between cardiac size and exercise capacity in CON. During exercise, individuals with severe obesity have a greater Q̇c and blunted peripheral O_2 extraction indicating that defects in muscle O_2 utilization may be a key contributor to exercise intolerance in obese HR adults.

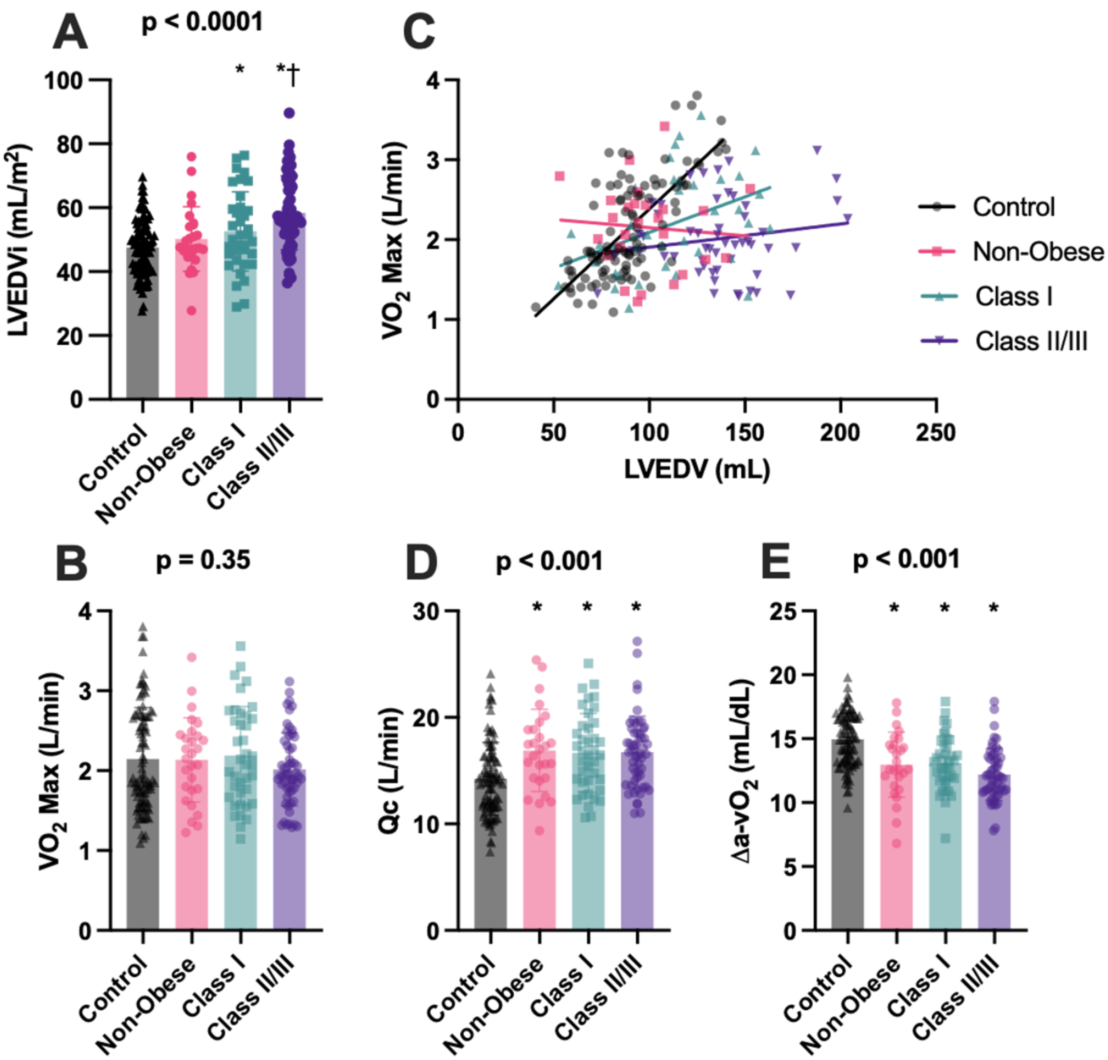

Figure: A) High risk (HR) stage A/B HF with severe obesity (Class II/III) have larger LVEDVi compared to CON and other less-obese HR individuals, however, B) there is no difference in peak VO_2. C) Larger LVEDV corresponds to improved VO_2 max in CON, but this relationship is attenuated in Class II/III. All HR groups demonstrated D) elevated peak Qc and E) depressed $\Delta a\text{-}vO_2$ compared to CON. Abbreviations: LVEDVi = LVEDV indexed to body surface area, VO_2 = oxygen uptake, Qc = cardiac output, $\Delta a\text{-}vO_2$ = peripheral O_2 extraction.

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Ventilatory And Respiratory Outcomes Are Impaired By Obesity In A Clinical Setting

Antonio Hernandez-Escobar[1], Marie R. Jensen[2], Jonathan M. Saxe[3], Lewis E. Jacobson[3], Michael L. Bruneau, Jr, FACSM[4], Juan M. Ramirez[1], J. Mark Van Ness[1], Courtney D. Jensen[1]. [1]*University of the Pacific, Stockton, CA.* [2]*Tufts University, Phoenix, AZ.* [3]*St. Vincent Hospital, Indianapolis, IN.* [4]*Drexel University, Philadelphia, PA.* (Sponsor: Michael L. Bruneau, FACSM)
(No relevant relationships reported)

Excess adiposity can alter breathing mechanics. Previous research has established relationships between obesity and asthma, sleep apnea, and minute ventilation. More relationships are likely to exist but require further investigation.
PURPOSE: To identify the effect of obesity on ventilatory and respiratory diagnoses and outcomes in hospital patients.
