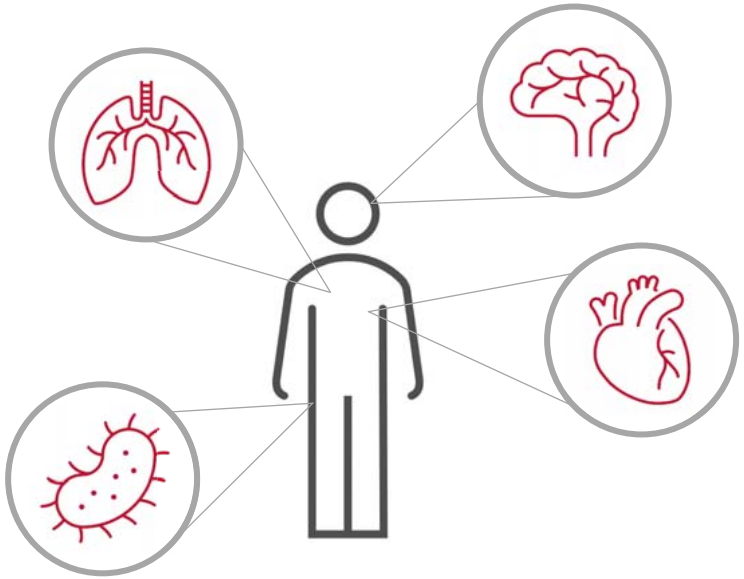
Multi-morbidity poses a complex problem for infection management.



Multi-morbidity is a **growing problem** leading to a **higher risk of infection**, increased **complexity** and **uncertainty**

Obesity is a major co-morbidity and is also a **driver** of other co-morbidities. Many obese patients fail to be treated appropriately leading to significant **health inequalities**

The literature mainly focuses on general **clustering** and co-morbidity disease prediction, with more work needed to understand the **relationship** between other diseases and **infection management**

We investigated the **impact of obesity** as a co-morbidity on **infection related patient outcomes**

A data engineering approach was taken towards data extraction and analysis.

Dataset

- MIMIC-IV
- **Electronic health record** information for patients admitted to a large Harvard teaching hospital between 2008 and 2019

Population

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

Data extracted

- Demographics
- Height and weight
- Obesity diagnosis
- **Length of ICU stay**
- **Antibiotic treatment** lengths

Data aggregation

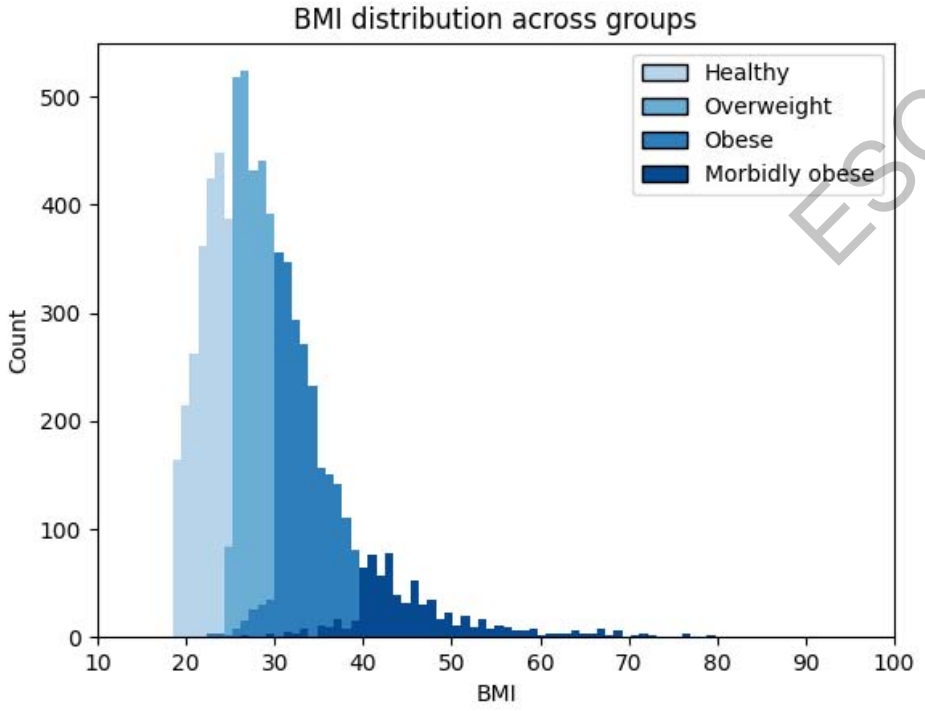
- **Grouped** according to diagnoses and BMI into healthy, overweight, obese, and morbidly obese categories

