A Prospective Survey of Knowledge and Perceptions of Ondansetron: What do Health Care Workers Know about this Drug?

Carlo Marra, Cindy Reesor Nimmo and Peter Jewesson

ABSTRACT

Ondansetron is a relatively new drug whose optimal use is dependent on an understanding of its characteristics and role relative to traditional antiemetics. To assess perceptions and knowledge regarding ondansetron, we conducted a prospective written survey involving 56 physicians, pharmacists, and nurses at this hospital.

Pharmacists claimed to be exposed to ondansetron promotion by industry more than the other groups. Apart from industry, pharmacists were considered to be the most common source of drug information. Nurses were less aware of dosage form equivalence than the other groups (p=0.042). Physicians were more aware of twice daily dosing efficacy than other respondents (p=0.0006). Nurses were able to better identify the relative duration of antiemetic benefit over metoclopramide (p=0.008); however, most participants tended to be misinformed on this issue. Pharmacists were more familiar with the side effect profile while physicians were more cognizant of oral (p=0.001) and parenteral (p=0.018) drug costs than other groups. Overall, survey scores for physicians and pharmacists were higher than those for nurses (p=0.007).

There is an apparent difference across health care profession disciplines in perceptions and knowledge about ondansetron. Specific misconceptions could lead to suboptimal drug use and warrant efforts to ensure a good understanding of the attributes and relative role of this agent.

Keywords: *health care workers, ondansetron, survey, perceptions,*

RÉSUMÉ

L'ondansétron est un agent relativement nouveau dont l'usage optimal est tributaire des connaissances qu'on a des caractéristiques et du rôle des antiémétiques classiques. Nous avons mené un sondage prospectif par écrit auprès de 56 médecins, pharmaciens, infirmiers et infirmières à cet hôpital, pour évaluer les perceptions et les connaissances de chacun à ce chapitre.

Les pharmaciens ont déclaré être plus fortement exposé que les autres groupes à la promotion que l'industrie pharmaceutique fait de l'ondansétron. Ceux-ci ont également été considérés comme la source d'information sur les médicaments la plus courante, mis à part l'industrie pharmaceutique. Les infirmiers et infirmières étaient pour leur part moins au courant des équivalences des formes posologiques que ne l'étaient les autres groupes (p = 0,042). Les médecins étaient par ailleurs plus aux faits de l'efficacité de la posologie biquotidienne que les autres (p = 0,0006). Cependant, les infirmiers et infirmières étaient en mesure de mieux identifier la durée de l'effet antiémétique bénéfique de l'ondansétron comparativement au métoclopramide (p = 0,008); la plupart des répondants semblaient toutefois être mal informés à ce sujet. Les pharmaciens étaient plus familiers avec le profil d'effets indésirables et les médecins plus au courant du coût des formes orale (p = 0,001) et parentérale (p = 0,018) du médicament, comparativement aux autres répondants. Dans l'ensemble, les cotes des médecins et des pharmaciens obtenus à ce sondage étaient supérieures à celles des infirmiers et infirmières (p = 0,007).

Il semble y avoir une différence appréciable parmi les professionnels de la santé en ce qui concerne les perceptions et les connaissances que ceux-ci ont de l'ondansétron. Les fausses idées pourraient bien mener à un usage suboptimal du médicament. C'est pourquoi l'on doit s'efforcer de véhiculer les bonnes connaissances relativement aux caractéristiques et au rôle relatif de l'ondansétron.

Mots clés : *ondansétron, perceptions, professionnels de la santé, sondage*

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Carlo Marra, B.Sc.(Pharm.), Pharm.D.was a pharmacy resident with the Department of Pharmacy, Vancouver Hospital and Health Sciences Centre at the time of this project. He is now a Clinical Specialist, Pharmaceutical Outcomes Research, B.C. Children's and Women's Hospital and a Clinical Assistant Professor, Faculty of Pharmaceutical Sciences, University of British Columbia.

Cindy Reesor Nimmo, B.Sc.(Pharm.), M.(Pharm.) is a Clinical Pharmacotherapeutics Specialist, Department of Pharmacy, Vancouver Hospital and Health Sciences Centre and a Clinical Assistant Professor, Faculty of Pharmaceutical Sciences, University of British Columbia.

Peter Jewesson, B.Sc.(Pharm.), Ph.D., F.C.S.H.P. is an Associate Professor, Faculty of Pharmaceutical Sciences, University of British Columbia and Director, Department of Pharmacy,Vancouver Hospital and Health Science Centre and Associate Member, Division of Infectious Diseases, Department of Medicine, University of British Columbia.

