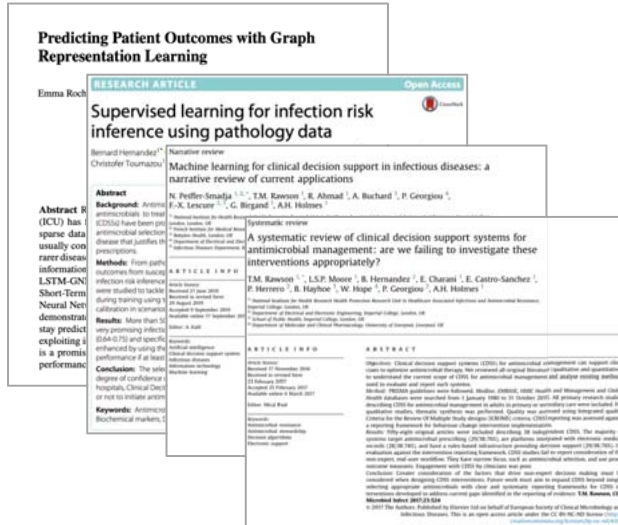


# AI clinical decision support has seen limited uptake but can provide innovative information.



HARD OUTCOMES

MORTALITY



LENGTH OF STAY



Numerous **clinical decision support systems (CDSS)** utilising **machine learning** and **electronic health record (EHR)** data have been developed to assist with infection management

Unfortunately, the uptake and utilisation of such systems has been limited to date, in part due to acceptance and behavioral issues

By predicting ‘hard’ outcome measures under a given scenario, we aim to provide **standard endpoint information** to healthcare professionals to explore how this may **influence clinical decision making**

We created a recurrent neural network to predict mortality and length of stay outcomes for individual patients receiving antibiotics

# A RNN model was created for mortality and length of stay prediction using MIMIC-IV.

## Dataset



- MIMIC-IV electronic health record database

## Population



- Patients who received **antibiotics** during an **ICU** stay

- Input features included **lab test** results and **clinical parameters**
- Features were normalised, **aggregated by day** for each unique stay and missing values highlighted or forward filled
- Data split into training , validation and testing sets
- Many-to-many long short-term memory recurrent neural network (**LSTM-RNN**) was used as it considers the temporal nature of medical data
- Entire stay (**sequence** of days) used as an input

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FEATURES

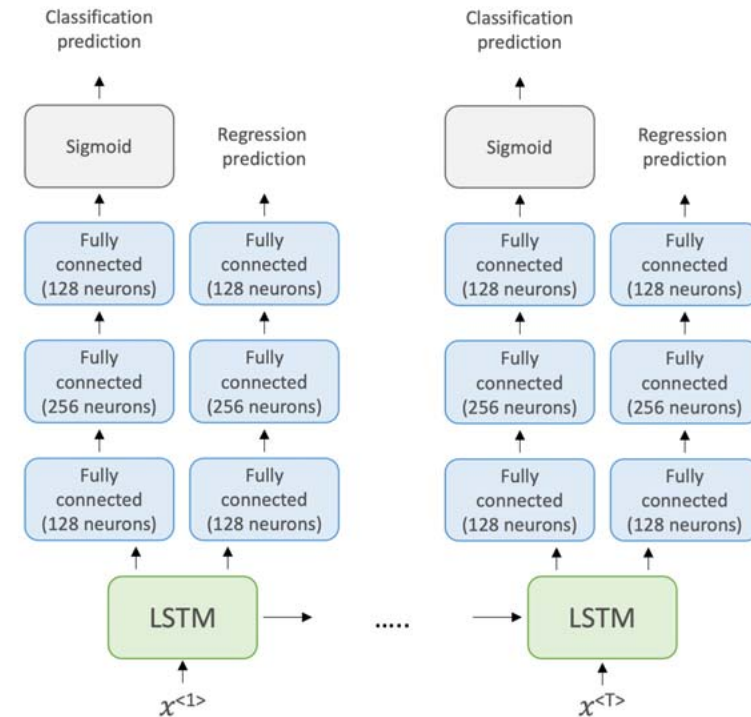
MORTALITY



LENGTH OF STAY (LOS)



