

Supplementary material

Embase

Embase Classic+Embase <1947 to 2025 October 02>

- 1 exp high flow nasal cannula therapy/ 10231
- 2 exp nasal cannula/ 12730
- 3 (high flow nasal cannula or high-flow nasal cannula or high flow nasal oxygen or high-flow nasal oxygen or heated humidified high flow or high flow oxygen therapy or nasal high flow or HFNC or HFNO).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word] 13789
- 4 (Optiflow or Airvo or Vapotherm).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word] 1232
- 5 ((nasal adj3 prong) or (nasal adj3 position) or nasal prong oxygen*).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word] 1577
- 6 2 and (high flow or high-flow or hi* fl*).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word] 4099
- 7 1 or 3 or 4 or 5 or 6 15823
- 8 exp postoperative period/ 770400
- 9 exp recovery room/ 13403
- 10 exp anesthetic recovery/ 10164
- 11 exp postoperative complication/ 1135941
- 12 (postoperative or post-operative or post anaesthe* or post anesthe* or post surgical or post-surgical or postextubation or post-extubation or PACU or recovery room).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word] 1647325
- 13 (postoperative hypox* or postoperative respiratory).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword heading word, floating subheading word, candidate term word] 4182
- 14 exp general anesthesia/ 152687
- 15 8 or 9 or 10 or 11 or 12 or 13 or 14 2388719
- 16 7 and 15 2163
- 17 limit 16 to (randomized controlled trial or controlled clinical trial or multicenter study) 454
- 18 exp randomized controlled trial/ 1108634
- 19 exp controlled study/ 12063777
- 20 18 or 19 12063777

21 16 and 20 837
22 17 or 21 858

MEDLINE

Ovid MEDLINE(R) ALL <1946 to October 03, 2025>

- 1 exp Oxygen Inhalation Therapy/ 29738
- 2 ((nasal cannu* and (high flow or high-flow or hi* fl*)).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 3391
- 3 (high flow nasal cannula or high-flow nasal cannula or high flow nasal oxygen or high-flow nasal oxygen or heated humidified high flow or high flow oxygen therapy or nasal high flow or HFNC or HFNO).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 4592
- 4 ((nasal adj3 prong) or (nasal adj3 position) or nasal prong oxygen*).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 388
- 5 (Optiflow or Airvo or Vapotherm).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 139
- 6 1 or 2 or 3 or 4 or 5 33130
- 7 exp Postoperative Period/ 63692
- 8 exp Postoperative Complications/ 660117
- 9 exp Recovery Room/ 1371
- 10 exp Anesthesia Recovery Period/ 5891
- 11 (postoperative or post-operative or post anaesthe* or post anesthe* or post surgical or post-surgical or postextubation or post-extubation or PACU or recovery room).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease

supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word]1104425

12 (postoperative hypox* or postoperative respiratory).mp. [mp=title, book title, abstract, original title, name of substance word, subject heading word, floating sub-heading word, keyword heading word, organism supplementary concept word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms, population supplementary concept word, anatomy supplementary concept word] 2701

13 exp Anesthesia, General/ 64241

14 7 or 8 or 9 or 10 or 11 or 12 or 13 1299681

15 6 and 14 2541

16 limit 15 to (controlled clinical trial or randomized controlled trial) 295

17 exp Randomized Controlled Trial/ 649126

18 15 and 17 283

19 16 or 18 295

Web of Science

Web of Science Search Strategy (v0.1)

Searches:

1: ALL=(nasal AND cannu*) Results: 6297

2: ALL=(nasal AND cannu*) and High Flow Nasal Cannula (OR - Search within topic) and High-flow Nasal Cannula (OR - Search within topic) and Hfnc (OR - Search within topic) and Nasal High Flow (OR - Search within topic) and High-flow Nasal Cannula Oxygen Therapy (OR - Search within topic) Results: 6703

3: ALL=(surgery OR (general AND anesth*) OR (post AND anesthesia)) Results: 4794432

4: ALL=(surgery OR (general AND anesth*) OR (post AND anesthesia)) and General Anesthesia (OR - Search within topic) and Enhanced Recovery After Surgery (OR - Search within topic) and Anesthesia (OR - Search within topic) Results: 4880817

5: #4 AND #2 Results: 1403

6: #4 AND #2 and Review Article (Exclude - Document Types) and Note or Book Chapters or Retracted Publication or Meeting Abstract (Exclude - Document Types) Results: 1184

Supplementary Table 1 Outcome matrix by study including measurement timepoints and modality specifiers

Study	PaO ₂	SaO ₂	P/F Ratio	PaCO ₂	pH	RR	HRR	BP	Lung atelectasis	Pneumonia	PPC	Reintubation rate	Treatment failure	ICU/Hospital stay	Mortality	Comfort	Functional tests	Imaging
Ansari (2016)														✓ (Hosp)		✓ (Post-op)	✓ (6MWT)	
Brainard (2017)	✓ (Post-op)	✓ (Post-op)									✓ (Post-op)			✓ (Hosp)		✓ (Post-op)		
Burra (2021)	✓ (Post-op)			✓ (Post-op)	✓ (Post-op)						✓ (Post-op)	✓ (Post-op)			✓ (Post-op)			
Chen (2025)		✓ (PACU)									✓ (PACU)	✓ (PACU)		✓ (Hosp)		✓ (PACU)		✓ (LUS)
Corley (2015)			✓ (24h)			✓ (24h)			✓ (24h)				✓ (24h)	✓ (ICU)	✓ (Hosp)	✓ (24h)		
El-Nori (2022)		✓ (Post-op)									✓ (Post-op)			✓ (Hosp)				
Ferrando (2019)		✓ (Post-op)	✓ (Post-op)								✓ (Post-op)			✓ (Hosp)				
Fogagnolo (2025)											✓ (7d)			✓ (Hosp)				✓ (LUS)
Frassanito (2023)			✓ (2h)	✓ (2h)							✓ (2h)				✓ (2h)			✓ (LUS)

