ICPIC13-ABS-1605
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A Novel Immediate Pre-Operative Decolonization Strategy Reduces Surgical Site Infections

E. Bryce, T. Wong, D. Roscoe, L. Forrester, B. Masri and the
Vancouver General Hospital Pre-operative Decolonization Therapy Team
Vancouver, British Columbia, Canada

Introduction

- Bacterial decolonization (DcTx) prior to surgery decreases the risk of surgical site infections (SSIs)
- Traditional DcTx consist of chlorhexidine (CHG) +/- intranasal mupirocin
- Compliance with DcTx is suboptimal
- The development of mupirocin resistance is a concern
- A novel approach using immediate pre-operative DcTx with intranasal photodisinfection therapy (PDT) and CHG body wipes was assessed

Objectives

1. To determine if immediate DcTx using PDT and CHG reduces SSI rates
2. To determine if immediate DcTx can be integrated into pre-operative work flow

Methods

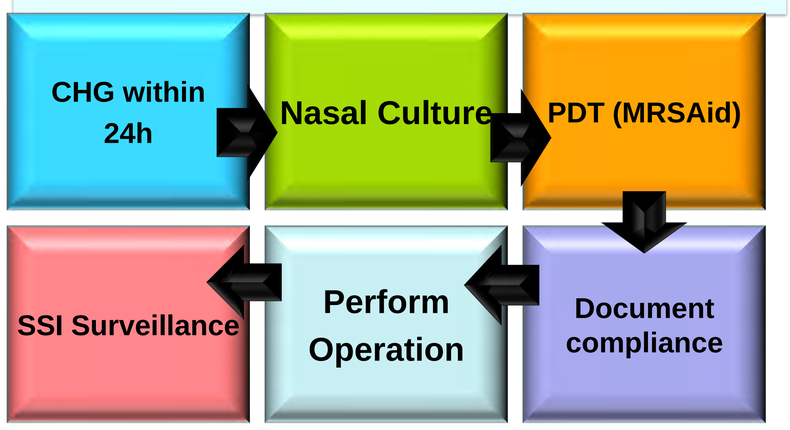
PHOTODISINFECTION

- Methylene blue applied to anterior nares, binding to bacteria (1)
- Two x 2-minute pulses of red light (2)
- Light activates the dye, producing bactericidal reactive oxygen species

CHLORHEXIDINE WIPES

- Used day of or night prior to surgery (3)
- Product left on the skin
- Alcohol free
- Equivalent to 4% CHG on skin

