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REVIEW ARTICLE

A Meta-Analysis of 80% Fraction of Inspired Oxygen on Surgical Site Infection in Patients Undergoing Surgery

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ABSTRACT

Background: WHO recommended the use of 80% FiO_2 in patients undergoing general anesthesia with endotracheal intubation (ETI) to prevent surgical site infection (SSI). However, the ongoing debate regarding efficacy and safety raises because further trials have been published. We conducted a review based on recommendations in terms of SSI as the primary outcome and adverse events as the secondary outcome in both patients with or without ETI.

Method: A literature search was carried out by PubMed, ScienceDirect, and Google Scholar for RCTs in all-type surgical patients who administrated 80% FiO_2 compared with 30–35% FiO_2. Pooled relative risks with a 95% confidence interval were conducted for meta-analysis.

Result: Based on 23 RCTs included in the analysis, there were no significant differences in terms of SSI (RR,0.85; 95%CI, 0.72 to 1.01; p=0.07), sepsis (RR,1.47; 95%CI, 0.78 to 2.76; p=0.23), postoperative hospitalization days (PHD) (RR,0.16; 95%CI, -0.67 to 0.98; p=0.71), ICU admission (RR,0.94; 95%CI, 0.78 to 1.13; p=0.50), reoperation required (RR,0.78; 95%CI, 0.30 to 2.06; p=0.62), and 30-days mortality (RR,1.18; 95%CI, 0.76 to 1.84; p=0.45). In contrast, even though the subgroup analysis showed association that PHD longer in high FiO_2 group for colorectal surgery (RR,0.80; 95%CI, 0.24 to 1.35; p=0.005), the high FiO_2 significantly reduced SSI and anastomotic leakage in abdominal surgery (RR,0.78; 95%CI, 0.62 to 0.99; p=0.04 and RR,0.55; 95%CI, 0.36 to 0.85; p=0.008).

Conclusion: This meta-analysis provides evidence that administration of 80% FiO_2 even though association with longer of PHD in colorectal surgery, it is associated with a reduction in SSI and anastomotic leakage in patients who underwent abdominal surgery. It contrasts for sepsis, ICU admission, reoperation required, 30-day mortality, SSI, and PHD in all-type surgery.

Keywords: adverse events; meta-analysis; oxygen; surgery; surgical site infection.

INTRODUCTION

Surgical site infections (SSI) are infection on incision site after surgery that clinically important postoperative adverse event because it leads to length of hospitalization, morbidty, mortality, and increases a considerable cost on health care system[1,2]. A total of 135 from 4,893 (2.8%) abdominal surgeries developed SSI has been reported at Cipto Mangunkusumo Hospital, Jakarta, Indonesia, from January 2012 to November 2017[3.] Preventive strategies approach by surgical or anesthesia departments to overcome this condition were urgently needed in order to enhanced satisfactory surgical care system. World Health Organization (WHO) have recommendation the use of 80% Fraction of inspiratory oxygen (FiO_2) as perioperative strategy to reduce the risk or incidence of surgical site infection in adult patients with endotracheal tube intubation under general anesthesia[4]. High concentrations of inspired oxygen might increase tissue oxygenation and thereby enhancing oxidative killing by neutrophil as bactericidal host defence. This mechanism is mediated when the superoxide anion is converted to hydrogen peroxide and then catalyzed by myeloperoxidase into hypochlorous acid which has a bactericidal mechanism [5]. Recent meta-analysis showed that 80% fraction of inspiratory oxygen clinically safe to reduce SSI in patients undergoing surgery and no substantial of safety concern against WHO recommendations[6]. However, further studies were widely published still lead to ongoing debate over the clinical use of high fraction of inspiratory oxygen. We conducted a review based on WHO recommendations in terms of surgical site infection as the primary outcome and adverse events such as sepsis, postoperative hospitalization days (PHD), anastomotic leakage, reoperation required, and 30-days mortality as the secondary outcome in both patients with or without endotracheal intubation.

METHODS

This systematic review and meta-analysis was reported based on the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guideline [7].

Database Searching and Study Selection

We performed database literature searching in Pubmed, Google Scholar, and ScienceDirect using the following

keywords: Oxygen, FiO_2, (Surgical Site Infection OR SSI), and Surgery.

We only included articles that match our eligibility criteria: (1) Reported patients who underwent a major surgery aged 18 year or older; (2) The patients received an intervention either high FiO_2 (80%) or low FiO_2 (30-35%); (3) Reported at least one of the following outcomes: Surgical site infection (SSI), sepsis, anastomotic leakage, postoperative hospitalization days (PHD), ICU admission, reoperation, and 30-days mortality; (4) The article used RCT study design; (5) Written in English. The literature search was done in February 2022 without any year restriction.

All results from the databases were inputted in *Rayyan.ai,* an artificial intelligence online program that integrated to expedite the initial screening of abstracts and titles during studies selection process[8]. Two independent reviewers (RNE and AIT) selected the articles based on title and abstracts.

All articles that passed the title and abstract selection were screened for the eligibility criteria. Any conflicts in articles within the article selection were discussed with all authors.

Data extraction

All included studies underwent data extraction by two independent reviewers (RNE and AIT). The main outcome of this study is SSI. There were many secondary outcomes such as the incidence of sepsis, anastomotic leakage, PHD, ICU admission, reoperation, and mortality. Several data were extracted from the studies including the author, year, sample size, age, type of surgery, duration of surgery, outcome, type of anesthesia, postoperative oxygenation, follow-up, and bacterial culture. Any controversies between data extraction were discussed with other authors.

