

Patient, operative and pain management factors influencing inpatient compared with surgical day care mastectomy procedures at a community hospital

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Background: The COVID-19 pandemic highlighted the importance of maximizing same-day discharge after surgery to mitigate potential patient harms associated with inpatient admission and conserve valuable hospital resources. Adoption of same-day discharge after breast surgery, particularly mastectomy, has been slow despite recent research suggesting the physical and psychological benefits of same-day discharge after surgery. We sought to identify factors associated with inpatient compared with surgical day care mastectomy procedures at a community hospital in Vernon, British Columbia.

Methods: We conducted a retrospective chart review of all patients who underwent a total mastectomy without reconstruction at Vernon Jubilee Hospital, a 196-bed community hospital, between April 2016 and March 2019. Patient characteristics, operative variables and pain management were compared between inpatient and surgical day care mastectomy procedures. We also compared 7-day readmission, reoperation and complications.

Results: A total of 187 mastectomy patients were analyzed with 72 (38.5%) surgical day care procedures. Factors associated with inpatient procedures included longer operative time (66.1 min v. 53.5 min, $p = 0.001$), bilateral mastectomy (91% v. 9%, $p = 0.01$) and suspected or confirmed obstructive sleep apnea (32% v. 17%, $p = 0.04$). Preoperative acetaminophen (83% v. 17%, $p < 0.001$), multilevel intercostal block (83% v. 17%, $p < 0.001$) and a prescription for acetaminophen plus tramadol (58% v. 42%, $p < 0.001$) were associated with day care surgeries. There were no significant differences between the inpatient and surgical day care groups with respect to 7-day readmission, reoperation or postoperative complications.

Conclusion: We found no significant differences in surgical outcomes between inpatients and those with same-day discharge after mastectomy procedures. These findings add to the growing body of evidence that surgical day care mastectomy procedures are safe in the community setting.

Contexte : La pandémie de COVID-19 a mis en lumière l'importance d'encourager la chirurgie de 1 jour afin d'atténuer les risques associés à l'hospitalisation et de ménager les précieuses ressources hospitalières. L'adoption du congé le jour même après la chirurgie mammaire, et plus particulièrement la mastectomie, a été lente, même si de récentes recherches ont attesté de ses bienfaits physiques et psychologiques. Nous avons voulu comparer les facteurs propres à l'hospitalisation et à la chirurgie de 1 jour dans les cas de mastectomies dans un hôpital communautaire de Vernon en Colombie-Britannique.

Méthodes : Nous avons réalisé une analyse rétrospective de tous les cas de mastectomies totales sans reconstruction à l'Hôpital Jubilee de Vernon, un hôpital communautaire de 196 lits, entre avril 2016 et mars 2019. Les caractéristiques des malades, des interventions et de l'analgésie ont été comparées selon que la mastectomie a requis une hospitalisation ou une chirurgie de 1 jour. Nous avons aussi comparé les nombres de réadmissions, de réinterventions et de complications dans les 7 jours suivants.

Résultats : En tout, 187 mastectomies ont été analysées, dont 72 (38,5 %) en chirurgie de 1 jour. Les facteurs associés aux hospitalisations ont été une durée plus longue de l'intervention (66,1 min c. 53,5 min, $p = 0,001$), la mastectomie bilatérale (91 % c. 9 %, $p = 0,01$) et une apnée obstructive du sommeil présumée ou avérée (32 % c. 17 %, $p = 0,04$). La prise d'acétaminophène avant l'intervention (83 % c. 17 %, $p < 0,001$), les blocs nerveux intercostaux multiniveaux (83 % c. 17 %, $p < 0,001$) et une ordonnance d'acétaminophène plus tramadol (58 % c. 42 %, $p < 0,001$) ont été associés aux chirurgies de 1 jour. On n'a observé aucune différence significative entre les groupes hospitalisation et chirurgie de 1 jour en ce qui concerne les nombres de réadmissions, de réinterventions et de complications postopératoires dans les 7 jours suivants.

