



# Singapore Healthcare Management 2018

# A Shotgun approach to Reduce Neonatal Cardiac Post-Operative Infection Rate



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## INTRODUCTION

- National University Hospital (NUH) has the only Neonatal ICU (NICU) in Singapore, providing collaborative and comprehensive care for newborns with congenital heart defects through a multidisciplinary team
- Very young program : inception in 2012
- Of the 76 babies with cardiac defects managed between 2013 and 2016, 47 cases had cardiac surgery (Patent ductus arteriosus (PDA) ligations excluded)
- Post surgical **Blood stream infection (BSI) rate of 15% and Surgical Site infection (SSI) rate of 11% were extremely high** and in contrast to reported figures of 5% - 8% among high volume centers of repute in the developed world
- Post-operative infection has a direct bearing on clinical outcome and resource utilization and is largely preventable

## OBJECTIVE

**Aim: Reduce combined rates of BSI and SSI from 23% to below 10%**

## METHODOLOGY

A multidisciplinary team of doctors, nurses and administrators came together to conduct a Rapid Improvement Event (RIE) in September 2016 to address this issue

### PRE-RIE Activities

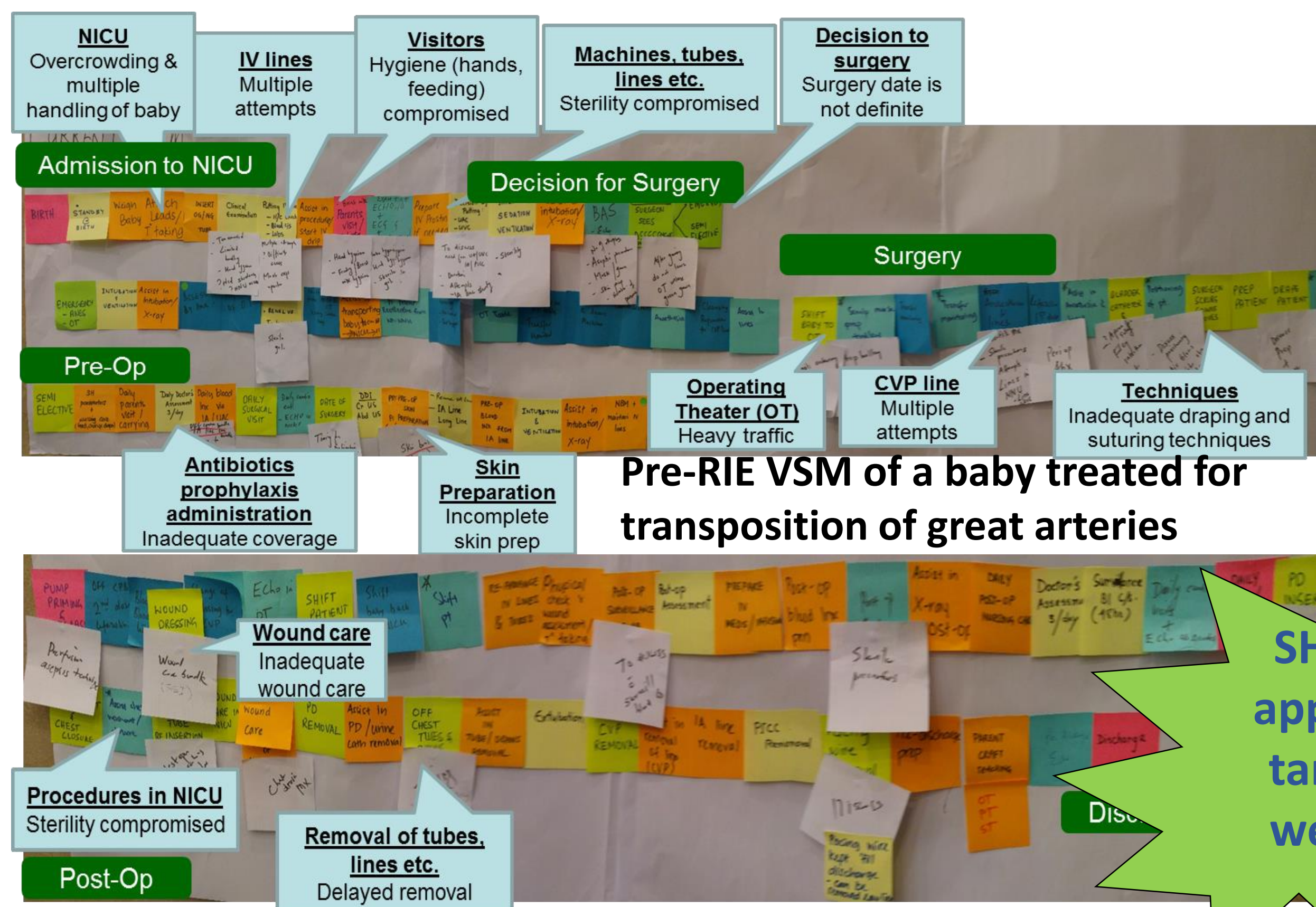
- Definitions of BSI, SSI and scope of the project were formalized
- Retrospective audit (2013-16) to identify risk factors of BSI and SSI
- Independent surprise on-site audits revealed lapses around the peri-operative period
- Survey among stake holders to identify perception of problem, possible causation & intention to improve

