



Prevention of Hospital Acquired Infection: Reduction of CAUTI rates in KKH by 30% in 3 years

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INTRODUCTION

This is a Large Scale Initiative under Singapore Healthcare Improvement Network (SHIne), a collaboration of all the SingHealth Institutions, Institute of Healthcare Improvement and Ministry of Health Singapore. There were 3 mainstreams: Medication Safety, Reduction of Hospital Acquired Infection and Surgical Safety that KKH has embarked on. Key priority of KKH is prevention of Hospital Acquired Infection such as Catheter Associated Urinary Tract Infection (CAUTI).

AIM

The main objective of the collaboration is to reduce harm from CAUTI by 30% in 3 years.

METHODOLOGY

The team was formed and led by an Infection Disease Control Consultant and co-led by a Nurse Clinician from the Infection Control Team. The members were Children's Intensive Care Unit (CICU) Senior Consultant and Senior Staff Nurse, Ward 43 Staff Nurse and Program Manager from Quality Safety and Risk Management. The pilot group were patients from CICU and female adult patients from gynecology-oncology ward (ward 43).

The baseline data for Catheter Associated Urinary Tract Infection (CAUTI) in CICU is 15-21 per 1,000 catheter days. CICU was the first to developed a CAUTI Maintenance Bundle as improvement initiative (Fig. 1 & Fig.2). However, there was poor compliance to the bundle after its implementation.

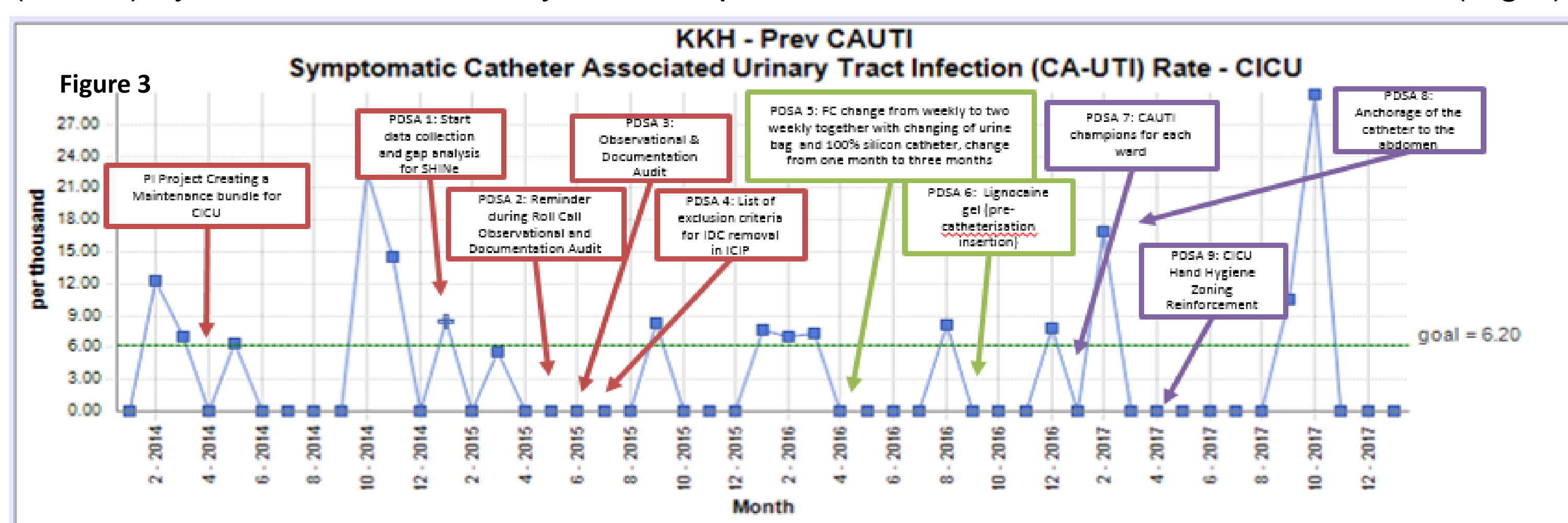
Figure 1 CAUTI BUNDLE IN PAEDIATRIC WARD

