Introduction:
Patients receiving bariatric surgery are often at risk for sleep apnea (OSA) and need extensive surveillance in the postoperative period. Recent literature suggests that the onset and frequency of respiratory events (RE) are unevenly distributed, with the incidence increasing up to several hours after leaving PACU. We explored the timing and onset of RE in patients recovering from bariatric surgery after PACU discharge, and through the first night after the intervention.

Methods:
The study was approved by our IRB, with patients giving written informed consent for data collection. We included 25 patients with OSA and 18 non-OSA patients. Patient's (18-80yr, 2 males) preoperative studies comprised OSA evaluation for all patients, with sleep studies for severe OSA grades. Additionally, we utilized the predictive score PRODIGY (3) to stratify for the risk of RE. All patients received multimodal intraoperative non-opioid anesthesia. Postoperative narcotics were limited to small boluses of Fentanyl, MgCl, and Ketorolac. Average PACU admission lasted just over 2 hr. Patients were later transferred to a general care floor and monitored continuously (MASIMO RAD 97). All variables were compiled through TRACE software for pulse oximetry, heart rate, acoustic respiratory rate, and perfusion index, for an average duration of 15 hr and 35 min. RE events after admission to the unit were counted at 0-4hr, 4-8 hr, 8-12 hr, and 12-16 hr. Software provided data were used to count RE (O2 sat < 89% or desaturation of 3% for >30s; Respiratory Rate < 10 breaths/min for >30s).

Statistical Methods:
Since many patients had 0 RE, we modeled their distribution using a zero-inflated regression strategy with a negative binomial link. The number of events was used as the outcome to test OSA status, normalized PRODIGY Score, and PRODIGY Level as predictors. Mean, and 95% confidence intervals for each stratum were reported for categorical variables and beta value by 1-SD for continuous variables. Because OSA status is a component of the PRODIGY Score (5 points out of 30), Nagelkerke pseudo-R2 was used as a prediction measure of the model for comparison between OSA, PRODIGY Score, and various versions of the PRODIGY Score, where the contribution of OSA ranged from 0 to 30 points. Analysis of Deviance under the same modeling strategy was performed by event type at the 4 different time points to test differences in the number of events during the monitoring. All the analyses were performed using R v4.2.1.

Results:
The distribution of mean respiratory events peaked in the interval 4-8 hr (Figure 1) for both desaturation and low respiratory rate, but no contrast between all time points was significantly elevated (all ANOVA contrasts p-value > 0.05). OSA status was significantly associated with the number of desaturation events (mean number of events for OSA 5.46 (1.39 - 9.54) vs. non-OSA 0.89 (0 - 1.82), beta 1.63, p=0.02) and OSA patients had a higher number of low respiratory rate events, albeit not reaching significance (3.08 (0.65 - 5.51) for OSA and 1.17 (0 - 2.34) for non-OSA, beta 1.08 p=0.15). On the other hand, the PRODIGY score demonstrated an increased number of events of 0.47 and 0.7 by 1-SD for desaturation and low respiratory rate events, respectively, but none of the models reached significance (p=0.19 and p=0.58, respectively). When treated as categorical (High vs. Low and Medium vs. Low risk), none reached significance. A model using a modified PRODIGY Score with 10-point for OSA instead of 5 significantly predicted low respiratory rate events (0.82 extra events per 1-SD, p=0.04), while a 20-point score predicted desaturation events (0.72 extra events per 1-SD, p=0.03).

Conclusions:
Continuous overnight monitoring of RE completed in our patients displays an earlier peak, in contrast to the literature (1,2). The low rate of episodes recorded could be due to our low opiate management. OSA status is also possibly underestimated by the PRODIGY score, and we propose that it might carry a heavier risk for sleep apnea (OSA) and need extensive management. OSA status is also possibly underestimated by the PRODIGY score, and we propose that it might carry a heavier risk than previously reported (3).

References: