

Project Title

MRSA Eradication to Reduce Catheter related infections (MERICI)

Project Lead and Members

Project lead:

- Dr Christopher Leo
- Liao Jun (ANC)

Project members:

- Dr Anil Gopinathan, Senior Consultant (DDI)
- Razali Mahdi, Nurse Clinician (Infection Control)
- Joan Marie Delipe Buenafe, SSN (Ward 55)
- Glenda Bayot Sinnung, SSN (Ward 54)
- Eden Laurente Valdez, ANC (DDI)
- Liao Jun, ANC (IDC)
- Judith Kaylene Lee

Organisation(s) Involved

National University Hospital

Project Period

Start date: 17th April 2018

Completed date: Nov-2018

Aims

Reduce the number of MRSA Bacteremia catheter related infections for Renal Patients

Background

A surge of MRSA infections has been observed in patients (MRSA carriers) undergoing catheters for dialysis across the months of January (2 cases) to February 2018 (5 cases). The 7 infected patients have been identified as having undergone dialysis in the hospital inpatient setting, with 2 patients being assessed to have acquired the infection

from the community. Out of the 5 patients that have acquired MRSA infections in the hospital, 4 had their catheter inserted at DDI, whilst 1 was in the dialysis centre. These patients were identified as MRSA positive upon their exit swab.

The typical procedure for a patient prior to their catheter insertion involves a preparation in the ward (Hibiscrub) 2 days before their insertion. This process is usually done in Ward 55, where most of the renal patients are located. However, with the high hospital BOR, some of these patients are located in other wards (e.g. Ward 54, 57). As a result, the staff in these wards do not order the necessary preparation procedures prior to the catheter insertion. This preparation is done before the procedure for patients going to either the dialysis centre or DDI for their insertions.

Methods

We conducted a Rapid Improvement Event to assess the issue and formulated the interventions to reduce catheter related MRSA bacteraemia in haemodialysis patients. We identified potential gaps in infection prevention practices including pre-procedural preparation that was inconsistent, type of cleaning agents used, dialysis catheter care and MRSA decolonization practices.

The Dialysis Access Checklist was created to improve pre-procedural disinfection and implemented throughout the institution for all dialysis patients requiring a tunneled dialysis catheter. This required a multidisciplinary approach from the Division of Nephrology, Diagnostic and Interventional Radiology and Nursing to put to practice.

We also re-examined and improved upon the standard operating protocols for catheter care within the inpatient dialysis centre.

Other interventions included but not limited to the change of cleaning agents for catheter care as well as a MRSA decolonisation protocol.

We also modified the radiology request form required for procedural requests to the Department of Radiology to include the Dialysis Access Checklist prior to scheduling the procedure.

Post implementation, regular audits were performed to assess the compliance to adherence to the Dialysis Access Checklist as well and catheter care.

Results

Within the 6 months of implementation (June – November 2018) we managed to achieve zero incidence of hospital acquired catheter related MRSA bacteraemia in NUH.

Lessons Learnt

Rapid Improvement Events or similar Quality initiatives that involve a multidisciplinary approach with the support of the institution is a powerful tool for instituting sweeping changes across the hospital system and improves patient care.

Implementation of system wide change requires a dedicated team to ensure that progress is achieved to reach the desired outcome.

We faced challenges in ensuring adherence of the Dialysis Access checklist which required frequent reminders to the clinical teams involved. The nursing staff played an essential role in assisting the physicians be reminded to document and prescribe the necessary. The incorporation of the Dialysis Access checklist in the radiology request checklist was also instrumental in ensuring adherence.

Conclusion

The MERCI project was a resounding success in reducing hospital acquired MRSA catheter related bacteraemia in our institution.

Project Category

Clinical Improvement, Safe Care, Process improvement

Keywords

Clinical Improvement, Safe Care, Process Improvement, System Level Improvement, Quality Improvement Tool, Healthcare Failure Mode and Effect Analysis, Infection Prevention, Compliance, Nephrology, Radiology, Nursing, National University

Hospital, Rapid Improvement Event, Dialysis Access Checklist, Hospital Acquired
MRSA Catheter Related Bacteraemia

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MRSA Eradication to Reduce Catheter related Infections (MERCURI) RIE

UMC Renal



Quality Improvement Award (Project/CPIP Category)

Report by : Valerie Ma

Start Date : 1/5/2018

End Date:

Annex 1.

