Sydney School of Public Health, University of Sydney, Sydney, Australia; ²Sydney Medical School, University of Sydney, Sydney, Australia; ³Department of Clinical Pharmacology and Department of Aged Care, Royal North Shore Hospital, Sydney, Australia; ⁴Centre for Education and Research on Ageing, Concord Hospital, Sydney, Australia; ⁵Sax Institute, Sydney, Australia; ⁶ANZAC Research Institute, Concord Hospital, Sydney, Australia; ⁷Kolling Institute of Medical Research, Institute of Bone and Joint Research, Royal North Shore Hospital, Sydney, Australia

Abstract

Objective To determine the speed at which the Grim Reaper (or Death) walks.

Design Population based prospective study.

Setting Older community dwelling men living in Sydney, Australia.

Participants 1705 men aged 70 or more participating in CHAMP (Concord Health and Ageing in Men Project).

Main outcome measures Walking speed (m/s) and mortality. Receiver operating characteristics curve analysis was used to calculate the area under the curve for walking speed and determine the walking speed of the Grim Reaper. The optimal walking speed was estimated using the Youden index (sensitivity+specificity-1), a common summary measure of the receiver operating characteristics curve, and represents the maximum potential effectiveness of a marker.

Results The mean walking speed was 0.88 (range 0.15-1.60) m/s. The highest Youden index (0.293) was observed at a walking speed of 0.82 m/s (2 miles (about 3 km) per hour), corresponding to a sensitivity of 63% and a specificity of 70% for mortality. Survival analysis showed that older men who walked faster than 0.82 m/s were 1.23 times less likely to die (95% confidence interval 1.10 to 1.37) than those who walked slower (P=0.0003). A sensitivity of 1.0 was obtained when a walking speed of 1.36 m/s (3 miles (about 5 km) per hour) or greater was used,

indicating that no men with walking speeds of 1.36 m/s or greater had contact with Death.

Conclusion The Grim Reaper's preferred walking speed is 0.82 m/s (2 miles (about 3 km) per hour) under working conditions. As none of the men in the study with walking speeds of 1.36 m/s (3 miles (about 5 km) per hour) or greater had contact with Death, this seems to be the Grim Reaper's most likely maximum speed; for those wishing to avoid their allotted fate, this would be the advised walking speed.

Introduction

The Grim Reaper, the personification of death, is a well known mythological and literary figure.¹⁻⁴ Reported characteristics include a black cloak with cowl, a scythe, and cachexia. High quality scientific research linking the Grim Reaper to mortality has been scarce, despite extensive anecdotes.

Walking speed is a commonly used objective measure of physical capability in older people, predicting survival in several cohort studies.^{5,7} A recent meta-analysis found that being in the lowest fourth of walking speed compared with the highest was associated with a threefold increased risk of mortality.⁸ Moreover, the association between slow walking speed and mortality seems consistent across several ethnic groups and shows a dose-response relation.⁸ Although the association

