Prevention & Treatment of Post-Operative Nausea & Vomiting in Adults (≥ 16 years)

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Dissemination Arrangements:

- NHS Ayrshire & Arran Intranet
- Poster on surgical wards, theatre suites, theatre recovery

Guideline Content

1.0 Introduction

Post-operative nausea and vomiting (PONV) remains a common cause of morbidity within the postoperative period. Untreated, it has an incidence from 20-30% in the general surgical population, to 80% in patients with higher risk. PONV is associated with patient distress and many would rather suffer pain than nausea or vomiting.

Throughout the NHS increasing numbers of patients are undergoing surgery as day cases, and PONV can result in medical complications, patient dissatisfaction, delayed discharge, readmission, and increased hospital costs.

2.0 Purpose of the Guideline

The intention of this guideline is to bring consistent, evidence-based practice to the prevention and treatment of PONV.

3.0 Scope of the Guideline

This guideline is applicable to adult patients (age over 16 years) undergoing surgery within NHS Ayrshire & Arran, and contains information relevant to doctors, nurses, and pharmacists caring for these patients.

4.0 Definition of Terms

PONV Post-operative Nausea and Vomiting
RRR Relative Risk Reduction
NNT Number needed to treat
NNH Number needed to harm
TIVA Total intravenous anaesthesia

5.0 Policy Content

5.1 Aetiology

PONV is nausea or vomiting occurring following surgery, and is due to stimulation of the vomiting centre within the medulla. The vomiting centre receives input from a number of different sources including the gut, vestibular system, chemoreceptor trigger zone and the cortex. A number of different mediators are involved, including serotonin, histamine, acetylcholine and dopamine. Drugs, which antagonise these mediators, are commonly used in clinical practice to prevent and treat PONV.
PONV can occur early (within 4 hours of surgery), or late (from 4 to 24 hours following surgery).

5.2 Risk Stratification.

Patient, surgical and anaesthetic factors can all increase risk of developing PONV. Several risk models have been suggested in the literature. Whilst no single model can accurately predict the likelihood of an individual developing PONV, they do allow us to estimate risk amongst different patient groups. The model proposed by Apfel is now generally accepted throughout the literature. This model has identified four individual patient risk factors:

- Female gender
- Previous PONV or motion sickness
- Non-smokers
- Post-operative opiate use

Using these factors risk can be stratified from 0 (low risk) to 4 (high risk):

Number of Risk Factors	Incidence of PONV
0	10%
1	20%
2	40%
3	60%
4	80%

5.3 Prevention

Reduce Baseline Risk Factors for PONV
Anaesthetic technique has significant influence on incidence of PONV, therefore the initial step should be to reduce baseline risk by:

- Avoiding volatile anaesthetics
- Avoiding nitrous oxide (N_2O)
- Minimisation of intraoperative and postoperative opioids e.g. regional anaesthesia
- Use of propofol for induction and maintenance of anaesthesia
- Minimisation of dose of neostigmine
- Reducing duration of surgery
- Adequate hydration

Pharmacological PONV prophylaxis
The IMPACT trial has identified four pharmacological interventions that can each reduce the incidence of PONV by roughly 25% (RRR).

- Dexamethasone
- Ondansetron
- Droperidol
- Total intravenous anaesthesia (TIVA)

Each intervention targets a different mechanism to prevent PONV, and according to this trial, the benefits of each intervention are additive, leading to a possible RRR of 70% using four interventions. However, the absolute risk reduction provided by a second or third intervention was shown to be less than that provided by the initial intervention (irrespective of which combination is chosen). Combining prophylactic interventions therefore markedly increases costs and the likelihood of adverse effects while providing progressively less additional absolute benefit.

It is generally accepted that not all patients should receive pharmacological PONV prophylaxis. The decision to use pharmacological prophylaxis lies in the balance of the benefits versus the costs and risks. For example, giving a prophylactic antiemetic to 100 low risk patients may prevent 2 cases of PONV (NNT 50), but may cause side-effects in 2 patients also (NNH 50). Giving an anti-emetic to 100 high risk patients may prevent 20 cases of PONV (NNT 5), still with an NNH of 50. Clearly prevention is beneficial in the latter group, but not the former.

See Appendix 1 for the flow chart for prevention of PONV.

- Low risk (0-1 risk factors): patients should not be given pharmacological PONV prophylaxis.
- Medium risk (2-3 risk factors): patients should be given one prophylactic drug, and dexamethasone is suggested as the first-line preventative agent of choice.
- High risk (4 risk factors): patients should be given a combination of antiemetics (dexamethasone and ondansetron) and TIVA should be considered.

