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The Cost-effective Management of Postoperative Nausea and Vomiting

POSTOPERATIVE nausea and vomiting (PONV) has been variously described as the "big little problem," the "final therapeutic challenge" to our specialty and the "big, big problem" of ambulatory surgery.¹ The MEDLINE database contains 87 publications, including 4 editorials concerning PONV in 1999 alone. Yet, the optimal strategy for its prevention and management remains uncertain.²⁻⁴ It is still controversial if the preferential use of newer, more expensive antiserotonin drugs for the prophylaxis of PONV leads to increased effectiveness and benefits.¹ Some respected authors have questioned the use of any prophylactic antiemetic, whereas others are just as vigorous in the support of this practice.^{2,5-9} In this issue of ANESTHESIOLOGY, Hill *et al.*¹⁰ used a decision-analysis model on a database from a previously published study¹¹ to calculate the institutional costs of four strategies to obtain freedom from PONV in one additional patient. The strategies studied were the prophylactic intravenous administration of 0.625 mg droperidol, 1.25 mg droperidol, and 4 mg ondansetron and a strategy of treating only symptomatic patients in the postanesthesia care unit (the placebo group).

How valid are their methods and conclusions that prophylaxis with 1.25 mg intravenous droperidol was the most cost-effective approach? Hill *et al.*¹⁰ rightfully did not limit the cost considerations to the acquisition cost of a drug, but included the costs of wasted drug, the need for adjunctive drugs to manage side effects, and the costs of nursing labor. Many anesthesiology-related cost

studies, including the one by Hill *et al.*,¹⁰ assume that nursing labor costs are linearly related to the time an individual nurse spends with a patient. However, institutional costs may not increase if a patient spends an additional 15-30 min in the postanesthesia care unit (PACU), unless overtime costs are incurred.⁸ It is of great importance to note that the exclusion of nursing labor from the calculated costs did not alter the conclusion by Hill *et al.*¹⁰ that the lowest costs to an institution occurred with the prophylactic use of 1.25 mg intravenous droperidol. This dose of droperidol has also been shown to be more cost-effective than both prophylactic dolasetron (12.5 mg) and a regimen limiting antiemetic use to rescue therapy in the PACU in a similar patient population.¹² The cost-effectiveness of prophylactic antiemetic therapy depends on the underlying incidence of PONV and on the costs and effectiveness of the drugs used for prophylaxis.⁷ The incidence of PONV at which prophylaxis was more cost-effective than was treating symptoms in the PACU was 30% for ondansetron and 13% for droperidol.⁷

The benefits of all antiemetic prophylactic regimens in the study by Hill *et al.*¹⁰ were not limited to cost savings, but included improved patient satisfaction compared with simple treatment of established symptoms.¹⁰ However, Scuderi *et al.*⁵ showed that clinically important improvement in patient satisfaction scores with prophylactic ondansetron occurred only in a subgroup at high-risk for PONV. The evaluation of the PONV risk for an individual patient therefore becomes more than just an academic exercise and can be the foundation for evidence-based recommendations for managing PONV⁹ (fig. 1). Apfel *et al.*¹³ identified female gender, nonsmoking status, history of PONV or motion sickness, and the postoperative use of opioids as risk factors. The presence of none, one, two, three, or four of these factors was associated with a risk for PONV of 10, 21, 39, 61, and 79%, respectively. Sinclair *et al.*¹⁴ noted that age, type of surgery, and duration and type of anesthesia (general or other) were independent risk factors, in addition to the ones mentioned previously.

What drug should be used for PONV prophylaxis in

This Editorial View accompanies the following article: Hill RP, Lubarsky DA, Phillips-Bute B, Fortney JT, Creed MR, Glass PSA, Gan TJ: Cost-effectiveness of prophylactic antiemetic therapy with ondansetron, droperidol, or placebo. ANESTHESIOLOGY 2000; 92:958-67.

