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Ondansetron in Patients Requiring Anti-Emetics: A Review of Clinical Effectiveness, Cost-Effectiveness, and Guidelines

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Abbreviations

ASA-PSC	American Society of Anesthesiologists Physical Status Classification
IV	intravenous
ODF	orally disintegrating film
PONV	postoperative nausea and vomiting
RCT	randomized controlled trial
SD	standard deviation

Context and Policy Issues

Nausea is defined as a subjectively unpleasant sensation associated with awareness of the urge to vomit, and vomiting refers to a forceful expulsion of gastric contents from the mouth, or labored, spasmodic, rhythmic contractions of the respiratory muscles without expulsion of gastric contents.[1] The conditions may be caused by multiple factors including organ failure, central nervous system disease, drug therapy, radiation, and gastrointestinal obstruction and pathology.[2] Nausea and vomiting are often associated with other symptoms such as pain, anxiety, depression, shortness of breath, drowsiness, loss of appetite, and tiredness that can negatively influence patients' activities of daily living and significantly impact their quality of life.[3,4] The management of nausea and vomiting involves treatment of the underlying cause(s), supportive care measures, and the use of anti-emetics.[2,4]

Anti-emetics are medications prescribed for the prevention of nausea and vomiting or use as a rescue treatment once symptoms develop.[5] There are many classes of anti-emetic drugs, including 5-HT3 receptor antagonists, NK-1 receptor antagonists, corticosteroids, butyrophenones, antihistamines, anticholinergics, and phenothiazines.[6] Ondansetron is the most well-studied 5-HT3 receptor antagonist and is considered by some to be the gold standard to which other anti-emetics are compared.[6] Ondansetron is commonly prescribed in the form of standard oral pills or tablets.[7] However, there are patients, including those in the palliative setting, for whom such formulations may not be suitable due to difficulty with swallowing caused by co-morbidities such as dysphagia.[8]

This report aims to identify and summarize evidence on the comparative clinical effectiveness of oral versus injectable ondansetron formulations in adult patients requiring medication to control nausea or vomiting. An additional objective is to synthesize evidence on the comparative clinical effectiveness and cost-effectiveness of ondansetron versus other anti-emetic agents for palliative patients, as well as evidence-based guidelines for the use of ondansetron to control nausea or vomiting in that population.

Research Questions

1. What is the comparative clinical effectiveness of oral ondansetron versus intravenous ondansetron?
2. What is the comparative clinical effectiveness of ondansetron versus other anti-emetic agents for palliative patients?

3. What is the comparative cost-effectiveness of ondansetron versus other anti-emetic agents for palliative patients?
4. What are the evidence-based guidelines regarding the use of ondansetron for palliative patients?

Key Findings

Evidence from one double-blind, randomized controlled trial suggested no difference in effectiveness between 4 mg or 8 mg orally disintegrating film tablets and 4 mg intravenous ondansetron in controlling the overall incidence of postoperative nausea and vomiting in women who underwent elective gynecological laparoscopic procedures. However, within the first six hours after surgery, the incidence of vomiting was statistically significantly lower with the 8 mg oral formulation than with the 4 mg intravenous ondansetron. There were no significant differences between any of the studied ondansetron formulations regarding incidence of postoperative nausea, analgesic consumption, time to oral intake, overall patient satisfaction, and side effects. A key source of uncertainty in the evidence was that it was based on one randomized controlled trial with an unclear level of statistical power to identify clinically meaningful differences in effects between treatment groups. Also, the study was conducted in women undergoing elective gynecological laparoscopic procedures at a single center in India, and the generalizability of the findings to patients requiring medication to control nausea and vomiting of different etiology is unknown.

No relevant evidence was identified regarding the comparative clinical effectiveness or cost-effectiveness of ondansetron versus other anti-emetic agents for palliative patients. Similarly, no evidence-based guidelines for the use of ondansetron in palliative patients were identified.

