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1. Introduction

The incidence of postoperative nausea and vomiting (PONV) is around 30% after a general anaesthesia using inhalational agents and opioids without prophylactic anti-emetics.¹ Scoring systems have been developed to estimate the risk of PONV. PONV is multi-factorial in origin and can have significant impact on recovery. Every patient undergoing surgery should be risk assessed for PONV and administration of prophylaxis should be considered. A multi-modal approach that includes pharmacological and non-pharmacological interventions have been found to be effective.

These guidelines have been written using the most up-to-date evidence currently available as well as anti-emetic availabilities within the Trust and cost considerations. The guidelines apply to all adult and paediatric patients undergoing surgery under sedation, general, neuro-axial and regional anaesthesia.

A. Quick Reference: Guideline for the management of PONV in adults

i. Risk assessment using Apfel Score

Risk Factor	Score
Female sex	1
Non-smoker	1
History of PONV or motion sickness	1
Post-operative opioids	1
Total score	0 - 4

Points Scored	% Risk of PONV	Level of risk
0	10	Low
1	20	Medium
2	40	
3	60	High
4	80	

Other considerations: Age <50 years, emetogenic surgery and duration of surgery

ii. Reduce baseline risks:

- If possible, consider alternatives to general anaesthesia
- Avoid volatile anaesthetic, consider propofol TIVA
- Minimise intra and post-operative opioids - multimodal and/or regional analgesia
- Adequate hydration and limit fasting time

iii. PONV prophylaxis as per stratified risk group:

Low risk
(0 - 1 risk factors)

Consider 1 anti-emetic

Medium risk
(2 - 3 risk factors)

Consider 2 or more anti-emetics

High risk
(>3 risk factors)

Consider multimodal approach

Prophylactic anti-emetics:

1. Ondansetron 4mg - 8mg IV
2. Dexamethasone 3.3mg - 6.6mg IV
3. Cyclizine 50mg slow IV/IM
4. Prochlorperazine IM/Buccal 12.5mg
5. Midazolam 2mg IV
6. Propofol TIVA

Rescue treatment for PONV

- Use anti-emetic from different class to one given prophylactically
- Consider stimulation of P6 acupressure point – Refer to page 6
- Ensure all potential causes investigated and managed appropriately:
 - Anaesthetic agent related
 - Opioid analgesia related
 - Pain
 - Hypotension or hypovolaemia
 - Blood or secretions in throat
 - Hypothermia
 - Sepsis
 - Intestinal or gastric outlet obstruction

B. Guideline for the prevention and treatment of PONV in adults

Prevention of PONV in adults:

i. Assessment of the risk of PONV

Risk factors in adults include:

- Female
- History of PONV or motion sickness
- Non-smoker
- Younger age (<50 years)
- General vs. regional anaesthesia
- Use of volatile anaesthetics
- Postoperative opioid use (but not intraoperative opioids)
- Increased duration of anaesthesia
- Type of surgery (laparoscopic, maxillofacial, ENT, squint and gynaecological surgeries)

The Apfel risk score is validated for risk stratification of postoperative nausea and vomiting. It consists of 4 scoring predictors for PONV and gives a low, medium or high level of risk depending on a patient's total score.² This is outlined in the tables below:

Risk Factor	Score
Female sex	1
Non-smoker	1
History of PONV or motion sickness	1
Post-operative opioid use likely	1
Total Score	0 - 4

Points Scored	% Risk of PONV	Level of risk
0	10	Low
1	20	
2	40	Medium
3	60	
4	80	High

ii. Reduction of baseline risk

The baseline risk of PONV is reduced by:

- Giving adequate peri-operative hydration
- Avoiding general anaesthesia if possible
- Using Total Intravenous Anaesthesia (TIVA) if general anaesthesia is required
- Avoiding the use of nitrous oxide
- Using multimodal analgesia including regional blocks and local anaesthetic infiltration if appropriate, to reduce the post-operative use of opioids
- Considering regular anti-emetics and laxatives if the patient is likely to need regular post-operative opioids

iii. Intra-operative prophylactic antiemetic use

A patient's Apfel risk score can be used to guide the prophylactic use of antiemetic agents.³

Patients with an Apfel score of 1 or more should receive some form of anti-emetic prophylaxis. Patients at medium or high risk of PONV (2 or more risk factors) should be prescribed more than one agent and a multimodal approach should be considered.⁴ Combinations of two or more anti-emetic agents, with different mechanisms of action, are more effective in preventing PONV than one agent given alone.⁴

Drugs suitable for use as prophylactic anti-emetics include:

Drug	Adult Dose	Route	Timing of Administration	Cautions*
Ondansetron	4 - 8mg	IV	Any time during anaesthesia ¹⁰	Avoid in long QT syndrome. Risk of acute dystonic reactions.
Dexamethasone	3.3 - 6.6mg	IV	At induction of anaesthesia	Impairment of glucose homeostasis in diabetic and obese patients, tumour lysis syndrome and immunosuppression.
Cyclizine	50mg	Slow IV	Towards the end of surgery	Can cause tachyarrhythmia and sedation.
Prochlorperazine	3 - 6mg	Buccal	In awake patients	Avoid in Parkinson's disease.
Prochlorperazine	12.5mg	IM	During or after anaesthesia	Avoid in Parkinson's disease.
Midazolam	2mg	IV	At induction or 30 mins prior to end of surgery	Increased risk of post-operative delirium.
Metoclopramide	10mg	IV	Towards the end of surgery	Risk of dystonic reactions. Avoid in Parkinson's disease.

