

BATTLING THE BUGS: REDUCING EARLY CATHETER-RELATED BLOODSTREAM INFECTION IN HAEMODIALYSIS PATIENTS



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Adding years of healthy life

Mission Statement

We aim to reduce early catheter-related blood stream infection (BSI) in haemodialysis (HD) patients with newly inserted tunnelled dialysis catheter (TDC) by 80% over a sustained period.

Team Members				
	Name	Designation	Department	
Team Leaders	Yeo See Cheng	Consultant	Renal Medicine	
	Chan Siew Mie	Senior Nurse Manager	Renal Unit	
Team Members	Timothy Koh	Consultant	Renal Medicine	
	Benjamin Khoo	Senior Resident	Renal Medicine	
	Jiang Nan	Nurse Clinician	Ward 9A	
	Ooi Swee Ling	Assistant Nurse Clinician	Renal Unit	
	Pua Uei	Senior Consultant	Radiology	
	Gabrielle Chia	Senior Staff Nurse	Infection Control	
	Koh Zhi Min	Executive	CSI	
Sponsor	Adrian Liew	Head of Department	Renal Medicine	

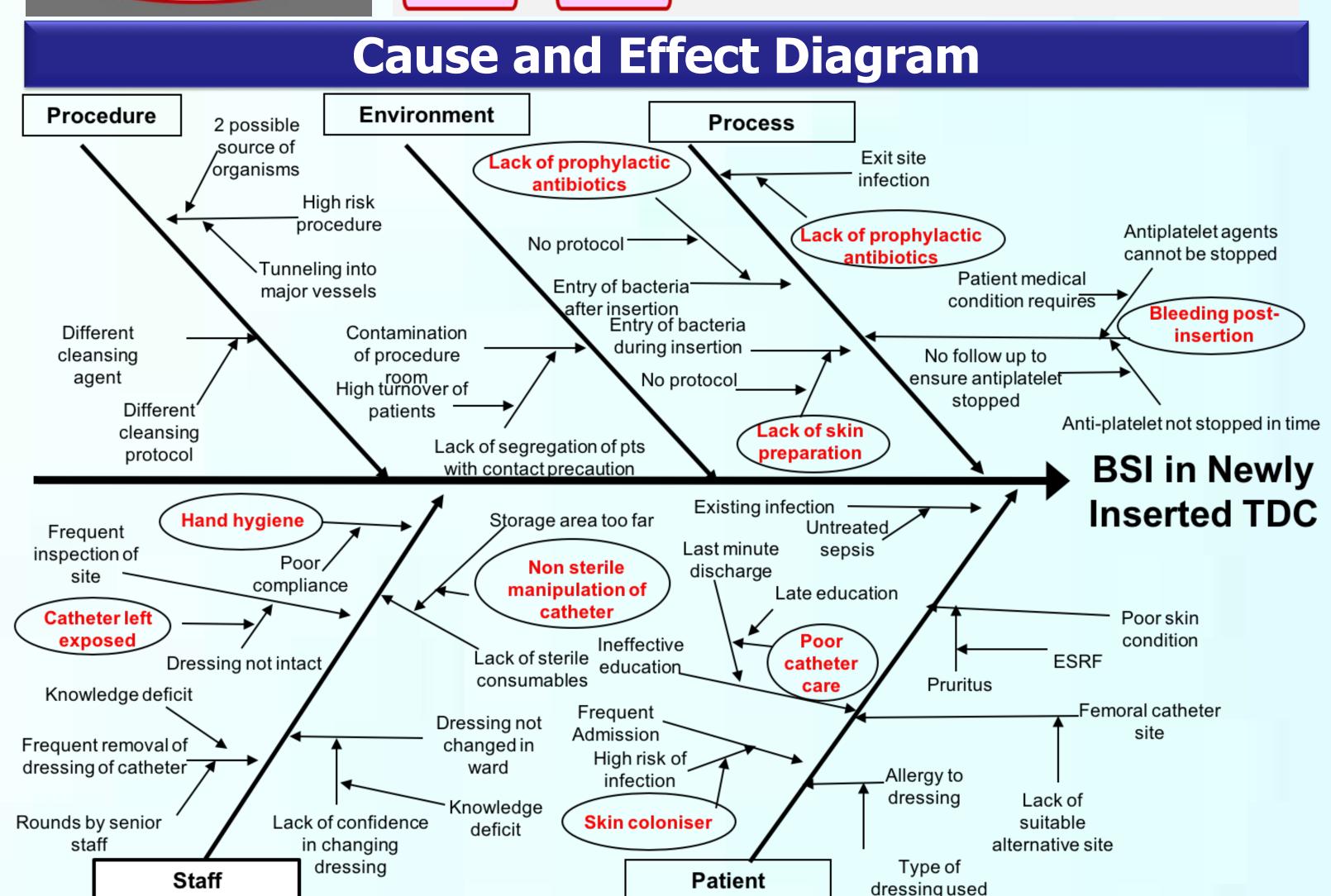
Evidence for a Problem Worth Solving

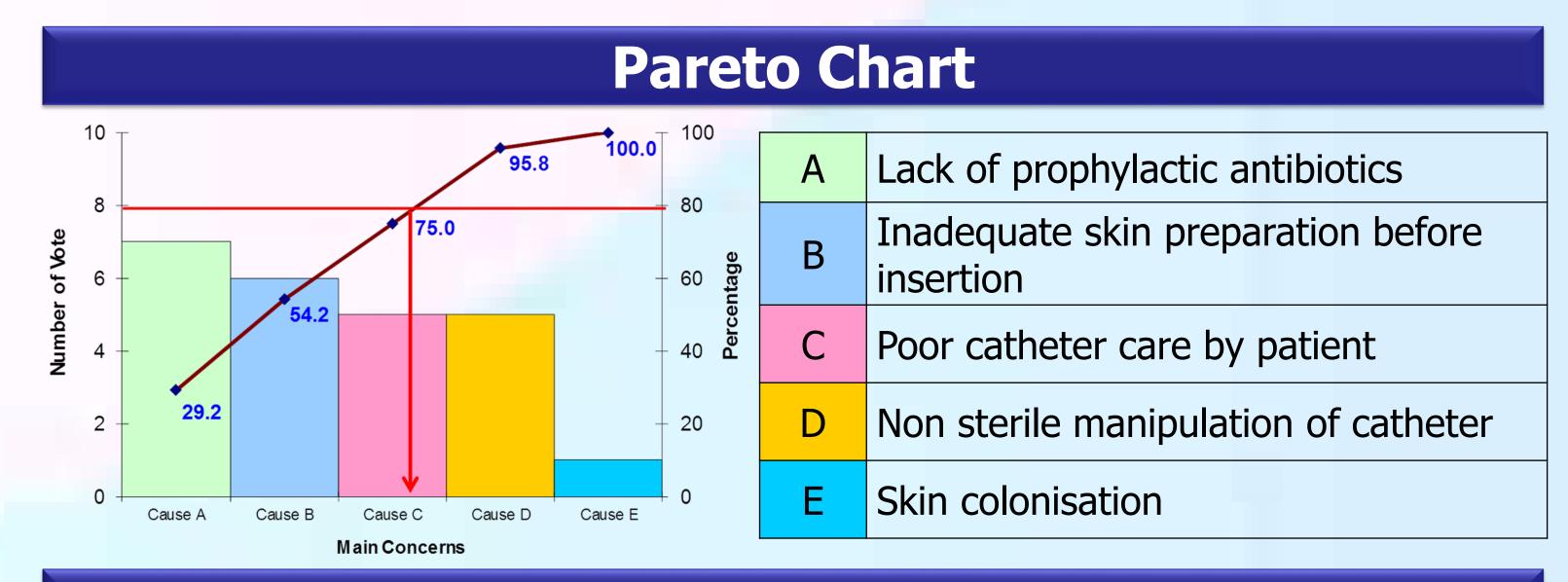
Dialysis catheter-related BSI is a leading complication in HD patients, associated with increased risk of mortality, additional invasive procedures, additional hospitalisation and/or increase in length of stay.

Current Performance of a Process

In 2014 and 2015, there were an annual average of 11.5 episodes of catheter-related BSI in HD patients that occurs after a newly inserted TDC in TTSH – a rate of 1.9 infections per 100 catheters inserted i.e. 1.9% of newly inserted TDC were infected.