Methods

Literature Search Methods

A limited literature search was conducted by an information specialist on key resources, including Medline, Embase, the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were Ondansetron and palliative care. No search filters were applied to limit retrieval by study type, except an additional search on anti-emetics in palliative care, which was limited to guidelines. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2010, and June 22, 2020.

Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed, and potentially relevant articles were retrieved and assessed for inclusion. The final selection of full-text articles was based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	Q1: Adult patients requiring medication to control nausea or vomiting Q2-4: Adult patients in a palliative care environment (end-of-life care), including palliative care after radiotherapy or palliative radiotherapy, in a long-term home, hospital, hospice, or at home requiring medication to control nausea or vomiting
Intervention	Q1: Oral ondansetron (e.g., dissolving film or dissolving oral tablet) Q2-4: Ondansetron in any dose or any delivery method (e.g., dissolving film or dissolving oral tablet, injectable)
Comparator	Q1: Injectable ondansetron in any dose Q2-3: Other anti-emetics (i.e., prochlorperazine, dimenhydrinate, dexamethasone, or metoclopramide) Q4: Not applicable
Outcomes	Q1-2: Clinical effectiveness (e.g., symptoms [e.g., nausea], quality of life, safety [e.g., adverse events]) Q3: Cost-effectiveness (e.g., quality-adjusted life-years, incremental cost-effectiveness ratios) Q4: Recommendations regarding the use of ondansetron in the palliative care populations
Study Designs	Health technology assessments, systematic reviews, randomized controlled trials, nonrandomized studies, economic evaluations, evidence-based guidelines

Exclusion Criteria

Articles were excluded if they did not meet the selection criteria outlined in Table 1 or were published before 2010.

Critical Appraisal of Individual Studies

The randomized controlled trial (RCT) included in this report was critically appraised by one reviewer using the Downs and Black checklist[9] for randomized and non-randomized studies.[9] A summary score was not calculated; instead, the strengths and limitations of the included study were described narratively.

Summary of Evidence

Quantity of Research Available

A total of 419 citations were identified in the literature search. Following the screening of the titles and abstracts, 396 citations were excluded, and 23 potentially relevant reports from the electronic search were retrieved for full-text review. The grey literature search did not identify any potentially relevant publications. Of the 23 potentially relevant articles, 22 were excluded for various reasons, and one RCT that met the inclusion criteria was included in this report. Appendix 1 presents the PRISMA [10] flowchart of the study selection.

Summary of Study Characteristics

Additional details regarding the characteristics of the included publication are provided in Appendix 2.

Study Design

The included study was a prospective, double-blind, placebo-controlled, 4-armed RCT, published in 2014.[1] Although there was a placebo arm, only data and comparisons relevant to the research questions of this report will be discussed further.

Country of Origin

The RCT[1] was conducted in India, at a hospital in a college of medical sciences.

Patient Population

The study[1] enrolled a total of 180 women who were scheduled for elective gynecological laparoscopic procedures from March to September 2012. Eligible patients were adults in the age group from 18 to 65 years, fitting the American Society of Anesthesiologists (ASA) Physical Status Classification Class I or Class II (i.e.., ASA I or ASA II). The ASA I refers to a regular healthy patient, including, but not limited to, a healthy, non-smoking person, with none or minimal alcohol use.[11] The ASA II describes a patient with a mild systemic disease without substantive functional limitations; including, but not limited to, a current smoker, social alcohol drinker, pregnancy, obesity (i.e., body mass index higher than 30 but less than 40), well-controlled diabetes mellitus, hypertension, or mild lung disease.[11]

Interventions and Comparators

The RCT[1] compared orally disintegrating film (ODF) ondansetron formulations (4 mg or 8 mg tablets) to 4 mg intravenous (IV) ondansetron and placebo. Patients in the ODF 4 mg group received one ODF tablet containing ondansetron 4 mg of ondansetron plus one placebo ODF, and those in the ODF 8 mg group received two ODF 4 mg ondansetron tablets. All patients received 2 ml intravenous infusion, which contained 0.9% normal saline in the ODF groups and 4 mg ondansetron in the IV group. Patients in the IV groups also received two placebo ODFs to conceal the treatment assignment. Intravenous dexamethasone at a dose of 8 mg was the rescue anti-emetic for patients with postoperative nausea and vomiting (PONV) score of 2 or more.