Conclusion : Nous n'avons observé aucune différence significative dans les paramètres évalués selon que les mastectomies ont requis une hospitalisation ou une chirurgie de 1 jour. Ces observations s'ajoutent au corpus de données qui s'accumulent et selon lesquelles la mastectomie effectuée en chirurgie de 1 jour est sécuritaire en milieu communautaire.

Breast cancer is the most common cancer diagnosed in Canadian women, with an estimate that 1 in 8 will receive a diagnosis within their lifetime.¹ Breast cancer death rates have declined by 48% since the 1980s in part owing to early detection and advancements in tailored surgical treatment.² Surgery continues to be a first-line treatment for early-stage breast cancer. Over the last 20 years, advancements in surgical techniques, the introduction of Enhanced Recovery After Surgery (ERAS) and multimodal pain management have provided overwhelming support for the safety of early or same-day discharge after mastectomy procedures, with no increased risk in readmission, wound complication or reoperation rates or emergency department visits.^{3–6} Furthermore, studies focused on patient-reported outcomes have found that the psychological benefits of same-day discharge include lower rates of anxiety and depression.⁷

Despite multiple studies throughout Canada and the United States concluding that same-day discharge following mastectomy is safe and cost-effective, the adoption of this as a routine standard of care has been slow among many health authorities nationwide.^{4,8–13} The COVID-19 pandemic created a series of unprecedented challenges to the delivery of medical care around the world. Many inpatient surgeries were cancelled owing to the substantial reduction in resources, such as personal protective equipment, medical personnel, acute care resources and inpatient beds.^{14,15} The pandemic highlighted the importance of maximizing surgical day care procedures to mitigate potential patient harms associated with inpatient admission and conserve valuable hospital resources.

Other studies have evaluated specific variables that facilitate successful same-day discharge and home recovery.^{6,8,11} We sought to identify these same factors influencing surgical day care compared with inpatient mastectomy procedures at a community hospital in Vernon, BC, Canada, with 196 beds and 6 general surgeons. The primary purpose of this study was to identify a variety of patient, operative and pain management factors that influenced the rate of surgical day care compared with inpatient mastectomy procedures to help surgeons and health authorities improve the rate of safe same-day discharge after mastectomy procedures.

METHODS

We conducted a retrospective chart review of all patients who underwent a total mastectomy without immediate reconstruction at Vernon Jubilee Hospital between April 2016 and March 2019. Patients who underwent partial mastectomy were excluded. Permission was granted by the Interior Health Authority to proceed as a quality improvement project, exempt from a full research ethics

review. Any person who had a unilateral or bilateral mastectomy was eligible for inclusion. Demographic data (age, sex, body mass index [BMI], Charlson Comorbidity Index [CCI], reason for procedure) were obtained from the electronic medical record.

Patient characteristics, operative variables and pain management were compared between inpatient and surgical day care mastectomy procedures. We defined surgical outcomes based on postoperative pain scores, 7-day readmission, reoperation and Clavien–Dindo classification of complications.

All statistical analyses were carried out using R version 4.0.5, with *p* values of 0.05 or less considered statistically significant. Univariate comparisons between inpatients and those with same-day discharge were made using either a Student *t* test or Wilcoxon rank sum test, depending on whether the variable was normally distributed or not. Categorical variables were compared univariately using χ^2 tests, except where a Fisher exact test was indicated owing to the presence of small cell sizes ($n < 5$). Logistic regression was used for multivariate analyses.

RESULTS

Over the 3-year period (April 2017 to March 2019), 187 patients underwent mastectomy, with 115 admitted postoperatively and 72 discharged the day of surgery. No patients in the surgical day care group had an unplanned admission. Table 1 summarizes the demographic characteristics. Patient age, sex, BMI, American Society of Anesthesiologists classification, CCI score and residence distance from the hospital did not influence whether patients had inpatient compared with surgical day care procedures. Suspected or confirmed obstructive sleep apnea increased the chance of inpatient surgery. Receiving neoadjuvant chemotherapy or having surgery for cancer compared with prophylactic surgery also had no effect.