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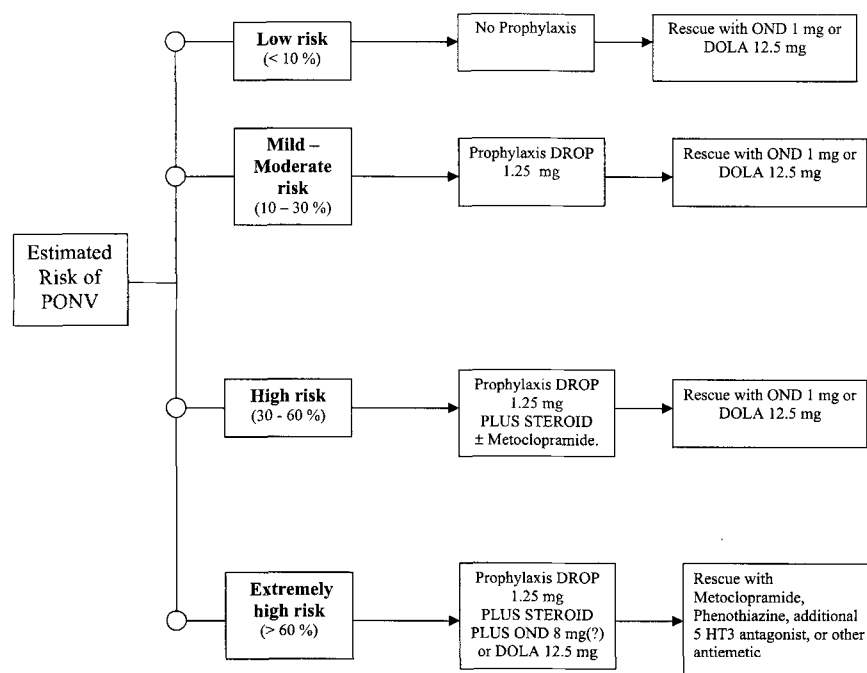


Fig. 1. Guidelines for the prophylaxis and therapy of postoperative nausea and vomiting (recommendations modified from Watcha and White⁹). A low, mild, moderate, high, and extremely high risk for postoperative nausea and vomiting (PONV) is determined by the presence of none, one, two, three, or four of the following factors, respectively: (1) female gender, (2) nonsmoker status, (3) previous PONV or motion sickness, and (4) opioid use.¹³ DOLA = dolasetron; DROP = droperidol; OND = ondansetron; PONV = postoperative nausea and vomiting.

high-risk patients? A more expensive drug may be preferred and reduce total institutional costs if it is more effective or associated with a decreased side-effect profile, a greater patient satisfaction, or an quicker return to work. There is convincing evidence from a systematic review of 54 blinded studies of 7,234 patients that ondansetron is more effective than metoclopramide, but not more effective than 1.25 mg droperidol for PONV prophylaxis in adults.¹⁵ Droperidol has also been shown to be as effective as tropisetron and dolasetron.^{12,16} Antiserotonin drugs are associated with increased headache, whereas central nervous system side effects of dysphoria, restlessness, and drowsiness have been reported with droperidol.¹⁷ However, when the dose of droperidol was limited to 1.25 mg intravenous, the incidence of these central nervous system events did not differ compared with ondansetron.^{11,15} It is also important to note that there were no patient preferences for a specific regimen in the study by Hill *et al.*¹⁰ In this era of cost containment, the less expensive drug, droperidol, should be used for PONV prophylaxis in the adult patient population until more effective drugs with decreased side effects are developed or the costs of alternative drugs are lowered. Similarly, in the absence of evidence to suggest that any available antiserotonin agent is superior to another in effectiveness or side-effect profile, the least expensive one should be used. In

contrast to adults, PONV prophylaxis with droperidol is less effective than ondansetron in children and is associated with increased drowsiness, delayed discharge, and extrapyramidal side effects.¹⁵ The preferential use of ondansetron in this patient population may be justified.

It should be noted that single-drug prophylaxis of PONV has a very high failure rate, with a consequent increased cost to the institution. A combination of antiemetic drugs with actions at different sites may reduce total costs, and the concomitant administration of a steroid with droperidol should be considered in the higher risk group. Prophylaxis with three antiemetic drugs may be justified in patients at the highest risk for PONV (e.g., nonsmoking woman with previous PONV undergoing laparoscopy and receiving postoperative opioids).^{1,9,18}

The choice and dose of drug used for treating established PONV in the PACU should also be made based on effectiveness data. In a meta-analysis, Tramer *et al.*¹⁸ concluded that there were no differences in the effectiveness of 1, 4, or 8 mg ondansetron when used for rescue from PONV in the PACU. Cost savings from using the lowest effective dose are obvious. The study by Hill *et al.*¹⁰ was not designed to determine the most cost-effective regimen for treating patients in whom prophylactic antiemetics have failed. However, Scuderi *et al.*⁵ noted that patients for whom prophylaxis with ondansetron was ineffective had no better response to a sub-

sequent dose than to placebo. It may be reasonable to use a drug from a class other than the one used for prophylaxis for treating breakthrough PONV.¹⁹

Anesthesiologists can best serve patients in this era of limited resources by making choices based on evidence of drug effectiveness, side-effect profile, patient preference, and an associated reduction of total costs. Prophylactic antiemetics benefit select patients, but the routine use of expensive antiserotonin drugs for all patients cannot be justified on the basis of available evidence. These conclusions should be reevaluated if future studies show that patients return to work more quickly, are more satisfied with their care when antiserotonin drugs are used in preference to the older antiemetics, or if newer, more effective drugs achieve these goals at a reduced cost. It is also possible that these conclusions about costs may not be valid in the office-based anesthesia setting, where a single nurse is often responsible for all perioperative care.

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