Outcomes

The primary outcome was the incidence of PONV, defined as at least one episode of either nausea or vomiting or both during the first 24 hours after surgery. Nausea was described as a subjectively unpleasant sensation associated with awareness of the urge to vomit.[1] Vomiting was defined as a forceful expulsion of gastric contents from the mouth, or labored, spasmodic, rhythmic contractions of the respiratory muscles without expulsion of gastric contents.[1]

The outcomes were assessed by an anesthesiologist who was blinded to the group allocations and was not involved in the administration of the study drugs and intraoperative management. The assessments were conducted in two-time intervals – from the time the drug was given until six hours afterward (i.e., 0 to 6 hours), and between seven and 24 hours after administration.

Secondary outcomes included the need for rescue anti-emetic, postoperative analgesic consumption, time to oral intake, overall patient satisfaction, and side effects, such as headache and dizziness. Patients graded their overall satisfaction, using an 11-point scale from 0 to 10, where 0 represented “no satisfaction at all,” and 10 represented “complete satisfaction.” It was unclear if the assessment scale had been validated. Patient-reported dizziness or headache were recorded as side effects.

Summary of Critical Appraisal

Additional details regarding the strengths and limitations of the included publication are provided in Appendix 3.

The study included in this report was a prospective RCT,[1] with patients, staff, and outcome assessors blinded to the assigned intervention, and blinding was achieved by using placebos and dummies matched in appearance and quantity to the intervention under investigation. Thus, the study design favored objective comparability of the treatment groups and minimized the risk of distorted results due to selective implementation of treatment by staff and modified patients' behavior or response, based on their knowledge of treatment allocation.

The authors stated the objective and hypothesis of the study.[1] The required study sample size was determined beforehand through calculations to ensure that it was adequately powered to detect meaningful differences in treatment effects between the study groups. However, the observed incidence of PONV in the placebo and IV ondansetron groups deviated from the projected rates, which were key assumptions for the sample size calculation. Specifically, the projected incidence of PONV was 60% in the placebo group and 30% in the IV ondansetron group. However, the observed PONV incidence was 58% overall in the placebo group and 46.5% in the IV ondansetron group. The impact of this on the actual power of the study was unclear.

All patients who participated in the study[1] were scheduled for elective gynecological laparoscopic procedures, and they were enrolled consecutively during the study period. Thus, the study population was likely to be representative of the larger population of women that require elective gynecological laparoscopy. The patient characteristics, and perioperative conditions, care, and medication use were similar in all the study groups, which indicated, which indicated the groups were well-matched.

The investigators clearly described interventions of interest and main outcomes to be measured. However, they evaluated the patients' satisfaction by a numerical rating scale with unclear validation status. The results were analyzed using appropriate statistical methods, and estimates of the random variability and actual probability values were reported. However, the analysis was not based on the intention-to-treat population, as data from seven patients were excluded due to protocol deviations, and the details of the deviations were not adequately reported. Therefore, it was unclear if there were any between-group differences in the reasons for excluding the data that potentially imposed a risk of bias. Overall, the main findings of the study were appropriately reported, with the exception of the results for the need for rescue anti-emetic, although it was one of the stated outcomes of interest. Thus, the risk of selective reporting cannot be ruled out.

The authors of the RCT[1] stated that they had no financial support and no competing interests to declare.

Summary of Findings

Appendix 4 presents the main study findings and the authors' conclusions.

