

# Interaction of Insurance Status with Cardiopulmonary Dysfunction, Metabolic Derangements, and Hepatobiliary Disease in Mega-Obese Patients



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## Introduction

The incidence of extreme obesity, with Body Mass Index (BMI) >50, is increasing rapidly in the USA. Such massive obesity can remodel dramatically both pulmonary and cardiac physiology by decreasing expiratory reserve volume, forced expiratory volume and functional residual capacity, as well as causing left ventricular dilation even in mildly obese individuals. Metabolic derangements, including Type II diabetes mellitus, hepatobiliary and musculoskeletal problems are increased also. With mega-obese ICU patients, their severe weight exacerbating and even causing critical illnesses, intensivists need every clinical clue. The interaction of insurance status with pre-existing obesity medical problems is unknown. The objective of this study, therefore, was to examine the distribution of presenting cardiopulmonary dysfunction, metabolic derangements, and hepatobiliary problems in mega-obese patients according to health insurance.

## Methods

Pre-operative data on 5,389 patients from the Surgical Review Corporation's BOLD database who planned open Roux-en-Y gastric bypass was examined in five groups: Medicaid (n=272), Medicare (n= 632), Private insurance (n=3,253), and Self-Pay (n=68). Continuous variables were tested by analysis of variance. Dichotomous variable distribution was assessed by the Chi-squared equation.

## Results

**Table 1. Mega-Obesity Variation in Demographics and Body Mass by Insurance Status**

|             | Medicaid | Medicare | Private Insurance | Self-Pay | p value |
|-------------|----------|----------|-------------------|----------|---------|
| Age         | 42+-12   | 53+-11   | 45+-11            | 40+-12   | <0.05   |
| BMI         | 53+-11   | 52+-11   | 50+-10            | 54+-12   | <0.05   |
| Weight      | 147+-37  | 148+-38  | 141+-33           | 157+-41  | <0.05   |
| Sex (F/M %) | 84/16%   | 72/28%   | 75/25%            | 63/37%   | 0.0001  |

**Table 2. Mega-Obese Variation in Musculoskeletal Co-Morbidities by Insurance Status**

|                       | Medicaid | Medicare | Private Insurance | Self-Pay | p value |
|-----------------------|----------|----------|-------------------|----------|---------|
| Musculoskeletal Pain  | 47.79%   | 54.43%   | 40.85%            | 36.76%   | <0.0001 |
| Back Pain             | 69.12%   | 61.08%   | 50.72%            | 45.59%   | <0.0001 |
| Fibromyalgia          | 4.04%    | 7.44%    | 2.95%             | 1.47%    | <0.0001 |
| Lower Extremity Edema | 34.56%   | 38.61%   | 26.04%            | 20.59%   | <0.0001 |

## Results (cont'd)

**Table 3. Mega-Obesity Variation in Cardiopulmonary Co-Morbidities by Insurance Status**

|                                  | Medicaid | Medicare | Private Insurance | Self-Pay | p value |
|----------------------------------|----------|----------|-------------------|----------|---------|
| Hypertension                     | 56.99%   | 76.11%   | 59.39%            | 52.94%   | <0.0001 |
| Angina                           | 7.72%    | 6.65%    | 3.60%             | 0        | <0.0001 |
| CHF                              | 5.15%    | 8.70%    | 2.27%             | 2.94%    | <0.0001 |
| Ischemic Heart Disease           | 6.99%    | 10.92%   | 4.92%             | 4.41%    | <0.0001 |
| DVT/PE                           | 6.62%    | 8.86%    | 2.89%             | 0        | <0.0001 |
| Pulmonary Hypertension           | 6.62%    | 7.44%    | 3.97%             | 2.94%    | 0.0006  |
| Peripheral Vascular Disease      | 2.57%    | 3.80%    | 1.32%             | 0        | <0.0001 |
| Obstructive Sleep Apnea          | 62.13%   | 63.92%   | 51.09%            | 45.59%   | <0.0001 |
| Obesity Hypoventilation syndrome | 6.25%    | 6.80%    | 3.14%             | 1.47%    | <0.0001 |
| Asthma                           | 28.31%   | 28.96%   | 20.04%            | 14.71%   | <0.0001 |