Risk of bias assessment

The risk of bias in each study was assessed using Cochrane Risk of Bias 2 (ROB 2) tool[9]. The ROB 2 tool consists of five domains like selection bias, performance bias, detection bias, attrition bias, and reporting bias. Each domain was graded as “low risk”, “some concern”, and “high risk” of bias.

The risk of bias assessment was conducted by two authors (LI and YTS) independently. Any difference in terms of grading was discussed with other authors. Publication bias was assessed using a funnel plot if only there were 10 or more studies included in the analysis,

a symmetrical funnel plot is defined as low publication bias.

Data synthesis and analysis

The data were analyzed both analyzed narratively and quantitatively using meta-analysis. The meta-analysis was conducted using Review Manager (RevMan) 5.4 (Cochrane collaboration, oxford, UK) with 95% confidence interval (CI). Pooled risk ratio was used to calculate the outcome of SSI, sepsis, anastomotic leakage, ICU admission, reoperation, and mortality.

In addition, pooled mean difference (MD) was used to calculate the outcome in PHD. Random Effects Model (REM) and Fixed Effects Model (FIM) were used based on the heterogeneity (I^2 > 50% determined as high heterogeneity, I^2<50% determined as low heterogeneity) based on Cochrane handbook of systematic reviews of interventions[10]. A subgroup analysis was performed based on the type of surgery.

RESULTS

Studies Selection

Based on the database searching, we found a total of 1954 articles from Pubmed, Google Scholar, and ScienceDirect. We conducted the duplicate screening automatically using Rayyan.ai and then underwent title and abstract screening. After title and abstract screening, 25 articles were checked for eligibility by full-text screening. Qualitative synthesis and quantitative analysis using meta-analysis were performed in 23 included articles. Figure 1 shows the PRISMA flow chart.

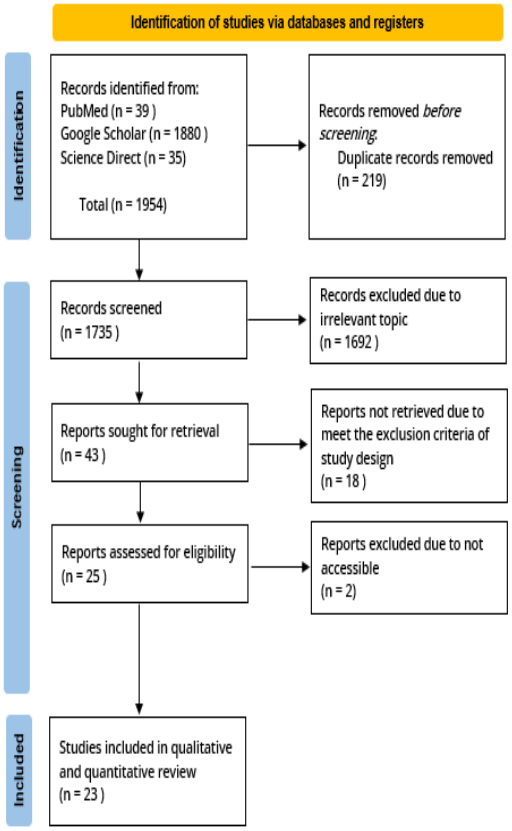


Figure 1. PRISMA Flowchart

Study characteristics and Risk of Bias

Table 1 and Table 2 summarize all the included RCT studies. The sample size varied between each study ranging from 38 to 2012 samples. The included studies were conducted in several countries such as Austria[1], USA[6], Spain[1], Israel[2], Denmark[1], France[1], Hong Kong[1],

Italy[3], India[2], Iran[1], China[1], and multicenter countries[3].

The risk of bias assessment was conducted using Cochrane ROB 2 tool and presented in supplementary files. The risk of bias varied from low risk – high risk of bias. There are 7 studies labeled as low risks of bias, 8 studies some concern/uncertain, and 8 studies high risks of bias.