Address correspondence to: Dr. Peter Jewesson Ph.D., F.C.S.H.P., Department of Pharmacy Vancouver Hospital and Health Science Centre, 855 West 12th Avenue, Vancouver, B.C. V5Z 1M9

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INTRODUCTION

Ondansetron, a 5-HT_3 antagonist, is a relatively new addition to the armamentarium of antiemetics to treat chemotherapy-induced nausea and vomiting.[1-7] Ondansetron has been shown to be more effective than traditional antiemetic therapy for the first 12 hours following highly emetogenic chemotherapy.[8,9] After the initial 12 hours, there appears to be no therapeutic advantage of ondansetron over traditional agents such as metoclopramide. Ondansetron became available in Canada in June 1991 at a cost of $17.90 per 8mg oral dose and $34.70 per 8mg intravenous dose;[10] therefore, a typical regimen of 8mg q8h could cost between $53.70 and $104.10 per day.

Because of its relative novelty, selective utility and high cost, the potential consequences of inappropriate use of ondansetron could be significant. Appropriate use of ondansetron is dependent, in part, upon the health care providers' knowledge and perceptions of this agent and its relative role in the prevention and treatment of chemotherapy-induced emesis. The purpose of this study was to evaluate health care provider's perceptions of and differences in knowledge regarding ondansetron's therapeutic applications and clinical pharmacology.

METHODS

This study was conducted at a 1000-bed, tertiary, teaching hospital which has a 22-bed Haematology Service, discharging approximately 280 patients per year. Ondansetron was added to the formulary on October 31, 1991 under the Limited Access Drug (LAD) Program, with it's use restricted to haematology/oncology patients. Under the LAD Program, a drug can only be prescribed through the completion of a preprinted order form (Appendix A). Established criteria for the use of the drug are outlined on the form including indication, standard doses, 24-hour duration for approved post-emetogenic chemotherapy, and the cost of intravenous and oral forms of the drug.

To promote the appropriate use of ondansetron, an article was also published in the bimonthly Pharmacy Newsletter prior to the addition of ondansetron to the formulary. This article outlined the therapeutic applications and the pharmacology of ondansetron. In addition, one of the investigators (CRN) presented an inservice about ondansetron to the haematology nurses.

Respondents

Haematology residents, fellows, and staff physicians on the haematology ward were individually approached to participate in the survey between November 24, 1992 and December 7, 1992. General pharmacists (not specifically associated with the haematology service) who attended a staff meeting on November 23, 1992 were also given the survey under "exam-like" conditions. Finally, haematology nurses were assessed at an educational inservice (unrelated to ondansetron or emesis) on November 26, 1992 under similar stringent conditions. To our knowledge, no participant had prior knowledge of the survey and the participants were urged not to communicate with their colleagues or co-workers about the survey.

Survey design

The survey was designed by the three investigators (Appendix B). It consisted of 16 written, multiple-choice questions designed to provide information regarding the participant's discipline, experience, source of ondansetron information, and knowledge and perceptions regarding the general therapeutic applications and clinical pharmacology of ondansetron. To minimize misinterpretation, the survey instrument was carefully scrutinized by the investigators prior to application. However, no actual pretesting of this instrument was undertaken. During the survey, the participants were invigilated by one investigator (CM) and were requested to complete the survey within 15 minutes.

Response analysis

All surveys were compiled by one investigator (CM) using an IBM-compatible computer and database program (dBase IV, Version 1.1, Ashton-Tate Corp.). Where applicable, responses were stratified according to correctness (e.g., the correct brand name for ondansetron is Zofran®, all other responses were categorized as incorrect). Finally, a total score was determined for each respondent depending upon the number of correct responses to the survey. Data were subsequently analysed using SPSS/PC+® for Windows® Version 6.0 (SPSS, Inc., 1993). Categorical data were tested using the Chi square statistic (two-tailed, Yates' corrected). Parametric data (total score) were assessed using an analysis of variance (ANOVA) procedure with a Bonferroni posthoc test for individual group comparisons. Significance level was predetermined to be $p<0.05$.

