

Review

Postdischarge nausea and vomiting: A review of current literature

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Abstract

Postoperative nausea and vomiting continues to occur in approximately one-third of patients who have surgery despite newer medications and emerging guidelines for care. There is a paucity of literature that relates to patients who experience postdischarge nausea and vomiting after outpatient surgery. The purpose of this article is to review the current knowledge in the area of postdischarge nausea and vomiting. The findings were that the problems with postdischarge nausea and vomiting (PDNV) have not been as thoroughly assessed and evaluated as nausea and vomiting immediately postsurgery. More research needs to be conducted in this population, as the rate of surgeries performed in this setting will only increase.

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1. Introduction

Postoperative nausea and vomiting (PONV) is a known complication for patients after surgery and has been called the

“big, ‘little problem’” [1]. In spite of newer anesthetic agents, antiemetic medications, and considerable research into the subject, one-third of all postoperative patients continue to experience PONV at some point after surgery [2–4]. In a recent study of six interventions for prevention of PONV, the average incidence was 34% [5]. The incidence of PONV in high-risk patients with four determined risk factors can be as high as 70–80% [6].

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Today, approximately 65% of all surgeries are conducted in the outpatient surgery setting [7]. The Federated Ambulatory Surgery Association states that approximately 6 million surgeries are performed yearly in 3300 ambulatory surgery centers [8]. The current healthcare environment requires that patients are quickly and efficiently moved through the system from admission to discharge.

Only a small number of studies are available that specifically examine strategies to reduce PDNV [9]. Much time and effort has been expended in research and publication regarding PONV. However, most of this research was conducted in the postanesthesia care unit (PACU) or in postanesthesia phase II immediately before patient discharge home. There is a paucity of literature that details the problems associated with nausea and vomiting experienced by patients after discharge home. The problems with postdischarge nausea and vomiting (PDNV) have not been as thoroughly assessed and evaluated as PONV immediate postsurgery. When conducting the literature review for this article, using “postdischarge nausea and vomiting” as a keyword elicited only two articles from CINAHL (1982–2004). PubMed delivered 56 articles with the same keyword, but some articles that only had one or two lines applicable to the subject.

To perform the literature search for appropriate articles, the author used the keywords “ambulatory surgery” (933 results), “nausea and vomiting” (948 results), and “postoperative complications” (5749 results). Combining those three keywords in one search resulted in 26 articles. The authors then searched the abstracts for suitable articles. The authors also searched the reference lists in those articles for additional articles. The result was 24 articles that specifically mention nausea and vomiting after discharge home. Of those 24 articles, several had only one to two sentences that were applicable. One of the articles was a systematic review and analysis of postdischarge symptoms, including nausea and vomiting. The purpose of this review is to synthesize a review of the literature that has been published on the subject of postdischarge nausea and vomiting.

2. Postdischarge nausea and vomiting

2.1. Incidence

It is possible that PDNV has been underreported in the past because the symptoms were not identified [10]. Upon discharge, patients are not as accessible to surveillance and care by healthcare workers, which may have contributed to underreporting of these symptoms [11]. Carroll et al. [11] found an overall incidence of more than 35% in 211 ambulatory surgery patients who had one of four selected surgeries: laparoscopy, dilation and curettage, arthroscopy, or hernia repair. Interestingly, most of the patients who experienced PDNV in the study had not experienced PONV before discharge. Wu, Berenholtz, Pronovost, and Fleisher found an incidence of postdischarge nausea (PDN) that ranged from

0% to 55% and an incidence of postdischarge emesis (PDV) that ranged from 0% to 16% in a systematic review that evaluated the incidence of reported postdischarge symptoms and included PDNV [12]. In a systematic review of randomized, controlled studies published in the English literature, the authors examined whether routine prophylaxis with antiemetics affected the incidence of PDNV after ambulatory surgery. The overall incidence of PDN was reported as 32.6% (35.7% placebo and 31.2% treatment) and the overall incidence of PDV was 14.7% (19.6% placebo and 12.1% treatment) [13].

2.2. Risk factors

The cause of PONV is multifactorial [10]. Risk factors can be described as related to the patient, the surgical procedure, the anesthesia, and the postoperative period [2]. Apfel et al. developed a risk score to predict the chances a patient would experience PONV. The final score had four predictors: female gender, history of motion sickness or PONV, nonsmoking, and the use of postoperative opioids. If no risk factors were present, the incidence of PONV was 10%. With 1, 2, 3, or 4 risk factors present, the incidences were 21%, 39%, 61%, and 79%, respectively [6].