Correspondence to: D Gnjidic danijela.gnjidic@sydney.edu.au

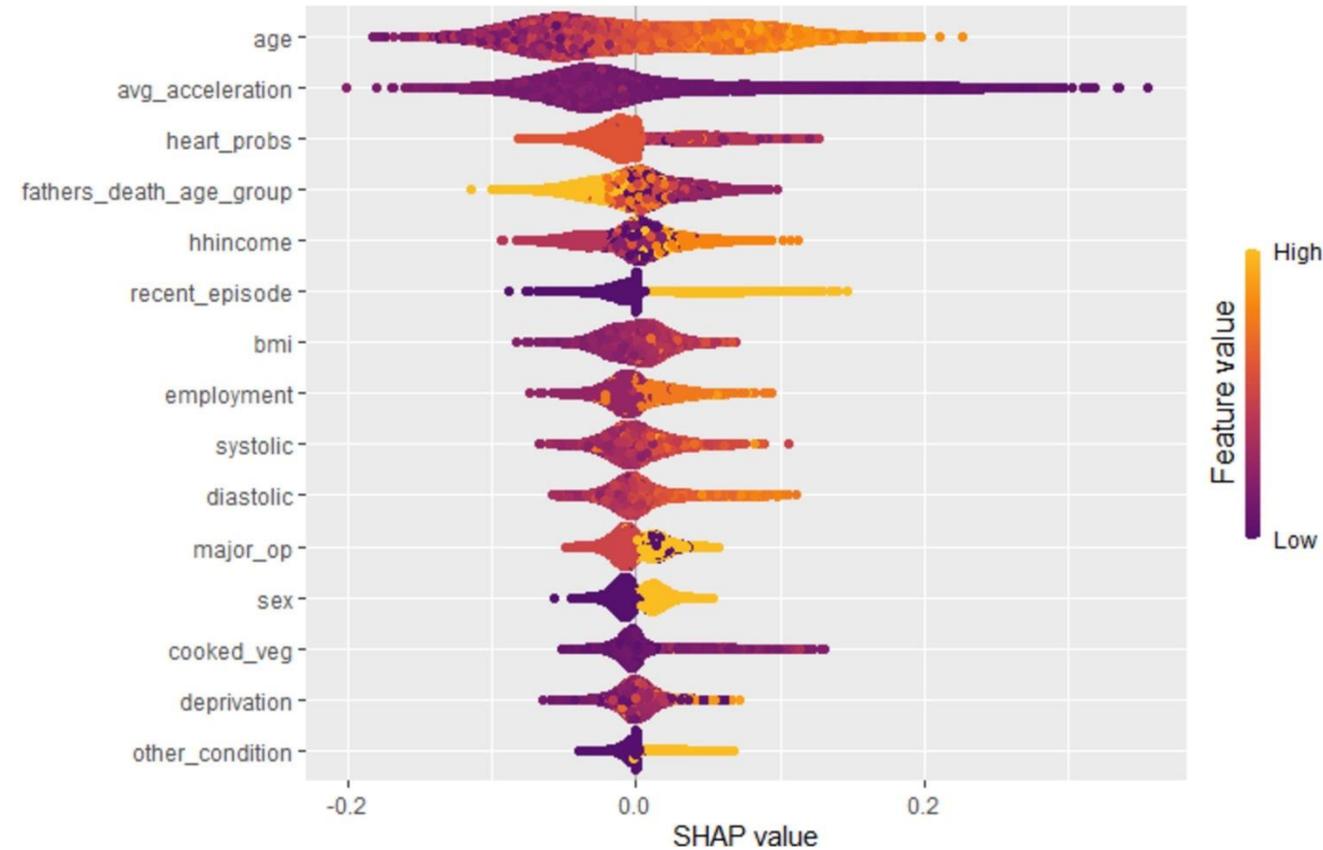
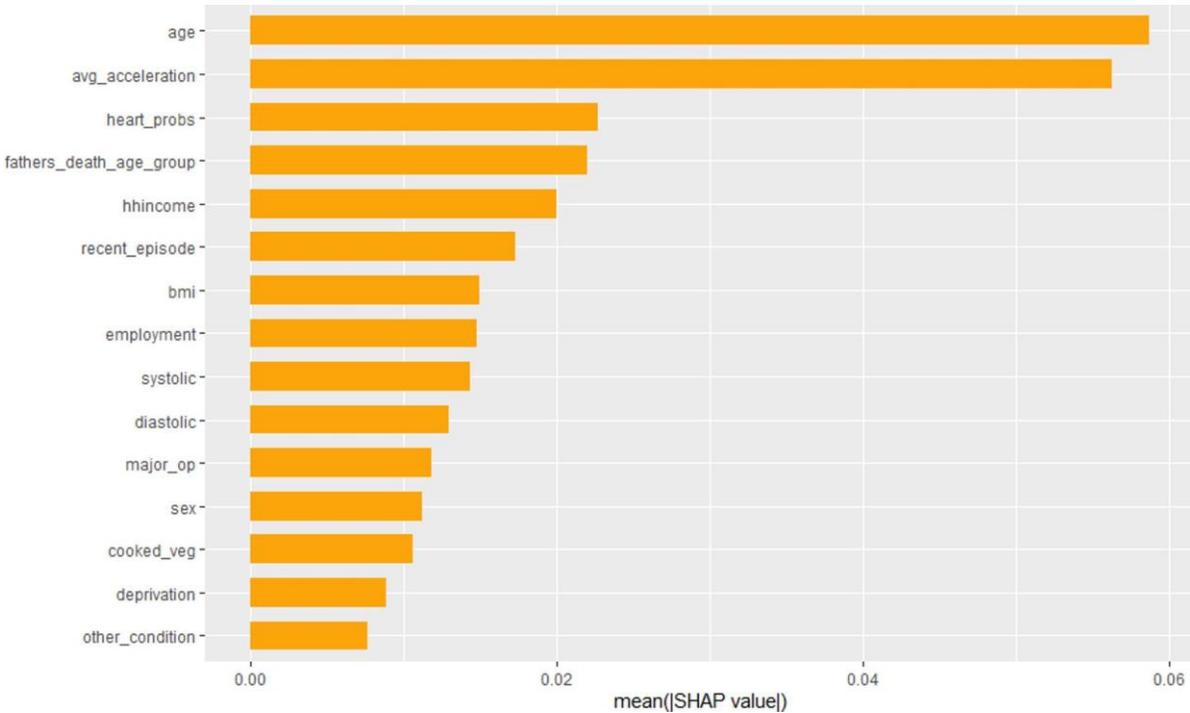
Source: [How fast does the Grim Reaper walk?](#)

1-specificity



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Using AI to predict mortality from activity trackers (2025)