Table 2 summarizes the operative factors. Duration of surgery was longer in the inpatient group than in the surgical day care group. Patients having a bilateral mastectomy were more likely to have inpatient surgery. Type of nodal operation did not affect the likelihood of inpatient surgery compared with surgical day care.

Pain management factors are summarized in Table 3. Patients in the surgical day care group were more likely than inpatients to have received preoperative acetaminophen. All patients had intraoperative bupivacaine, but only those who had a multilevel intercostal block were more likely to be discharged on the same day as their surgery. Intraoperative lidocaine and ketamine made no difference, nor did postoperative acetaminophen, nonsteroidal anti-inflammatory drugs (NSAIDs), hydromorphone, morphine, fentanyl, or gabapentin. Patients in the surgical day care group were more likely than inpatients to receive a prescription for oral narcotics (84.7% v. 53%), with 79%

Table 1. Demographic characteristics

Characteristic	Group; no. (%) [*]			p value ^t
	Inpatient n = 115	Surgical day care n = 72	All n = 187	
Age, yr (95% CI)	68.6 (66.3–70.8)	66.1 (63.4–68.8)	67.6 (65.9–69.3)	0.16 ^c
Sex				
Female	113 (98.3)	70 (97.2)	183 (97.9)	0.64 ^f
Male	2 (1.7)	2 (2.8)	4 (2.1)	
BMI, mean (95% CI)	27.4 (26.4–28.5)	27.1 (26.0–28.3)	27.3 (26.5–28.1)	0.97 ^w
ASA classification				
1	9 (7.8)	9 (12.5)	18 (9.6)	0.23 ^f
2	60 (52.2)	44 (61.1)	104 (55.6)	
3	44 (38.3)	18 (25.0)	62 (33.2)	
4	2 (1.7)	1 (1.4)	3 (1.6)	
1–2	69 (60.0)	53 (73.6)	122 (65.2)	0.06 ^w
3–4	46 (40.0)	19 (26.4)	65 (34.8)	
CCI score				
0–3	21 (18.3)	21 (29.2)	42 (22.5)	0.21 ^f
4–7	87 (75.7)	48 (66.7)	135 (72.2)	
≥ 7	7 (6.1)	3 (4.2)	10 (5.3)	
OSA				
No	78 (67.8)	60 (83.3)	138 (73.8)	0.04 ^f
Suspected	25 (21.7)	10 (13.9)	35 (18.7)	
Yes	12 (10.4)	2 (2.8)	14 (7.5)	
Patient location ≤ 50 km	107 (93.0)	62 (86.1)	169 (90.4)	0.13 ^f
Patient location > 50 km	8 (7.0)	10 (13.9)	18 (9.6)	
Neoadjuvant chemo: no	111 (96.5)	67 (93.1)	178 (95.2)	0.31 ^f
Mastectomy reason: cancer	95 (82.6)	59 (81.9)	154 (82.4)	1.000 ^c
Mastectomy reason: prophylactic	20 (17.4)	13 (18.1)	33 (17.6)	

ASA = American Society of Anesthesiologists classification; BMI = body mass index; CCI = Charlson Comorbidity Index; CI = confidence interval; OSA = obstructive sleep apnea.
^{*}Unless indicated otherwise.
^tt = Student t test; ^ww = Wilcoxon rank-sum test; ^cc = χ^2 test; ^ff = Fisher exact test.

Table 2. Operative factors

Operative factor	Group; no. (%) [*]			p value ^t
	Inpatient n = 115	Surgical day care n = 72	All n = 187	
Procedure duration, min (95% CI)	66.1 (61.1–71.1)	53.5 (50.1–56.8)	61.2 (57.8–64.7)	0.001 ^w
Axillary dissection	28 (24.3)	13 (18.1)	41 (21.9)	0.37 ^c
Sentinel node	68 (59.1)	42 (58.3)	110 (58.8)	
No nodal operation	19 (16.5)	17 (23.6)	36 (19.3)	
Laterality: unilateral	94 (81.7)	70 (97.2)	164 (87.7)	0.001 ^f
Laterality: bilateral	21 (18.3)	2 (2.8)	23 (12.3)	

CI = confidence interval.
^{*}Unless otherwise indicated.
^tw = Wilcoxon rank-sum test; ^cc = χ^2 test; ^ff = Fisher exact test.

of prescriptions for acetaminophen plus tramadol and 21% for acetaminophen plus codeine.