There are no studies that specifically determine risk factors related to PDNV. Carvalho et al. [14] evaluated the influence of inhalational versus total intravenous anesthesia (TIVA) maintenance on functional recovery and symptom distress after gynecological surgery. No significant differences were found between the two groups with respect to functional recovery, nausea, vomiting or pain. In 1 study of 211 outpatients who had one of four selected surgeries, PDNV was not related to PONV in the immediate postoperative period [11] while in another study 95 healthy, female patients who had PONV immediately after laparoscopic surgery were reported to be four times more likely to experience PDNV [15].

2.3. Consequences

PONV is known to have physiologic consequences as well as an impact on patient satisfaction [3,16–20]. Identified consequences for the postdischarge patient include impaired sleep time due to vomiting [21], drowsiness as a side effect of the rescue antiemetic [15], increased anxiety for parents of pediatric patients [22], a delay in resumption of activities of daily living (ADL) [11,12], and a decision by the patient not to self-administer an analgesic for pain because they believe it is related to the nausea and vomiting [23,24].

2.4. PDNV published information

Pfisterer et al. [25] studied the incidence and impact of PONV before and after discharge following outpatient surgery. A total of 586 patients from nine countries were enrolled in the study. Upon leaving the facility 64 patients experienced PONV, with 29 reporting moderate and 8 reporting severe symptoms. Another 76 patients experienced

PDNV while traveling home. Some patients experienced PDNV 5 days after surgery. There was also an impact on activities of daily living and time lost from work. Of the 129 patients who experienced PDNV, 35% lost time from work or normal activities requiring 21 patients to take one or more days off work and 21 friends and relatives to take time off from work to assist the patient. The authors go on to state that PONV is “either not adequately recognized or treated in hospital and beyond, or that some of the antiemetic agents may be inadequate” [25].

Enever et al. [26] compared postdischarge morbidity after outpatient dental care under general anesthesia between pediatric patients with and without disabilities. Symptoms were similar in both groups and included nausea and vomiting (20%), unexpected drowsiness (13%), and need for pain relief at home (42%). One patient was readmitted for persistent nausea and vomiting. Ernst and Thwaites [27] evaluated post-discharge pain, nausea and vomiting of outpatients undergoing elective surgeries over a 2-month period. The type of surgeries were general surgery, orthopedic, dental, ENT, and gynecology. They discovered that more patients suffered from nausea and vomiting after discharge (33% nausea; 10% vomiting) than before discharge (16% nausea; 6% vomiting). The authors concluded that pain, nausea, and vomiting are persistent problems after discharge and that they increase in incidence after discharge.

Amanor-Boadu and Soyannwo [28] followed pediatric patients from time of discharge to first outpatient visit. They discovered that the most prevalent problem was pain (18.9%), but also discovered that vomiting (12.2%) was a significant finding. These authors did not address nausea in this population. The authors conclude that “concerns for safety and comfort of the patients should extend beyond the recovery room to the ward and home” [28].

Young et al. [29] examined whether enhanced discharge education would make a difference once patients returned home after outpatient surgery. While compiling symptoms that occurred after surgery, the authors discovered that many patients stated they were not feeling hungry, had no interest in food, or felt nauseous during the first 2 days at home. The enhanced teaching package, a procedure-specific patient educational tool, that was implemented had no effect on patient recovery or the patient’s ability to self-manage. The authors concluded that the patient’s own understanding of self-care affected the recovery more significantly than the enhanced teaching package.

Waterman et al. [30] conducted qualitative research of postoperative pain, nausea, and vomiting after discharge. They discovered that one-third of patients found the pain and nausea worse than they had imagined. They also discovered that some patients are reluctant to take their pain medications because they felt they were related to the nausea. One patient stated, “The first day post-op was awful . . . I had pain but I was reluctant to take painkillers because of nausea” [30]. The authors incorporate recommendations based on their interviews with the patients that include advising patients

preoperatively on how to manage nausea and side effects of drugs and deferring discharge for those who have higher levels of pain or who are nauseous.

Kangas-Saarela et al. [31] studied patients’ experiences with outpatient surgery. This was a survey of the incidences of pain, nausea, and vomiting and patient satisfaction. Overall, 11.3% of patients surveyed experienced nausea either during recovery, travel home, or after arriving home. The authors believe that the lower than usual incidence of nausea was due to the high number of orthopedic cases who received regional anesthesia during surgery. See Table 1 for a summary of studies.