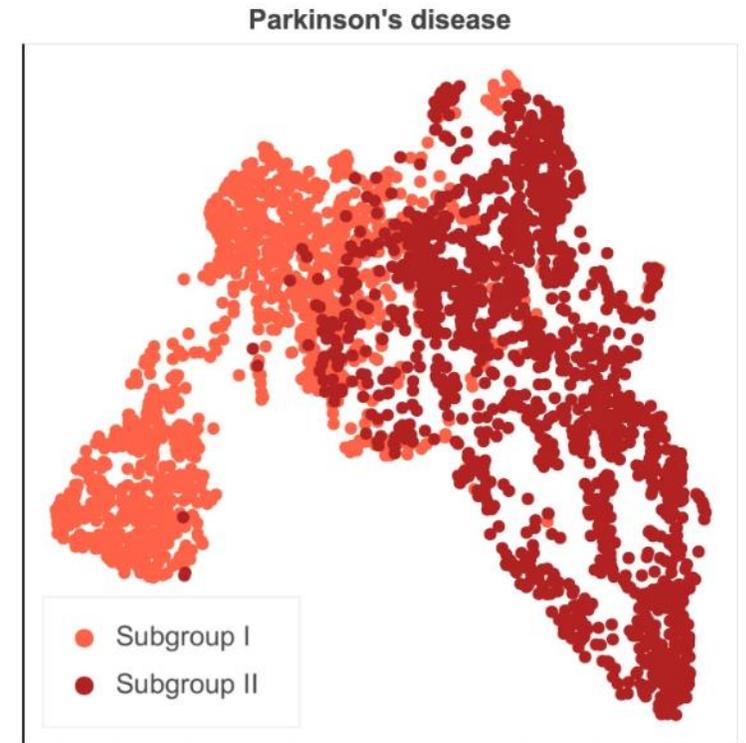
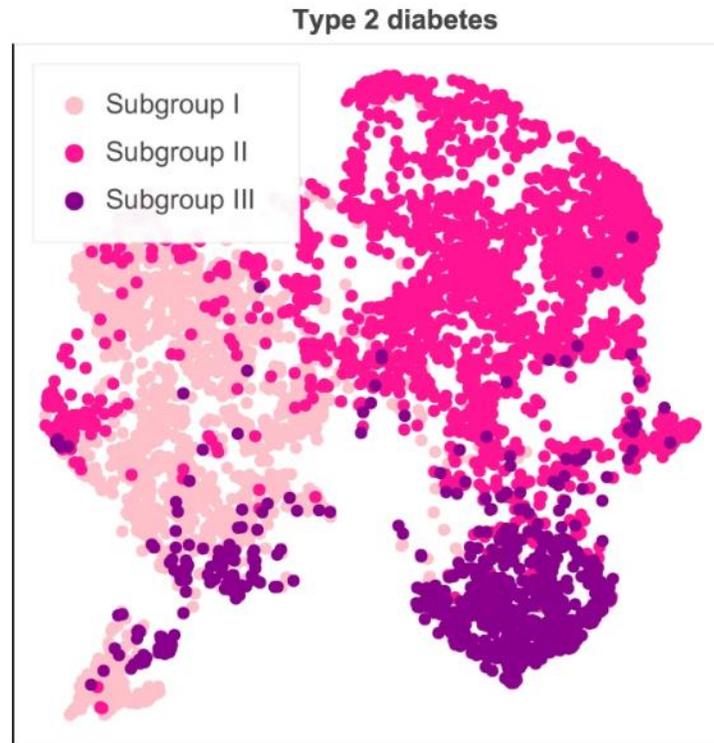
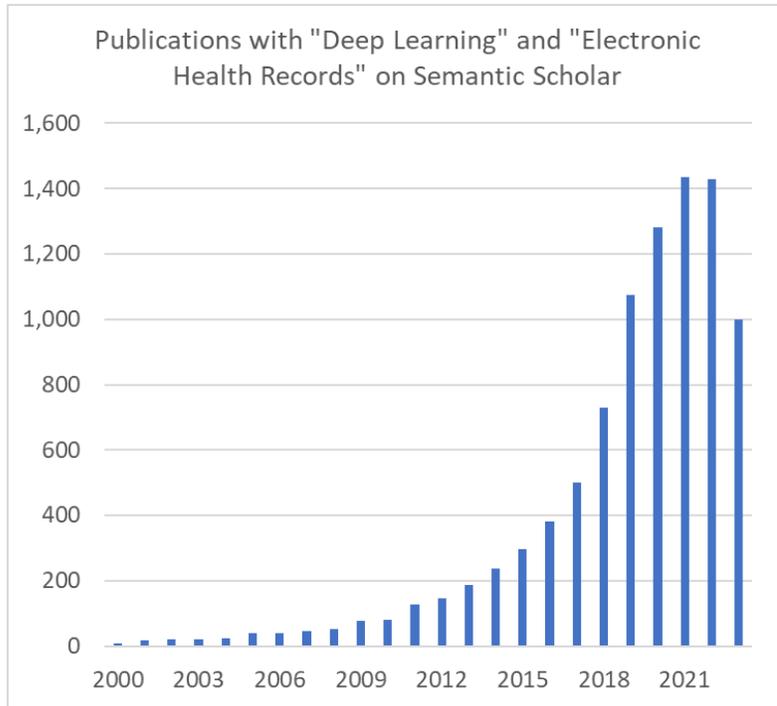


Source: [Mortality prediction using data from wearable activity trackers – an explainable artificial intelligence approach](#)



