

# A Machine Learning Algorithm for Implantable Cardioverter Defibrillators to predict Life-Threatening Heart Rhythms

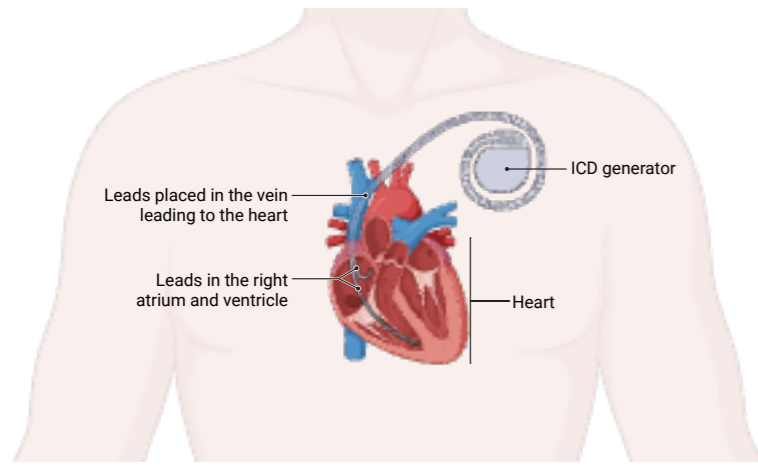
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## WHAT'S THE PROBLEM?

### What Are Implantable Cardioverter Defibrillators?

These are small devices placed into a patient's chest, with leads extending into their heart.



If the defibrillator detects a life-threatening heart rhythm, it will deliver electric shocks to terminate it.

### What's The Issue?

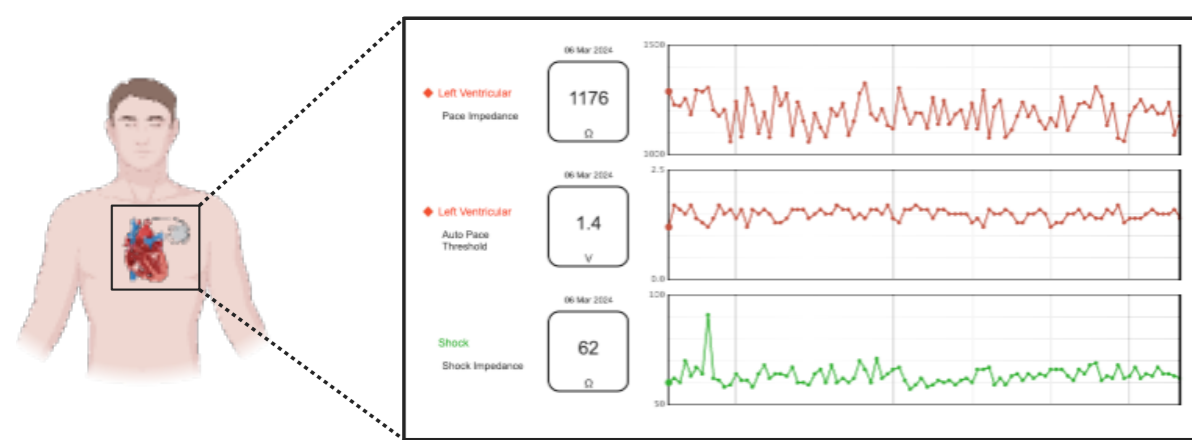
Defibrillator shocks are painful and reduce a patient's quality of life.



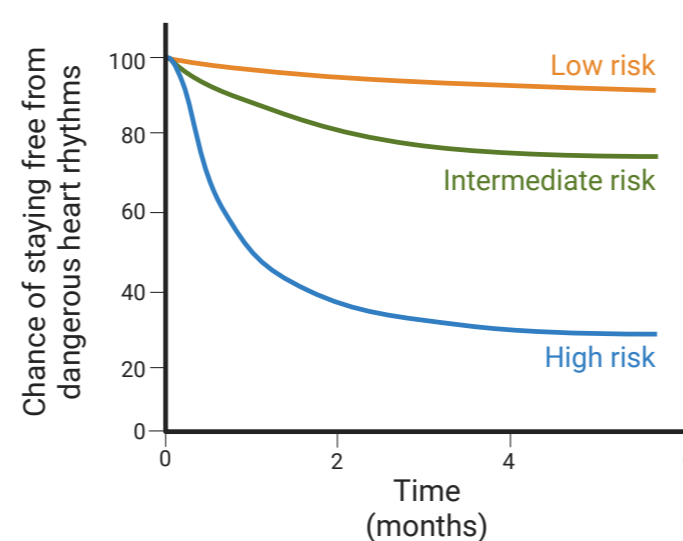
Currently, we can't predict the dangerous heart rhythms that require shocks - so can't act to prevent them.

## OUR SOLUTION

### Data From Defibrillators



### Individualised Risk Prediction



Implanted defibrillators continuously collect information about heart activity and device performance.

The result is a personalised prediction showing each patient's risk of dangerous heart rhythms over the next six months.