Project Title 4	MRSA Eradication to Reduce Catheter related Infections (MERCRI) RIE		
Department	UMC Renal	Duration	From May 2018
Team Leaders	Dr Christopher Leo, NM Judith Kaylene Lee	Sponsors / Facilitators	A/Prof Jimmy Teo), ADON Lucy Leong
Team Members	Dr Anil Gopinathan, NC Razali Mahdi, SSN Joan Marie Dalipe Buenafe, SSN Glenda Bayot Sinnung, ANC Eden Laurente Valdez, ANC Liao Jun		

A: Define the Problem

- A surge of MRSA infections has been observed in patients (MRSA carriers) undergoing catheters for dialysis across the months of January (2 cases), February (1 case) and March 2018 (1 case). The typical procedure for a patient prior to their catheter insertion involves a preparation in the ward (Hibiscrub) 2 days before their insertion. This process is usually done in Ward 55, where most of the renal patients are located. However, with the high hospital BOR, some of these renal patients are located in other wards (e.g. Ward 54, 57). As a result, the staff in these wards do not order the necessary preparation procedures prior to the catheter insertion. This preparation is done before the procedure for patients going to either the dialysis centre or DDI for their insertions.

B: Goal

- Reduction of HO MRSA cases due to lines tunneled catheter to <1/1000 catheter days per month (over each quarter)

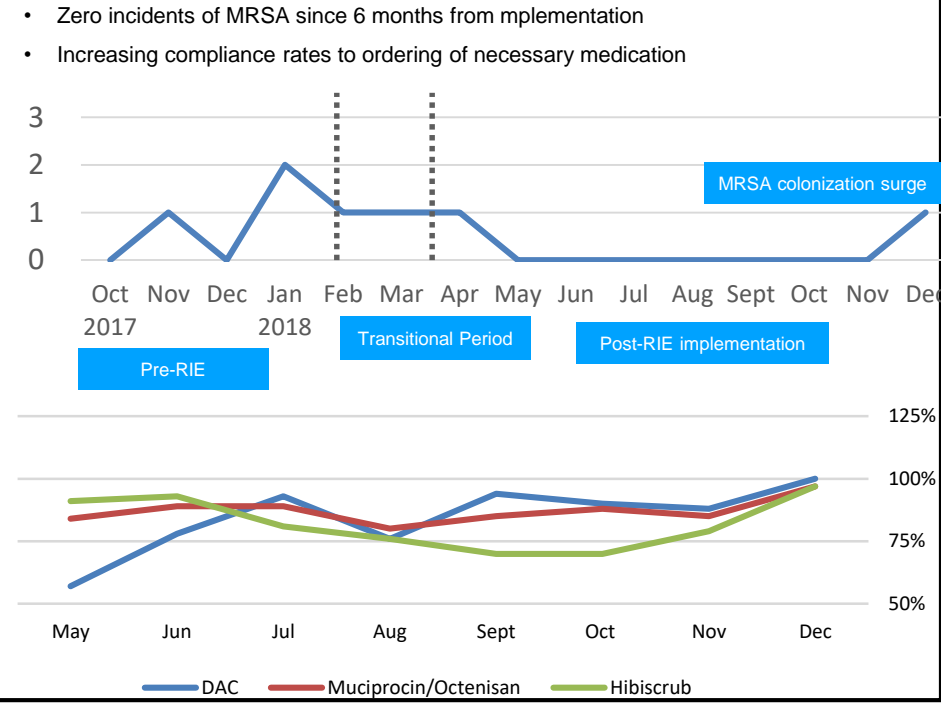
C: Problem Analysis

Refer to HMFEA Slides

D: Interventions & Action Plan

	Changes	Benefits	Implemented
1	<ul style="list-style-type: none"> One standard checklist for all patients with tunneled catheter (MRSA/Non MRSA) Robust Training Program SOP for care of tunneled catheter 	Improved compliance towards patient safety	Yes
2	<ul style="list-style-type: none"> Change of cleansing solution (Chlorhexidine 2% Aqueous) for during tunneled catheter dressing Use of Prolene instead of silk for stitching at tunneled catheter site. Change of dressing within 24 hours of tunneled catheter insertion / exchange 	Reduced skin infection	Yes
3	Implementation of eradication protocol	Reduced MRSA Carriage	Yes

E: Benefits/ Results



F: Strategy for Spreading/Sustaining

- Audit compliance of Dialysis Access Checklist (DAC) and hibiscrub/octenisan adherence
- Update of SOP and review of skills validation by Nursing team
- This initiative was shared in the UMC meeting in May 2018.