Table 1. Characteristic of included studies part 1

Study	Sample Size	Type of surgery	Age		Duration of surgery		Intervention		Patients outcomes
			High FiO_2	Low FiO_2	High FiO_2	Low FiO_2	High FiO_2	Low FiO_2	
Greif et al, (2000) Austria [11]	500	Elective open colorectal resection	57±15	57±15	3.1±1.4 (h)	3.1±1.4 (h)	80% O_2 with 20% N_2O	30% O_2 with 70% N_2O	SSI, PHD, ICU admission
Pryor et al, (2004) USA [12]	160	Major abdominal surgery	54±16	57±15	233±83 (min)	208±91 (min)	80% O_2	35% O_2	SSI, PHD, ICU admission
Belda et al, (2005) Spain [13]	291	Elective colorectal resection	64.2±11.8	62.3±12.5	161±62 (min)	159±61 (min)	80% O_2	30% O_2	SSI, PHD, ICU admission
Mayzler et al, (2005) Israel [14]	38	Elective colorectal surgery	67±10	69±9	140±40 (min)	135±40 (min)	80% O_2 with 20% N_2O	30% O_2 with 70% N_2O	SSI, anastomotic leakage
Myles et al, (2007) Multicenter [15]	2012	Mixed surgeries	55.8±17	54.6±16	3.3±2.0 (h)	3.3±2.0 (h)	80% O_2 with 20% N_2O	30% O_2 with 70% N_2O	SSI, ICU admission, 30-days mortality
Gardella et al, (2008) USA [16]	143	Caesarean section	31 (19–46)	28 (16–47)	48 (26–87) (min)	52 (20–141) (min)	80% O_2	30% O_2	SSI
Meyhoff et al, (2009) Denmark [17]	1386	Acute or elective laparotomy	64 (27–85)	64 (34–84)	128 (38–310) (min)	132 (35–295) (min) \	80% O_2	30% O_2	SSI, ICU admission, anastomotic leakage, PHD, re 30-days mortality
	633	Colorectal surgery	NR	NR	NR	NR	80% O_2	30% O_2	SSI
Bickel et al, (2011) Israel [18]	210	Open appendectomy	28.5± 12.3	27.6±10.8	33.04±10.6 (min)	32.75±10.3 (min)	80% O_2 with 20% air	30% O_2 with 70% N_2O	SSI, PHD
Scifres et al, (2011) USA [19]	585	Caesarean section	27.5±6.4	27.8±5.9	57.4±20.5 (min)	60.6±26.1 (min)	80% O_2	25-35% O_2	SSI
Thibon et al, (2012) France [20]	434	Abdominal, gynecologic, breast (Mixed surgeries)	52.1±13.7	51.8±13.3	89±61 (min)	84±58 (min)	80% O_2	30% O_2	SSI
Chen et al, (2013) Hong Kong [21]	60	Open colorectal surgery	62±12	60±15	A/199± 76 (min)	A/184±85 (min)	80% O_2	30% O_2	SSI, PHD
Duggal et al, (2013) USA [22]	831	Caesarean section	29.2±5.6	29.5±5.8	NR	NR	80% O_2	30% O_2	SSI and/or endometritis
Schietroma et al, (2013) Italy [23]	171	gastrectomy and subsequent esophagojejunal anastomosis	68.4 (51–84)	67.8 (48–82)	175 (100–250) (min)	180 (118–270) (min)	80% O_2	30% O_2	SSI, anastomotic leakage, reoperation required
Stall et al (2013) USA [24]	235	Open reduction and internal fixation	42.3±12.1	42.5±12.2	233±88 (min)	228±88 (min)	80% O_2	30% O_2	SSI
Williams et al, (2013) USA [25]	160	Caesarean section	24.6024	24.8961	51.2048 (min)	52.2467 (min)	80% O_2	30% O_2	SSI
Kurz et al, (2015) Multicenter [26]	586	Colorectal resection	54±16	51±17	3.5±1.5 (h)	3.5±1.8 (h)	80% O_2	30% O_2	SSI, PHD, 30-days mortality
Wasnik et al, (2015) India [27]	64	Open Appendectomy	27.15±10.46	28.56±12.22	61.87±10.6 (min)	61.4±12.5 (min)	80% O_2	30% O_2	SSI, PHD
Fariba et al, (2016) Iran [28]	122	Caesarean section	29.70±5.4	29.26±4.6	57.5±14.2 (min)	60±10.4 (min)	80% O_2	30% O_2	SSI
Schietroma et al, (2016a) Italy [29]	239	Open perforated peptic ulcer surgery	58.3 (35–80)	57.8 (30–82)	63.2 (38–104) min	58.7 (33–102) min	80% O_2	30% O_2	SSI
Schietroma et al, (2016b) Italy [30]	85	Open colorectal resection	71.4 (55–92)	68.6 (49–86)	200 (95–410) min	195 (100–385) min	80% O_2	30% O_2	SSI, anastomotic leakage, reoperation required
Mayank et al, (2019) India [31]	94	Elective colorectal surgery	57.02±12.94	53.36±14.45	233.51±87.65 (min)	207.66±103.53(min)	80% O_2 with 20% N_2O	33% O_2 with 66% N_2O	SSI, PHD, anastomotic leakage
Ferrando et al, (2020) Multicenter [32]	740	Abdominal sutgery	64.2±12.8	63.9±13.9	214.2±93.3 (min)	209.2±89.7 (min)	80% O_2	30% O_2	SSI, PHD, 30-days mortality
Xue-Fei Li et al, (2020) China [33]	251	Abdominal surgery	54±14	53±13	190 (154–245) min	200 (146–258) min	80% O_2	30% O_2	SSI, sepsis, ICU admission

SSI= surgical site infection; PHD= postoperative hospitalization days; ICU= intensive care unit; min= minutes; h= hour