RESULTS

Fifty-six participants (nine haematology service physicians, 22 general staff pharmacists, and 25 nurses from the haematology service) completed the survey. The survey results are described in Table I. The haematology service physicians who participated represented 75% of all those in practice at the time of the survey. The nurse respondents represented approximately one-third of all haematology nurses on staff, while the pharmacists involved in the survey comprised about one-half of all general staff pharmacists in the hospital. Physicians tended to have been in the haematology service for under two years or in excess of five years, while the majority of nurse respondents had been in practice for

Table I. Ondansetron survey results by professional group

Parameter	Physicians	Pharmacists	Nurses	p value[1]
1. *Participants, N (%)*	9 (16)	22 (39)	25 (45)	
2. *Length of service, N (% by group)*				
≤ 2 years	6 (66)	4 (18)	1 (4)	0.0006
> 2-5 years	0 (0)	13 (59)	14 (56)	
≥ 5 years	3 (33)	5 (22)	10 (40)	
3. *Sources of ondansetron information, N (%)*				
Drug Company Information[2]				
Written	3 (33)	17 (77)	10 (40)	0.015
Audiovisual	1 (11)	8 (36)	0 (0)	0.003
None	6 (66)	4 (18)	15 (60)	0.006
Other Sources of Information				
Pharmacists	5 (56)	19 (86)	23 (92)	0.035
Miscellaneous[3]	5 (56)	3 (14)	4 (16)	0.046
4. *Comparative efficacy of ondansetron, correct responses (%)*				
Efficacy of oral vs. intravenous	8 (89)	21 (95)	17 (68)	0.042
Efficacy of BID vs. TID	8 (89)	13 (59)	5 (20)	0.0006
Duration of superior efficacy	0 (0)	1 (5)	5 (20)	0.008
5. *Side effects of ondansetron, correct responses (%)*				
Headache	4 (44)	17 (77)	10 (40)	0.029
Constipation	2 (22)	7 (32)	4 (16)	0.439
Diarrhea	0 (0)	10 (45)	3 (12)	0.005
Sedation	4 (44)	8 (36)	9 (36)	0.895
Elevated liver function tests	4 (44)	9 (41)	12 (48)	0.972
6. *Product information, correct responses (%)*				
Brand name of ondansetron	8 (89)	18 (82)	25 (100)	0.089
Manufacturer of ondansetron	2 (22)	20 (91)	10 (40)	0.0001
7. *Cost of ondansetron, correct responses (%)*				
Cost of 8mg oral tablet	9 (100)	11 (50)	8 (32)	0.001
Cost of 8mg intravenous	6 (67)	11 (50)	6 (24)	0.018
8. *Mean total score (%)*[4]	55	55	42	0.007

[1] two-tailed chi square (2X3 contingency table for all responses excluding length of service (3X3) and total score (analysis of variance))
[2] some respondents identified exposure to both written information and audiovisual presentations
[3] physicians- published articles (3), study protocols (1), other physicians (1); Pharmacists- physicians (2), published articles (1); Nurses- physicians (2), study protocols (1), colleagues (1)
[4] the score for each respondent was based upon the number of correct responses to questions reflected in sections 4 through 8 of this table

two years or longer. The majority of pharmacists identified a general hospital experience in excess of two years.

Pharmacists reported having been exposed to more pharmaceutical industry promotional activities regarding ondansetron than that reported by physicians and nurses. Pharmacists were subjected to both written promotional material and audiovisual presentations about ondansetron more than the other two groups. Across all groups, pharmacists were the next most likely source of information. However, nurses and pharmacists were more likely than physicians to have obtained information about ondansetron from pharmacists. Physicians also appeared to utilize various sources of ondansetron information more so than pharmacists and nurses.

Of the three groups, pharmacists were most aware that the oral and intravenous forms of ondansetron were equally efficacious.[1,5] Most physicians realized that there is no difference between the efficacy of twice daily or three times daily administration of ondansetron.[9] Nurses were the most aware that ondansetron was only more effective than high-dose metoclopramide (1-2mg/kg) for only the first 12 hours following chemotherapy;[8,9] however, nurses' answers were equally distributed across the five choices (see Appendix B). Eighty-two percent of pharmacists, and 56 % of physicians responded that ondansetron is superior for the first 24 hours after chemotherapy.

Pharmacist respondents appeared to be more knowledgeable about the side effects of ondansetron than the other two groups, although the differences were only significant for headache and diarrhea (p=0.042 and 0.0006, respectively).

Most respondents were aware of the brand name of ondansetron while pharmacists were most knowledgeable regarding the source of this product. Physicians appeared to be the most aware of the cost of both oral and intravenous ondansetron. There was a trend for nurses to be more informed about the brand name of ondansetron, but pharmacists were the most aware of the manufacturer.

Of the three professional groups, there was a difference in the perception of how ondansetron would affect the number of breakthrough (PRN) antiemetics administered. All nurses and 78% of physicians surveyed perceived that ondansetron could decrease the amount of "PRN" antiemetics utilized, while only 59% of pharmacists agreed with this statement.