### Pre-RIE: Key Findings

- 65% Staff felt current practice inadequate to prevent post-op infections
- No single causative factor emerged
- BSI: all gram negative infections and occurred within 72 hours of surgery – so target peri-op period
- SSI: mostly gram positive; by 1-2 weeks

### RIE activities

- Lean tools including Value Stream Mapping, Gap Analysis and Paradigm Breaking were used to understand the process, identify risks and root causes during the 4.5 days RIE
- Additional resources : evidence based literature, expert opinion , best practices adopted from internationally benchmarked cardiac programs (observership – CHOP, USA)



VSM Identified Multiple Weak Links

SHOTGUN approach to target ALL weak links

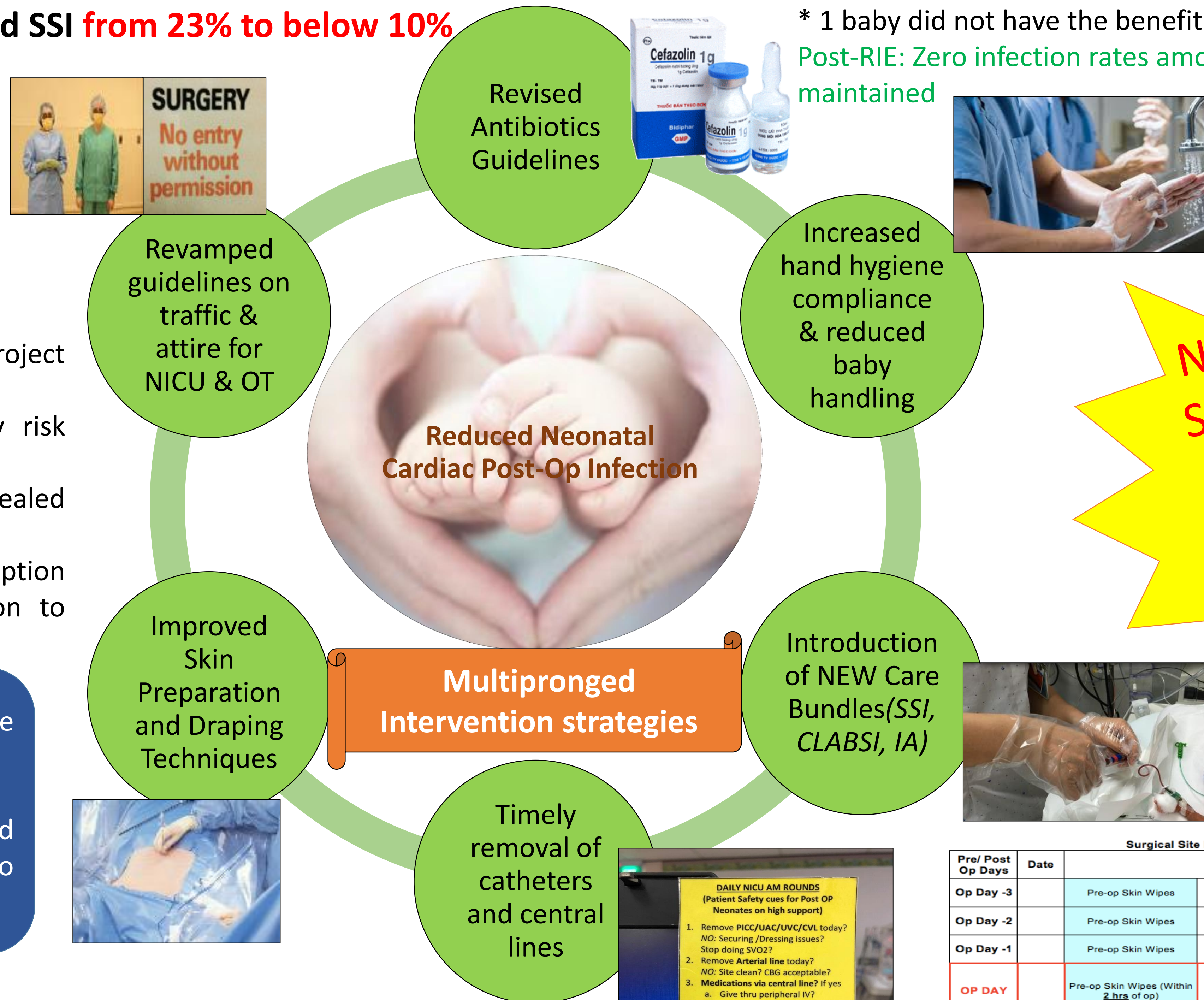
### POST-RIE activities

- Establish action plans and designate roles to orchestrate the changes through a Plan-Do-Check-Act (PDCA) cycle.
- Quarterly review meetings were conducted to keep RIE on track
- Tracking of results and compliance audits

## RESULTS

	Pre-RIE 2013 – Aug 16	Post-RIE (Sept 16 – Mar 18)
Cardiac surgeries Excluding PDA ligation and Norwood	N=47	N=14
Blood -stream Infection Rate (BSI)	15% (7 cases)	0% (No BSI)
Surgical Site Infection Rate (SSI)	11% (5 cases)	7% (1 case*)
<b>SSI + BSI Rate</b>	23% (11 cases)	<b>7% (1 case*)</b>

\* 1 baby did not have the benefit of SSI bundle in Sep'16  
