

Project Title

A shotgun approach to reduce Neonatal Cardiac Post-Operative Infection Rate

Project Lead and Members

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Project members: Dr. Merchant Soomar Sanah, A/Prof Zubair Amin, Dr. Shegufta Rahman, Dr. Senthil Kumar Subbian, Dr. Lalitha Manickam, Dr. Chan Si Min, Lee Soke Yee, Tomomi Ogura, Nur Aliza Binte Kamsan, Wang Xia, Ng Lay Ho Hazel, Sun Bixian

Organisation(s) Involved

National University Hospital

Aims

To reduce combined rates of Blood Stream Infection (BSI) and Surgical Site Infection (SSI) from 23% to below 10%.

Project Category

Clinical improvement, Safe Care, Quality

Keywords

Clinical Improvement, Safe Care, Patient Safety, Quality Of Care, Risk Management, Workflow Improvement, Quality Improvement Methodology, Neonatal ICU, Neonatology, Paediatric Cardiology, Paediatric Infectious Diseases, Neonatal Care, Congenital Heart Defects, Cardiac Surgery, Post-Operative Infection, Infection Control, Multipronged Interventions, Multidisciplinary Care, National University Hospital, Blood Stream Infection, Surgical Site Infection, Reduced Antibiotics Usage, New Care Bundles, Reduced Baby Handling, Increased Hand Hygiene Compliance, Timely Catheter Removal, Skin Preparation, Rapid Improvement Event, Audit, Surveys, Lean Methodology, Value Stream Mapping, Gap Analysis, Paradigm Breaking, Evidenced-based Literature Review, International Benchmark , Plan-Do-Check-Act

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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

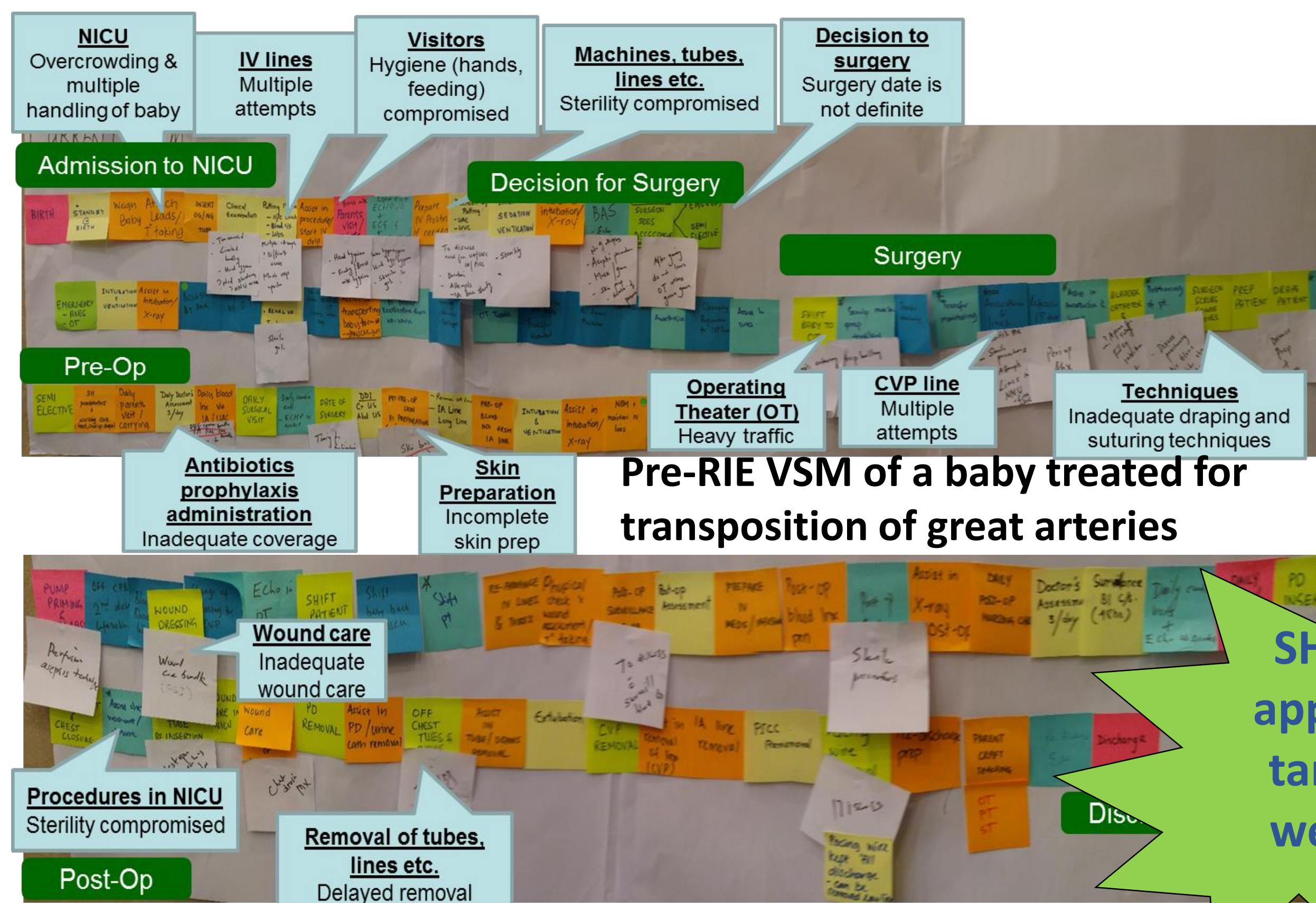
- Definitions of BSI, SSI and scope of the project were formalized
- Retrospective audit (2013-16) to identify risk factors of BSI and SSI
- Independent surprise on-site audits revealed lapses around the peri-operative period
- Survey among stake holders to identify perception of problem, possible causation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