HFMEA – Wards (1/3)

#	Step description	Failure Mode	Potential Cause	Severity	Frequency	Hazard Score	Action
1	Doctor to order hibiscrub daily x 7 days/nasal bactroban ointment BD x 7 days	Doctor did not order	Not aware that it must be ordered, incorrect/incomplete order	1. Minor	4. Frequent	4	<ol style="list-style-type: none"> 1. Standard guidelines/protocol 2. Pathway or standard order sets in C-Doc 3. Standard documentation template 4. Onboarding survival guide for newbies by renal team
2	Shower of patient with HIBISCRUB 4%	Patient doesn't want to shower					<ol style="list-style-type: none"> 1. PFE on importance of personal hygiene 2. Reinforce technique of Hibiscrub shower to nurses, 1 min contact time of hibiscrub on skin 3. Visual reminders or timer.
3	Application of Bactroban nasal ointment	<p>Missed prophylaxis treatment prior to procedure (Hibiscrub, Bactroban)</p> <p>Inadequate prep-Less than 2 days of prep.</p> <p>Confusion and difficulty in carrying out protocol.</p>	<ol style="list-style-type: none"> 1. Knowledge deficit- Dr, Nurse 2. Lack of awareness 3. Overflow cases- Variation of practices in wards 4. Nil clear instructions/ order in eIMR by Dr. 5. Urgent cases, 1h- no prep 	2. Moderate	4. Frequent	8	<ol style="list-style-type: none"> 1. One Checklist for ALL dialysis line insertions 2. Renal module eLearning with Quiz. 3. Standardized teaching materials 4. Planning of line insertions by reviewing Dr availability and logistics. 5. Role redesign for IDC Coordinator (admin) and procedure nurse (EN, courier nurse, coordinate cases, assist Dr, priming staffing)

HFMEA – Wards (2/3)

#	Step description	Failure Mode	Potential Cause	Severity	Frequency	Hazard Score	Action
4	Preparation of patient before line insertion	<p>Missed prophylaxis treatment prior to procedure (Hibiscrub, Bactroban)</p> <p>Inadequate prep-Less than 2 days of prep.</p> <p>Confusion and difficulty in carrying out protocol.</p>	<p>1. Knowledge deficit- Dr, Nurse</p> <p>2. Lack of awareness</p> <p>3. Overflow cases- Variation of practices in wards</p> <p>4. Nil clear instructions/ order in eIMR by Dr.</p> <p>5. Urgent cases, 1h- no prep</p> <p>6. Different versions of prep protocol (HD access creation checklist, DDI, infection protocol, nursing pre-tunnelled catheter insertion preparation)</p>	2. Moderate	4. Frequent	8	
5	PFE Care of tunneled catheter	PFE not done	Nurse did not provide PFE	3. Major	3. Occasional	9	1. Review of ward processes and quality of PFE given to patient (inc return demo) and documented evidence that education given.
6	Nurse teach family covering of catheter during shower & family to return demo	Catheter not covered during shower	Patient did not know, did not cover properly.	1. Minor	4. Frequent	4	(UPC, documentation, NM/NC/NE)

HFMEA – Wards (3/3)

#	Step description	Failure Mode	Potential Cause	Severity	Frequency	Hazard Score	Action
7	Check catheter site post procedure and every shift, change if dressing is wet	Wet dressing not assessed to require change and left on the patient	Variation in physical assessment of dressing Competency checklist not updated Dialysis access creation checklist not used	1. Minor	4. Frequent	4	1. Competency of nurses (Options: UMC, all settings) Assessment of patient/dressing Dressing technique a) catheter site b) limbs- if stained with blood, to scrub with hexodane, cover with gauze, paste warning sign label.
		Delayed change in dressing	Review of line during Dr rounds (bleeding/ infection)	1. Minor	4. Frequent	4	2. SQE (high risk, low volume) Review and implement SQE Checklist 3. Renal resource/procedure nurse (role: manage complex catheters)
8	Delisting of MRSA patients						1. NC Razali (IC) to provide Renal the list of MRSA patients 2. Vascular coordinator (Renal) to implement Eradication Protocol as an outpatient

HFMEA – Procedure (1/3)