## Many-to-many RNN Model Architecture

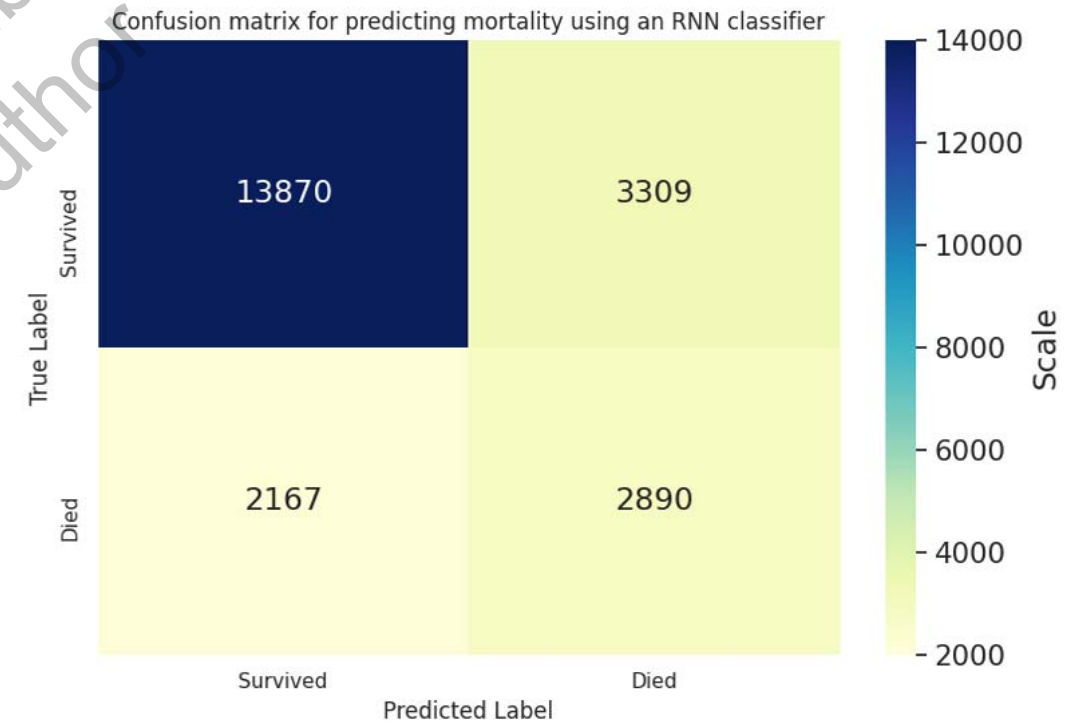


Results present a promising step towards predicting 'hard' patient outcome measures.

### RNN Model Performance

- In total 18,988 patients, associated with 22,845 unique ICU stays, were included across datasets

	Metric	Result
<b>Mortality classification</b>	AUROC	0.78
	Accuracy	0.75
	Precision	0.47
	Recall	0.57
	F1 Score	0.51
<b>Length of stay regression</b>	Root mean squared error	3.67



# Next steps include stakeholder engagement and focusing on antibiotic cessation decisions.

## Conclusion

- Promising step towards predicting the **'hard' outcome measures** mortality and LOS for patients receiving antibiotics through **temporal neural networks** and **routinely collected EHR data**
- Results highlight the **inherent regression challenge** of estimating LOS, while the confusion matrix shows difficulties associated with **class imbalance** and discerning false positives and false negatives from true negatives in mortality classification



Continue



VS

Stop



## Future Work

- Conduct **patient and public involvement** studies and regularly engage with **clinical stakeholders** to inform CDSS development
- Create AI models that focus on the decision to **cease antibiotic treatment**
- Discern the ability of such a tool to **influence antimicrobial decision making**