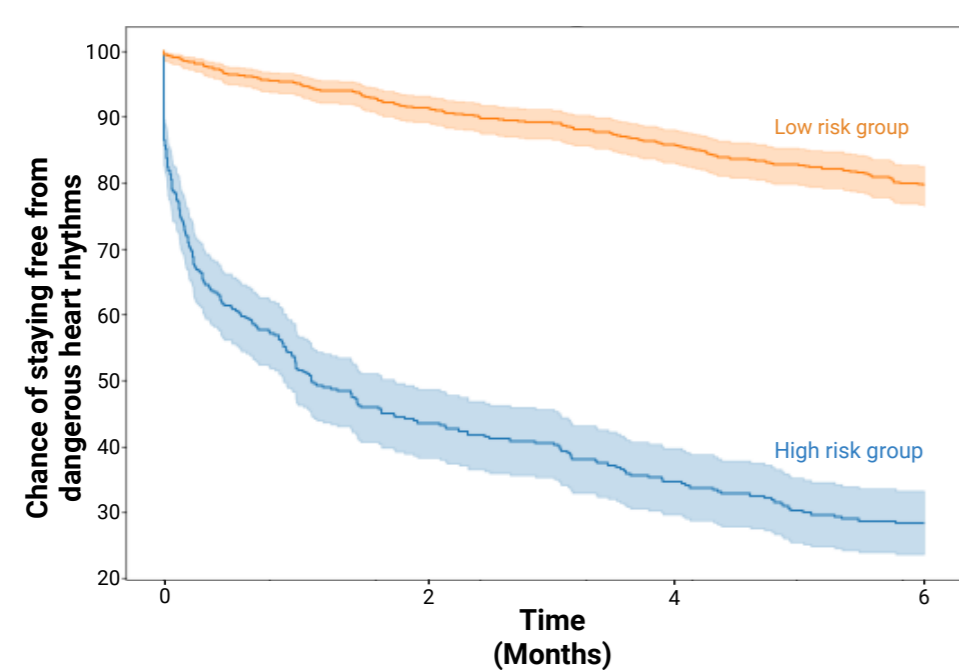
### Machine Learning Algorithm



We used the defibrillator data to teach a computer system to estimate a patient's chance of having a dangerous heart rhythm within six months.

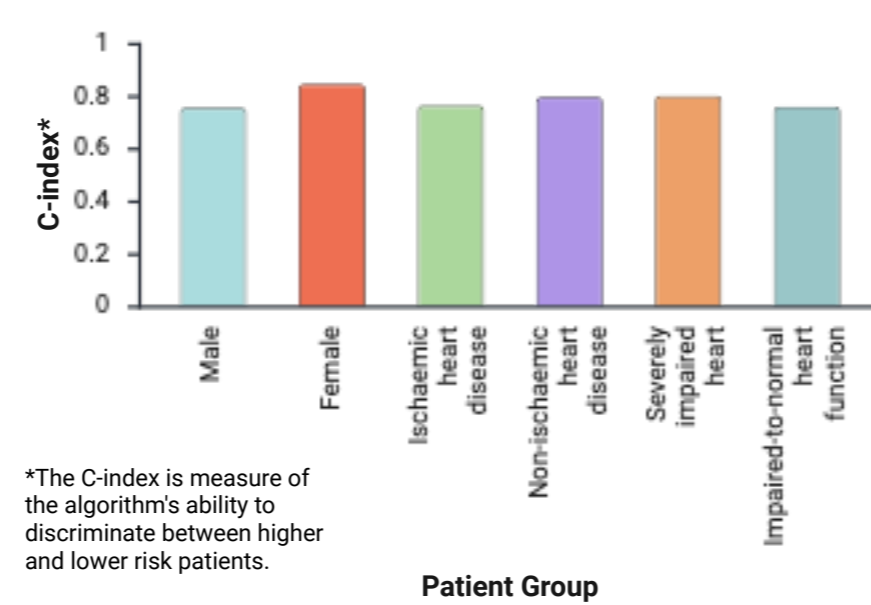
## HOW WELL DID THE ALGORITHM WORK?

### The Algorithm Accurately Predicted The Risk Of Dangerous Heart Rhythms



When patients are grouped into low- and high-risk categories based on the algorithm's predictions, their risk over time is clearly different.

### The Algorithm Performed Fairly Across Groups



\*The C-index is a measure of the algorithm's ability to discriminate between higher and lower risk patients.