 Post-RIE: Zero infection rates among PDA ligations (n=7) maintained



No BSI & SSI in last 18 months



Pre/ Post Op Days	Date	Interventions
Op Day -3		Pre-op Skin Wipes, Nasal Bactroban Ointment
Op Day -2		Pre-op Skin Wipes, Nasal Bactroban Ointment
Op Day -1		Pre-op Skin Wipes, Nasal Bactroban Ointment, Oral Care
OP DAY		Pre-op Skin Wipes (Within 2 hrs of op), Antibiotics (1 <sup>st</sup> dose: Within 60 mins of incision, 2 <sup>nd</sup> dose: Post-bypass), Oral Care
POD 1		Wound Dressing, Antibiotics
POD 2		Wound Dressing, Antibiotics
POD 3		Wound Dressing, For patients with open chest, to continue antibiotics for 24 hrs after chest closure
POD 4		Wound Dressing
POD 5		Wound Dressing

Intervention	Compliance Rate
Pre-OP skin preparation (SSI bundle)	76% *
Pre-OP nasal Mupirocin (SSI bundle)	76% *
Pre-OP oral care (SSI bundle)	81% *
Antibiotic prophylaxis as per bundle	95%
NICU traffic control	>99%
NICU Hand Hygiene compliance rate (2018)	95%

\* 100% compliance for non emergency surgeries

## CONCLUSIONS

- The team improved workflows, adopted new care bundles, invigorated healthcare staff attitude towards infection control, decreased antibiotic usage and navigated a steep learning curve to obtain the RIE target and meet standards set by best of high volume cardiac centers
- In complex multidisciplinary and multi-site care processes more than a few weak links may exist, all of which need to be addressed to improve outcomes