Clinical effectiveness of oral ondansetron versus intravenous ondansetron

Overall Postoperative Nausea and Vomiting

There was no statistically significant difference in the incidence of PONV between the oral and IV ondansetron groups during 0 to 6 hours, 7 to 24 hours, or overall 0 to 24 hours after the surgery.[1] The percentage of patients with PONV within the full 24-hour period was 51.2%, 34.9%, and 46.5% in the ODF 4 mg tablet, ODF 8 mg tablet, and the IV ondansetron groups, respectively.[1]

Postoperative Nausea

There was no statistically significant difference in the incidence of nausea after surgery between the oral and IV ondansetron groups.[1] In the 0 to 6 hour interval after surgery, the rate of nausea was 23.3%, 18.6%, and 23.3% in the ODF 4 mg tablet, ODF 8 mg tablet, and the IV ondansetron groups, respectively. Within the 7 to 24 hours interval after surgery, the incidence of nausea was 25.6%, 18.6%, and 16.3% in the ODF 4 mg tablet, ODF 8 mg tablet, and the IV ondansetron groups, respectively.[1]

Postoperative Vomiting

In the 0 to 6 hour interval after surgery, the incidence of vomiting was 16.3%, 4.7%, and 18.6% with ODF 4 mg tablet, ODF 8 mg tablet, and IV ondansetron, respectively. The difference in the incidence of vomiting after surgery was statistically significant in favor of ODF 8 mg tablet compared with the IV ondansetron (P = 0.045).[1]

In the 7 to 24 hour interval after surgery, there was no statistically significant difference in the incidence of vomiting between the oral and IV ondansetron groups. The incidence rates in that period were 11.6%, 14%, and 14% in the ODF 4 mg tablet, ODF 8 mg tablet, and the IV ondansetron groups, respectively.[1]

Analgesic consumption

The mean (standard deviation [SD]) amount of morphine that patients received after surgery was 5 (4.5) mg, 3.3 (3.8) mg, and 4.3 (4.5) mg in the ODF 4 mg, ODF 8 mg, and the IV ondansetron groups, respectively.[1] There were no statistically significant differences between the groups.

Time to oral intake

The mean (SD) time to oral intake after surgery was 265 (56) minutes, 258 (43) minutes, and 271 (65) munites in the ODF 4 mg and ODF 8 mg, and IV ondansetron groups, respectively.[1] There were no statistically significant differences between the groups.

Overall patient satisfaction

The median (range) patient satisfaction score was 10 (4 to 10), 10 (5 to 10), and 10 (5 to 10) in the ODF 4 mg, ODF 8 mg, and IV ondansetron groups, respectively, on a 0 to 10 scale.[1] There were no statistically significant differences between the groups. It was unclear if the scale used to assess patient satisfaction had been validated.

Side effects

Dizziness was reported in 18.6%, 4.7%, and 11.6% of patients in the ODF 4 mg tablet, ODF 8 mg tablet, and IV ondansetron groups, respectively.[1] Headache was reported in 7.0% of patients in the ODF 4 mg group compared with 4.7% in the IV ondansetron group.[1] There was no incidence of headache among the patients who were treated with oral ondansetron ODF 8 mg.[1] The difference in the rate of dizziness and headaches in the study groups was not statistically significant. It is important to note that dizziness and headache are not side effects specific to ondansetron and could be related to other factors (e.g., any of the other drugs, such as morphine and fentanyl, which were used in the study,[12,13] or nonspecific side effects that may not be a direct result of the pharmacological action of any drug).[14]

Clinical effectiveness of ondansetron versus other anti-emetic agents

No relevant evidence regarding the comparative clinical effectiveness of ondansetron versus other anti-emetic agents for palliative patients was identified; therefore, no summary can be provided.

Cost-effectiveness of ondansetron versus other anti-emetic agents

No relevant evidence regarding the comparative cost-effectiveness of ondansetron versus other anti-emetic agents for palliative patients was identified; therefore, no summary can be provided.