Table 2. Characteristic of included studies part 2

Study	Type of SSI Assesment	Type of anaesthesia	Post-operative oxygenation	Follow up for SSI assesment	Bacterial culture
Greif et al (2000) Austria [11]	ASEPSIS scores	General	2 h by NRBM	15 days	*Escherichia coli* Enterococcus *Pseudomonas aeruginosa* *Staphylococcus aureus* *S. epidermidis* Enterobacter
Pryor et al, (2004) USA [12]	NR	General	2 h by CN for low group and NRBM for high group	14 days	*Escherichia coli* *Bacteroides fragilis* *Enterococcus faecalis* *Coagulase-negative staphylococcus* No species identified
Belda et al, (2005) Spain [13]	ASEPSIS scores and CDC criteria	General	6 h by NRBM	14 days	NR
Mayzler et al, (2005) Israel [14]	NR	General	2 h by face mask	30 days	NR
Myles et al, (2007) Multicenter [15]	NR	General	NR	30 days	NR
Gardella et al, (2008) USA [16]	NR	Regional	2 h by NRBM	14 days	Group B streptococcus
Meyhoff et al, (2009) Denmark [17]	ASEPSIS scores and CDC criteria	General	2 h by NRBM	14 days	NR
Bickel et al, (2011) Israel [18]	ASEPSIS scores	General	2 h by CN for low group and NRBM for high group	14 days	NR
Scifres et al, (2011) USA [19]	NR	Regional	2 h by CN for low group and NRBM for high group	28 days	Group B streptococcus
Thibon et al, (2012) France [20]	CDC criteria	General	NR	30 days	*Staphylococcus aureus* coagulasenegative staphylococcal species *Pseudomonas aeruginosa* Gram-negative bacteria
Chen et al, (2013) Hong Kong [21]	ASEPSIS scores and CDC criteria	General	24 h by facemask	30 days	NR
Duggal et al, (2013) USA [22]	NR	Regional	1 h by facemask	14 days	NR
Schietroma et al, (2013) Italy [23]	NR	General	6 h by facemask with reservoir	NR	NR
Stall et al, (2013) USA [24]	ASEPSIS scores and CDC criteria	General	2 h by CN for low group and NRBM for high group	12 weeks	NR
Williams et al, (2013) USA [25]	CDC criteria	Regional	2 h by aerosol mask	6 weeks	NR
Kurz et al, (2015) Multicenter [26]	CDC criteria	General	1 h by NRBM	30 days	NR
Wasnik et al, (2015) India [27]	ASPESIS scores	NR	2 h	10 days	NR
Fariba et al, (2016) Iran [28]	ASEPSIS scores	Regional	6 h by normal mask for low group and venturi mask for high group	14 days	NR
Schietroma et al, (2016a) Ital [29]	ASEPSIS scores and CDC criteria	General	6 h by NRBM with a reservoir	14 days	NR
Schietroma et al, (2016b) Italy [30]	NNIS, SENIC scales, and ASEPSIS scores	General	6 h by NRBM	14 days	NR
Mayank et al, (2019) India [31]	ASEPSIS score and CDC criteria	General	6 h by standard venturi mask for low group and NRBM venturi face mask for high group	2 days	NR
Ferrando et al, (2020) Multicenter [32]	CDC criteria	General and Regional	3 h by venturi mask for low group and NRBM with a reservoir for high group	30 days	NR
Xue-Fei Li et al, (2020) China [33]	CDC criteria	General	NR	7 days	NR

NR= Not Reported; h= hour; CN= canule nasal; NRBM= non rebreathable mask

Outcomes: Surgical site Infection

23 studies reported on surgical site infection incidences with 656/4672 events in the low FiO_2 and 558/4671 events in the high FiO_2 (Figure 2). Overall, high FiO_2 was not associated with an reducing risk of SSI in all-type surgery (pooled RR 0.85; 95% CI 0.72 – 1.01; p=0.07). There was considerable heterogeneity in the analysis (I^2=52%).

Accordance results also showed by subgroup analysis revealed that high FiO_2 statistically no significant to reduced SSI for colorectal surgery (pooled RR 0.84; 95% CI 0.64 – 1.10; p=0.20), open appendectomy (pooled RR 0.41; 95% CI 0.16 – 1.03; p=0.06), and caesarean section (pooled RR 1.20; 95% CI 0.91 – 1.58; p=0.21).

In contrast, high FiO_2 significantly reduced SSI in patients who underwent abdominal surgery (pooled RR 0.78; 95% CI 0.62 – 0.99; p=0.04) with high heterogeneity between studies (I^2=61%).

Outcomes: Sepsis

Two studies reported on sepsis with 16/826 events in low FiO_2 and 23/811 events in high FiO_2.

This results showed the trend of sepsis higher in high FiO_2 group but the pooled estimates did not demonstrate statistically significant (pooled RR 1.47; 95% CI 0.78 – 2.76; p=0.23). There was mild heterogeneity (I^2=0%).

Outcomes: Anastomotic leakage

Anastomotic leakage only available for abdominal surgery and conducted by six trials with 51/466 events in low FiO_2 and 28/464 in high FiO_2 (Figure 3). The pooled estimates showed that high FiO_2 statistically significant in terms to reducing the incidence of anastomotic leakage for abdominal surgery (pooled RR 0.55; 95% CI 0.36 – 0.85; p=0.008).

Low heterogeneity was observed in the analysis (I^2=0%).

Four studies conducted for colorectal surgery as subgroup analysis showed statistically significant association between high FiO_2 and anastomotic leakage (pooled RR 0.61; 95% CI 0.37 – 1.00; p=0.05). Heterogeneity between studies was low (I^2=0%).

Outcomes: Postoperative hospitalization days

Eight studies reported on postoperative hospitalization days (PHD) available only for abdominal surgery. The result showed not significantly differing between the groups (pooled MD 0.16; 95% CI -0.67 – 0.98; p=0.71). Heterogeneity between studies was high (I^2=0.74).

