



@karinv

AI for healthcare: Friend or Foe?

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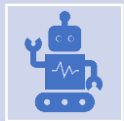
Many opportunities for AI in healthcare

(health care services view)



ambient listening

automated documentation
interpreting / language support



robots

guide minimally-invasive surgery
patient monitoring
social robots



automation

inventory management
services demand prediction
scheduling

Many opportunities for AI in healthcare

(data scientist view)



computer vision /
image processing tools

detect suspicious skin lesions
measure the size/growth trajectory of a
tumour



real-world evidence
generation

tracking outcomes
modelling and prediction



personalised medicine

molecular diagnostics & genomics
treatment selection

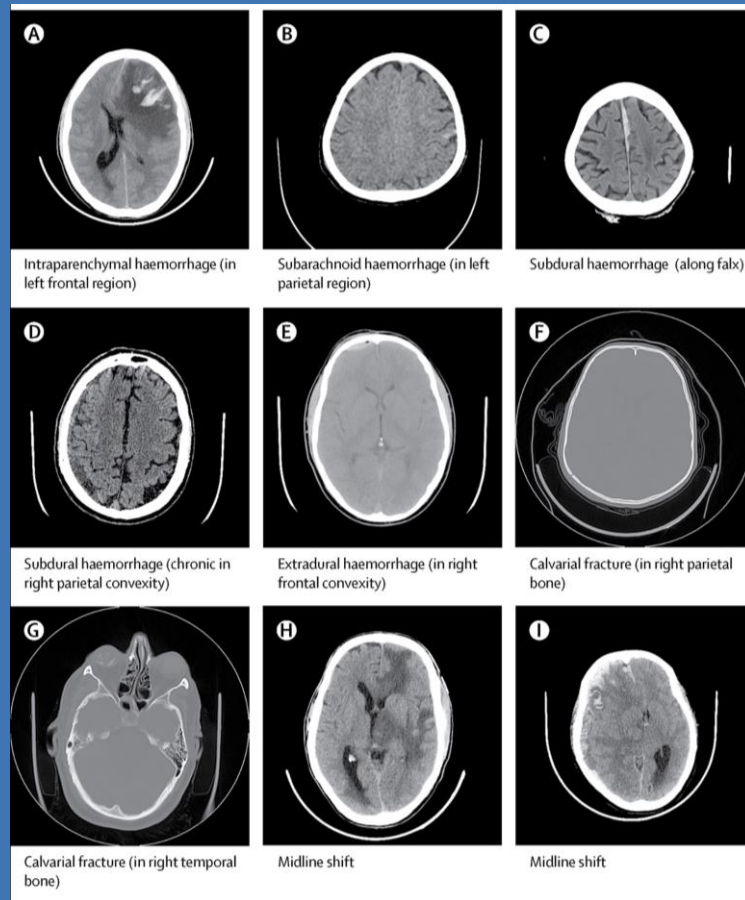
Detection as classification



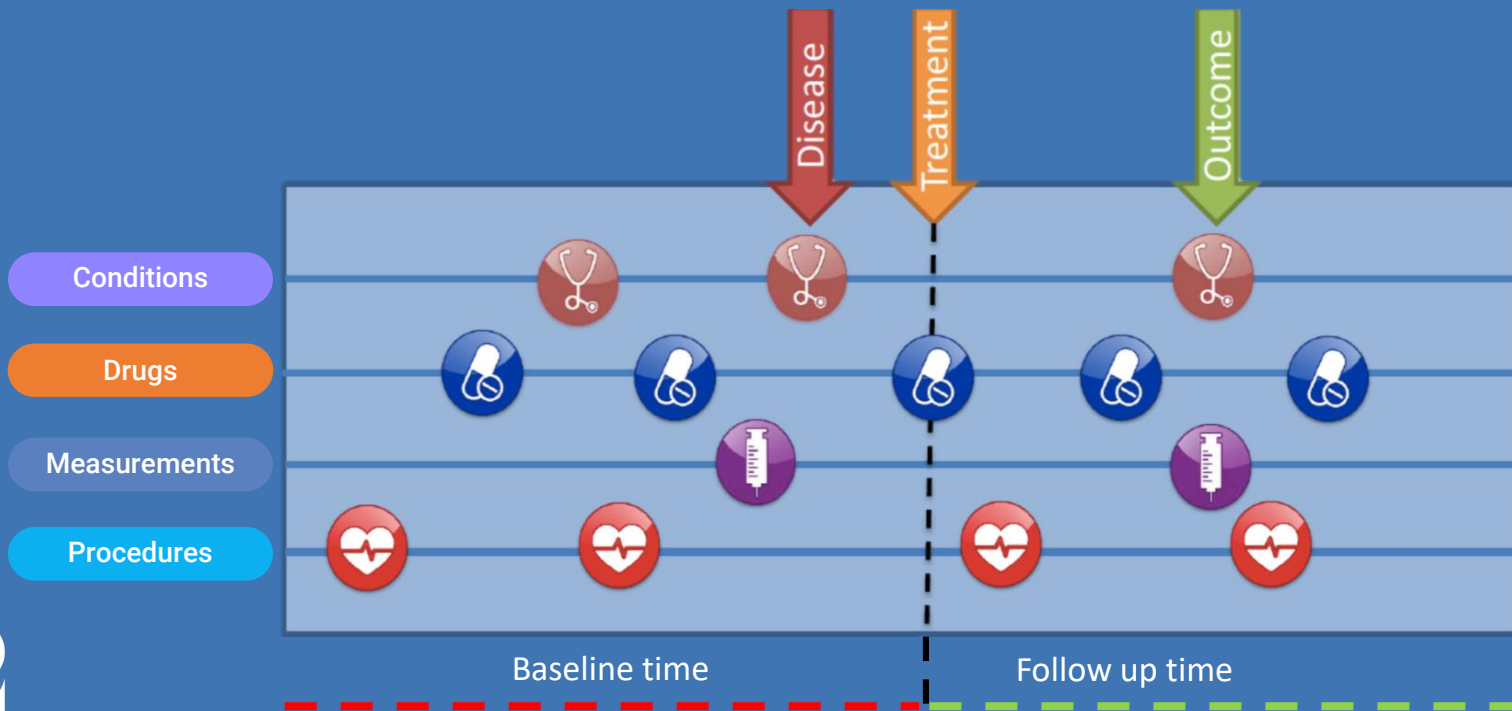
**Subdural
hemorrhage
?**



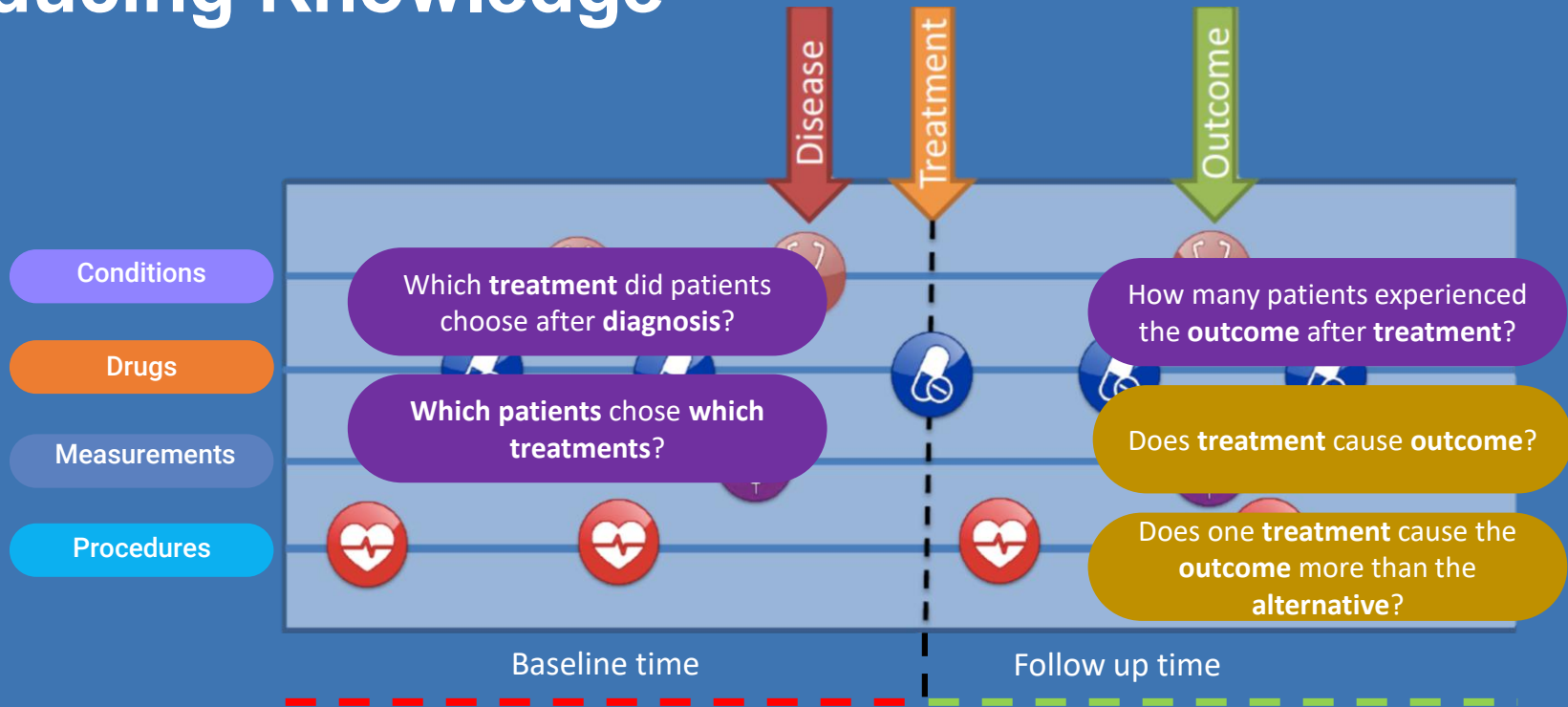
**Subdural
hemorrhage
!**



Learning from clinical data



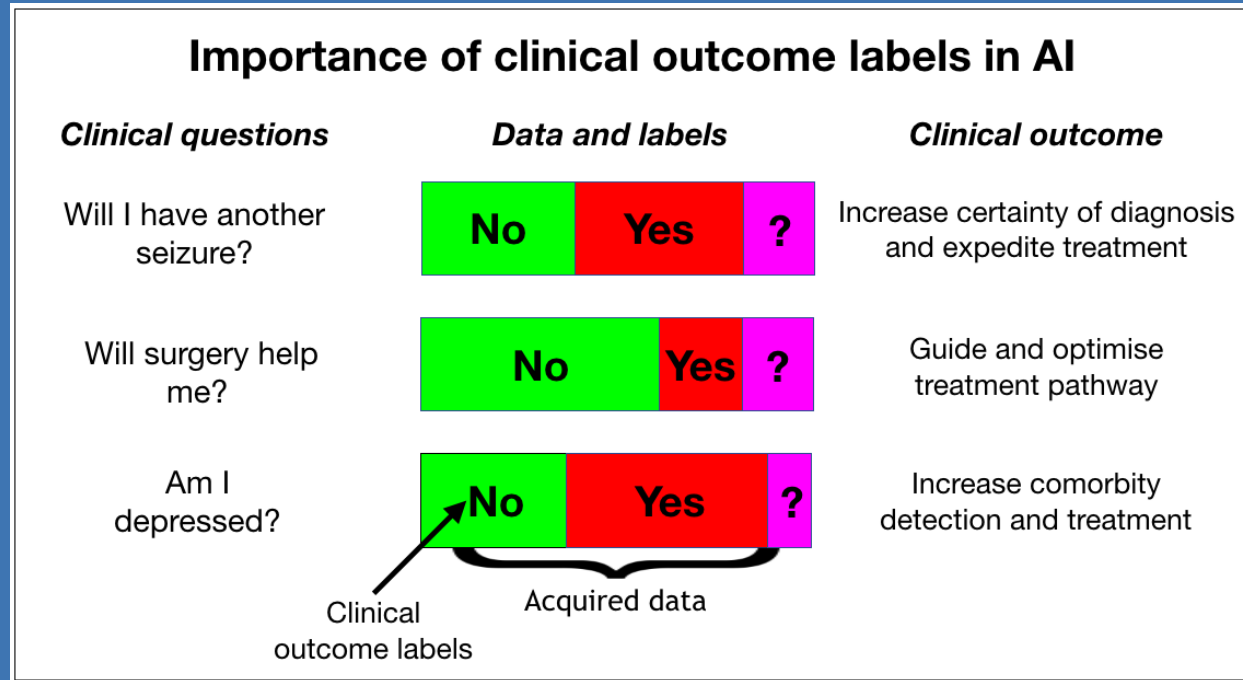
Producing Knowledge



What is the probability that **this patient** will develop the **disease**?