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Growth of deep learning in investigating eHR databases

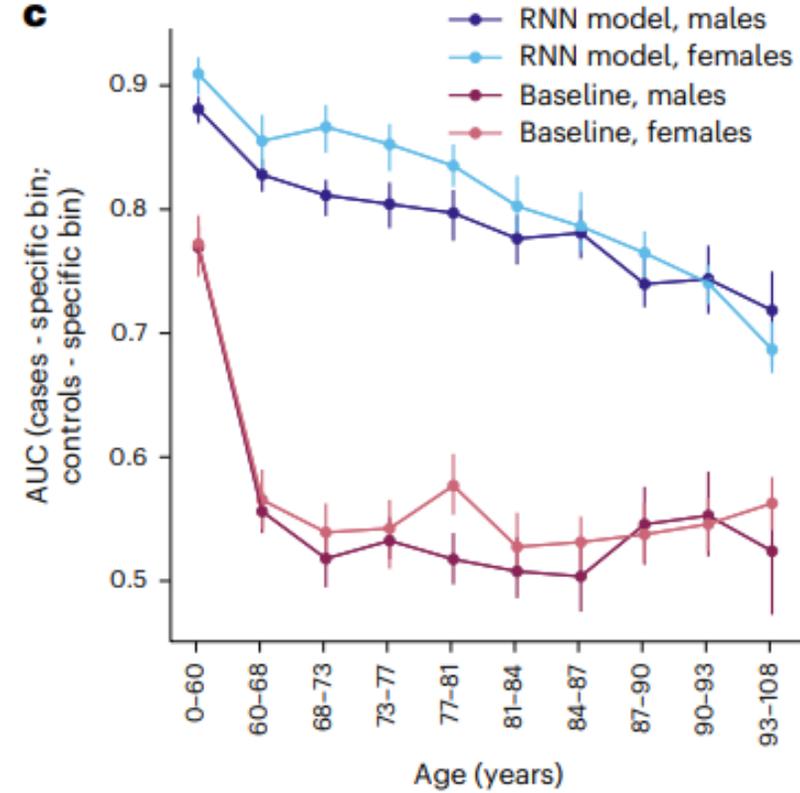
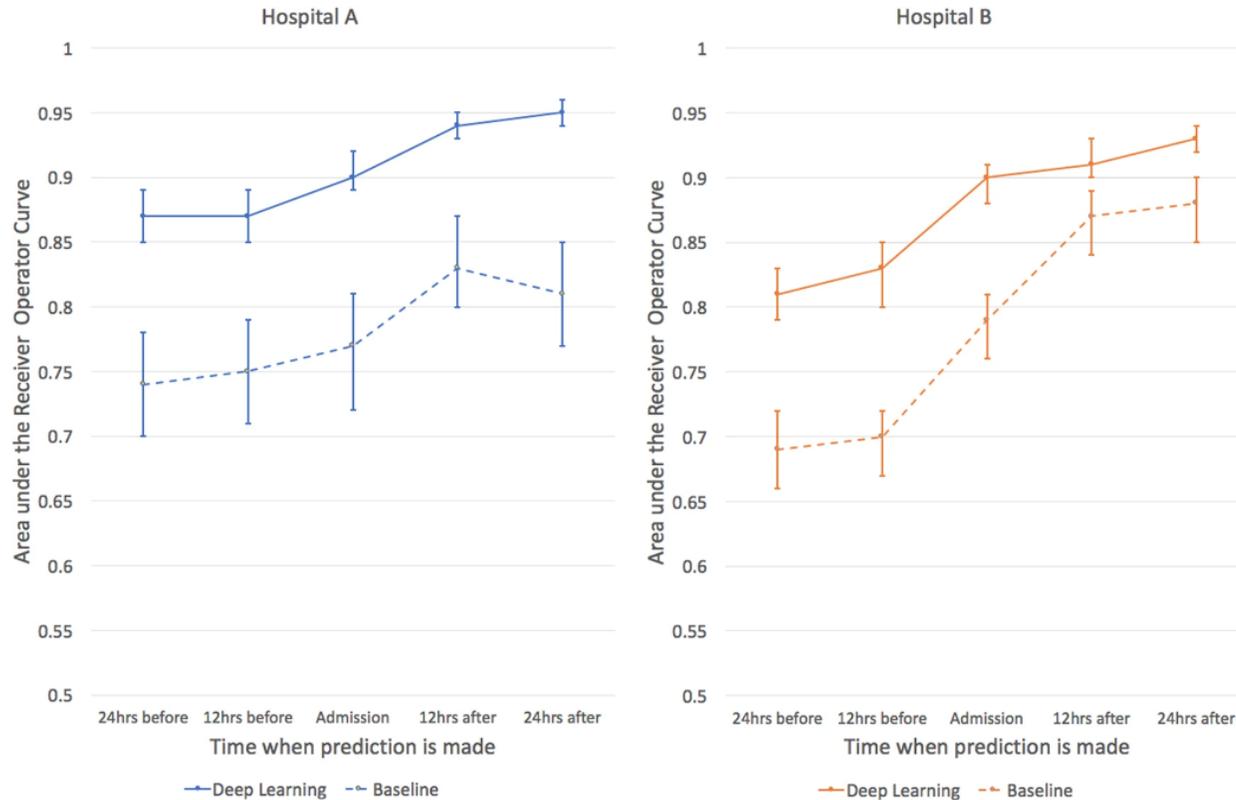