Subgroup analysis was conducted in terms for open appendectomy showed no significantly differing (pooled MD -1.25; 95% CI -3.23 – 0.74; p=0.22) with high heterogeneity (I^2=80%). However, instead reducing the PHD for colorectal surgery as subgroup analysis, high FiO_2

showed statistically significant increase of PHD (pooled MD 0.80; 95% CI 0.24 – 1.35; p=0.005). A low heterogeneity was observed (I^2 = 0%).

Surgical site infection

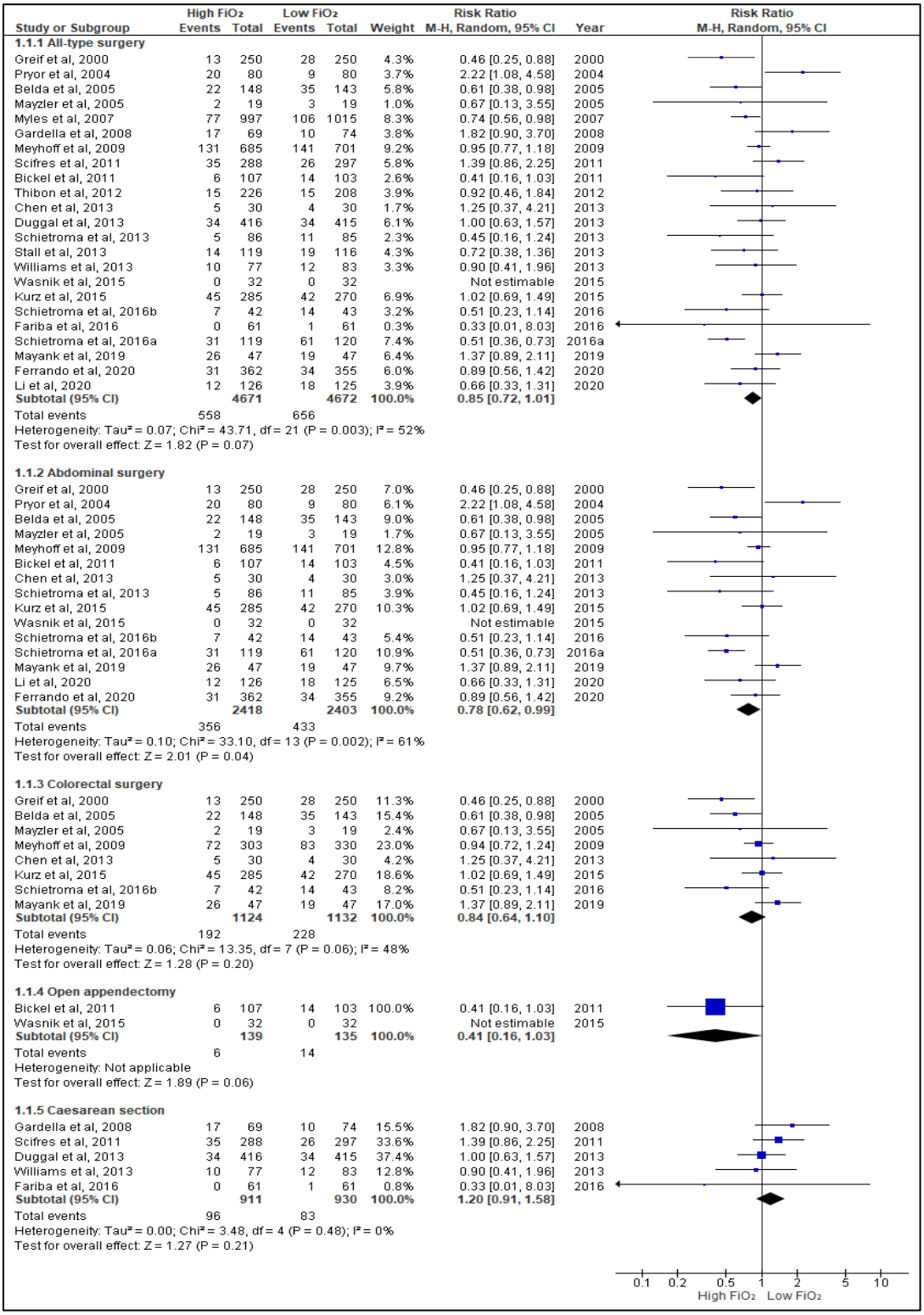
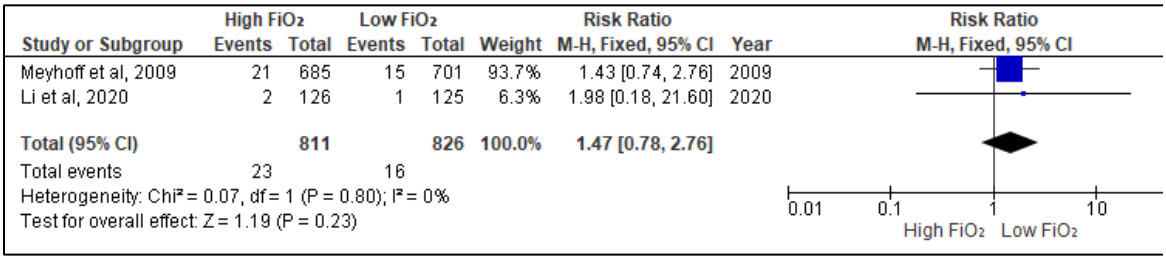
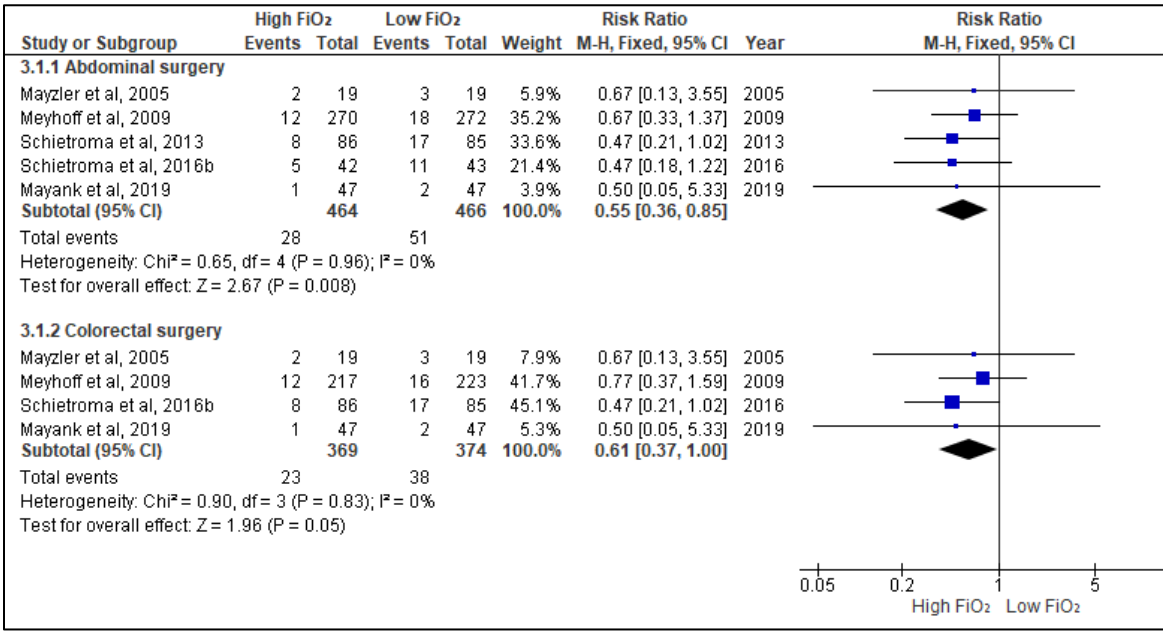