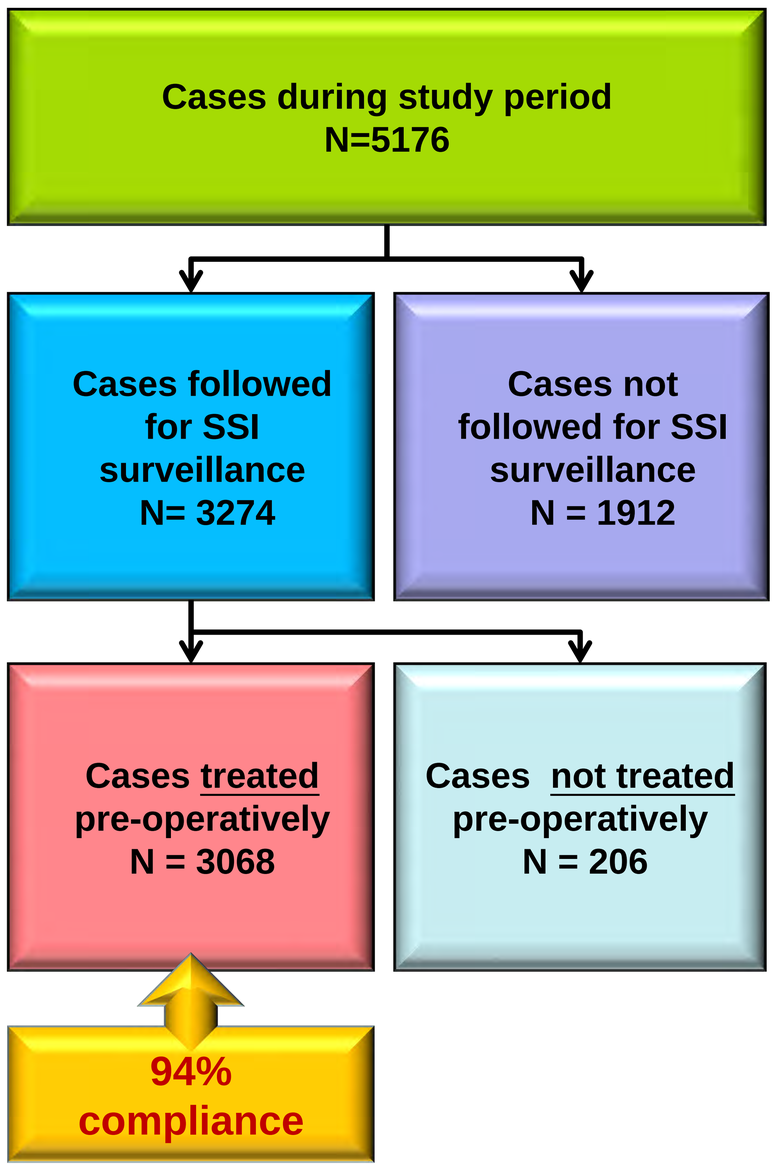
DECOLONIZATION PROTOCOL



Surgeries included: Cardiac, thoracic, orthopedic, vascular, neurosurgical, spine and breast operations

Surgeries excluded: Dirty/contaminated or duplicate cases, operations in 6 week introductory period

Results



Impact: Reduction in SSI rates

Specialty	TREATED PATIENTS		4-year HISTORICAL GROUP		P value	OR
	SSIs	Rate %	SSI	Rate %		
Cardiovascular[1]	19/628	3.0	83 /3334	2.5	0.4373	0.82
Neuro[2]	2/502	0.4	31 /2152	1.4	0.0764	3.65
Orthopedics[1]	6/892	0.7	50 /2844	1.8	0.0251	2.64
Spine	18/475	3.8	136 /1606	8.5	0.0009	2.35
Thoracic	1/431	0.2	14 /1357	1.0	0.1478	4.48
Vascular	3/140	2.1	25 /1094	2.3	0.9152	1.07
TOTAL	**49/3068**	**1.6**	***339 /12,387***	**2.7**	**0.0004**	**1.73**

(1) CHG/mupirocin program in place previously
(2) CHG bathing program in place previously

42% reduction

Impact: Comparing Treated and Untreated Patients

- 206/3274 (6.3%) cases did not receive treatment
- 1:4 propensity score matching of treated and untreated cases and conditional logistic regression analysis with treatment as the only variable confirmed that DcTx reduced the risk of SSI (**coefficient = -1.39**; z=-3.64; p=0.0027)

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- 15/49 (30.6%) treated patients vs 10/17 (58.8%) untreated patients had *S.aureus* as a pathogen (**p=0.0436;** OR 3.2381)

Conclusions

1. The novel combination of nasal photodisinfection and chlorhexidine wipes administered immediately pre-operatively **reduced surgical site infections by 42%.**
2. Conditional logistic regression analysis of matched treated and untreated cases confirmed that our novel strategy was protective, reducing surgical site infection risk by **ten-fold**.
3. The combination of photodisinfection and chlorhexidine wipes **takes 10 minutes** compared to traditional methods which take 5-7 days.
4. This approach is **safe** (0.12% adverse events)
5. This approach was easily integrated into the perioperative workflow (**94% compliance**)
6. This approach is cost-effective, conservatively **saving $1.3 million** Canadian.

This new strategy has broad-spectrum activity, minimal risk of antimicrobial resistance, and excellent compliance.

The potential application of PDT to other clinical situations is intriguing.

Impact: Cost Avoidance

Item	Number	Case Cost	Cost Avoidance
Total SSI cases avoided	35	$25,000 - 33,000	$1,040,000
Readmission days avoided	552*	$500/dy	$276,000
		TOTAL	**$1.3 M**

***140 possible extra surgeries**

Acknowledgements

Special thanks to the VGH Perioperative Services, VGH Medical Microbiology Laboratory, and VGH Infection Control team,

This project was funded by a generous grant from the UBC and VGH Hospital Foundation.

Ondine Biomedical provided technical expertise, and discounted supplies.