*Please refer to the BNF for a full list of known side effects and cautions.

Treatment of established PONV in adults

PONV is usually self-limiting but can be distressing for patients. A sub-group of patients will develop 'clinically important' nausea and vomiting which significantly impacts their post-op recovery. There should be a regular assessment of patients in theatre recovery and treatment for PONV should be given when symptoms first appear. Patients should not be returned to the ward until adequate PONV management is established.

Causes of PONV in addition to a recent general anaesthesia should be considered and treated accordingly. These may include:

- Hypotension
- Hypovolaemia
- Hypothermia
- Pain
- Opioid use; including PCA, epidural analgesia and neuroaxial anaesthesia
- Infection/sepsis
- Bowel/ gastric outlet obstruction

Consider giving an antiemetic from a different class to the drug(s) used as prophylaxis. Giving two anti-emetics of different classes is more effective than giving repeated doses of one drug⁴.

Consider a NG tube if there is evidence of bowel obstruction.

Other options include low dose propofol (20mg), but this is short lived and risks airway compromise.⁵ Sub-hypnotic doses of midazolam can also be used as a rescue anti-emetic in appropriately monitored environments.⁶

Stimulation of the P6 acupressure point is associated with a reduction in the risk of nausea, vomiting and the need for rescue anti-emetics when used in combination with anti-emetic therapy compared to pharmacological management alone.⁷ The P6 acupressure point can be found 4cm proximal to the wrist crease, between the tendons of the palmaris longus and flexor carpi radialis muscles.

P6 acupressure point

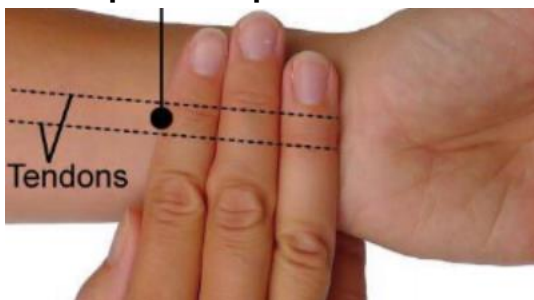


Image 1

If PONV is a persistent problem, ensure that effective anti-emetics are prescribed for regular administration.

Record the episode and interventions clearly for future reference.

C. Quick Reference: Guideline for the management of PONV in children

i. Risk assessment using Simplified Eberhart Score

Risk Factor	Score	Points Scored	% Risk of PONV	Level of risk
Surgery ≥ 30 minutes	1	0 1 2 3 4	9 10 30 50 70	Low
Age ≥ 3 years	1			
History or family history of PONV or motion sickness	1			
Strabismus surgery	1			
Total score	0 – 4			
				High

Other consideration: Higher PONV risk in adenotonsillectomy

ii. Reduce baseline risks:

- If possible, consider alternatives to general anaesthesia
- Avoid volatile anaesthetic, consider propofol TIVA
- Minimise intra and post-operative opioids - multimodal and/or regional analgesia
- Adequate hydration and limit fasting time

iii. PONV prophylaxis as per stratified risk group:

Low risk
(0 risk factors)

Consider 1 anti-emetic

Medium risk
(1 - 2 risk factors)

Consider 2 or more anti-emetics

High risk
(3-4 risk factors)

Consider multimodal approach

Prophylactic anti-emetics and interventions:

1. Ondansetron 0.15 mg/kg IV/PO
2. Dexamethasone 0.15 mg/kg IV
3. Cyclizine 1 mg/kg slow IV
4. Propofol TIVA
5. Optimise non-opioid analgesia
6. Prescribe regular post-op anti-emetics

Rescue treatment for PONV

- Use anti-emetic from different class to one given prophylactically
- Consider stimulation of P6 acupressure point – Refer to page 6
- Ensure all potential causes investigated and managed appropriately:
 - Anaesthetic agent related
 - Opioid analgesia related
 - Pain
 - Hypotension or hypovolaemia
 - Blood or secretions in throat
 - Hypothermia
 - Sepsis
 - Intestinal or gastric outlet obstruction

D. Guideline for the prevention and treatment of PONV in children

Prevention of PONV in children:

i. Assessment of the risk of PONV

The risk factors of PONV in children are different to those in adults.⁸ Risk factors with positive evidence for PONV in children include:

- Age \geq 3 years
- History of PONV and/or motion sickness
- Family history of PONV and/or motion sickness
- Post-pubertal female
- Strabismus surgery
- Adenotonsillectomy
- Otoplasty
- Surgery \geq 30 minutes duration
- Volatile anaesthetic use
- Anti-cholinergics
- Post-operative opioid use

PONV risk scores have been shown to reduce the rate of PONV at an institutional level. They can be used to guide prevention and management options however they are not completely predictive on an individual level.