What is the probability that **this patient** will experience the **outcome**?

Supporting clinical decisions



“Tasks as Decisions” vs “Tasks as Needs”



Friedman 2009. Friedman’s Fundamental Theorem of Informatics

“A person working in partnership with an information resource is ‘better’ than that same person unassisted”

Journal of the American Medical Informatics Association, 29(10), 2022, 1810–1817

<https://doi.org/10.1093/jamia/ocac121>

Advance Access Publication Date: 14 July 2022

Perspective



Perspective

Tasks as needs: reframing the paradigm of clinical natural language processing research for real-world decision support

Asher Lederman¹, Reeva Lederman¹, and Karin Verspoor ²

Shift focus of AI/NLP tools from **end-to-end decision making** to **supporting humans** to make better clinical decisions

Human + AI >
Human >
AI

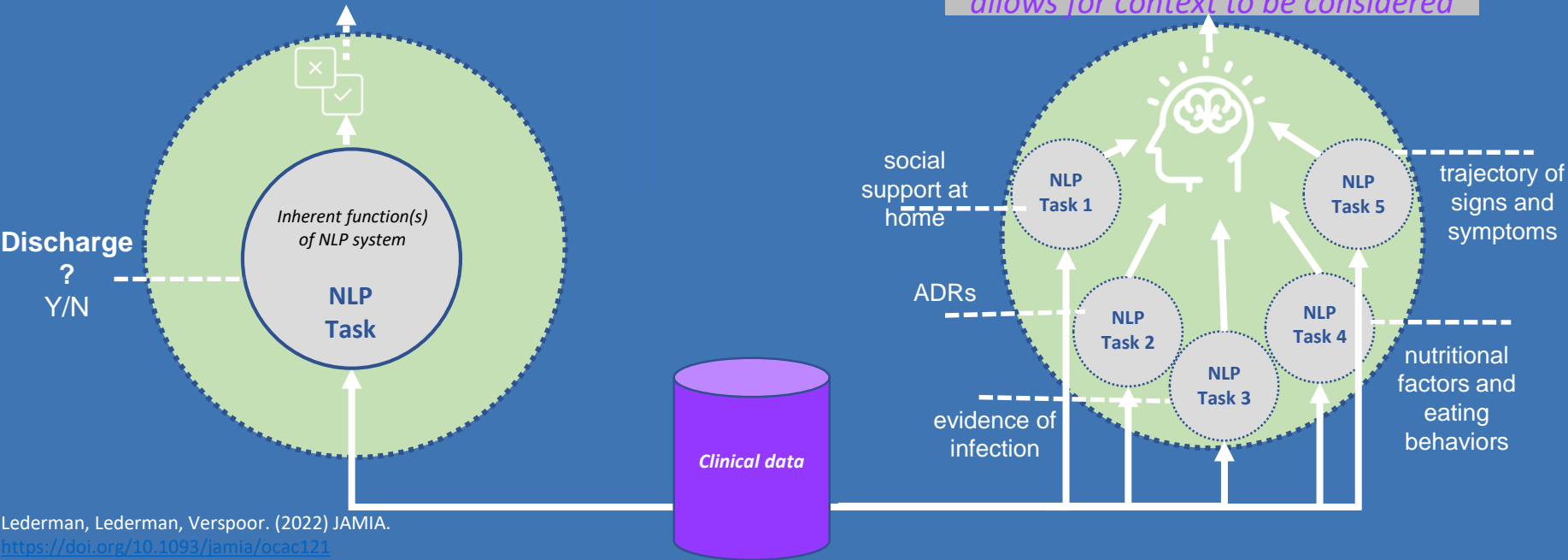


“Tasks as Decisions” vs “Tasks as Needs”

Example: Hospital discharge decision

Discharge Decision
made by AI tool
directly from data to decision
divorced from context

Discharge Decision
made by clinician
with information surfaced by
targeted AI tools
allows for context to be considered