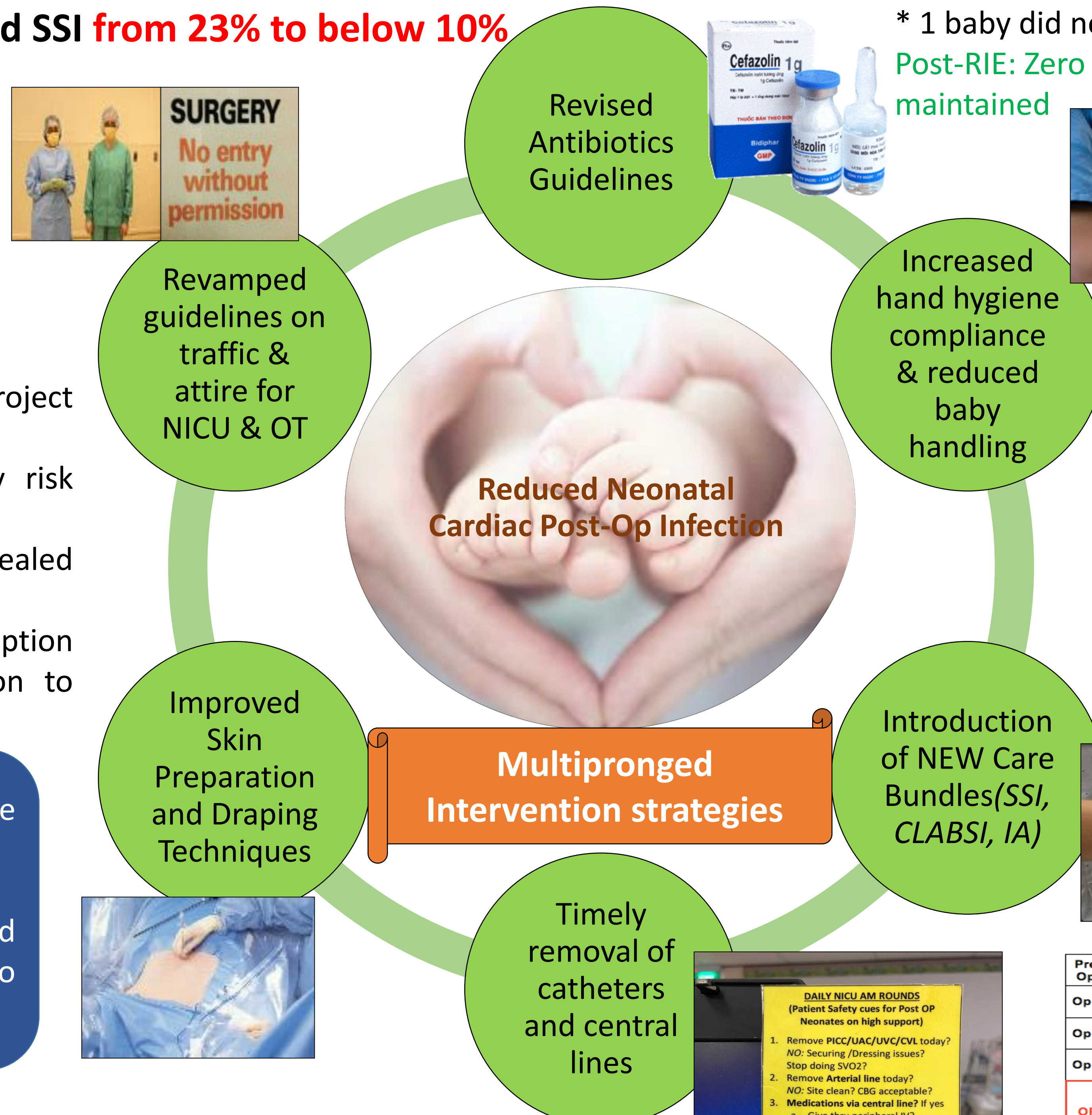
POST-RIE activities

- 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*)
SSI + BSI Rate	23% (11 cases)	7% (1 case*)

* 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 st dose: Within 60 mins of incision, 2 nd 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