2.5. Management and treatment

Prevention of PONV and PDNV begins with the anesthesia plan preoperatively. Because only one-third of surgical patients will experience PONV or PDNV, prophylaxis is warranted only in high-risk patients [32]. The decision to give antiemetics should be based on risk factors with a focused plan of care developed to decrease the chances the patient will experience PONV/PDNV, e.g. use of local anesthetics to decrease opioid need or limiting use of neuromuscular agents to avoid reversal agents. There is no one drug that can block all pathways mediating nausea and vomiting. Different classes of drugs are available that affect one or more receptor sites, and alternative treatments for PONV are becoming more common although not yet tested specifically in the PDNV population [2,3,32–34]. Most alternative treatments are completed in conjunction with pharmacologic methods of controlling nausea and vomiting.

One systematic review and three studies were found in which the efficacy of pharmacologic treatment was considered in patients with PDNV. Gupta et al. [13] conducted a systematic review of randomized controlled trials to determine if the routine prophylactic use of antiemetics affected the incidence of PDNV after ambulatory surgery. A total of 815 patient had PDNV with an overall incidence of 26% PDNV in the treatment group and 40.4% in the placebo group. A significantly lower risk of PDNV was discovered with ondansetron 4 mg, dexamethasone 4–10 mg and combination treatment with more than one drug compared to placebo. The overall incidence of PDNV was 14.6% in the treatment group and 26.5% in the placebo group. The relative risk was lower with ondansetron 4 mg and combination treatment with two or more drugs than with placebo.

Tang et al. [35] compared ondansetron and droperidol as a prophylactic antiemetic agent for elective outpatient gynecologic procedures. This study was included in the above systematic review. Droperidol 1.25 mg and ondansetron 4 mg significantly reduced the incidence of PDNV when compared to placebo or droperidol 0.625 mg. Parlow et al. [15] assessed the efficacy of prophylactic administration of promethazine for PDNV after ambulatory laparoscopy. An intramuscular injection of either saline or promethazine 0.6 mg/kg was administered to patients immediately prior to discharge

Table 1
Studies addressing PDNV

Reference	Publication year	Study	PDNV	PDN	PDV	Findings
Amanor-Boadu and Soyannwo [28]	1997	Complications after pediatric outpatient surgery			12.2%	Need to continue to trend complications postdischarge to aid in prevention
Carroll et al. [11]	1995	Patient experiences with nausea and vomiting after discharge from outpatient surgery	35%			Significantly more likely to report impairment in daily activities if PDNV present. Little correlation between pre-discharge NV and PDNV. Few patients called HCP or purchased products to treat NV
Carvalho et al. [14]	2002	Long-term functional recovery: inhalation vs. TIVA		35% (during journey)	10.3% (during journey)	Incidence of PONY similar between two groups (TIVA and inhalation)
Enever et al. [26]	2000	Postoperative morbidity following outpatient dental care under general anesthesia in pediatric patients with and without disabilities	20%			No differences between groups of patients with and without disabilities. N/V most commonly reported symptom
Ernst and Thwaites [27]	1997	Incidence and impact of pain, nausea and vomiting after outpatient surgery		33%	10%	Pain, nausea, vomiting serious and persistent problems postdischarge, increasing in incidence after discharge
Fetzer et al. [24]	2005	Self-care activities for PDNV required for inclusion in study	PDNV required for inclusion in study			Few patients contacted their HCP. Significant number of patients believed PDNV due to analgesics and therefore did not self-administer analgesics
Grenier et al. [22]	1998	Quality at home of pediatric patients after outpatient surgery			9%	PDV and agitation was one of three main causes for anxiety by parents
Gupta et al. [13]	2003	Routine prophylactic use of antiemetics on incidence of PDNV after ambulatory surgery		32.6%	14.7%	Prophylactic treatment with ondansetron 4 mg or combination with two drugs produced significant decrease in PDNV
Kangas-Saarela et al. [31]	1999	Patients' experiences of outpatient surgery		6%		Decreased incidence of PDN probably due to high number of patients in study who received regional anesthesia
Kokinsky et al. [21]	1999	Postoperative comfort after pediatric outpatient surgery	20%			Incidence of PDNV significantly higher in those patients given intraoperative opioid (fentanyl)
Parlow et al. [15]	1999	PDNV after ambulatory laparoscopy is not reduced by promethazine prophylaxis		48%	17%	Patients requiring an antiemetic in PACU are at higher risk for PDNV. Prophylactic promethazine IM before discharge did not reduce the incidence of PDNV
Pfisterer et al. [25]	2001	An international study of PONV in outpatient surgery	21.4% (prophylactic antiemetic) 19.2% (no prophylactic antiemetic)			Some patients reported N/V up to 5 days after surgery. Inadequate control of PDNV remains a problem
Tang et al. [35]	1996	Comparison of ondansetron and droperidol for antiemetic prophylaxis in outpatient gynaecological procedures		68% (P), 57% (D), 41% (D2), 32% (O)	52% (P), 27% (D), 15% (D2), 14% (O)	Incidence of emesis and need for rescue significantly lower with both droperidol and ondansetron groups
Waterman et al. [30]	1999	Postoperative pain, nausea, and vomiting—a qualitative perspective				One-third of the group (55) reported pain and nausea worse than imagined

