

## Examining factors associated with post-surgical site infections (SSI) among breast patients: A retrospective case record review

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### Introduction and Background

There are about 500 women diagnosed with breast cancer yearly in Singapore General Hospital. Of which, 80% of the patients go through surgery. 20% of patient goes through mastectomy with breast reconstruction. Surgical Site Infection is the most common complication following breast surgery as mentioned in literature reviews. SSI can lead to prolong hospitalization stay, increase healthcare cost, poor cosmetic outcome, delay adjuvant treatment, burden to patients' coping post surgery, and burden to family in transporting patients to and fro for dressing management and cost.

As such the study was to explore the SSI among the patients operated locally to understand the factors and to intervene appropriately even before the surgery to reduce the risk of SSI.

### Aim of the study

This study aims to identify factors associated with SSI development among patients who have undergone surgery for breast cancer.

### Methodology

A retrospective design study, medical record review of breast cancer surgery done from January 2013 to December 2016.

Records documented on SSI and/or positive wound culture results within a year from breast cancer surgery were retrieved. Controls were women who underwent breast cancer surgery but had no SSI.

Each case was age-matched with four controls. Chi-square test and Mann-Whitney U test were used to identify risk factors significantly associated with SSIs.

Analysis of predictive variables with a multiple regression included factors with p-values < 0.20 in the univariate analyses.

### Result

A total of 84 records were analyzed (21 cases, 84 controls).

Multivariate analysis found 'Surgical department' and 'home with surgical drains' to be predictive of SSI.

The odds of SSI is 11 times higher among patient going home with a surgical drains (OR 10.93, 95% CI: 1.623–73.53; p = 0.01).

Having more than one surgical department performing the operation increases the odd of developing SSI by 6 times (OR 6.15, 95% CI: 1.05–36.10; p = 0.04).

### Result

#### Significant Variables Included in Regression

Variable	p-value
Any breast implant	0.126
Any post-op seroma	0.045
Axillary dissection	0.095
Comorbidity: hyperlipidaemia	0.132
Home with surgical drains	0.020
Operation type	0.044
Previous chemotherapy before operation	0.198
Previous surgery	0.150
Length of Stay	0.165
Surgeon Department	0.163
Intra-operative blood transfusion	0.040

#### Multivariate Logistic Regression Model (Step 10)

		p-value	Odds Ratio(B)	95% CI <sup>a</sup>
<b>Home with surgical drains</b>	Yes	<b>0.014*</b>	10.925	1.623–73.525
	No <sup>^</sup>			
<b>Surgeon Department</b>	GS <sup>b^</sup>	<b>0.044*</b>	6.152	1.049–36.096
	GS/PS <sup>c</sup>			

<sup>^</sup> Reference Group, \* Significant at p < 0.05, <sup>a</sup> Confidence Interval, <sup>b</sup> General Surgery (GS), <sup>c</sup> Plastic Surgery (PS)

### Conclusion

SSI is a significant factor that can affect the patient's morbidity, mortality rate and most importantly increasing healthcare cost. This study allowed us to identify factors that contributes to SSI and introduce preventive measures.

Patients with surgical drains and those who had undergone reconstructive surgery are more likely to develop SSI. Therefore it is important to emphasize on hygiene during self drain care management and to monitor these group of patients closely. Result showed a significant number of 26% of SSI among the study group.

Limitations of the study were identified. The duration of the drain kept was not considered as a predictor in this study. Therefore, future research should explore the association between the duration of drainage system and SSI among post breast surgery patients. Future study can be recommended to explore the relationship of SSI and neoadjuvant chemotherapy, previous radiotherapy, diabetes, nutrition status, skin integrity, obesity, tobacco or steroid use.

#### References:

1. Epidemiology of surgical site infection in adults [Internet]. Uptodate.com. 2017 [cited 13 June 2017]. Available from: <https://www.uptodate.com/contents/epidemiology-of-surgical-site-infection-in-adults>
2. Boyce JM, Potter-Bynoe G, Dziobek L. Hospital reimbursement patterns among patients with surgical wound infections following open heart surgery. Infect Control Hosp Epidemiol 1990; 11:89.
3. Poulsen KB, Bremmelgaard A, Sørensen AI, et al. Estimated costs of postoperative wound infections. A case-control study of marginal hospital and social security costs. Epidemiol Infect 1994; 113:283.
4. Vegas AA, Jodra VM, García ML. Nosocomial infection in surgery wards: a controlled study of increased duration of hospital stays and direct cost of hospitalization. Eur J Epidemiol 1993; 9:504.
5. Pinto A, Faiz O, Davis R, Almoudaris A, Vincent C. Surgical complications and their impact on patients' psychosocial well-being: a systematic review and meta-analysis. BMJ Open. 2016;6(2):e007224.
6. CDC NNIS System. National Nosocomial Infections Surveillance (NNIS) System report, data summary from January 1992 through June 2004, issued October 2004. Am J Infect Control. 2004;32:470–485.
7. Hall JC, Hall JL. Antibiotic prophylaxis for patients undergoing breast surgery. J Hosp Infect. 2000;46:165–170.
8. Nanashima A, Arai J, Oyama S, Ishii M, Abo T, Wada H et al. Associated factors with surgical site infections after hepatectomy: Predictions and countermeasures by a retrospective cohort study. International Journal of Surgery. 2014;12(4):310-314.