AREA OF FOCUS	RECOMMENDATION
Infection Control	<ul style="list-style-type: none"> Maintain a closed drainage system at all times Hand hygiene Change gloves before emptying urine bag for another patient Proper secure of catheter Leave catheters in place, only as long as possible
Maintain unobstructed urine flow	<ul style="list-style-type: none"> Hold the tube nearer to patient and drain out DO NOT siphoned back the urine to the patient Keep catheter and collecting tube free from kink
Empty urine bag	<ul style="list-style-type: none"> Drain urine at every shift or when the bag is 2/3 full Empty collection bag using a separate clean container for each patient Swab the drainage spigot before and after draining Ensure drainage spigot does not contact non-sterile container Empty urine bag prior to procedure such as scan
Transfer of patient	<ul style="list-style-type: none"> Manually clamp catheter prior to transfer Keep collecting bag below level of bladder at all times Keep urine bag off the floor
Mental hygiene	<ul style="list-style-type: none"> Daily mental hygiene using soap and water For male: Push back foreskin (if uncircumcised). Clean around the glans stroking away from the meatal opening For female: Part the labia and clean urethral area from front to back, towards the anus
Routine catheter and bag change	<ul style="list-style-type: none"> Review need of urinary catheter daily Routine catheter change and whenever necessary: <ul style="list-style-type: none"> Foley's catheter - 14 days Silicone catheter - 3 to 12 weeks Change drainage bag when change catheter Change when bag/catheter contaminated
Education	<ul style="list-style-type: none"> Educate on catheter care to patient or caregiver

Figure 2 CAUTI BUNDLE IN O&G WARD

AREA OF FOCUS	RECOMMENDATION
Infection Control	<ul style="list-style-type: none"> Change gloves before emptying urine bag for another patient Maintain a closed drainage system at all times Proper secure of catheter Review need of urinary catheter daily
Maintain unobstructed urine flow	<ul style="list-style-type: none"> Hold the tube nearer to patient and drain out DO NOT siphoned back the urine to the patient Keep catheter and collecting tube free from kink
Empty urine bag	<ul style="list-style-type: none"> Drain urine daily and/or when bag is half full Empty collection bag using a separate clean container for each patient Swab the drainage spigot before and after draining Ensure drainage spigot does not contact non-sterile container Empty urine bag prior to procedure such as scan
Transfer of patient	<ul style="list-style-type: none"> Manually clamp catheter when there is likelihood of bag being lifted above bladder level Keep urine bag below level of bladder at all times Keep urine bag off the floor
Mental hygiene	<ul style="list-style-type: none"> Daily mental hygiene using soap and water Part the labia and clean urethral area from front to back, towards the anus
Routine catheter and bag change	<ul style="list-style-type: none"> Routine catheter change and whenever necessary: <ul style="list-style-type: none"> Foley's catheter - 14 days Silicone catheter - 12 weeks Change drainage bag upon every change of catheter or when bag/catheter is contaminated
Education	<ul style="list-style-type: none"> Educate on catheter care to patient or caregiver

The team used the tool Gap Analysis tool, implemented the "Ask 5 Take 5" to identify the gaps in non-compliance with the CAUTI Maintenance Bundle. Multiple Plan-Do-Study-Act (PDSA) cycles to test and analyze the improvement from the different interventions (Fig.3).



INTERVENTIONS THAT SHOWED IMPROVEMENT (Figure 5a,5b,5c,5d,5e):

Creation of Urinary Catheter Procedure List and CAUTI bundle checklist in IntelliVue Clinical Information Portfolio (ICIP).

Figure 5a

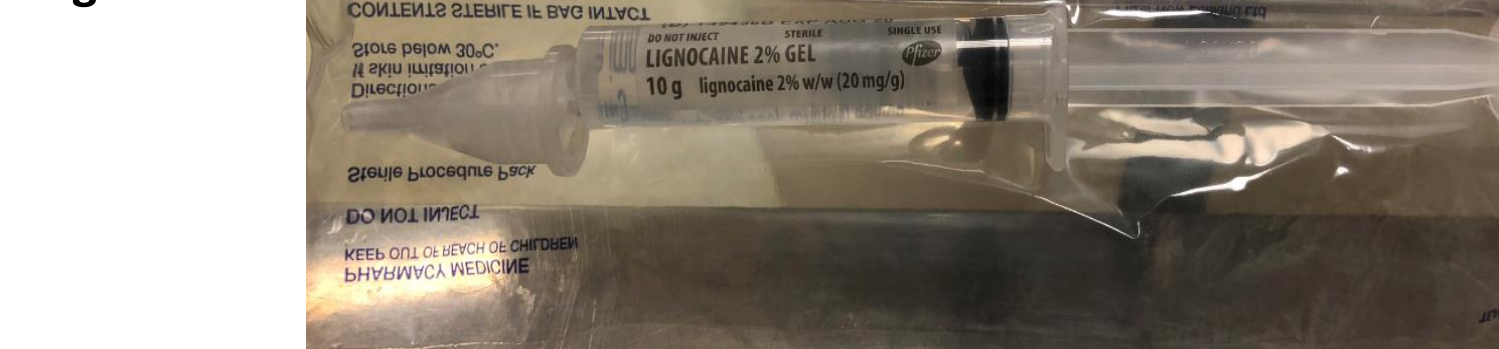
The team identified CAUTI champions and shared the analysis of the problem to the Nurse-in-charge of the unit and disseminated during the safety huddle. The champions were the agent of spread to other areas.