Source: [Deep representation learning of electronic health records to unlock patient stratification at scale](#), 2020



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Real-world use of deep learning to improve predictions

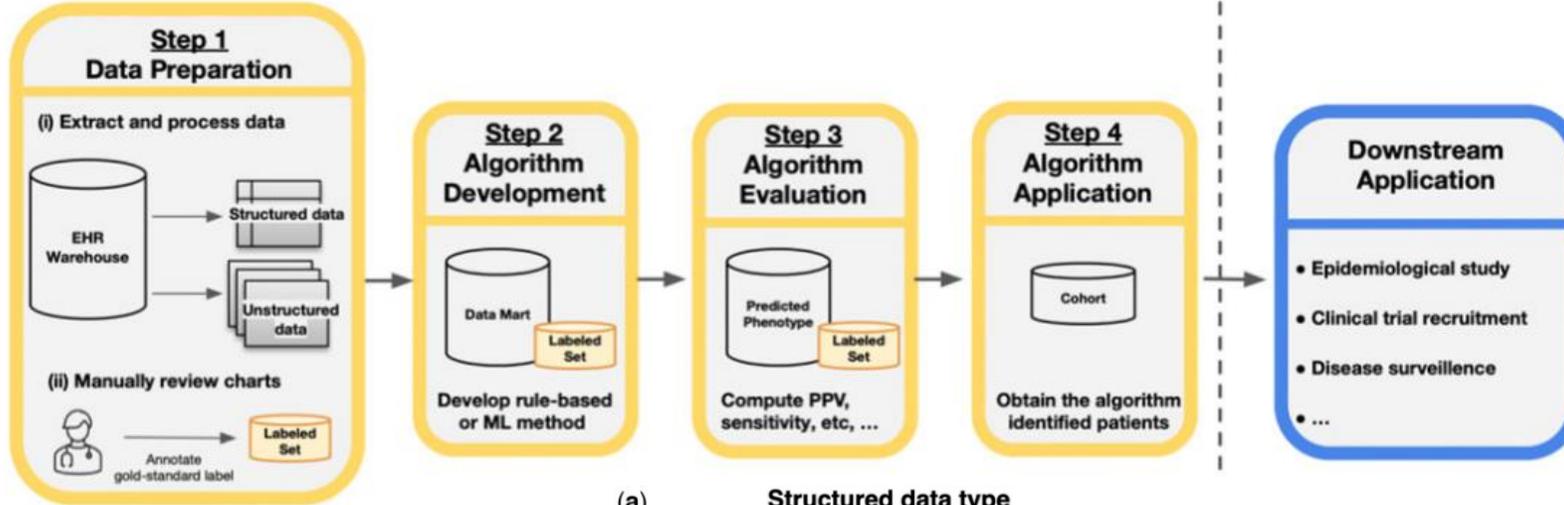


Source: Scalable and accurate deep learning with electronic health records, 2018; Deep learning prediction of one-year mortality in Finland

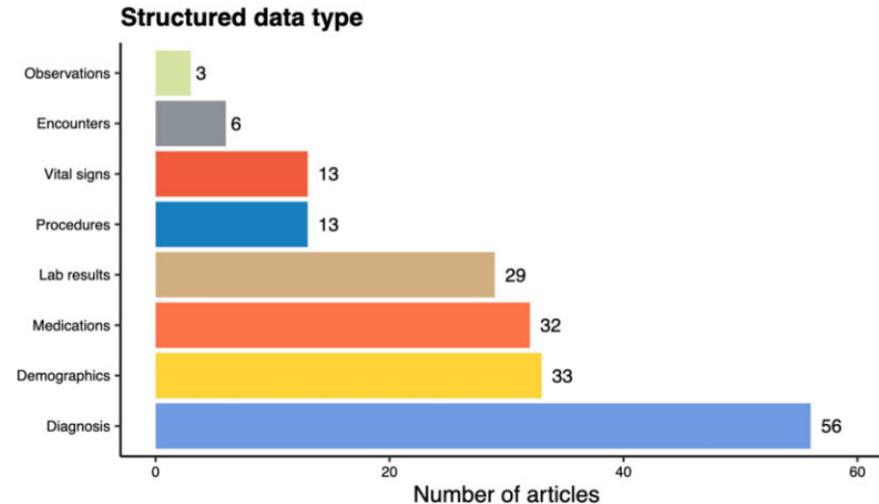


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Use of machine learning to identify patient cohorts



(a)