Evidence-based guidelines regarding the use of ondansetron

No relevant evidence-based guidelines regarding the use of ondansetron for palliative patients were identified; therefore, no summary can be provided.

Limitations

The evidence in this Rapid Response report addressing the comparative clinical effectiveness of oral versus intravenous ondansetron came from one RCT.[1] Because the assumptions about the rates of PONV in the study groups (which were used in the statistical power analysis) did not align with the observed rates (with lower and higher observed rates for placebo and IV ondasetron, repectively), it was unclear if the study was adequately powered to allow valid inferences about the statistical relationship between the interventions and the outcomes. Taken together with other limitations described in the critical appraisal section, it appears the evidence was limited both in quantity and quality. Furthermore, the RCT[1] was conducted at a single center in India. Therefore, the generalizability of the findings to the Canadian context is unclear, given the potential for differences in practice patterns that might impact the interpretation of the results or the resources used to achieve them. Also, the study[1] enrolled only women undergoing elective gynecological laparoscopic procedures. Thus, the it is unknown if the results are generalizable to other populations requiring medication to control nausea and vomiting of different etiology.

No relevant evidence was identified regarding the comparative clinical effectiveness or cost-effectiveness of ondansetron versus other anti-emetic agents for palliative patients. Therefore the comparative clinical and cost-effectiveness of ondasetron versus other anti-emetic agents in palliative patients is unclear. Similarly, no evidence-based guidelines regarding the use of ondansetron in palliative patients were identified.

Conclusions and Implications for Decision or Policy Making

One relevant RCT[1] was identified regarding the comparative clinical effectiveness of oral versus intravenous ondasetron. No relevant evidence regarding the comparative clinical or cost-effectiveness of ondansetron versus other anti-emetic agents for palliative patients was identified, nor were any evidence-based guidelines regarding the use of ondansetron in this population.

The RCT that provided information for this report assessed the comparative clinical effectiveness of oral versus intravenous ondansetron for PONV in a total of 180 women who underwent elective gynecological laparoscopic procedures.[1] The interventions of interest were ODF 4 mg, and ODF 8 mg, and 4 mg IV ondansetron. There was no evidence

that any of the assessed ondansetron formulations or strengths was more effective than the others with respect to PONV in the 0 to 24 hour after the surgery. However, within the first six hours after surgery, the incidence of vomiting was statistically significantly lower with ODF 8 mg than with the 4 mg IV ondansetron. There was no statistically significant difference in the rate of vomiting after surgery between the oral formulations and IV ondansetron during the 7 to 24 hours interval. Also, there was no statistically significant difference in the incidence of postoperative nausea, analgesic consumption, time to oral intake, overall patient satisfaction, or side effects, between any treatment groups.

Evidence in this report was from one RCT[1] with unclear statistical power to identify clinically meaningful differences in effects between treatment groups. Thus, it was unknown if larger sample sizes could have produced different results. Also, the generalizability of the findings appeared limited because the RCT[1] was conducted at a single center in India. Thus, it was unclear if the results could be replicated in the Canadian context, considering the potential for differences in practice patterns that might impact the interpretation of the results or the resources used to achieve them. Furthermore, because the study[1] enrolled only women undergoing elective gynecological laparoscopic procedures, it is unknown if the results are generalizable to other populations requiring medication to control nausea and vomiting of different etiology. Overall, the quality and quantity of evidence available for this report were limited, and further studies are needed to address the clinical effectiveness of oral ondansetron versus intravenous ondansetron to control nausea and vomiting in adult patients.

No relevant evidence was identified regarding the comparative clinical effectiveness or cost-effectiveness of ondansetron compared with other anti-emetic agents for palliative patients. Similarly, no relevant evidence-based guidelines were identified for the use of ondansetron in palliative patients. Thus, there is a need for studies that assess the comparative clinical effectiveness or cost-effectiveness of ondansetron to control severe nausea in palliative patients who do not respond adequately or are refractory to other anti-emetics. There is also a need for evidence-based guidelines with specific recommendations for the use of the various formulations of ondansetron in palliative patients.