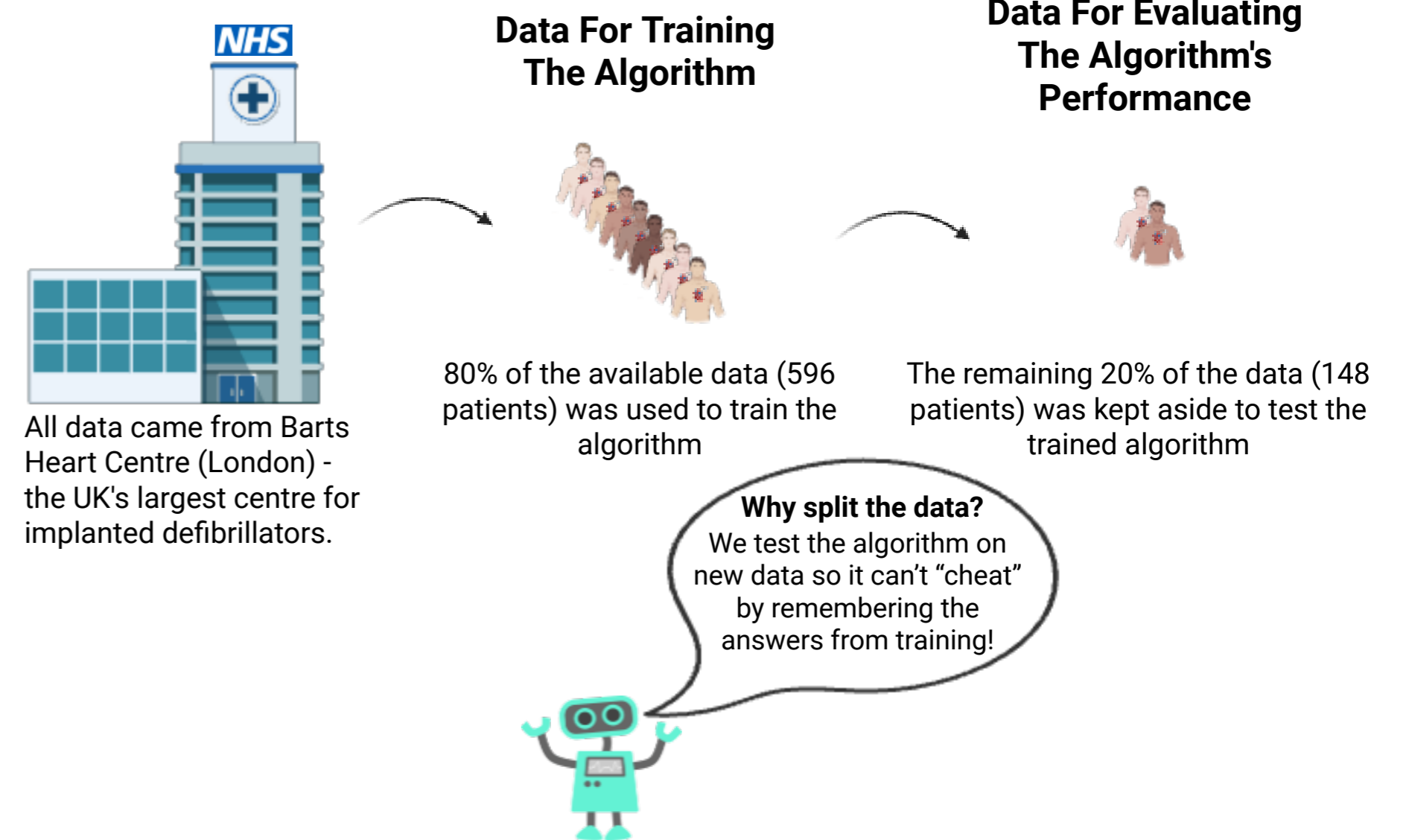
The algorithm performed well across different patient groups, suggesting it works consistently and helps reduce the risk of unfair bias.

# Our algorithm predicts the risk of dangerous heart rhythms for patients with implanted defibrillators.



What's my risk of a shock, Doc?

## WHAT DATA WAS USED TO TRAIN AND EVALUATE THE ALGORITHM?



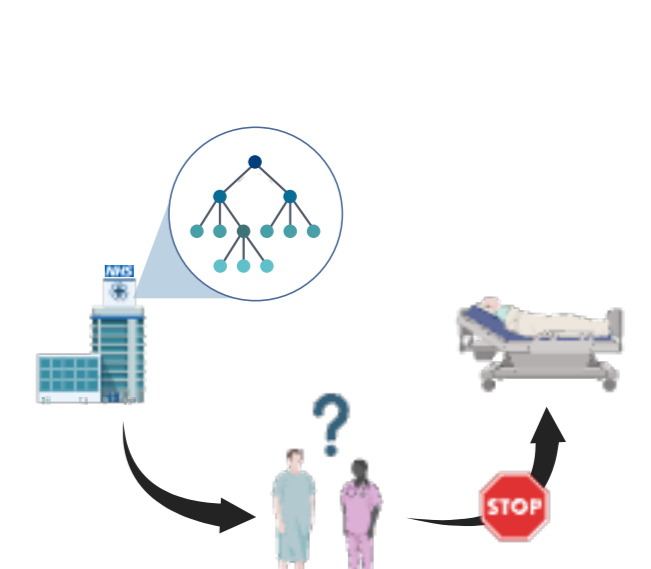
## WHAT DOES THIS MEAN FOR PATIENTS (AND WHAT'S NEXT...)?

### Spotting High-Risk Patients



This algorithm helps doctors spot patients at higher risk of dangerous heart rhythms so they can take steps to reduce risk, such as adjusting medications and monitoring patients more closely.

### Real World Testing



Next steps include testing the algorithm in real world clinical settings and studying how it changes treatment decisions and patient outcomes. We will also see the algorithm can save the NHS money by reducing hospital visits caused by shocks.