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Exploring the impact of obesity on infection-related outcomes in a large ICU dataset

11. Other

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Background

Co-morbid conditions provide a significant challenge to infection management, causing 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. We investigated the impact of obesity as a co-morbidity on infection related patient outcomes.

Methods

Patients who received antibiotics during an ICU stay were selected from a large US tertiary academic medical center database, MIMIC-IV. Demographic, outcome, obesity diagnosis, height, and weight data were extracted from relevant tables and patients' antibiotic treatment lengths were calculated. Patients were grouped into categories (i.e., healthy, overweight, obese, and morbidly obese) according to diagnoses and (Body Mass Index) BMI. Statistical analysis was performed using SciPy a free open-source Python library and statsmodels.

Results

The final dataset contained 19,612 healthy patients (mean BMI 22.40), 2,405 patients classed as overweight (mean BMI 27.38), 3,803 diagnosed with obesity (mean BMI 33.34), and 1,543 individuals with morbid obesity (mean BMI 46.28). The mean BMI over the entire population was 29.18. The mean ICU length of stay (LOS) was 5.86 days for healthy individuals but much greater for the other groups at 7.98 for overweight patients, 7.14 for obese individuals and 8.14 for those with morbid obesity. Subsequent statistical analysis through a one-way ANOVA (analysis of variance), the pairwise Tukey method and Kruskal-Wallis Test confirmed a statistically significant (alpha = 0.05) difference in LOS between all

groups, except those who are overweight and those with morbid obesity (Table 1). Similar results were obtained for antibiotic treatment length (groups had means of 5.18 days, 5.87, 5.61 and 6.40 respectively) with all p-values being statistically significant other than for obese and overweight populations. Death rates were comparable at 0.18 for the healthy group, 0.18 for the overweight group, 0.15 for the obese group, and 0.17 for the morbidly obese group.

Conclusions

Analysis of a large-scale critical care database confirms previous research that obesity is associated with extended length of stay and increased antibiotic treatment. Future research will aim to understand confounders, and if the impact of obesity, on antibiotic management is clinically meaningful.

Statistical tests p-value results

Table 1: p-value results from statistical tests conducted between groups on length of stay and antibiotic treatment length outcomes.

	Group 1	Group 2	Length of stay p-value	Antibiotic treatment length p-value
ANOVA	-	-	0.000	0.000
Pairwise Tukey	Healthy	Overweight	0.001	0.001
	Healthy	Obese	0.001	0.001
	Healthy	Morbidly Obese	0.001	0.001
	Overweight	Obese	0.001	0.234
	Overweight	Morbidly Obese	0.9	0.014
	Obese	Morbidly Obese	0.001	0.001
Kruskal-Wallis	-	-	0.000	0.000

Conflicts of interest