Physicians and pharmacists achieved a higher overall survey score than nurses. Areas of apparent knowledge gaps were consistent across all three groups and appeared to be related to side effects (constipation, transiently elevated liver function tests, diarrhea) and duration of superior action of ondansetron relative to traditional agents.

DISCUSSION

Since the inclusion of ondansetron on formulary at our institution, numerous educational efforts such as inservices, a newsletter article, and therapeutic tips on the LAD forms have been aimed at physicians, pharmacists, and nurses to promote the rational prescribing of ondansetron. This survey, which was conducted two months after the initial educational seminar, was undertaken to evaluate health care provider perceptions and differences of knowledge regarding ondansetron therapeutic applications and clinical pharmacology.

All three of the professional groups surveyed demonstrated an apparent lack of knowledge of ondansetron. Physicians and pharmacists appeared to have superior knowledge of the drug compared with nurses. Pharmacists were subjected to more lobbying by the pharmaceutical industry than the other two professional groups which may have lead to increased knowledge or misconceptions. Since haematology physicians and nurses were being compared to general staff pharmacists with little or no specialized oncology training, it is possible that the pharmacists participating in this survey were at a disadvantage.

There were misconceptions about ondansetron's antiemetic characteristics that could lead to potential misuse of the drug. Nurses tended to be less aware that oral and intravenous forms of ondansetron are equally efficacious.[1,5] This could lead to more expensive therapy when the choice of either route is determined by the nurse (i.e., the prescription specifies oral or intravenous doses may be given). More recent data suggest that parenteral ondansetron may be superior to the oral dosage form in the management of acute emesis associated with select highly emetogenic antineoplastic agents (e.g., cisplatin).[11] However this information was not readily available at the time of the survey and we generally considered the oral and parenteral dosage forms to be equivalent. Other misconceptions we identified that could lead to suboptimal use of ondansetron include the general belief that ondansetron has superior efficacy over traditional agents greater than 12 hours after the administration of chemotherapy and that thrice daily administration is superior to twice daily administration. The side effect profile of ondansetron was not well known indicating a potential for inappropriate monitoring. In addition, the majority of respondents did not have an accurate impression of the cost of oral and intravenous ondansetron formulations. This could have significant implications in the prescribing, distribution, and administration of the drug.

As with any survey, we must be cautious about the interpretation of our results. We did not employ a pre/post study design to determine the impact of our educational efforts on the health care provider's perceptions and knowledge regarding ondansetron. In addition, we were unable to control for the influence of extraneous factors (e.g., drug company promotions, external continuing education programs) on our survey. Nevertheless, our findings reflected the current status of understanding across three health care disciplines subsequent to any and all internal and external influences.

This study has provided us with useful information regarding the level of health care worker's perceptions and knowledge of ondansetron. It was apparent from the results of this study that there are misconceptions regarding the role of ondansetron which could lead to inappropriate use. Accordingly, this study validates the need for our LAD Program which is aimed at controlling the use of this agent and providing information to health care workers regarding its appropriate use. While the results of the survey were disseminated to the disciplines involved, we believe that ongoing efforts will be necessary to further improve the understanding of health care providers regarding the relative benefits and pitfalls associated with the use of this agent.

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Appendix A
Preprinted Limited Access Drug (LAD) form

VANCOUVER HOSPITAL &
HEALTH SCIENCES CENTRE
PHYSICIAN'S ORDERS

PAGE 1 OF

LIMITED ACCESS DRUG (LAD) PROGRAM
A D&T AND MAC INITIATIVE

INITIALS WHEN TRANSCRIBED

NURSES COMMENTS

Date: Time:

ONDANSETRON is a non-formulary drug for use in restricted circumstances only. The ATTENDING PHYSICIAN must complete the following to obtain ONDANSETRON.

1. ***APPROVED INDICATIONS: (CHECK ONE)***

Indication A FIRST LINE prevention of acute-onset nausea and vomiting associated with:	Indication B FOLLOWING FAILURE with conventional anti-emetic therapy associated with:
☐ carboplatin with previous history of emesis on cisplatin	☐ asparaginase
☐ carboplatin in the elderly (> 70yr)	☐ busulfan total dose > 1mg/kg
☐ carmustine > 200mg	☐ carboplatin
☐ cisplatin	☐ cytarabine
☐ cyclophosphamide > 1g dose	☐ doxorubicin < 50mg/m²
☐ daunorubicin	☐ epirubicin < 50mg/m²
☐ doxorubicin ≥ 50mg/m²	☐ etoposide > 800mg/m²
☐ epirubicin ≥ 50mg/m²	☐ 5-fluorouracil
☐ mechlorethamine	☐ ifosfamide
☐ melphalan IV	☐ mitoxantrone
☐ SINGLE fraction TBI	☐ mitomycin
	☐ teniposide
	☐ FRACTIONATED TBI