Surgical outcomes are summarized in Table 4. There were no differences in postoperative pain scores between inpatients and those in the surgical day care group. Complication rates were also similar. In the inpatient group, there were 8 patients with wound issues or hematoma not requiring intervention (grade 1), 1 patient with

a urinary tract infection (grade 2), 4 patients requiring operative hematoma drainage (grade 3) and 1 patient who developed a gastrointestinal bleed secondary to NSAID use (grade 3). In the surgical day care group, there were 8 patients with minor wound issues or minor hematoma (grade 1), 1 patient with a hypertension requiring treatment (grade 2) and 1 patient with a hematoma that required surgical drainage on postoperative

Table 3. Pain management factors

Pain management	Group; no. (%)			p value*
	Inpatient	Surgical day care	All	
Preoperative				
Acetaminophen: no	102 (88.7)	14 (19.4)	116 (62.0)	< 0.001 ^c
Acetaminophen: yes	12 (10.4)	58 (80.6)	70 (37.4)	
Intraoperative				
Bupivacaine	115 (100)	72 (100)	187 (100)	N/A
Multilevel intercostal block	11 (9.6)	55 (76.4)	66 (35.3)	< 0.001 ^c
No block	104 (90.4)	17 (23.6)	121 (64.7)	
IV lidocaine: no	75 (65.2)	54 (75.0)	129 (69.0)	0.24 ^c
IV lidocaine: yes	39 (33.9)	18 (25.0)	57 (30.5)	
Ketamine: no	107 (93.0)	69 (95.8)	176 (94.1)	0.74 ^f
Ketamine: yes	7 (6.1)	3 (4.2)	10 (5.3)	
Postoperative				
Acetaminophen: no	10 (8.7)	4 (5.6)	14 (7.5)	0.57 ^f
Acetaminophen: yes	104 (90.4)	68 (94.4)	172 (92.0)	
NSAIDs: no	96 (83.5)	66 (91.7)	162 (86.6)	0.26 ^c
NSAIDs: yes	17 (14.8)	6 (8.3)	23 (12.3)	
Hydromorphone: no	64 (55.7)	38 (52.8)	102 (54.5)	0.77 ^c
Hydromorphone: yes	50 (43.5)	34 (47.2)	84 (44.9)	
Morphine or Fentanyl: no	42 (36.5)	23 (31.9)	65 (34.8)	0.62 ^c
Morphine or Fentanyl: yes	71 (61.7)	48 (66.7)	119 (63.6)	
Gabapentin: no	114 (99.1)	71 (98.6)	185 (98.9)	0.39 ^f
Gabapentin: yes	0 (0.0)	1 (1.4)	1 (0.5)	
Narcotic prescription: no	54 (47.0)	11 (15.3)	65 (34.8)	< 0.001 ^c
Narcotic prescription: yes	61 (53.0)	61 (84.7)	122 (65.2)	

IV = intravenous; N/A = not applicable; NSAIDs = nonsteroidal anti-inflammatory drugs.
^cc = χ^2 test; ^ff = Fisher exact test.