Figure 5b



Advocated the use of a local anaesthetic (Lignocaine sterile gel) minimises the discomfort and can aid success of the procedure.

Figure 5c



Anchorage of the catheter at the abdomen area minimizes the trauma for paediatric patients.

Figure 5e

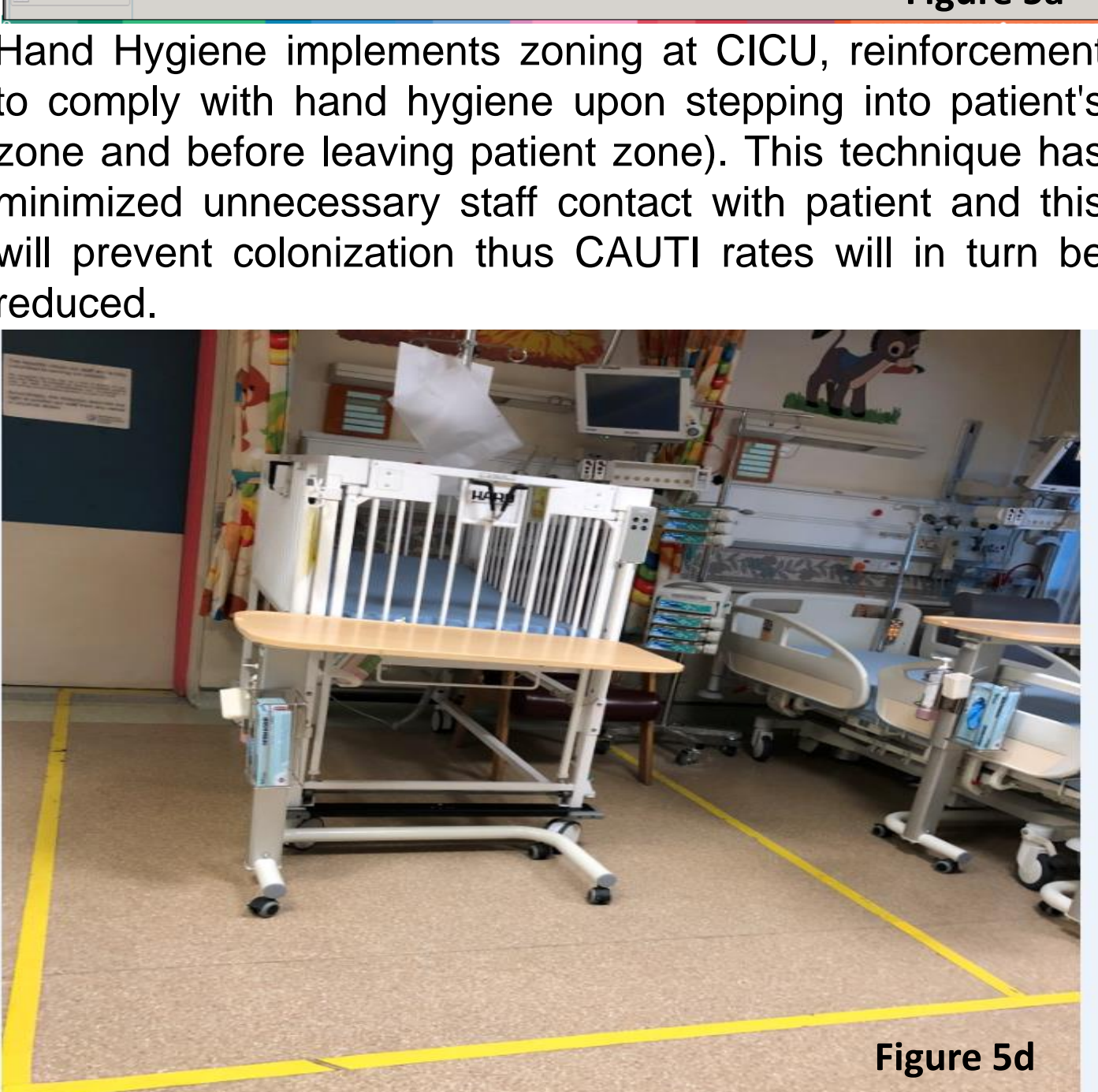


Figure 5d

RESULTS

The team used the process measures that includes Percent Urinary Catheters Maintained according to Recommended Guidelines and Symptomatic Catheter Associated Urinary Tract Infection Rate for paediatric units and O&G wards. The outcome measurement is the Days between Symptomatic Catheter Associated Urinary Tract Infection (Fig.4a & 4b).