#	Step description	Failure Mode	Potential Cause	Severity	Frequency	Hazard Score	Action
1	Doctor takes consent in holding bay/IDC	Cross contamination among patient (MRSA vs Non MRSA)	Space constraints	2. Moderate	4. Frequent	8	MRSA patient consented in MRSA recovery bay, instead of the common holding bay. Disinfect the signature pad after each patient.
2	Cleaning of the area and draping	Inadequate disinfection of area of intervention	Lack of standard practice to guide appropriate methods	2. Moderate	2. Uncommon	4	Chlorhexidine 2% for disinfection for at least 2 minutes contact time. Standardised guideline for area disinfection for procedures.
3	Suturing of the IJ site, exit site and catheter hub	Increased risk of infection with Mersilk suture	Mersilk is currently used in both DDI and IDC	2. Moderate	4. Frequent	8	Change to use of Prolene as standard suturing material.
4	Cleaning of the exit site post procedure	Inadequate disinfection of area prior to dressing application	No standard practice to repeat disinfection of area post procedure and prior to dressing (saline vs chlorhex)	2. Moderate	4. Frequent	8	To use Hexodine to clean area post insertion prior to dressing
5	Cleaning the procedure room after the procedure is completed	Inadequate cleaning prior to next case to be done	Cleaner unavailable to clean the room in time. Procedure nurse too occupied to disinfected the area thoroughly.	2. Moderate	3. Occasional	6	Pre-emptively informing cleaners prior to starting the procedure so that cleaning can commence immediately post procedure. If cleaning by nursing for procedure room, to follow standardised cleaning practice to ensure proper disinfection of the environment.

HFMEA – Procedure (2/3)

#	Step description	Failure Mode	Potential Cause	Severity	Frequency	Hazard Score	Action
6	Patient brought to IDC	Cross contamination among patient (MRSA vs Non MRSA)	MRSA patients overflow to the clean area due to space constraints	2. Moderate	1. Remote	3	No overflows of MRSA patients to the clean bays allowed.
7	Change in dressing for newly inserted catheter exit dressing >24 hours after procedure	Change of dressing too soon. Change of dressing not done at 24 hours	Nurses unsure when the dressing was last changed. Date of application not written on the dressing. Assumption that only dialysis nurses can change the dressing.	1. Minor	1. Remote	2	Standard protocol for a change of dressing within 24 hours by ward nurse. This can be incorporated in a checklist to facilitate compliance.
8	Cleaning the catheter with cleaning agent (chlorhexidine vs iodine)	Use of iodine without alcohol based agent for catheter area. Chlorhexine with alcohol shown to be superior to iodine in clinical studies.	Possible increased risk of infection with iodine vs chlohexidine. Potential for catheter damage (in non-tunneled catheters) with chlohexine with alcohol solution.	2. Moderate	4. Frequent	8	All catheters are to be cleaned with chlorhexidine 2% (non-alcohol)
9	Disinfection of the ports before manipulation if intervention is required (i.e. reverse flow, change of circuit)	Disinfection not done well. Aseptic technique not carried out properly.	No standardised practice protocol for disinfection after dialysis has started (ie . If manipulation is done half way during the dialysis process). Lack of time to perform thorough cleaning.	2. Moderate	3. Occasional	6	Standard practice for disinfection to be incorporated into the existing SOP.

HFMEA – Procedure (3/3)

#	Step description	Failure Mode	Potential Cause	Severity	Frequency	Hazard Score	Action
10	Disinfection of the IV medication port of blood line if intervention is required (i.e. administration of medication)	Disinfection not done well. Aseptic technique not carried out properly.	No standardised practice protocol for disinfection and practices not audited or enforced.	2. Moderate	4. Frequent	8	<p>Standard practice for disinfection to be incorporated into the existing SOP.</p> <p>Regular audits to be done to ensure compliance of good practices including hand hygiene practices.</p>
11	Clean dialysis machine and environment	Inadequate cleaning of the environment	Lapse in cleaning resulting in lack of wipe down of equipment, unavailability of cleaning staff and high turnover.	2. Moderate	4. Frequent	8	<p>Dedicated cleaner in the IDC to ensure timely cleaning of the environment between each patient (replacement during meal times) + Visual cues for cleaner</p> <p>Regular audit to ensure compliance to equipment and environmental cleaning. (Glo-gel Audit for cleaners + audit for nurses [ICN])</p> <p>Compliance to aseptic procedures</p>