

## Intra-operative oxygenation in the reduction of colorectal surgical site infections: Does the WHO have any influence?

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**Introduction:** Surgical Site Infections (SSIs) are preventable complications which result in significant morbidity and mortality. In low and middle-income countries, 11% of patients who undergo surgery are infected in the process. Colorectal procedures, due to the location of the surgical site, carry a higher risk for SSIs than other surgical procedures. The World Health Organization (WHO) has published recommendations to reduce the risk of SSIs; adult patients undergoing general anesthesia with endotracheal intubation for surgical procedures should receive an 80% fraction of inspired oxygen ( $\text{FiO}_2$ ) intraoperatively and, if feasible, in the immediate postoperative period for 2-6 hours to reduce the risk of SSI. A retrospective review was conducted of elective colorectal patients operated over a period of 20 months (February 2018 to October 2019) at a tertiary centre hospital to assess the current unit practice with regard to WHO and institutional guidelines for intraoperative oxygenation. Further analysis was conducted to assess if there was a link demonstrated between intraoperative oxygenation and the incidence of observed SSIs.

**Method:** Anesthetic charts were reviewed and the following data subjects collected for 392 patients undergoing elective open colorectal surgery: (1) Maximum and minimum (post induction) operative saturations ( $\text{SpO}_2$ ); (2) modal frequency operative  $\text{SpO}_2$ ; (3) maximum and minimum (post induction) delivered oxygen fraction ( $\text{FiO}_2$ ), (4) modal frequency  $\text{FiO}_2$ , (5) post-operative complications coded as “Wound infection” and “Dehiscence”, and (6) Baseline demographics: Age, Gender, BMI and ASA. The primary outcome was the comparison of intra-operative  $\text{SpO}_2$  and  $\text{FiO}_2$  values with WHO recommendations and institutional recommendations. Secondary outcomes were to assess if there was a statistically significant difference in  $\text{SpO}_2$  or  $\text{FiO}_2$  values in groups experiencing a wound infection/dehiscence versus those that did not. Data was analyzed using Welch’s t-test.

**Result:** (1) Primary Outcome: Mean intra-operative low/modal/high  $\text{SpO}_2$  values (%) 96.25/98.03/99.38, respectively and mean intra-operative low/modal/high  $\text{FiO}_2$  values (%) 39.63/42.84/52.53, respectively. (2) Secondary Outcome: 32 cases of wound infection/dehiscence was observed. No statistically significant difference (defined as  $p < 0.05$ ) was observed between those with complications and those without complications with regard to low/modal/high  $\text{SpO}_2$  and  $\text{FiO}_2$  values. Baseline demographics were found to be not statistically significant between those with complications and those without with the exception of BMI ( $p = 0.005$ ). Those in the complication group had a mean BMI of 30.8 versus 27.2 for the non-complication group.

Measurement	Group	Mean (%)	P value
SpO <sub>2</sub> Modal	Wound complication	98.03	0.2958
	No wound complication	98.42	
FiO <sub>2</sub> Modal	Wound complication	42.84	0.9319
	No wound complication	42.98	

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**Conclusion:** Results indicate a clear concordance with institutional recommendations for intraoperative SpO<sub>2</sub> values to be greater than 95%. With regard to intra-operative FiO<sub>2</sub> fractions there is a trend toward normoxia (30-35%) versus hyperoxia (80%). This was a relatively small study population. It is interesting to note the relationship between minimum intraoperative SpO<sub>2</sub> and wound complications (p=0.0634). A further study with a larger population is warranted to further explore this.