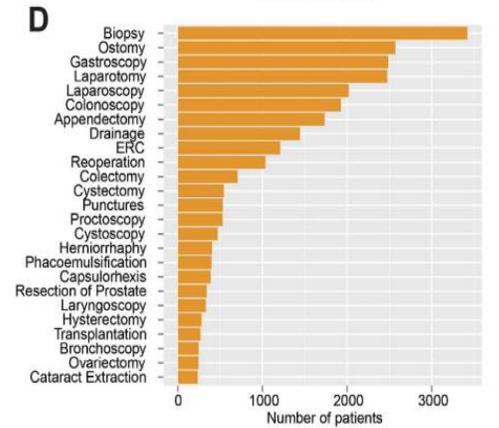
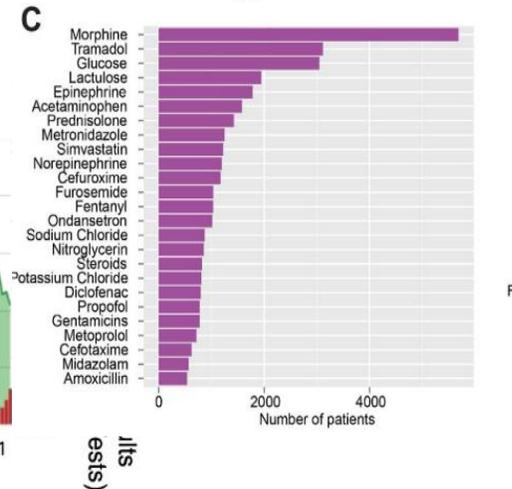
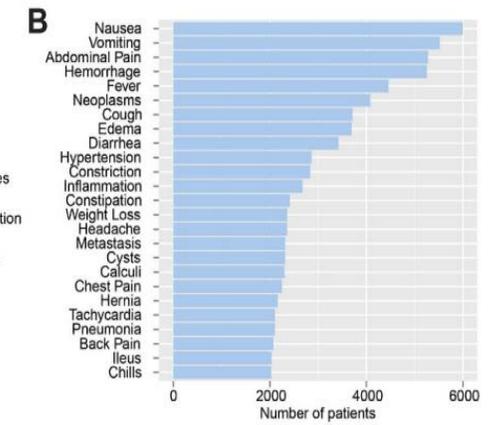
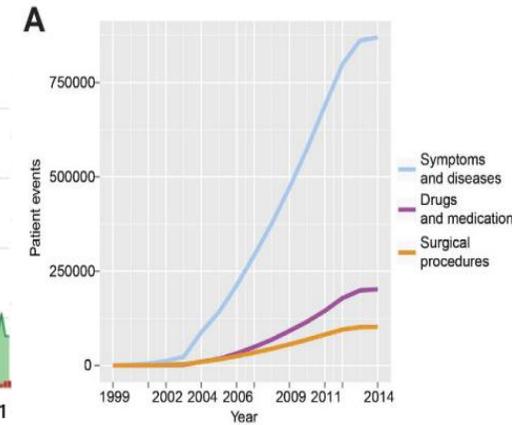
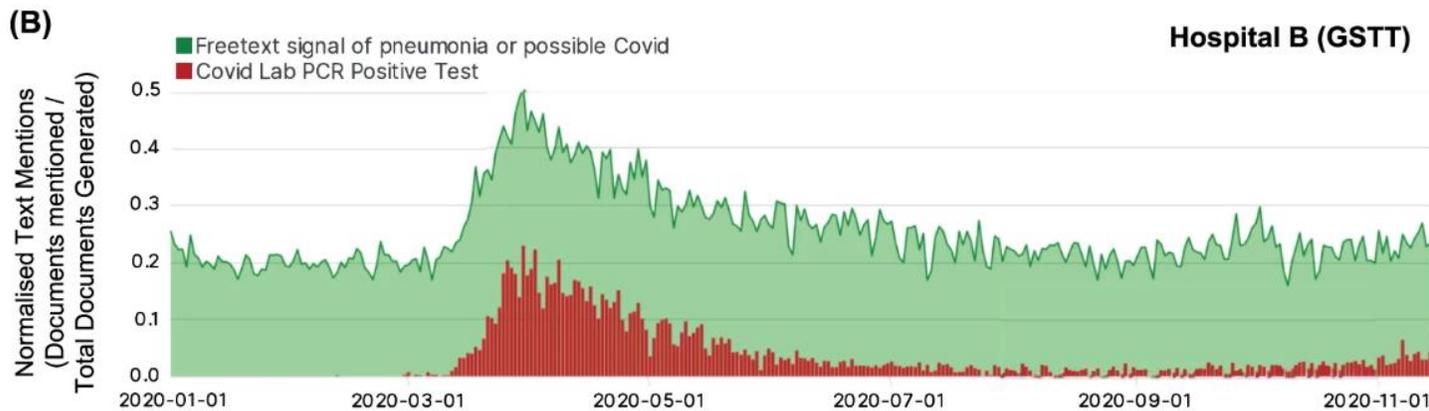
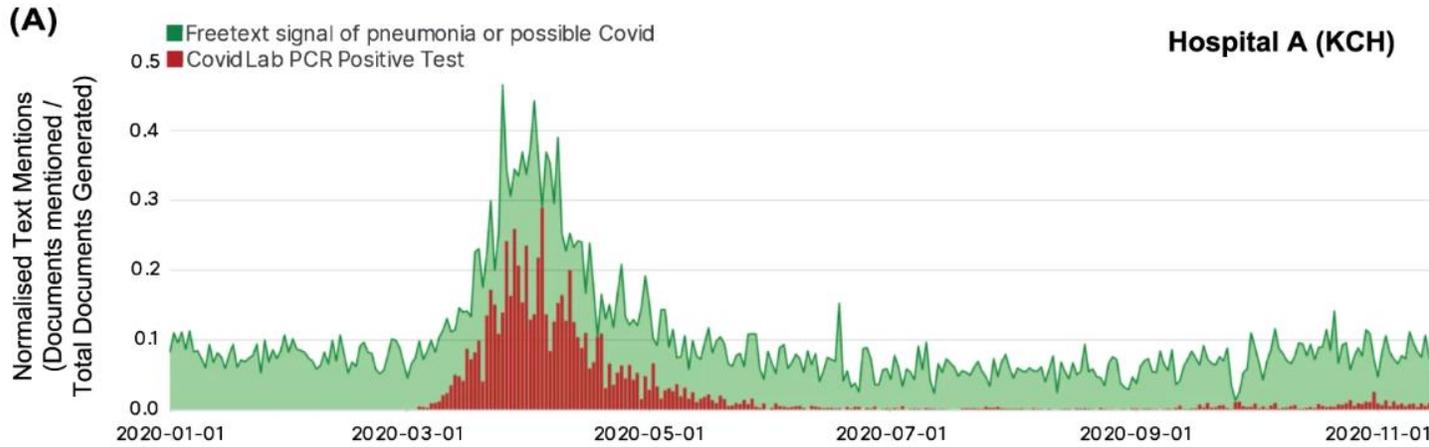
Machine learning type	Methods	Number of articles
Traditional supervised learning	Random forest	14
	Logistic regression	11
	Support vector machine (SVM)	11
	L1-penalized logistic regression	8
	Decision trees	4
	Extreme gradient boosting (XGBoost)	4
	Naive Bayes	3
Deep supervised learning	Recurrent neural networks (RNNs) and variants	19
	Convolutional neural networks (CNNs) and variants	11
	BERT and variants	7
	Feed-forward neural networks (FFNNs)	3
Weakly supervised learning	PheNorm ⁷⁴	3
	MAP ⁷⁵	2
	Random forest (with silver-standard labels)	2