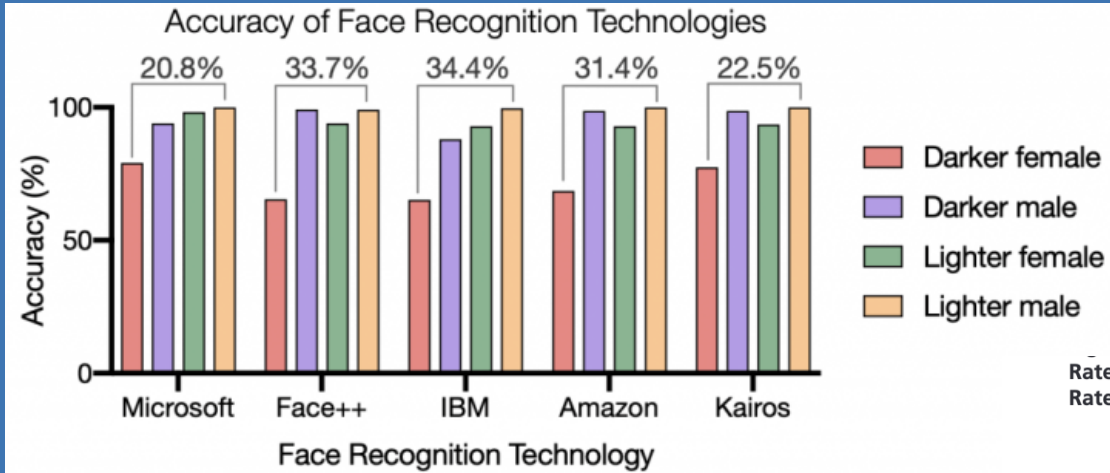
AI is not yet medical grade

- Hallucinations
- Bias in \rightarrow Bias out
- Data drift?
- Generalisation?
- Transportability?
- Evaluation based on aggregate rather than stratified performance

WHO is your data?

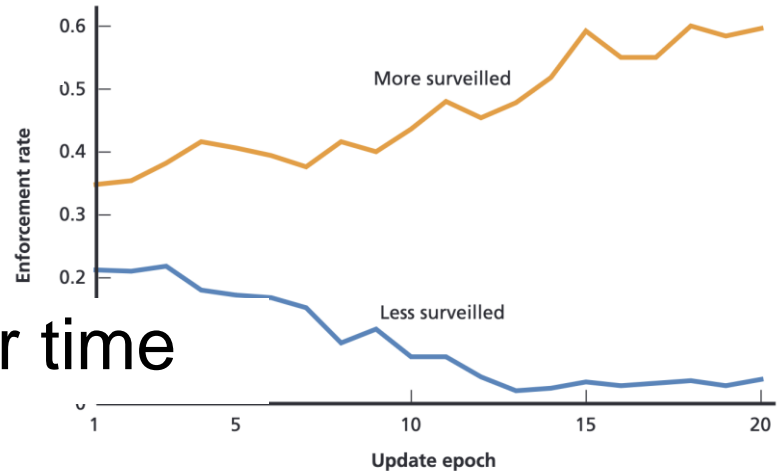


Errors are not randomly distributed



<https://sitn.hms.harvard.edu/flash/2020/racial-discrimination-in-face-recognition-technology/>

