

Usage of Sedative in Catheterization Procedures

Jamal Hassan^{1,3}, Dr. Mahboob Alam, M.B.B.S.,

F.A.C.C., F.S.C.A.I.²

Hightower High School

Baylor College of Medicine

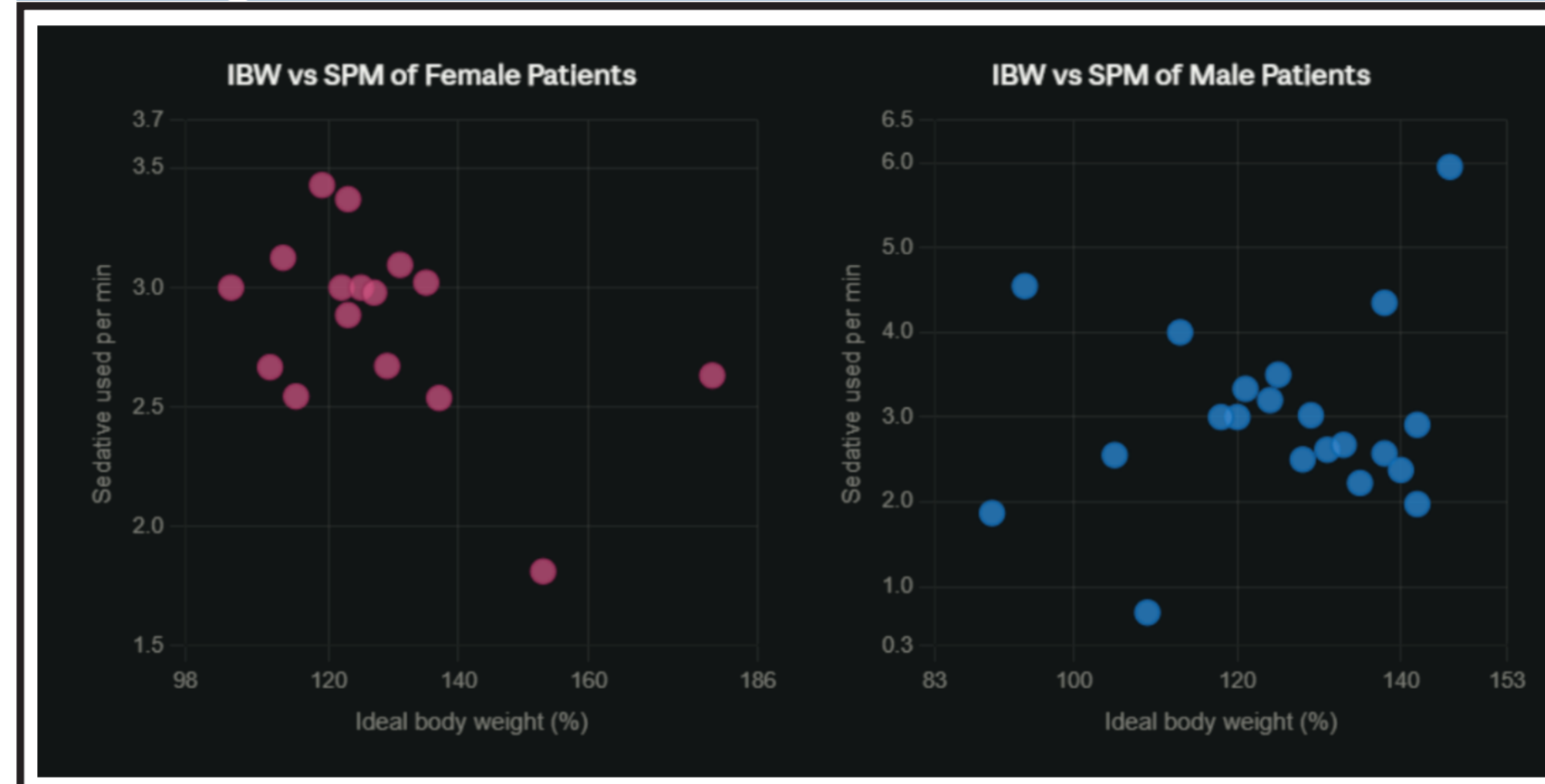
Gifted and Talented Mentorship, Fort Bend ISD

- 1.
- 2.
- 3.