**Table 4. Mega-Obese Variation in Hepato-Biliary and Abdominal Co-Morbidities by Insurance Status**

|                             | Medicaid | Medicare | Private Insurance | Self-Pay | p value |
|-----------------------------|----------|----------|-------------------|----------|---------|
| Abdominal Hernia            | 11.03%   | 12.34%   | 7.53%             | 7.35%    | 0.0004  |
| Abdominal Skin Pannus       | 15.07%   | 16.46%   | 6.95%             | 10.29%   | <0.0001 |
| Cholelithiasis              | 26.47%   | 31.17%   | 19.95%            | 8.82%    | <0.0001 |
| GERD                        | 55.15%   | 50.00%   | 40.55%            | 38.24%   | <0.0001 |
| Liver Disease               | 9.93%    | 15.98%   | 12.85%            | 8.82%    | 0.0402  |
| Stress Urinary Incontinence | 27.21%   | 25.79%   | 20.20%            | 10.29%   | 0.0001  |

## Results (cont'd)

**Table 5. Mega-Obese Variation in Metabolic and Hormonal Co-Morbidities by Insurance Status**

|                     | Medicaid | Medicare | Private Insurance | Self-Pay | p value |
|---------------------|----------|----------|-------------------|----------|---------|
| Diabetes            | 36.40%   | 52.22%   | 36.95%            | 27.94%   | <0.0001 |
| Hyperlipidemia      | 38.24%   | 51.11%   | 38.61%            | 26.47%   | <0.0001 |
| Irregular Menses    | 19.85%   | 27.85%   | 18.81%            | 14.71%   | <0.0001 |
| PCOS                | 2.57%    | 1.27%    | 4.86%             | 7.35%    | 0.0001  |
| Pseudotumor Cerebri | 2.94%    | 3.01%    | 2.24%             | 4.41%    | 0.4275  |
| Gout                | 5.51%    | 7.12%    | 3.84%             | 1.47%    | 0.0013  |

**Table 6. Mega-Obese Variation in Mental and Functional Co-Morbidities by Insurance Status**

|                            | Medicaid | Medicare | Private Insurance | Self-Pay | p value |
|----------------------------|----------|----------|-------------------|----------|---------|
| Mental Health Diagnosis    | 25.37%   | 21.04%   | 10.79%            | 0        | <0.0001 |
| Disabled Functional Status | 11.03%   | 16.77%   | 3.97%             | 2.94%    | <0.0001 |
| Depression                 | 47.06%   | 50.79%   | 33.60%            | 23.53%   | <0.0001 |
| Psychological Impairment   | 33.09%   | 29.91%   | 17.31%            | 11.76%   | <0.0001 |

**Table 7. Mega-Obese Variation in Social Behavior by Insurance Status**

|                 | Medicaid | Medicare | Private Insurance | Self-Pay | p value |
|-----------------|----------|----------|-------------------|----------|---------|
| Alcohol Use     | 12.87%   | 13.45%   | 18.72%            | 11.76%   | 0.0010  |
| Substance Abuse | 0        | 0.79%    | 0.28%             | 0        | 0.1404  |
| Tobacco Use     | 9.93%    | 7.44%    | 5.38%             | 7.35%    | 0.0068  |
| Unemployed      | 58.09%   | 74.84%   | 14.97%            | 11.76%   | <0.0001 |

## Conclusions

Distribution of systems failure in the mega-obese varies by health insurance status. Obese Medicare patients are oldest and present to the ICU with the highest frequencies of underlying hypertension, CHF, ischemic heart disease, DVT/PE, pulmonary hypertension, diabetes, asthma, OSA, cholelithiasis, liver disease and hyperlipidemia. Critically ill mega-obese Medicaid patients will be younger, but have highest angina, plus CHF, ischemic heart disease, DVT/PE, pulmonary hypertension, and OSA second to Medicare. Co-morbidities in Private insurance patients were less severe than Medicaid and Medicare. Obesity illnesses were least among Self-Pay, in spite of the highest BMI. In the ICU, anticipating increased medical fragility of obese Medicare and Medicaid patients in managing their critical illnesses could be life-saving.