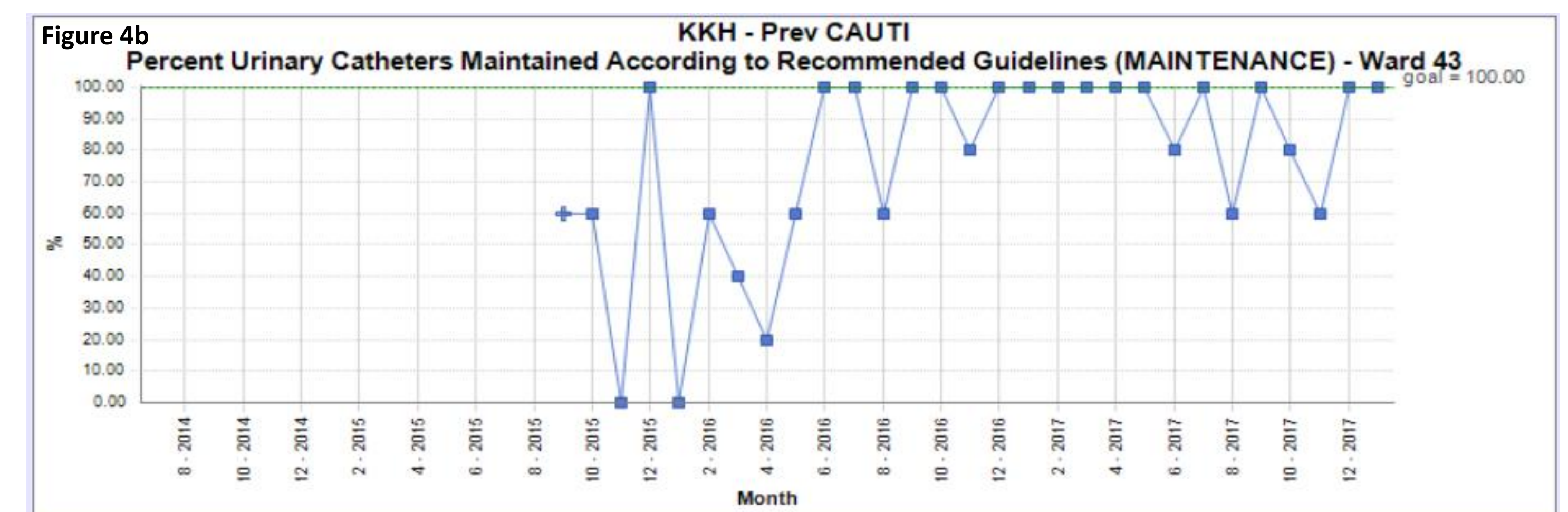
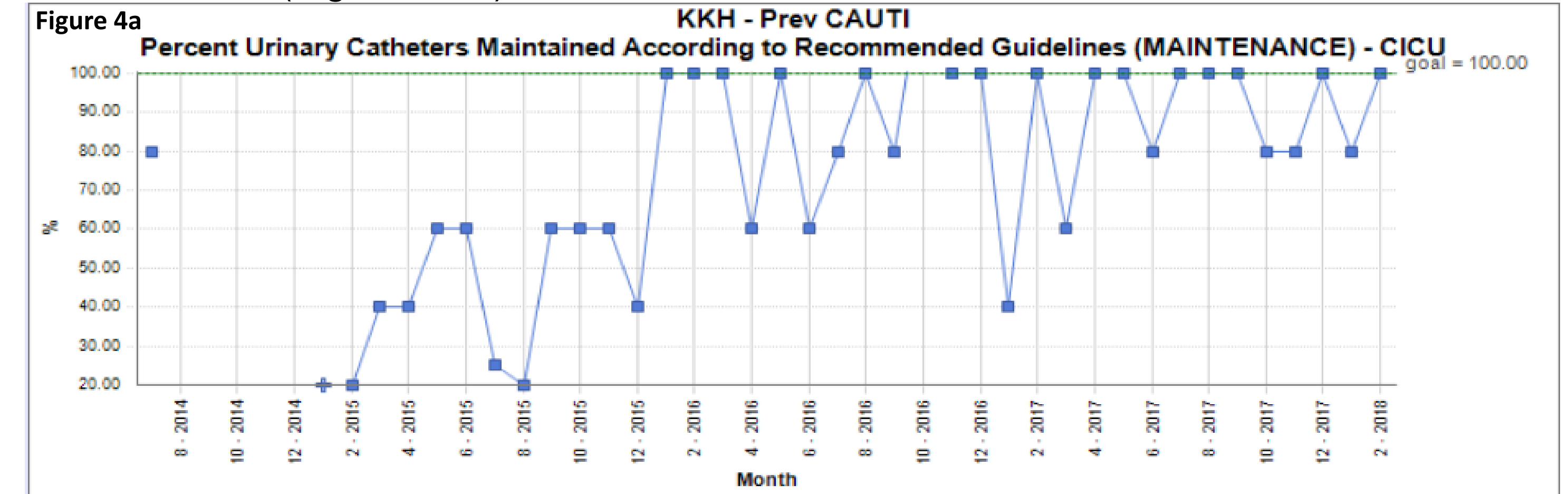