Table 4. Surgical outcomes

Outcome	Group no. (%)*			p value†
	Inpatient	Surgical day care	All	
Postoperative pain scale				
None	70 (60.9)	51 (70.8)	121 (64.7)	0.37 ^f
Moderate	43 (37.4)	21 (29.2)	64 (34.2)	
Severe	1 (0.9)	0 (0.0)	1 (0.5)	
No	70 (60.9)	51 (70.8)	121 (64.7)	0.25 ^c
Yes	44 (38.3)	21 (29.2)	65 (34.8)	
Length of hospital stay, d (95% CI)	1.3 (1.1–1.5)	0.0 (0.0–0.0)	0.8 (0.6–1.0)	< 0.001 ^w
Postoperative complications: no	101 (87.8)	62 (86.1)	163 (87.2)	0.91 ^c
Postoperative complications: yes	14 (12.2)	10 (13.9)	24 (12.8)	
Reoperation: no	111 (96.5)	71 (98.6)	182 (97.3)	0.39 ^w
Reoperation: yes	4 (3.5)	1 (1.4)	5 (2.7)	
ED visit or IP readmission within 7 days: no	102 (88.7)	62 (86.1)	164 (87.7)	0.60 ^w
ED visit or IP readmission within 7 days: yes	13 (11.3)	10 (13.9)	23 (12.3)	

CI = confidence interval; ED = emergency department; IP = inpatient.
 *Unless indicated otherwise.
^ww = Wilcoxon rank-sum test; ^cc = χ^2 test; ^ff = Fisher exact test.

day 7 (grade 3), 2 days after the drain was removed. The hematoma became apparent only after drain removal; admitting the patient for 1 night after surgery would have made no difference. There were no patients in

either group with Clavien–Dindo grade 4 or 5 complications. Presentation to the emergency department or readmission within 7 days was also similar between the 2 groups.

A multivariate logistic regression was also performed and showed no notable differences in surgical outcomes between the 2 groups.

DISCUSSION

Our findings were very similar to those of previous studies^{6,8,11} in a community hospital setting. In terms of patient factors, our study showed that confirmed or suspected obstructive sleep apnea was associated with inpatient surgery; to our knowledge, this association has not been examined previously. Vuong and colleagues⁸ reported that immediate reconstruction was associated with inpatient surgery, but we did not examine this association in our study because immediate reconstruction is not performed at Vernon Jubilee Hospital, as there is no plastic surgery service. Simpson and colleagues¹³ showed equivalent outcomes for immediate reconstruction and mastectomy without reconstruction.

Multimodal analgesia increases the likelihood of same-day discharge by reducing opioid use and consequent adverse effects such as nausea and vomiting.^{3,5,8,12} In our study, the use of preoperative acetaminophen was associated with surgical day care, possibly correlating with intravenous (IV) perioperative acetaminophen use in the study by Vuong and colleagues.⁸ It is not possible to compare this finding directly as IV administration of acetaminophen has only recently been approved by Health Canada and is not yet widely available. It was not available at Vernon Jubilee Hospital during the study period. Further, we showed an association between multi-level intercostal block technique¹⁶ with high-volume dilute bupivacaine and surgical day care, though it may be the case that this association is owing to a particular surgeon preferring both this technique and same-day discharge for mastectomy procedures.

Vuong and colleagues⁸ showed that filling an opiate prescription was associated with surgical day care; our study showed the same association. The use of NSAIDs and gabapentin was associated with inpatient surgery in the study by Vuong and colleagues,⁸ but this was not reproduced in our study. Relatively few patients in our study received postoperative NSAIDs or gabapentin regardless of admission. The sample size may have been too small to show a difference.

Our study did not show a difference in reoperation or complication rates between inpatient and surgical day care mastectomy procedures, and no surgical day care patients needed an unplanned admission.

We did not evaluate cost savings, but other studies have previously shown cost savings with inpatient compared with surgical day care for mastectomy procedures.^{4,9,12}

Limitations

The limitations of our study included its relatively small sample size and retrospective study design. The small sample size may have resulted in failure to show substantial differences similar to the findings in other studies. We also were unable to study patient-reported outcomes, though other studies have reported improved patient satisfaction⁴ and psychological outcomes¹² with surgical day care mastectomy procedures. A follow-up study of patient-reported outcomes is being considered.

CONCLUSION

Our results provide reassurance to community surgeons, who may be reluctant to send patients home the day of surgery, that this is a safe option with favourable savings in hospital bed utilization. Only 2 of 23 patients undergoing bilateral mastectomy were discharged the day of surgery. Given the results of this study, more patients undergoing a bilateral mastectomy could be offered same-day discharge.