Figure 2. Forest Plot for Incidence of SSI between High FiO2 Group and Low FiO_2 Group

a) Sepsis



b) Anastomotic leakage



c) Postoperative hospitalization days

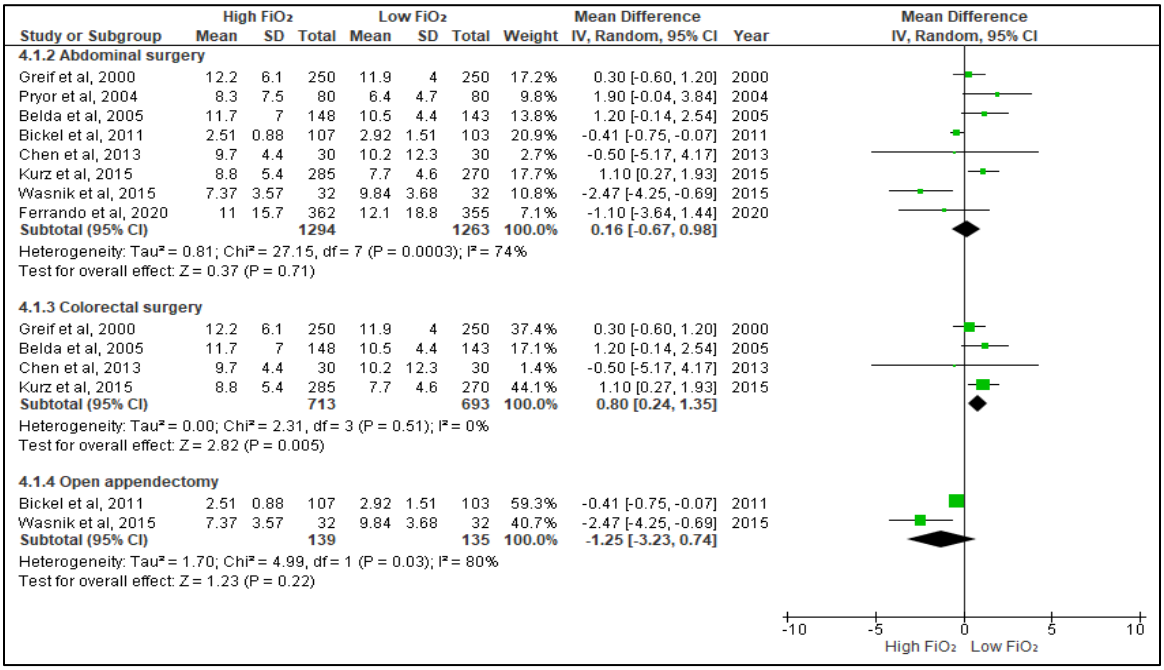
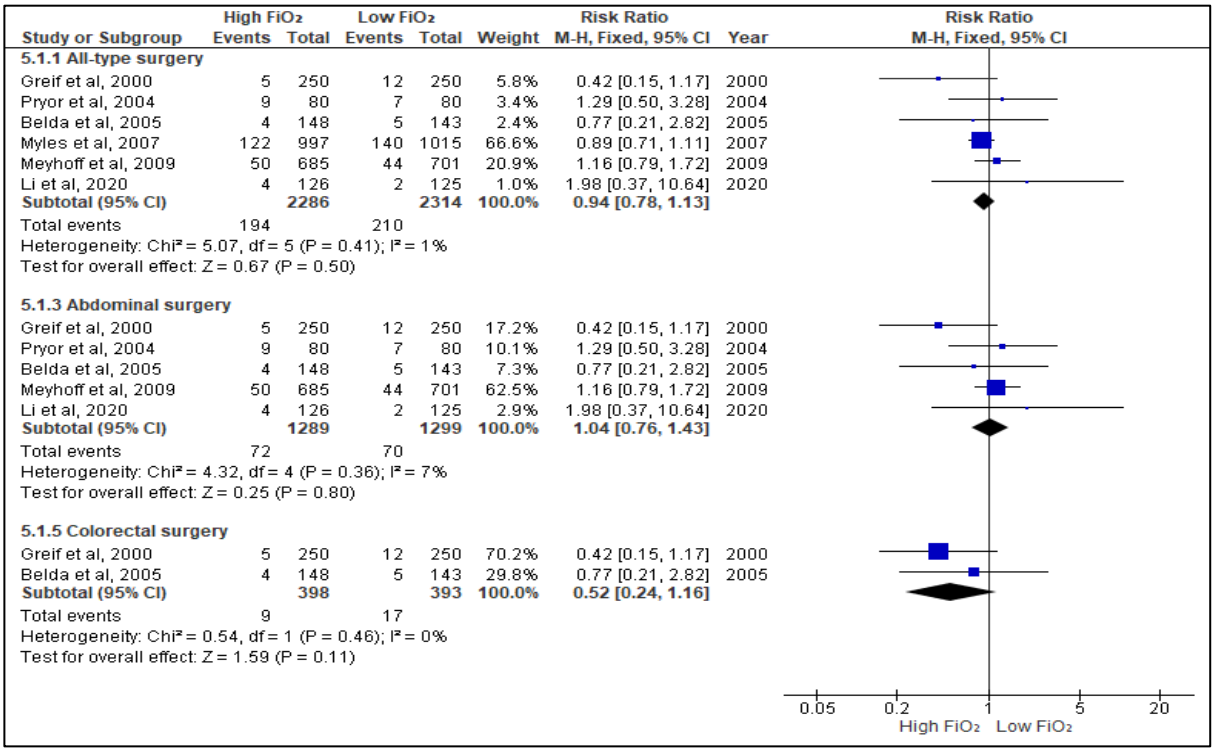
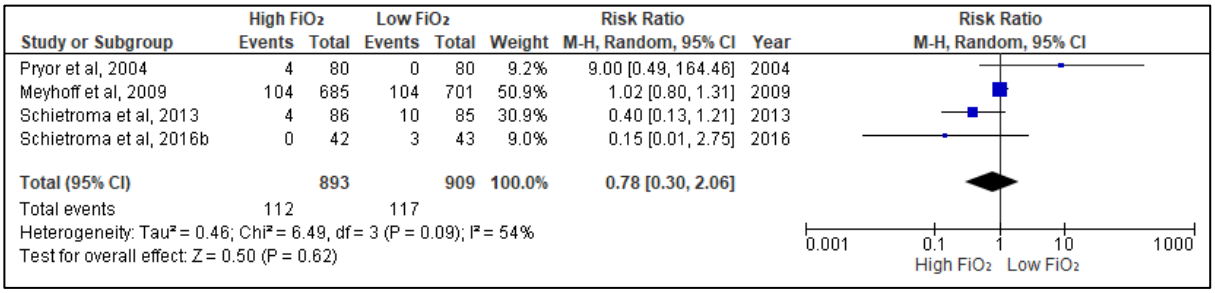


Figure 3. Forest Plot for Incidence of Sepsis, Anastomotic leakage, and Postoperative hospitalization days between High FiO2 Group and Low FiO_2 Group

d) ICU Admission



e) Reoperation required



f) 30-days mortality

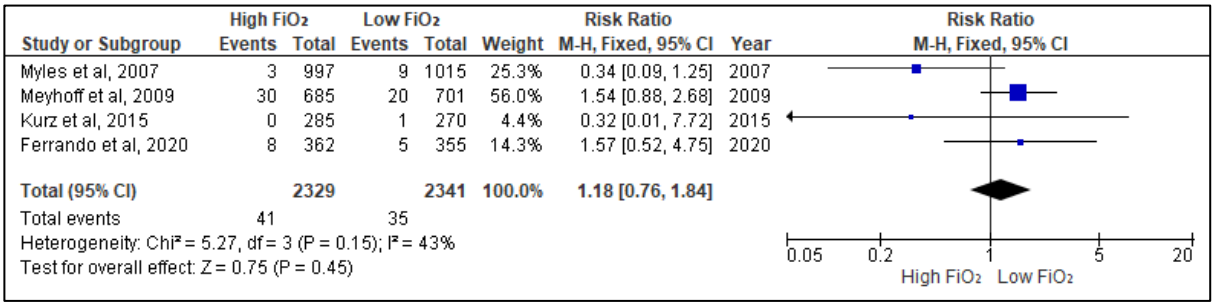


Figure 4. Forest Plot for ICU Admission, Reoperation Required, and 30-days mortality between High FiO_2 Group and Low FiO_2 Group

Outcomes: ICU admission

Six studies reported on ICU admission with 210/2314 patients in low FiO_2 group and 194/2286 in high FiO_2 group. There was statistically no significant in terms of ICU admission for

all-type surgery between the groups (pooled RR 0.94; 95% CI 0.78 – 1.13; p=0.50) with low heterogenity was observed (I^2=1%). The subgroup analysis was conducted for abdominal surgery and colorectal surgery also showed statistically no significant difference (pooled RR 1.04; 95% CI 0.76 – 1.43; p=0.80) and (pooled RR 0.52; 95% CI 0.24 – 1.16; p=0.11) with low heterogeneity was observed (I^2=7%) and (I^2=0%).