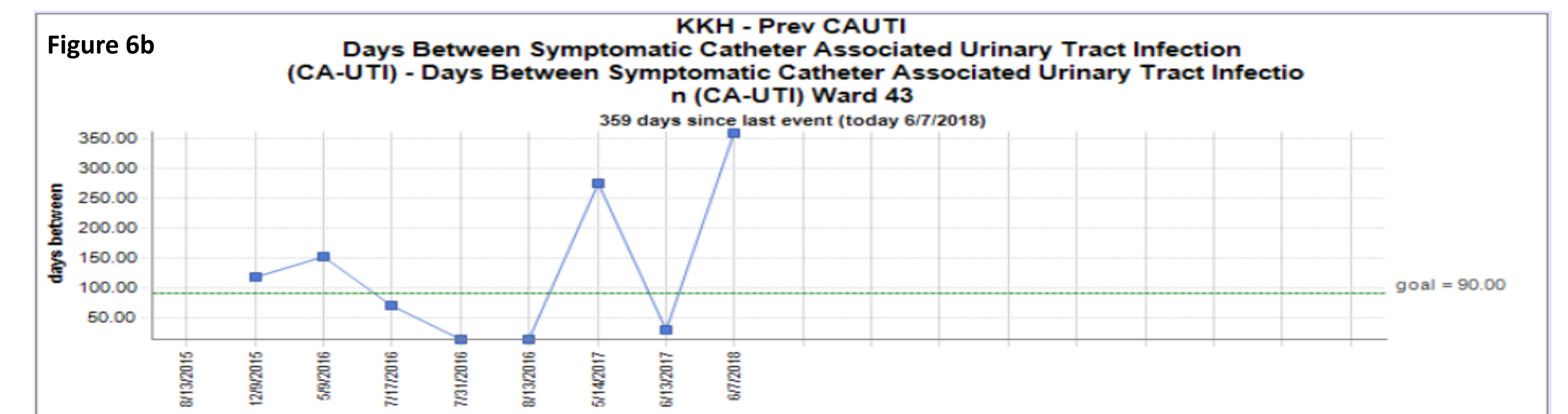
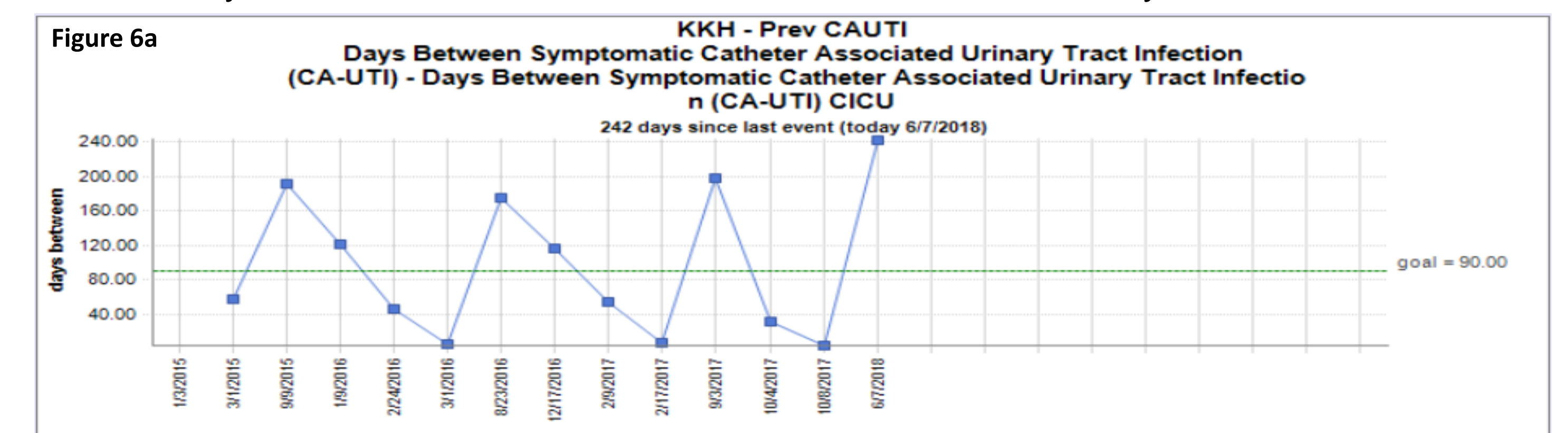