METHODS: We exported patient registries from two departments at a major Midwestern hospital: the emergency department (ED; n=1,005) and trauma center (TC; n=424). All patients were between 15 and 85 years of age and had a Glasgow Coma Scale score ≥14, enabling cogent reporting of health history. All TC patients were admitted for thoracic trauma, permitting analysis of obesity's effect on ventilatory treatments and outcomes. ED patients did not experience thoracic trauma. Linear and logistic regressions assessed the effect of obesity on respiratory rate, oximetry, diagnosis of respiratory disease, and use of mechanical ventilation. Confounding variables were held constant.
RESULTS: Among ED patients, 30.9% were obese. Obesity was unrelated to sex (p=0.642) and age (p=0.963). However, sex (p=0.002) and age (p<0.001) predicted diagnosis of a respiratory disease; holding both constant, obesity predicted a 76.5% increase in the odds of diagnosis (p=0.009). Holding sex (p=0.044) and age (p<0.001) constant, obesity predicted a 0.6% reduction in oxygen saturation (p<0.001). Among TC patients, 26.8% were obese, and obesity was unrelated to sex (p=0.673) and age (p=0.727). Holding age (p=0.023) and injury severity score (ISS; p=0.071) constant, the odds of obese patients presenting with a pulmonary contusion were decreased by 45.6% (p=0.027), possibly owing to insulation of impact. Despite less severe pulmonary injury, the odds of requiring mechanical ventilation were elevated by 120.9% (p=0.015) while holding sex (p=0.049) and ISS (p<0.001) constant. The duration of ventilation was 3.4 days longer, but insignificant owing to wide variance. Holding ISS constant (p=0.008), respiratory rate was 0.8 breaths per minute higher in obese patients (p=0.020).
CONCLUSION: These data support the hypothesis that obesity is a risk factor for several pulmonary abnormalities. Weight management may be an important component of long-term patient care in this population.