Note: More liberal prophylaxis is appropriate for patients in whom vomiting poses a particular medical risk, including those with wired jaws, increased intracranial pressure, gastric or oesophageal surgery.

5.4 Treatment of patients with PONV who did not receive prophylaxis or in whom prophylaxis failed

Ondansetron, cyclizine and prochlorperazine are used for treatment of established PONV. The choice of drug depends primarily on whether prophylaxis or treatment has already been given and whether it was effective or not.

- If prophylaxis was given, and PONV occurs:
    - **during** the therapeutic time of the drug, then **do not** re-administer the prophylactic drug. Choose a rescue drug from a different class.
    - **after** the therapeutic time of the drug, consider readministering the prophylactic drug.
- If no prophylaxis was given, then administer ondansetron (1st choice), cyclizine, or prochlorperazine.
- If there has been no response after 30 minutes, administer a further drug from another class.

- When there has been good response to an antiemetic, consider prescribing this agent regularly for the following 24 hours.
- Dexamethasone can be used once daily to treat persistent PONV, but takes 90 minutes to work.
- If three different drugs have been tried and the patient continues to experience PONV, call the anaesthetist for advice.

See Table 1 for information on antiemetic drug classes, target receptor, dose, route, frequency, side-effects and interactions.

See Appendix 1 for the flow chart for treatment of PONV.

Note: The attempt at rescue should be initiated when the patient complains of PONV and, at the same time, an evaluation should be performed to exclude an inciting medication or mechanical factor for nausea and/or vomiting. Contributing factors might include opioids or intestinal obstruction.

Table 1 – Treatment of PONV - Antiemetic drug classes, target receptor, dose, route, frequency, side-effects, interactions

Generic name	Target receptor	Dose, route & frequency	Main side-effects	Interactions	Comments
Ondansetron	Serotonin (5-HT_3) antagonists	4mg IV 6 hourly	Headache, sensation of warmth or flushing, constipation, dizziness	• Ondansetron may reduce the analgesic efficacy of tramadol	• Onset of action (IV) – within 30 minutes • Duration of action 6 hours • ECG changes including QT interval prolongation have been reported • May be better at treating vomiting than nausea
Cyclizine	Histamine (H_1) antagonists	50mg orally, IM or IV, 4-6 hourly (**max 150mg/24 hours**)	Sedation, tachycardia, hypertension, antimuscarinic effects (dry mouth, confusion, blurred vision, urinary retention)	• Cyclizine may have additive effects with central nervous system depressants e.g. hypnotics, tranquillisers, anaesthetics • Because of its anticholinergic activity, cyclizine may enhance the side-effects of other anticholinergic drugs	• Onset of action – within 30 minutes • Duration of action – 4-6 hours • Cyclizine should be used with caution in patients with severe heart failure and acute coronary events

Generic name	Target receptor	Dose, route & frequency	Main side-effects	Interactions	Comments
Prochlorperazine	Dopamine (D_2) antagonists	12.5mg IM 6 hourly (**max 37.5mg/24hours**) 3-6mg buccal 12 hourly	Dystonia, tardive dyskinesia in prolonged use, lower seizure threshold, hypotension, neuroleptic malignant syndrome	• Prochlorperazine may have additive effects with central nervous system depressants, respiratory depression may occur • The hypotensive effect of most antihypertensive drugs especially alpha adrenoreceptor blocking agents may be exaggerated by prochlorperazine • Because of its mild anticholinergic activity, prochlorperazine may enhance the side-effects of other anticholinergic drugs	• Onset of action (IM) – within 30 minutes • Duration of action (IM) – 6 hours • Also has some anti-muscarinic, anti-histaminergic and anti-serotonergic (5-HT_2) activity
Dexamethasone	Unknown	4-8mg IV once daily	May cause insomnia, mood changes, increase blood glucose levels (>1mmol/L), gastric irritation and increase the incidence of infection	• The blood glucose-lowering effects of antidiabetics are opposed by corticosteroids with glucocorticoid (hyperglycaemic) activity	• Onset of action (IV) – within 90 minutes • Duration of action – 24 hours • To be used preferably in combination • For persistent PONV only

Please refer to Summary of Product Characteristics (SPC) for full prescribing information.

6.0 Related NHS Ayrshire & Arran Documents

- ADTC 107: Acute Pain Guidelines for Adults aged 16 years and over.
- ADTC 81: Guidelines on the use of Patient-Controlled Analgesia (PCA) in Adults aged 16 years and over.
- ADTC 85: Intrathecal Opiate Guideline for patients aged 16 and over.

7.0 Bibliography

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8.0 Appendices

PONV Guideline flowchart