Figure 6a & 6b showed the results of the outcome measures for both pilot sites, there are 242 days since the last event of CAUTI in CICU and 359 days in Ward 43.



We have achieved our aim of reducing CAUTI by 30% in 3 years as shown in figure 7a & 7b.

Figure 7a CICU Measurement of Improvement

AREA	YEAR	CAUTI Rate per 1000 Catheter Days
CICU (pilot in Paediatric patients)	2014	8/1436 5.57/1000 catheter days
	2015	3/1,501 2.00/1000 catheter days
	2016	5/1,318 3.80/1000 catheter days
	2017	5/1,267 3.90/1000 catheter days

Aim reduction 30%: reduced 30% (2014 - 2017)

Figure 7b Ward 43 Measurement of Improvement

AREA	YEAR	CAUTI Rate per 1000 Catheter Days
Ward 43 (pilot Adult Women patients)	2016	4/1,228 3.26/1000 catheter days
	2017	2/1,823 1.10/1000 catheter days

Aim reduction 30%: reduced 66.7% (2016 - 2017)

The team was surprised by sizeable cost savings in CICU, Ward 65, Ward 43, Ward 44, Ward 55 and Ward 86 as shown in figure 8.

Figure 8 Table on Cost Savings from the Pilot and Spread Wards

INSTITUTION	LOCATION	BASELINE		OBSERVED		Expected CAUTI cases (E x H/1000)	CAUTI Cases Prevented (I-G if J>G; (Rounded to nearest whole number)	\$ impact		
		CAUTI cases	Catheter days	CAUTI cases	Catheter days			per CAUTI	Total (LxM)	
KKH	CICU (pilot paediatric)	9	1554	10	3704	21.5	11.5	12	\$5,360.00	\$64,320.00
	Ward 43 (pilot adult female ward)	1	1103	0.91	2979	2.7	0	0	\$5,360.00	\$0.00
	Ward 65	1	104	9.6	564	5.42	5.42	5	\$5,360.00	\$26,800.00
	Ward 86	1	218	4.59	117	0.53	0.53	1	\$5,360.00	\$5,360.00
	Ward 55	1	134	7.46	320	2.38	0.38	0	\$5,360.00	\$0.00
	Ward 42	0	0	0	0	0	0	0	\$5,360.00	\$0.00
Ward 71	0	0	0	0	0	0	0	\$5,360.00	\$0.00	
Ward 44	1	456	2.19	494	1.08	0	0	\$5,360.00	\$0.00	

CONCLUSION

Over the 3 year period, the team was able to achieve 30% reduction of CAUTI for CICU and 66.7% reduction for Ward 43. Getting feedback from the ground is important to address the gaps in the implementation. Having CAUTI champions within the individual units helped to support the sustainability and spread of the project. It is also important to educate and engage the patient and caregiver.