Abstract

This study investigates the absence of a standardized method for determining sedative dosage in cardiac catheterization procedures, where dosing decisions are based on informal physician-nurse discussions rather than data-driven guidelines. Data from 37 procedures was collected and used to calculate sedative per minute (SPM) and ideal body weight (IBW) ratios. Statistical analysis revealed moderate negative correlations between IBW and SPM in female patients ($r = -0.56$) and male patients after outlier exclusion ($r = -0.53$), with regression models explaining 29–31% of variance. While IBW influences dosing, it does not fully explain variability, and a predictive model would require multiple variables beyond basic patient characteristics.

Figure 1: IBW vs SPM of Female and Male Patients



Findings

Female patients showed a moderate negative correlation between IBW ratio and SPM ($r = -0.56$, $R^2 = 0.31$), yielding a regression formula of $SPM = 5.02 - 1.66 \times IBW$. The male dataset, has a weak, slightly positive correlation ($r = +0.16$), distorted by three outliers, M4, M5, and M7, whose extreme SPM values corresponded to unusually short and long procedures rather than patient characteristics. After their removal, the male correlation strengthened to $r = -0.53$ ($R^2 = 0.29$), producing $SPM = 4.81 - 1.60 \times IBW$. The near-identical slopes sexes suggest IBW ratio may function as a sex-independent predictor of sedative dosing.

Introduction & Summary

Cardiac catheterization patients remain awake while catheters are maneuvered near the heart [2], making proper sedative dosing critical as improper administration can cause serious complications including cardiac events [3]. Despite this, dosing decisions observed at the Baylor College of Medicine St. Luke's catheterization lab [1] rely entirely on brief physician-nurse discussions with no standardized method. Prior research focuses almost exclusively on critically ill patients and addresses when to sedate rather than how much, leaving a significant gap for the stable, non-critical patients who make up the majority of cath lab procedures [4]. This study addresses that gap by analyzing patient-specific variables, gender, height, weight, dosage, and procedure duration, to identify correlations with sedative usage and provide a foundation for a safer, standardized dosing framework.

Methodology

Patient records from 37 procedures were collected from the St. Luke's MyChart system with all identifying information removed to ensure privacy. Variables recorded included gender, height (cm), weight (kg), age (years), sedative dosage (mcg), and procedure duration (mins). These were used to calculate sedative per minute (SPM) and ideal body weight ratio (IBW), a widely accepted metric for weight-based dosing [5]. Data was separated by sex to account for physiological differences, then analyzed using Pearson correlation and linear regression to identify statistically significant relationships and develop predictive formulas.

Discussion

The hypothesis is partially supported as IBW ratio shows a moderate relationship with SPM in both sexes, but lower R^2 values indicate that body weight alone cannot reliably predict dosing. Unrecorded variables, such as physician judgment and procedural complexity, likely account for much of the remaining variance. The outlier illustrate this clearly as procedure duration dominated dosing decisions in those cases. The decision to use IBW ratio rather than raw weight and to separate data by sex proved meaningful, as the uniformity of regression lines suggests a potential unified dosing formula. Future studies should incorporate multi-institution samples with additional variables such as procedure, patient and physician type to develop a comprehensive multivariable dosing model.

References

- [1] Baylor College of Medicine. (n.d.). Interventional cardiology. Baylor College of Medicine. <https://www.bcm.edu/healthcare/specialties/cardiovascular-medicine/you-and-your-heart/interventional-cardiology>
- [2] Walker, A. (2026, January 15). Cardiac catheterization: Best awake info. Liv Hospital. <https://int.livhospital.com/cardiac-catheterization-best-awake-info/>
- [3] Higgins, T. (n.d.). CCJM. <https://www.ccjm.org/content/ccjom/63/6/355.full.pdf>
- [4] Tracy, M. F., Chlan, L., Savik, K., Skaar, D. J., & Weinert, C. (2019). A novel research method for determining sedative exposure in critically ill patients. Nursing research. <https://pmc.ncbi.nlm.nih.gov/articles/PMC6293984/>
- [5] Ideal body weight and adjusted body weight. MDCalc. (n.d.). <https://www.mdcalc.com/calc/68/ideal-body-weight-adjusted-body-weight>