2. ***REGIMEN:***

Ondansetron ____mg IV/PO ____minutes prior to chemotherapy

followed by ____mg IV/PO every ____ hours prn

Ondansetron will be provided to permit therapy for a maximum of 24 hours following the last dose of chemotherapy

THERAPEUTIC TIPS
- **Equivalent efficacy has been demonstrated between:**
  - **IV and PO therapy; use oral form when tolerated**
  - **8mg every 24, 12 or 8 hrs; higher doses do not increase efficacy but may increase toxicity**
- **Acquisition costs (8 mg): •IV = $38 •PO = $17**

ONDANSETRON
LIMITED ACCESS DRUG

Physician Signature Printed Name/PIC Rev. Apr/93

PART 1 - WHITE - PATIENT'S CHART
PART 2 - CANARY - PHARMACY COPY

Appendix B
Ondansetron survey[1]

ONDANSETRON QUESTIONNAIRE

The following survey is being used to evaluate the knowledge base of registered nurses, pharmacists, and physicians about the antiemetic drug ondansetron. Your responses are confidential and you will not be identified, therefore DO NOT PUT YOUR NAME ON THIS PAPER.

Answer each question by marking the best answer with an "X"

1. How long have you worked on ES or an oncology ward?
- □ less than 12 months
- □ 1 - 2 years
- □ greater than 5 years
- □ 2 - 5 years

2. What sources of information have you been exposed to regarding ondansetron? (identify as many as apply)
- □ written promotional material from a drug company
- □ audio-visual presentation from a drug company
- □ verbal or written information from a pharmacist
- □ other: (please identify):_____

3. What is the cost of ondansetron?

PO:	IV:
□ $5.87 8mg tablet	□ $18.80 8mg IV
□ 0.75¢ 8mg tablet	□ $3.38 8mg IV
■ $17.92 8mg tablet	□ $53.32 8mg IV
□ $36.53 8mg tablet	□ $34.40 8mgIV

4. What is the brand name of ondansetron?
- □ Zoloft
- ■ Zofran
- □ Zocor
- □ Zestril

5. Who is the manufacturer of ondansetron?
- □ Parke Davis
- □ Upjohn
- □ Bristol-Myers Squibb
- ■ Glaxo

6. Side effects associated with ondansetron include...? (identify as many as you think apply)
- ■ headache
- □ tachycardia
- □ extra-pyramidal effects
- ■ constipation
- ■ sedation
- □ orthostatic hypotension
- □ arrhythmias
- ■ diarrhea
- ■ transient increased LFTs
- □ transient decreased LFTs

7. Ondansetron has been reported in the literature to be more efficacious than high dose (1-2 mg/kg) metoclopramide:
- ■ for the first 12 hrs post chemotherapy
- □ for the first 24 hrs post chemotherapy
- □ for 72 hours post chemotherapy
- □ for acute and delayed nausea and vomiting post chemotherapy (up to 5 days)

8. At V.G.H., ondansetron is part of the "LAD" program. What does the acronym LAD stand for?
- ■ Limited Access Drug
- □ Last Attempt Drug
- □ Leukemia Assistance Drug
- □ Lifestyle Assistance Drug

9. Do you perceive that the use of ondansetron has decreased the number of "prn" antiemetic dosages?
- □ Yes
- □ No

10. Ondansetron should be used first line in the management of nausea and vomiting due to...? (identify as many as you think apply)
- ■ chemotherapy
- □ motion sickness
- □ surgery
- □ narcotics
- □ pregnancy

Appendix B (Continued)
Ondansetron survey[1]

ONDANSETRON QUESTIONNAIRE

11. At high doses, the mechanism of action of metoclopramide is similar to the action of ondansetron.
■ True
□ False

12. The mechanism of action of ondansetron includes the blockade of 5-HT_3 receptors in the chemo-receptor trigger zone and the gastro-intestinal tract.
■ True
□ False

13. Ondansetron has been reported in the literature to be more effective if used with regularly scheduled antiemetics such as dexamethasone.
■ True
□ False

14. Ondansetron IV has been reported in the literature to be more effective than PO.
□ True
■ False

15. TID (three times daily) dosing of ondansetron has been reported in the literature to be more efficacious than BID (two times daily) dosing in the management of chemotherapy induced nausea and vomiting.
□ True
■ False

[1] ■ - correct response to question (not on original survey)