The simplified risk score from Eberhart et al. is validated for risk stratification of post-operative nausea and vomiting. It consists of 4 scoring predictors for PONV and gives a low, medium or high level of risk depending on a patient's total score.⁹ This is outlined in the tables below:

Risk Factor	Score
Surgery \geq 30 mins	1
Age \geq 3 years	1
History or family history of PONV or motion sickness	1
Strabismus surgery	1
Total Score	0 - 4

Points Scored	% Risk of PONV	Level of risk
0	9	Low
1	10	Medium
2	30	
3	50	High
4	70	

ii. Reduction of baseline risk

Similar to adults, the baseline risk of PONV in children can be reduced by:

- Giving adequate peri-operative hydration
- Avoiding general anaesthesia if possible
- Using Total Intravenous Anaesthesia (TIVA) if general anaesthesia is required
- Avoiding the use of nitrous oxide
- Using multimodal analgesia including regional blocks and local anaesthetic infiltration if appropriate, to reduce the post-operative use of opioids
- Considering regular anti-emetics and laxatives if the patient is likely to need regular post-operative opioids

iii. Intra-operative prophylactic antiemetic use

Anti-emetic prophylaxis should be considered in all children due to their increased risk of PONV. A patient's risk score can be used to guide the prophylactic use of anti-emetic agents.

Patients with a risk score of 1 or more should be prescribed more than one agent and a multimodal approach should be considered. Combinations of two or more anti-emetic agents, with different mechanisms of action, are more effective in preventing PONV than one agent given alone.⁴ Multimodal approaches could include the use of Propofol based TIVA, local anaesthesia, dual/triple agent anti-emetic prophylaxis and non-opioid analgesia.

Drugs suitable for use as anti-emetics include:

Drug	Dose	Route	Timing of Administration	Cautions*
Ondansetron	0.15mg/kg (max 4mg)	IV	Any time during anaesthesia ¹⁰	Avoid in long QT syndrome. Risk of acute dystonic reactions.
Dexamethasone	0.15mg/kg (max 5mg)	IV	At induction of anaesthesia	Impairment of glucose homeostasis in diabetic and obese patients, tumour lysis syndrome and immunosuppression.
Cyclizine	1mg/kg	Slow IV	Towards the end of surgery	Can cause tachyarrhythmia and decreased conscious level.

*Please refer to the BNF for a full list of known side effects and cautions.

Treatment of established PONV in children

PONV is usually self-limiting but can be distressing for patients, particularly children. A sub-group of patients will develop 'clinically important' nausea and vomiting which significantly impacts their post-op recovery.

Nausea and vomiting should always be considered in children who are distressed in recovery, especially those unable to communicate the reason for distress (the young, those with learning difficulties).¹⁰

There should be regular assessment of patients in theatre recovery and treatment should be given when symptoms first appear. Patients should not be returned to the ward until adequate PONV management is established.

Causes of PONV in addition to a recent general anaesthesia should be considered and treated accordingly. These may include:

- Hypotension
- Hypovolaemia
- Hypothermia
- Pain
- Opioid use; including PCA, epidural analgesia and neuroaxial anaesthesia
- Infection/sepsis
- Bowel/ gastric outlet obstruction

Consider giving an anti-emetic from a different class to the drug(s) used as prophylaxis. Giving two anti-emetics of different classes is more effective than giving repeated doses of one drug⁴. Ondansetron combined with dexamethasone increases the effectiveness in preventing PONV in children¹⁰.

Consider a NG tube if there is evidence of bowel obstruction.

Other options include low dose propofol, but this is short lived and risks airway compromise.⁵

Stimulation of the P6 acupressure point is associated with a reduction in the risk of nausea, vomiting and the need for rescue antiemetics when used in combination with anti-emetic therapy compared to pharmacological management alone.⁷ The P6 acupressure point can be found 4cm proximal to the wrist crease, between the tendons of the palmaris longus and flexor carpi radialis muscles. Please refer to **Image 1** on page 6.

If PONV is a persistent problem, ensure that effective anti-emetics are prescribed for regular administration.

Record the episode and interventions clearly for future reference.

3. Education and Training

All medical staff that provides anaesthesia and patient recovery from anaesthesia should be aware of the management of post-operative nausea and vomiting (PONV).

Anaesthetists and nurse-in-charge for clinical areas where patients are monitored post-operatively will be responsible for ensuring staff are aware of this guideline.

4. Monitoring Compliance

What will be measured to monitor compliance	How will compliance be monitored	Monitoring lead	Frequency	Reporting arrangements
Incidence of PONV in recovery	Audit of intra-operative administration and post-operative prescription of anti-emetics	Hospital site audit lead	12 to 18-monthly	iTAPS Audit, Quality and Safety meeting

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6. Key Words

List of words, phrases that may be used by staff searching for the Guidelines on PAGL:

Nausea and vomiting, PONV, post-operative, PONV adult, PONV children, PONV quick reference, perioperative, management of nausea and vomiting

CONTACT AND REVIEW DETAILS	
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Details of Changes made during review: New Guideline (April 2023)	