Watt-Watson et al. [23]	2004	Pain management following discharge after outpatient surgery	14%	Patients stopped taking analgesics despite considerable pain due to side effects of constipation or nausea
Wright et al [36]	1999	Efficacy of promethazine suppositories for home use after outpatient surgery	55%	Promethazine suppositories well-tolerated; used by 89% of patients with access. All patients who used reported decrease in nausea
Wu et al. [12]	2002	Systematic review and analysis of postdischarge symptoms after outpatient surgery	0–55%	Postdischarge symptoms may be significant factor in patient's resumption of normal activities patient recovery. Need further studies to determine impact
Young et al [29]	2000	Does enhanced discharge instruction make a difference after outpatient surgery	13–16% (Day 1), 7–9% (Day 4)	Majority of patients did not experience problems with recovery at home. Patients needed carer assistance for average of 3 days. The enhanced teaching package made no difference

home. There was no difference between the placebo group and treatment group regarding the incidence of PDNV. The incidence of “excessive drowsiness” was notably higher in those patients who had received promethazine ($P = 0.008$).

Wright et al. [36] evaluated the effectiveness of promethazine suppositories in decreasing nausea and vomiting in adult outpatients following discharge home. Patients who had a prolonged stay in PACU due to PONV, developed PONV after the IV was discontinued, or had a long car trip home were given two promethazine suppositories (25 mg each) upon discharge. A high percentage of the patients who had PDNV used the suppositories. All patients who used the suppositories stated that their PDNV improved after use, and no significant side effects were reported. Promethazine suppositories were determined to be clinically, as well as, cost effective.

2.6. Guidelines for determining prevention and treatment

There were five algorithms published for the care and treatment of PONV. Gan [10] lists patient and surgical risk factors and advises avoidance of those risk factors. The algorithm is specific for prophylactic antiemetic therapy and lists options for mild to moderate risk (1–2 factors), moderate to high risk (3–4 factors) or very high risk (>4 factors). The author believes that a multimodal approach to prevention of PONV should be adopted that includes identification of preoperative risk factors, reduction of avoidable risk factors, and use of combination antiemetics. The guideline is based on the 45 references, a mixture of clinical and research, included in the article.

Watcha [4] identified guidelines for prophylaxis and therapy of PONV. Patients were divided into four groups based on estimated risk: low risk (<10%), mild to moderate risk (10–30%), high risk (30–60%), and extremely high risk (>60%). This guideline lists suggested prophylaxis, as well as, suggested rescue antiemetics. The references for the guideline are two editorials published by White and Watcha [37,38]. One discusses the use of meta-analysis in improving an understanding of treatment of PONV, and the other includes recommendations on prophylaxis of high-risk patients based on several studies referenced in the editorial.

Gan et al. [39], in a consensus guideline, listed an algorithm for management of PONV. The algorithm begins with evaluation of risk and divides patients into low, moderate or high-risk groups. This algorithm does suggest consideration of nonpharmacologic therapies, consideration of regional anesthesia, and reduction of baseline risk factors, as well as, antiemetics alone or in combination for treatment. This group of experts considered an evidence rating scale that was based on study design and also considered strength of recommendation based on expert opinion. The panel consisted of 10 physicians, 1 pharmacist, and 1 certified registered nurse anesthetist. Notably missing from the panel were expert perianesthesia registered nurses. There has been concern voiced in the literature about the make-up and selection

of the expert panel and the fact that the panel was funded by a pharmaceutical company [40,41]. Others considered it important that for the first time, an international expert panel attempted to determine a guideline based on evidence-based strategies [20].