Flow Chart of Process MACRO MICRO Check 2 patient Stop anti-Monitor vital signs Open disposal sterile Set IV plug, Send patient to platelets and identifiers before set by circulating and put on shower DI for TDC Admission to Ward transfer to and put on NBM cap for patient for TDC PT/PTT procedure trolley insertion/exchange Flush TDC set Perform hand Perform 'Time-Out with N/Saline Prepare Don cap, sterile Cetrimide 1%, hygiene by before start of requisites for gown, gloves and and prepare In followed by Pre-procedure procedurist and TDC insertion procedure Xylocaine & scrub nurse Preparation vith Alcohol 70% Give LA and Cover the X-ray N/Saline and TDC insertion/exchange at nake an incision Secured with Orape the site for equipment with Cleanse the site and Heparin lock **Diagnostic Imaging Dept** Prolene 3/0 for catheter applied dressing when TDC is in plastic cover insertion Ward Inform Ward Send star team 8 ine (non-touch) List for dialysis at Send patient back to nurse the vital signs x 4 hours porter to fetch Renal Unit or ward by star team a& scheduled time and STO 14th POD &preparation of for dialysis Listing for Dialysis at Check 2 patient Renal Unit or 9AHU Perform hand Check HD Clean catheter site identifiers & Scrubbing of catheter with Chlorhexidin prescription wash and open requisites and imbs 1 min and ports take patient's order, medicine sterile renal 2% and apply procedure trolley via Aurora transparent dressing Ward Wipe down of discharge, RU Transfer back to Monitor and Check post oloodlines and cover GW by star team scrubbing of ports dialysis weight document connecting ports & catheter limbs & porter and parameters provide step parameters hourly with gauze Provide Discharge education on private dialysis Care of TDC, fluid control and diet





Implementation				
CAUSE	INTERVENTION			
Lack of prophylactic antibiotics	 Prophylactic IV antibiotics before insertion Topical gentamicin to newly inserted TDC exit site 			
Inadequate skin preparation before insertion	 Chlorhexidine wash to skin before insertion of TDC Nasal decolonisation for MRSA carriers 			
Poor TDC care by patient	 Education on care of TDC before TDC insertion Education message reinforced in Ward 9A/11A and Renal unit after insertion Synchronised education message from Renal unit and Ward 9A/11A Education material to show pictures for clarity 			
Results				

In the pilot phase (April-December 2016), there was an 86% decrease in rate of dialysis catheter-related BSI from 4.4% to 0.6%.

In the sustaining phase, we conducted a hospital-wide cohort study. Between April and June 2017, patients receiving the interventions had an infection rate of 0.4 infections/1000-catheter-days, compared to 5 infections/1000-catheter-days in patients not receiving the interventions, representing a 92% reduction in dialysis catheter-related BSI.

Number of cases of dialysis catheter related BSI/Number of dialysis catheter insertion

	Intervention Arm (Ward 9A & 9B)	Control Arm (All other locations, including MAC and ICUs)	
April	0/34	2/21	
May	0/29	5/30	
June	1/24	3/22	
Total	1/87 (1.1%) 0.4 infections per 1000 catheter-days	10/73 (13.7%) 5 infections per 1000 catheter-days	

Cost Savings

Each episode of catheter-related MRSA bacteraemia is estimated to have a direct increased cost of \$5,645.81 to the patient (increased length of stay, additional invasive procedures and treatment). Given that the interventions implemented cost \$53.52 per patient and assuming 50 interventions are necessary to prevent one episode of bacteraemia (historical infection rate of 1.9% and 600 new catheter insertions per year), the cost savings per episode of catheter-related BSI avoided is \$2,969.81 and the annual cost savings is estimated to be \$34,152.82.

The actual additional marginal healthcare cost of TDC-related BSI is likely higher (reported ~USD\$30,000 per episode of MRSA infection) and it is expected that the overall healthcare cost savings is substantial.

Strategies to Sustain

Improve reliability of applying required processes / interventions:

- 1. Refine & simplify standardised protocol & checklist for interventions
- 2. Process measure to document reliability of applying interventions
- 3. Micro-processes audits and forced function to ensure adherence

We are also identifying interventions that are key to improving outcome measures to refine the processes.