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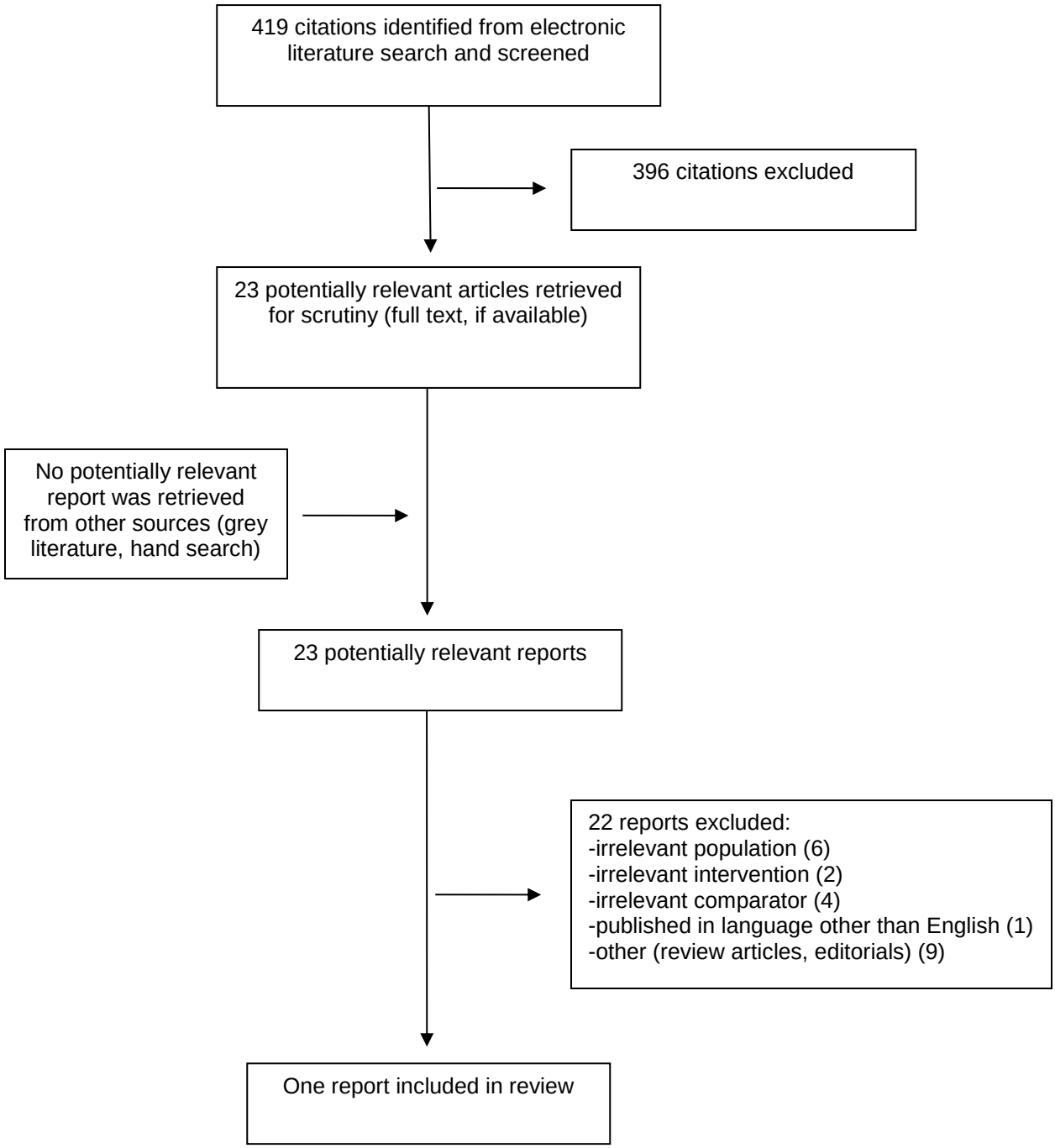
Appendix 1: Selection of Included Studies