Fulton (2021)										✓ (Post-top)		✓ (Hosp)	✓ (Post-op)	✓ (Post-op)		✓ (EIT)	
Futier (2016)			✓ (1h)	✓ (1h)	✓ (1h)			✓ (7d)	✓ (7d)	✓ (7d)	✓ (7d)	✓ (Hosp)	✓ (Hosp)	✓ (1h)			
Li (2022)	✓ (1h)	✓ (1h)		✓ (1h)	✓ (1h)					✓ (3d)				✓ (1h)			
Mishra (2024)	✓ (2h)	✓ (2h)	✓ (2h)	✓ (2h)		✓ (2h)	✓ (2h)	✓ (2h)						✓ (2h)			
Parke (2013)		✓ (Day 3)	✓ (Day 3)	✓ (Day 1)	✓ (Day 1)	✓ (Day 1)		✓ (Day 3)		✓ (28d)	✓ (28d)	✓ (Hosp)	✓ (Hosp)	✓ (28d)	✓ (4h-D2)	✓ (Spiro)	
Pennisi (2019)	✓ (1-96h)	✓ (1-96h)	✓ (1-96h)	✓ (1-96h)				✓ (7d)	✓ (7d)	✓ (7d)		✓ (Hosp)	✓ (30d)	✓ (1-96h)		✓ (X-ray)	
Rosén (2022)	✓ (60m)	✓ (60m)		✓ (60m)	✓ (60m)	✓ (60m)	✓ (60m)	✓ (60m)						✓ (60m)			
Sahin (2018)	✓ (4-48h)	✓ (4-48h)		✓ (4-48h)		✓ (4-48h)	✓ (4-48h)	✓ (4-48h)	✓ (4-48h)	✓ (4-48h)	✓ (4-48h)	✓ (Hosp)	✓ (Hosp)	✓ (Hosp)	✓ (D1-2)	✓ (Spiro)	✓ (X-ray)
Shiho (2022)	✓ (60m)		✓ (60m)	✓ (60m)	✓ (60m)	✓ (60m)	✓ (60m)	✓ (60m)									
Soliman (2022)	✓ (30m)	✓ (48h)	✓ (30m)	✓ (30m)		✓ (48h)	✓ (48h)	✓ (48h)	✓ (Day 5)	✓ (Day 5)	✓ (Day 5)	✓ (Day 5)	✓ (Hosp)		✓ (30m-1h)	✓ (LUS)	
Sun (2024)		✓ (PA)							✓ (PAC)	✓ (Hosp)		✓ (Hosp)				✓ (LUS)	

Supplementary Table 2 Summary of pooled results with subgroup analysis of primary outcome

Outcome	Studies	Patients	OR or MD	95% CI	I ²	P
Reintubation	13	1693	0.93	0.36 – 2.38	47.1	0.86
Subgroup analyses of primary outcome						
Risk of Bias	P _{between-group} = 0.11					
High	7	879	0.64	0.29 – 1.44	63.8	0.54
Some concerns	3	440	0.73	0.17 – 3.26	0	0.30
Low	3	384	2.40	0.91 – 6.35	0	0.25
Patient Risk	P _{between-group} = 0.57					
High	6	975	1.14	0.23 – 5.62	62.9	0.76
Average	7	718	0.82	0.16 – 4.13	21.7	0.65
Surgery	P _{between-group} = 0.045					
Cardiac	7	944	1.54	0.36 – 6.59	44.0	0.48
Thoracic	3	385	0.29	0.02 – 4.36	0	0.19
Secondary Outcomes						
Therapy Escalation	8	1190	0.64	0.31 – 1.32	57.8	0.19
Mortality	8	1172	0.71	0.18 – 2.78	0	0.53

Atelectasis	6	628	0.33	0.18 – 0.59	10.8	0.0046
Hypoxemia	11	1276	0.42	0.21 – 0.83	78.3	0.017
PPC	6	645	0.68	0.33 – 1.40	49.0	0.22
Hospital LOS	16	1877	-0.58	-1.17 to 0.01	71.0	0.053
ICU LOS	14	1770	-0.02	-0.19 to 0.15	37.3	0.085
pH	4	423	0.0002	-0.01 to 0.01	13.3	0.97
PaO ₂	9	767	43.0	-15.7 to 101.7	97.1	0.13
PaCO ₂	10	831	-1.1	-2.6 to 0.4	76.4	0.13
PF Ratio	6	447	33.4	-7.99 to 74.8	82.0	0.09
RR	4	343	-1.4	-3.0 to 0.3	61.6	0.075
SpO ₂	3	344	0.84	-0.61 to 2.23	58.5	0.13
HR	5	504	-4.6	-8.6 to -0.6	45.6	0.034
Discomfort	6	1000	-0.7	-2.3 to 0.9	92.6	0.32

OD: odds ratio, MD: mean difference, CI: confidence interval, LOS: length of stay, PF: arterial oxygen pressure to inspired oxygen fraction, RR: respiratory rate, SpO₂: peripheral saturation of oxygen, HR: heart rate