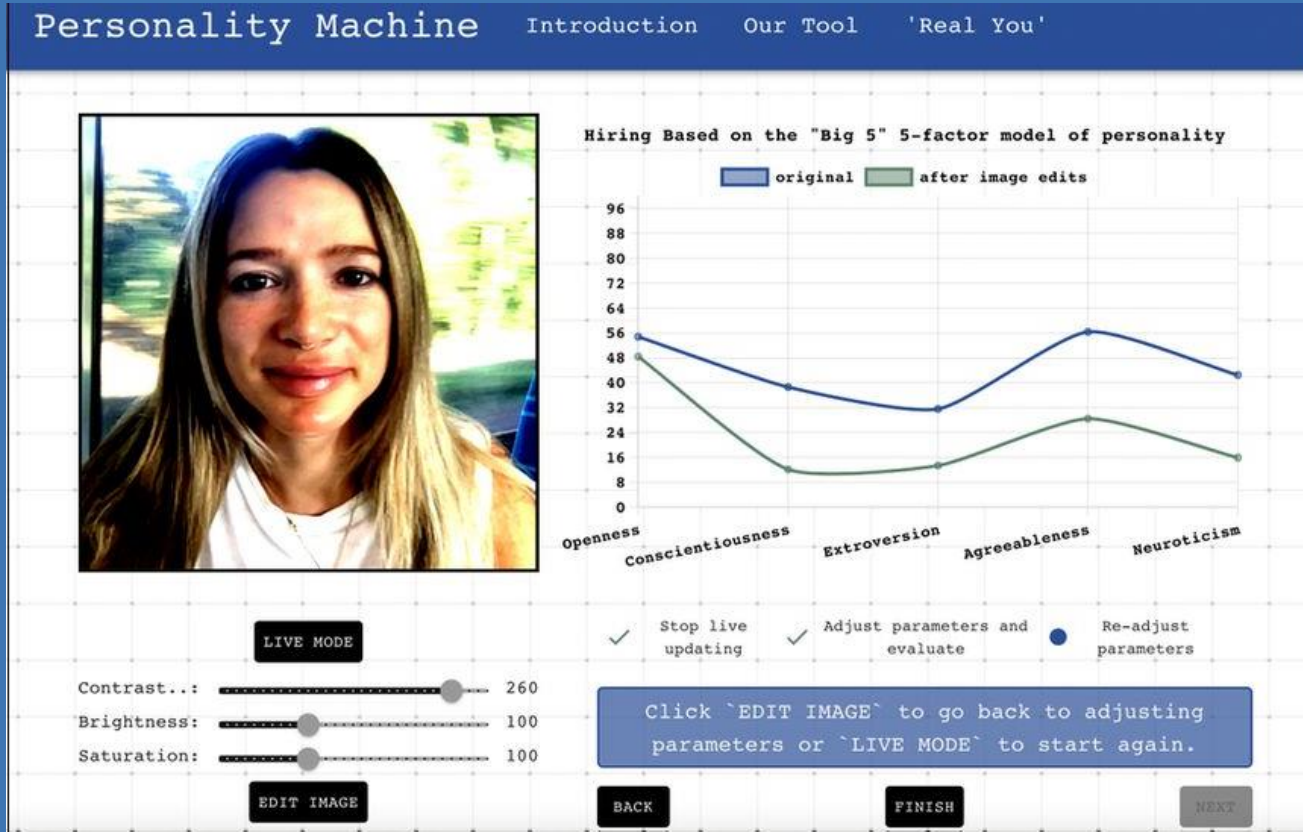
Rate of Enforcement Events per Epoch: Two Subpopulations, Same Crime Rate, Differing Vigilance



Biases can worsen over time

<http://www.rand.org/t/RR1744>

Spurious factors influence outcomes





ChatGPT produces highly generic and very literal responses

KV

Create a treatment plan for a patient in acute pulmonary edema



Acute pulmonary edema is a serious condition that requires prompt medical attention.  
Here is a possible treatment plan for a patient with acute pulmonary edema:

1. **Emergency treatment:** The patient should be taken to the emergency department immediately for evaluation and treatment. Emergency treatment may include oxygen therapy, medications to reduce fluid buildup in the lungs, and monitoring of vital signs such as blood pressure, heart rate, and oxygen saturation levels.
2. **Diagnostics:** A series of diagnostic tests should be performed to confirm the diagnosis and identify the underlying cause of the acute pulmonary edema. These tests may include blood tests, chest x-ray, electrocardiogram (ECG), echocardiogram, and pulmonary function tests.
3. **Medications:** Depending on the underlying cause of the pulmonary edema, medications may be prescribed to relieve symptoms and improve the function of the heart and lungs. These may include diuretics to reduce fluid buildup, vasodilators to improve blood flow, and inotropes to improve the strength of the heart muscle.

Data privacy and security

- How can we work with highly sensitive data, from underrepresented or marginalized groups, safely?
 - It is critical that we incorporate this data, to ensure their representation in the models.
 - It is also critical that we protect the individuals whose data is captured.
- But this requires careful and new methods
 - Learning algorithms can implicitly reconstruct sensitive fields (e.g. inferring race or income from postcode)
 - High-parameter models can “memorise” very detailed patterns in data



AI for healthcare: Friend or Foe?

A friend *we must get to know better*
in order to build trust.

A friend *we must collaborate with closely*
in order to work as a team.