As SARS-CoV-2 becomes endemic, having the option to perform mastectomy with a same-day discharge reduces the need to delay urgent cancer surgery^{14,15} owing to resource limitations and infection-control concerns associated with inpatient surgery during future spikes in SARS-CoV-2 or other future infections and hospital admissions. Our study adds to the existing literature showing that same-day discharge for mastectomy procedures is a safe option in appropriately selected patients and that this can be implemented in a community hospital setting.

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Competing interests: H. Hwang is an associate editor of *C7S*; he was not involved in the review or decision to accept this paper for publication. No other competing interests were declared.

Contributors: H. Hwang designed the study. C. Davey acquired the data, which L. Chen, C. Davey and H. Hwang analyzed. C. Davey and H. Hwang wrote the article, which L. Chen reviewed. All authors approved the final version to be published.

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References

1. Smith L, Woods R, Brenner D, et al. *Canadian Cancer Statistics 2019*. Available: <https://Cancer.ca/Canadian-Cancer-Statistics-2019-EN> (accessed 2022 Jul. 17).

2. Statistics Canada. *Table 13-10-0394-01. Leading causes of death, total population by age group*. Available: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310039401> (accessed 2022 Jul. 17).
3. Arsalani-Zadeh R, Elfadl D, Yassin N, et al. Evidence-based review of enhancing postoperative recovery after breast surgery. *Br J Surg* 2011;98:181-96.
4. Keehn AR, Olson DW, Dort JC, et al. Same-day surgery for mastectomy patients in Alberta: a perioperative care pathway and quality improvement initiative. *Ann Surg Oncol* 2019;26:3354-60.
5. Ludwig K, Wexelman B, Chen S, et al. Home recovery after mastectomy: review of literature and strategies for implementation American Society of Breast Surgeons Working Group. *Ann Surg Oncol* 2022;29:5799-808.
6. Sibia US, Klune JR, Turcotte JJ, et al. Hospital-based same-day compared to overnight-stay mastectomy: an American College of Surgeons National Surgical Quality Improvement Program analysis. *Oschner J* 2022;22:139-45.
7. Bonnema J, van Wersch AMEA, van Geel AN, et al. Medical and psychosocial effects of early discharge after surgery for breast cancer: randomised trial. *BMJ* 1998;316:1267-71.
8. Vuong B, Dusendang JR, Chang SB, et al. Outpatient mastectomy: factors influencing patient selection and predictors of return to care. *J Am Coll Surg* 2021;232:35-44.
9. de Kok M, Dirksen CD, Kessels AG, et al. Cost-effectiveness of a short stay admission programme for breast cancer surgery. *Acta Oncol (Madr)* 2010;49:338-46.
10. Canadian Partnership Against Cancer. *Examining disparities in cancer control: a system performance special focus report*. Available: <https://www.partnershipagainstcancer.ca/topics/disparities-in-cancer-control/> (accessed 2022 Jul. 17).
11. Cordeiro E, Jackson T, Cil T. Same-day major breast cancer surgery is safe: an analysis of short-term outcomes using NSQIP data. *Ann Surg Oncol* 2016;23:2480-6.
12. Marla S, Stallard S. Systematic review of day surgery for breast cancer. *Int J Surg* 2009;7:318-23.
13. Simpson SA, Ying BL, Ross LA, et al. Incidence of complications in outpatient mastectomy with immediate reconstruction. *J Am Coll Surg* 2007;205:463-7.
14. Cortina CS, Ward EP, Kong AL. The consideration for outpatient mastectomy during the COVID-19 global pandemic. *Am J Surg* 2021;222:290-1.
15. Bartlett DL, Howe JR, Chang G, et al. Management of cancer surgery cases during the COVID-19 pandemic: considerations. *Ann Surg Oncol* 2020;27:1717-20.
16. Huang TT, Parks DH, Lewis SR. Outpatient breast surgery under intercostal block anesthesia. *Plast Reconstr Surg* 1979;63:299-303.