Appendix 2: Characteristics of Included Publication

Table 2: Characteristics of Included Primary Clinical Study

Study citation, country, funding source	Study design	Population characteristics	Intervention and comparator(s)	Clinical outcomes, length of follow-up
Hegde et al., 2014[1] **India** **Funding Source:** None	A prospective, double-blind, placebo-controlled, 4-armed RCT	A total of 180 women scheduled for elective gynecological laparoscopic procedures from March to September 2012 The patients had to be adults in the age group from 18 to 65 years, with ASA-PSC Class I or II	ODF of ondansetron at two different doses groups (4 mg, n = 43; and 8 mg, n = 46) Versus IV ondansetron 4 mg (n = 46) Versus Placebo (n = 45)	***Primary*** • Incidence of PONV assessed in two intervals of time – from administration until 6 hours afterward (i.e., 0 to 6 hours) and 7 to 24 hours. ***Secondary*** • The severity of nausea, • Need for rescue anti-emetic, • Analgesic consumption, • Time to oral intake, • Overall patient satisfaction, and • Side effects.

ASA-PSC = American Society of Anesthesiologists Physical Status Classification; IV= intravenous; ODF = orally disintegrating film; PONV = postoperative nausea and vomiting; RCT = randomized controlled trial.

Appendix 3: Critical Appraisal of Included Publication

Table 3: Strengths and Limitations of Included Primary Clinical Study Using the Downs and Black checklist[9]

Strengths	Limitations
Hegde et al. 2014[1]	
• The objective of the study was stated, and the main outcomes to be measured were described clearly. • Consecutive patients undergoing the same surgical procedure were enrolled during the study period. • The study sample size was based on calculations to determine the required number of patients, which ensured that the study was adequately powered to detect meaningful differences in treatment effects between the study groups. • The patients were randomized into the study arms, with patients and outcome assessors blinded to the assigned intervention. Blinding was achieved using	• The observed incidence of PONV in the placebo and IV ondansetron groups deviated from the projected rates that formed the basis of the sample size calculation. The impact of this on the actual power of the study was unclear. • It was unknown if the scale used to assess patient satisfaction had been validated for the purpose for which it was used. • The analysis was not based on the intention-to-treat (ITT) population, as data from seven patients were excluded due to protocol deviations, details of which were not provided.

Strengths	Limitations
placebos and dummies matched in appearance and numbers to the intervention under investigation. • The patient characteristics, and perioperative conditions, care, and medication use were similar in all the study groups. • The interventions of interest and the main findings of the study were described clearly. • The outcomes were analyzed using appropriate statistical methods. • The results were reported along with estimates of the random variability and actual probability values. • The authors stated that they had no financial support and no competing interests to declare.	• The study was conducted at a single center in India. Therefore, the generalizability of the findings to the Canadian context is unclear, given the potential for differences in practice patterns that might impact the interpretation of the results or the resources used to achieve them. • The results for the need for rescue anti-emetic were not reported clearly, although this was one of the stated outcomes of interest. Thus, the risk of selective reporting cannot be ruled out.

IV = intravenous; PONV = postoperative nausea and vomiting.