Outcomes: Reoperation required

Four studies reported on reoperation required, where of 117/909 events observed in the low FiO_2 group and 112/893 events in the high FiO_2 group. There was no significant difference in the reoperation required between the groups (pooled RR 0.78; 95% CI 0.30 – 2.06; p=0.62). High heterogeneity was observed in the analysis (I^2=54%).

Outcomes: 30-days mortality

Four studies reported on 30-days mortality with 35/2341 events in the low FiO_2 group and 41/2329 events in the high FiO_2 group. 30-days mortality was observed higher in High FiO_2 group, but there was no statistically significant different (pooled RR 1.18; 95% CI 0.76 – 1.84; p=0.45). A low heterogeneity was observed (I^2=43).

DISCUSSION

A meta analysis of 23 RCTs involving 9,343 patients was conducted in both patients with or without endotracheal intubation in order to developing the WHO guideline. This study showed no evidence for a benefit of the use high FiO_2 (80%) compared low FiO_2 (30-35%) to prevent or reducing the risk of SSI in all-type surgery although the incidence of SSI was higher in low FiO_2 group. In contrast, previous meta-analysis similar with WHO guideline revealed that high FiO_2 reducing the SSI risk in surgical patients under general anaesthesia with endotracheal intubation[4,34]. Although there are six additional studies where of three studies are the most recent [31-33] and three other are studies that have done of investigation enhanced that incidence of SSI still higher in low FiO_2 group, there are six studies showed contradictory incidence with relatively greatest RR than in other seventeen studies [12,16,19,21,26,31]. Subgroup analysis in terms of colorectal surgery also showed no evidence benefit of the use high FiO_2 compared low FiO_2, this results similar with previous meta analysis even though

these previous study was conducted not only for RCTs[35]. Caesarean section and appendectomy that performed by a lack of included studies demonstrate that high FiO_2 no evidence for benefit to prevent SSI. However, modification of subgroup analysis performed for all-type abdominal surgery suggest that high FiO_2 beneficially to prevent or reducing the risk of SSI.

Instead reducing the postoperative adverse events, this meta analysis showed that the trend of sepsis and 30-days mortality was higher in high FiO_2 group even though the results no statistically significant. PHD only showed statistically significant in subgroup analysis in term for colorectal surgery revealed that the use of high FiO_2 increases duration of PHD. Previous meta-analysis showed no definite signal of harm with 80% FiO_2 in surgical patients undergoing general anaesthesia because of there is lack of safety-related included studies that suggest to discourage this perioperative treatment [6]. Supplementation of high and low FiO_2 did not differentially of the mortality, pneumonia, respiratory failure, and length of hospital stay, but high FiO_2 associated with a significantly higher incidence of atelectasis [6,36].

The incidence of ICU admission and reoperation required was higher in low FiO_2 group but did not statistically significant. The beneficially evidence of high FiO_2 for secondary outcomes was observed only for anastomotic leakage in terms of both abdominal surgery and colorectal surgery. This results contrasts with previous meta-analysis where of the included studies conducted by multiple study design[35]. The beneficially of high FiO_2 for anastomotic leakage may related with increases of tissue perfusion in order to maintained mechanical stability of anastomosis[37].

Our meta-analysis was carry out by the most up to date search of the literature and clinically-important outcomes. However, this study has some limitations. First, the subgroup analysis performed by type of surgery instead of patient who undergo endotracheal intubation or not. However, there are no previous meta analysis that performed by type of surgery especially to investigated the use of high FiO_2 to reducing or prevent incidence of SSI. Second, the time of literature search not limited to the last 5 years, this condition was performed following WHO guideline which is the WHO latest guideline conducted by meta-analysis studies that

included studies above 5 years of publication.

CONCLUSION

In conclusion, the administration of 80% FiO_2 in both patients with or without endotracheal intubation for all-type surgery is not associated with the incidence of SSI, sepsis, PHD, ICU admission, reoperation required, and 30-days mortality. The evidence for a benefit the use of 80% FiO_2 is associated with reduction of SSI in abdominal surgery. It also showed beneficially for reducing of anastomotic leakage in abdominal and colorectal surgery. However, the use of 80% FiO_2 increases the duration of PHD in abdominal surgery.

In conclusion, based on the evidence showed in this result, the administration of 80% FiO2 in both patients with or without endotracheal intubation is strongly associated with reduction of SSI in abdominal surgery. This intervention is also associated with the reduction of anastomotic leakage in abdominal and colorectal surgery. However, it increases the duration of PHD in abdominal surgery.

CONFLICT OF INTEREST

All authors declare no conflict of interest.

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