Source: [Machine learning approaches for electronic health records phenotyping: a methodical review, 2022](#)



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Use of machine learning to unlock value from free text

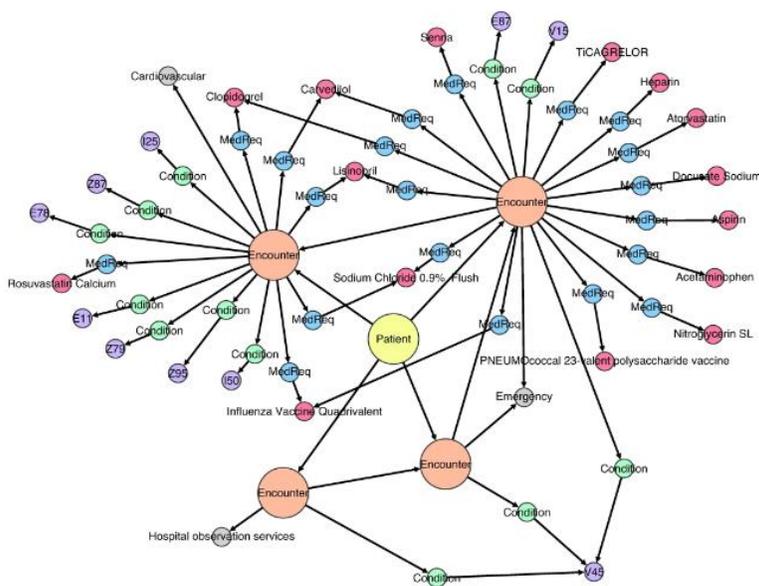


Source: [Real-time clinician text feeds from electronic health records, 2021](#)
[Analysis of free text in electronic health records for identification of cancer patient trajectories, 2017](#)