Appendix 4: Main Study Findings and Authors' Conclusions

Table 4: Summary of Findings of Included Primary Clinical Study

Main study findings	Authors' conclusion
Hegde et al. 2014[1]	
Results from analysis of data from a total of 173 patients who underwent gynecological laparoscopic procedures – **Overall Postoperative Nausea and Vomiting** • The number of patients who had PONV within the 24 hours after surgery was 22 (51.2%) and 15 (34.9%) in the ODF 4 mg and ODF 8 mg groups, respectively, compared with 20 (46.5%) in the IV ondansetron group. No statistically significant difference was observed between the oral and IV ondansetron groups in the incidence of PONV during the 0 to 24 hours period after the surgery. • In the 0 to 6 hour interval after surgery, the number of patients with PONV scores of 0, 1, 2, and 3 were 30, 6, 6, 1 with ODF 4 mg; 35, 6, 2, 0 with ODF 8 mg, and 31, 4, 8, 0 with IV ondansetron, respectively. There was no significant difference in the severity of PONV between the oral and IV ondansetron groups. • In the 7 to 24 hour interval after surgery, the overall PONV scores of 0, 1, 2, and 3 were 30, 8, 4, 1 with ODF 4 mg; 33, 4, 6, 0 with ODF 8 mg, and 33, 4, 4, 2 with IV ondansetron, respectively. There was no significant difference in the severity of PONV between the oral and IV ondansetron groups. **Postoperative Nausea** • In the 0 to 6 hour interval after surgery, the number of patients who had nausea was 10 (23.3%), 8 (18.6%), and 10 (23.3%) in the ODF 4 mg, ODF 8 mg, and IV ondansetron groups, respectively. The difference between the ondansetron groups was not statistically significant. • In the 7 to 24 hour interval after surgery, the number of patients who had nausea in the ODF 4 mg and ODF 8 mg groups was 11 (25.6%) and 8 (18.6%), respectively, compared with 7 (16.3%) in the IV ondansetron group. The difference between the ondansetron groups was not statistically significant. **Postoperative Vomiting** • In the 0 to 6 hour interval after surgery, the number of patients in the ODF 4 mg and ODF 8mg groups with vomiting was 7 (16.3%) and 2 (4.7%), respectively, compared with 8 (18.6%) in the IV ondansetron group. The difference in the incidence of vomiting after surgery between the ODF 8 mg and IV groups was statistically significant in favor of ODF 8 mg (P = 0.045).	• "Orally disintegrating film of ondansetron is an efficacious, novel convenient and may be a cost-effective option for the prophylaxis of PONV. ODF of ondansetron 4 mg could be the minimal effective dose and 8 mg dose may be the optimal. ODF is well accepted by the patients (p. 429)"[1]

Main study findings	Authors' conclusion
• In the 7 to 24 hour interval after surgery, the number of patients in the ODF 4 mg and ODF 8 mg groups with vomiting was 5 (11.6%) and 6 (14%), respectively, compared with 6 (14%) in the IV ondansetron group. The difference between the groups was not statistically significant. **Analgesic consumption** • The mean (SD) amount of morphine used after surgery was 5 (4.5) mg and 3.3 (3.8) mg in the oral ondansetron ODF 4 mg and ODF 8 mg groups, respectively, compared with 4.3 (4.5) mg in the IV ondansetron group. The difference was not statistically significant. **Time to oral intake** • The mean (SD) time to oral intake after surgery was 265 (56) minutes and 258 (43) minutes in the ODF 4 mg and ODF 8 mg groups, respectively, compared with 271 (65) minutes in the IV ondansetron group. There were no statistically significant differences differences between the groups. **Overall patient satisfaction** • The median (range) patient satisfaction score was 10 (4 to 10) and 10 (5 to 10) in the ODF 4 mg and ODF 8 mg groups, respectively, compared with 10 (5 to 10) in the IV ondansetron group. There were no statistically significant differences differences between the groups. **Side effects** • The number of patients who experienced dizziness in the ODF 4 mg and ODF 8 mg groups was 8 (18.6%) and 2 (4.7%), respectively, compared with 5 (11.6%) in the IV ondansetron group. • Headache was reported in 3 (7.0%) patients in the ODF 4 mg group compared with 2 (4.7%) in the IV ondansetron group. No headache was reported in the patients in the oral ondansetron ODF 8 mg group. • There were no statistically significant differences differences between the groups in either comparison.	

IV = intravenous; ODF = orally disintegrating film; PONV = postoperative nausea and vomiting; SD = standard deviation.