Statistical analysis

- Performed using SciPy
- One-way **ANOVA**
- Pairwise Tukey method
- Kruskal-Wallis Test

Co-morbid obesity leads to significantly worse infection outcomes.

	Number of patients	Mean body mass index (BMI)	Death rate	Mean length of ICU stay (days)	Mean antibiotic treatment length (days)
Healthy (HE)	19,612	22.40	0.18	5.86	5.18
Overweight (OW)	2,405	27.38	0.18	7.98	5.86
Obese (OB)	3,803	33.34	0.15	7.14	5.60
Morbidly obese (MB)	1,543	46.28	0.17	8.14	6.39



Length of ICU stay (days)

	HE	OW	OB	MB
HE				
OW				
OB				
MB				

Antibiotic treatment length (days)

	HE	OW	OB	MB
HE				
OW				
OB				
MB				

Statistically significant difference between groups (alpha = 0.05)

No statistically significant difference between groups

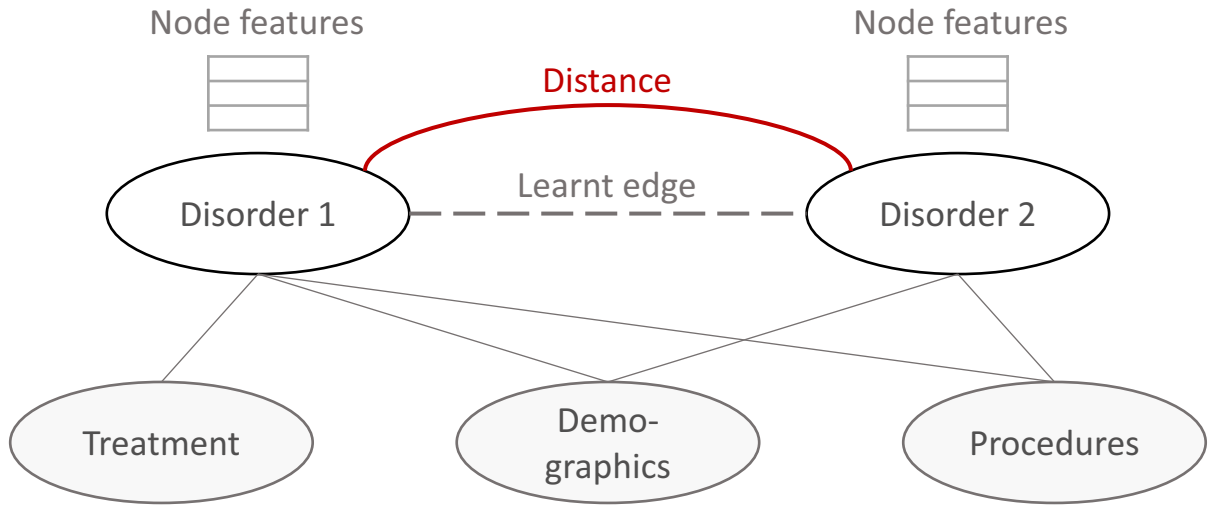
Next steps include understanding relationships further through graph methodologies.

Conclusion

- Analysis of a **large-scale critical care database** confirms previous research that obesity is associated with **extended length of ICU stay** and **increased antibiotic treatment**
- Results highlight the **inherent messy nature** of electronic health record data

Future Work

- Understand potential **confounders**, and if the impact of obesity, on antibiotic management is **clinically meaningful**
- Model patients' co-morbidities through **graphs methods** to elucidate more of the **underpinning relationship** between co-morbidities and infection as well as provide useful **input information** to AI models



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