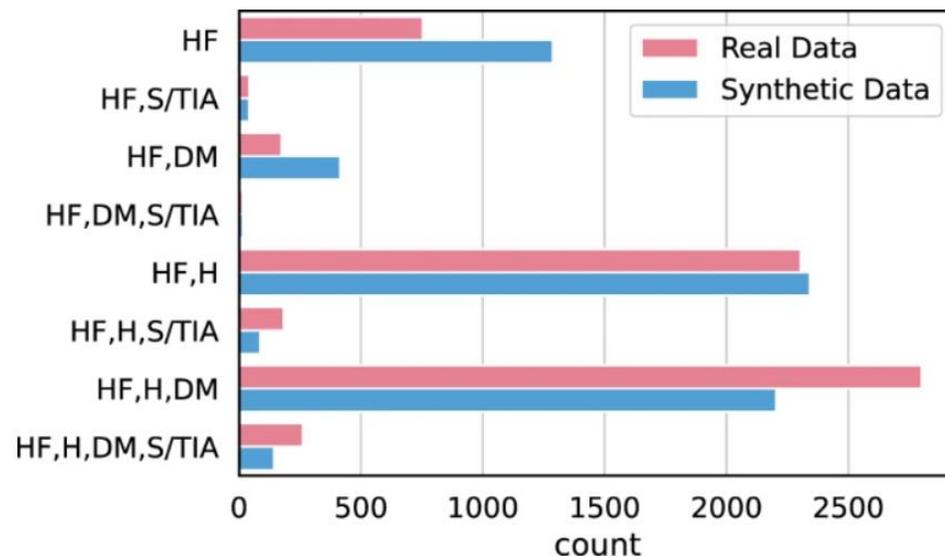
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Generation of synthetic patient datasets



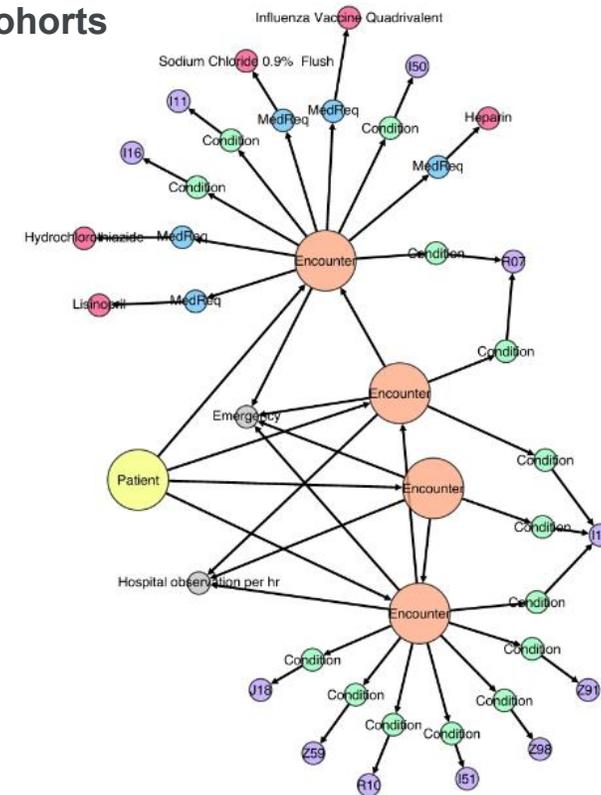
Genuine patient trajectory

Comorbidities for real and synthetic atrial fibrillation cohorts



HF – heart failure, S – Stroke, DM – diabetes, H-- hypertension

Synthetic patient trajectory



Source: Synthetic electronic health records generated with variational graph autoencoders, 2023



Why does this matter to actuaries?

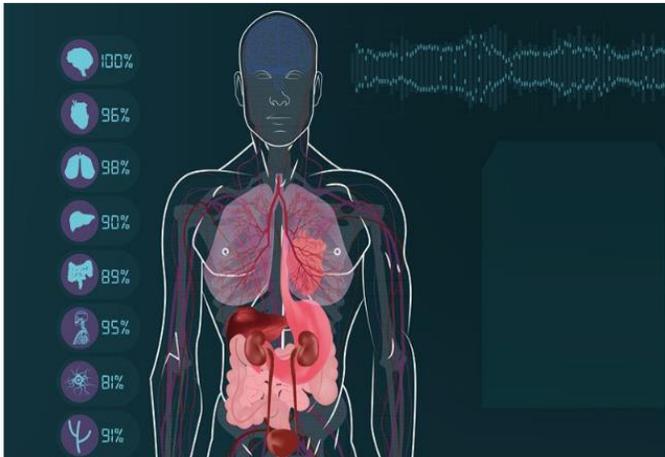
Quick links: [Home](#) » [The Actuary Issues](#) » [October 2021](#) »

General Features

The patient data pipeline

Niall Fennelly — Wednesday 6th October 2021

Niall Fennelly sets out key lessons around electronic health records for insurance, and explores what the future could hold



Have you ever peered around your GP's computer screen to see what software they use? Or pondered a future where your health insurer notifies you via smartwatch that your blood pressure is unusually high (perhaps due to year-end reporting)? During the past few months, the Electronic Health Records (EHRs) Working Party has been working with underwriters and academics to gain a better understanding of what EHRs mean for the UK insurance industry, and how this area might evolve in the coming years.

- Better insights for pricing/reserving
 - Improved predictions of critical illness events
 - Severity data to support partial payments
 - Matched cohorts illustrating disease progression to death
 - Quantifying prevalence and impact of disease interactions
 - Assessing missed benefits through poor adherence
- Future impact on trends
 - Increase efficiency and credibility of clinical trials
 - Better targeting of treatments
 - Improve clinical guidance, reflecting deeper understanding of disease and risk factors

Source: [The Actuary](#), 2021



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Questions

Comments

The views expressed in this presentation are those of the presenter.



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