Tramer [20] describes a possible decision tree for PONV prophylaxis. Patients are identified as positive or negative for risk. If patients are positive for risk factors, the decision tree suggests keeping baseline risk low and describes a prophylactic antiemetic cocktail. Tramer recognizes the difficulty in defining what “high-risk” actually means and assuring that the appropriate patients are identified. Tramer further discusses the need for evidence concerning the efficacy of therapeutic antiemetic cocktails. He believes that trials are needed to determine the best rescue treatment for patients who continue to vomit after surgery and that minimal effective doses are unknown. Tramer’s premise is that more research is needed for dissemination of best practices and implementation of evidenced-based guidelines.

Golembiewski and O’Brien [33] illustrate the most extensive algorithm that covers the immediate perioperative period. It begins with assessment of risk factors in the preoperative period. Patients are divided into mild to moderate risk (1–2 factors), moderate to high risk (3–4 factors), or very high risk (>4 factors). For all groups there is consideration of intraoperative and postoperative factors that can decrease the incidence of PONV or treat PONV should it occur, and then suggests rescue antiemetics. The algorithm is based on nine references; two that discuss systematic reviews of the literature.

None of the algorithms, guidelines, or decision trees attempts to guide management of nausea and vomiting in the postdischarge phase of patient care. Two of the algorithms address prophylactic antiemetic therapy only. Even those algorithms that discuss postoperative care are specific to the immediate postanesthesia phase of care. The only guidelines based on an evidence rating scale were those from Gan et al. [39].

2.7. Future implications

Very little research has been conducted specifically regarding PDNV. We do know that postdischarge symptoms, including PDNV, can affect patient recovery and resumption of normal activities. We do not know how those symptoms impact the recovery, how extensive the delay in recovery remains, or the costs attributable to these symptoms [12].

Pfisterer et al. [25] suggest the need to consider risk factors when using antiemetics for outpatients. The authors also suggest that future studies should compare the use and effectiveness of older antiemetics with newer antiemetics. They state that the newer antiemetics seem to result in less impact on postdischarge activity (due to less drowsiness or other side effects.) Other authors [10] suggest that study of the neurokinin 1 (NK-1) receptor antagonists may hold hope for the future in terms of preventing or limiting PDNV. Further sug-

gestions for research include creation of valid and reliable instruments to collect information on postdischarge symptoms [12].

Carroll et al. [11] found that patients who experienced PDNV were more likely to report delay and inability to perform their normal daily activities. The authors also discovered that patients usually did not call the health professional or purchase products to treat the problem. Fetzer et al. [24] discovered that only 7 of 190 subjects who experienced PDNV contacted a health care provider for PDNV symptoms. These authors discovered that patients’ most common response to PDNV was to stop the pain medication, even though pain can contribute to nausea and vomiting.

One practice implication would be to provide education for patients including more detailed instructions for managing the PDNV episodes [11]. The patient’s ability to self-manage should be considered because Young et al. [29] discovered that the ability to self-manage was related to the patient’s understanding of self-care. Fetzer et al. [24] call for an antiemetic algorithm for patients to use upon discharge home. This algorithm would take other algorithms one step further by adding the period of time that patients are recovering at home. This algorithm would also need to be written in lay-terms, easy to understand and follow. Instructions for patients’ home care could also include suggestions for complementary therapy. Further research is needed to validate the usefulness of complementary therapies at home for PDNV.

The economic impact of postdischarge symptoms, including PDNV, is not known [12]. Research implications include studying the economic impact of PDNV on delays in resumption of normal activities and examining cost-effectiveness, cost-benefit, cost utility, as well as, direct and indirect costs. These costs include not only the costs of unplanned hospital admission or increased rescue medication, but also delays in return to work, time that must be taken off, not only by the patient, but by the caregiver [12].

3. Conclusion

In conclusion, PDNV continues to be a problem for at least one-third of patients after return home. More research needs to be conducted in this arena as the rate of surgeries in the outpatient setting is only going to rise. Suggestions for study include antiemetic efficacy in the postdischarge setting, the effectiveness of a detailed education program for these patients, and economic impact.

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