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Validity Of 'Range-based Methods' Compared To The 'Ventilatory Thresholds-based Method' For Exercise Intensity Prescription In Patients After Bariatric Surgery

Sara Faggian, Giulia Quinto, Anna Centanini, Marco Vecchiato, Andrea Ermolao, Francesca Battista, Daniel Neunhaeuserer.
University of Padova, Padova, Italy.
(No relevant relationships reported)

Obesity represents an ongoing pandemic and bariatric surgery is needed in severe, morbid obesity. Sustainable weight loss and positive effects on cardiometabolic conditions can thereby be achieved, while concomitant exercise training positively affects body composition, weight regain, muscle strength and fitness. Cardiopulmonary exercise testing (CPET) is the gold standard methodology for exercise prescription (ExRx), defining intensities based on ventilatory thresholds (VTs). However, ExRx by range-based methods may be a more affordable option for such a large population.
PURPOSE: to determine the validity of range-based methods versus VTs-based methods for exercise intensity prescription of endurance training in patients after bariatric surgery.
METHODS: 565 patients were evaluated 6-month after bariatric surgery by CPET. VT_1 and VT_2 were considered as lower limits of the moderate and high intensity domain, respectively. Values of oxygen consumption (VO_2) and heart rate (HR) obtained at VT_1 and VT_2 were compared with the respective lower limit of moderate and high intensity ranges, determined by the percentages of measured and predicted values of peak VO_2 ($VO_{2\,peak}$), maximum HR (HR_{max}) and Karvonen HR (HR_{Karv}), as proposed by the 2020 ESC Guidelines.
RESULTS: all values of VO_2 and HR at the lower limit of both moderate and high intensity according to the 2020 ESC Guidelines, were statistically significant different from the respective values at VT_1 and VT_2. All range-based methods seem to underestimate exercise intensity, while the predicted HR_{Karv} leads to overestimations. Overall, the HR_{Karv} relying on measured HR_{rest} and HR_{max} appears more closely related to the HR at VT_1 and VT_2.
CONCLUSION: in patients after bariatric surgery, range-based methods as proposed by 2020 ESC Guidelines are not valid enough to provide adequate ExRx; the identification of VTs by CPET remains essential. Measured HR_{Karv} is the most appropriate alternative for this population.

CPET dataVT_1 [1]	Lower limit of "moderate" intensity [2, 3]	Spearman's rank correlation	CPET dataVT_2 [1]	Lower limit of "high" intensity [2,3]	Spearman's rank correlation
VO_2 [mL/kg·min]13.0 (11.3, 14.9)	Measured 40% $VO_{2\,peak}$ [mL/kg·min]8.8 (7.5, 10.2) ***	0.756 ***	VO_2 [mL/kg·min]17.3 (14.9, 19.7)	Measured 70% $VO_{2\,peak}$ [mL/kg·min]15.4 (13.1, 17.9) ***	0.901 ***
HR [bpm]110 (99, 119)	Measured 55% HR_{max} [bpm]84 (77, 91) ***	0.646 ***	HR [bpm]133 (120, 146)	Measured 75% HR_{max} [bpm]115 (105, 125) ***	0.790 ***
	Predicted 55% HR_{max} [bpm]95 (91, 98) ***	0.424 ***		Predicted 75% HR_{max} [bpm]130 (125, 134) *	0.543 ***
	Measured 40% HR_{Karv}: HR $_{rest}$ + 40% $HR_{reserve}$ [bpm]107 (99, 115) **	0.768 ***		Measured 70% HR_{Karv}: HR $_{rest}$ + 70% $HR_{reserve}$ [bpm]130 (119, 140) *	0.819 ***
	Predicted 40% HR_{Karv}: HR $_{rest}$ + 40% $HR_{reserve}$ [bpm]115 (110, 121) ***	0.663 ***		Predicted 70% HR_{Karv}: HR $_{rest}$ + 70% $HR_{reserve}$ [bpm]144 (138, 150) ***	0.640 ***

Measured and predicted values are indicative of $VO_{2\,peak}$ and HR_{max} measured with CPET or predicted with formulae. [1] Median (IQR); [2] 2020 ESC Guidelines; [3] Wilcoxon rank-sum test; * p < 0.05; ** p < 0.01; p < 0.001.Abbreviations: CPET, cardiopulmonary exercise testing, HR, heart rate; VT, ventilatory threshold; VO_2, oxygen uptake.