



1. INTRODUCTION

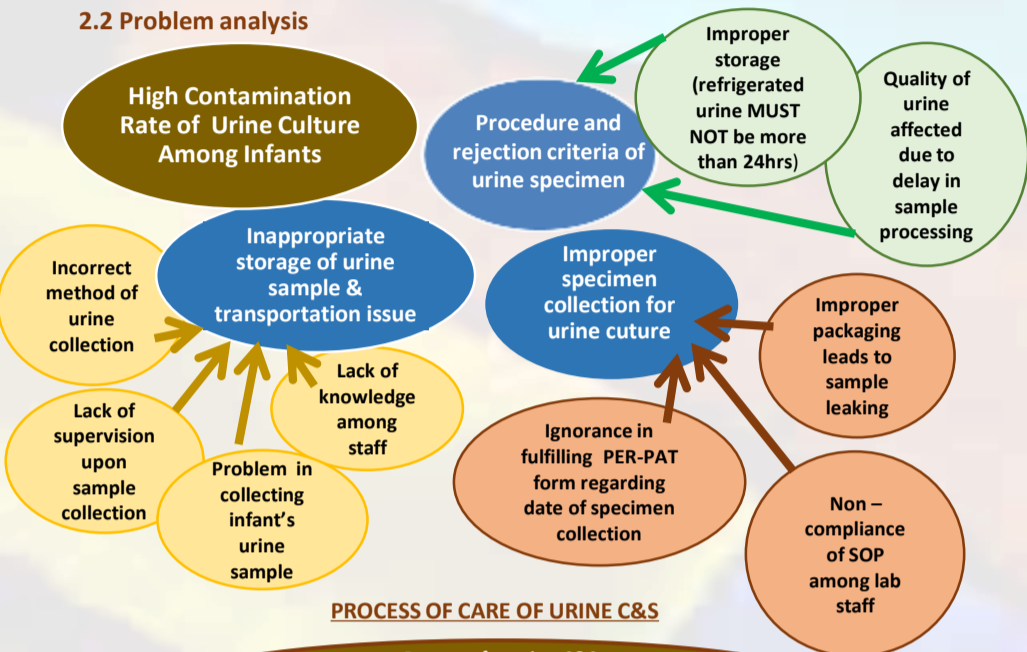
Urine culture & sensitivity (C&S) is an important test to support the diagnosis of urinary tract infection (UTI). In infant less than 1 year old, the urine sample mostly taken for investigation of prolonged jaundice. However, it can be easily contaminated due to various factors mainly pre-analytical phase. A contaminated urine culture is defined as the presence of more than one organism isolated at $\geq 100,000$ CFU/ml. The contamination is a significant problem from the health clinics in Kelantan especially in infant age group. The verification study showed that in the year 2018, KK Ketereh got the highest rate of contamination amongst PKD Kota Bharu, about 60.8%. This problem may cause several consequences such as decreased patient satisfaction, overused or delayed in giving appropriate antibiotics, incorrect diagnosis, increased cost and many more.

2. SELECTION OF OPPORTUNITIES FOR IMPROVEMENT

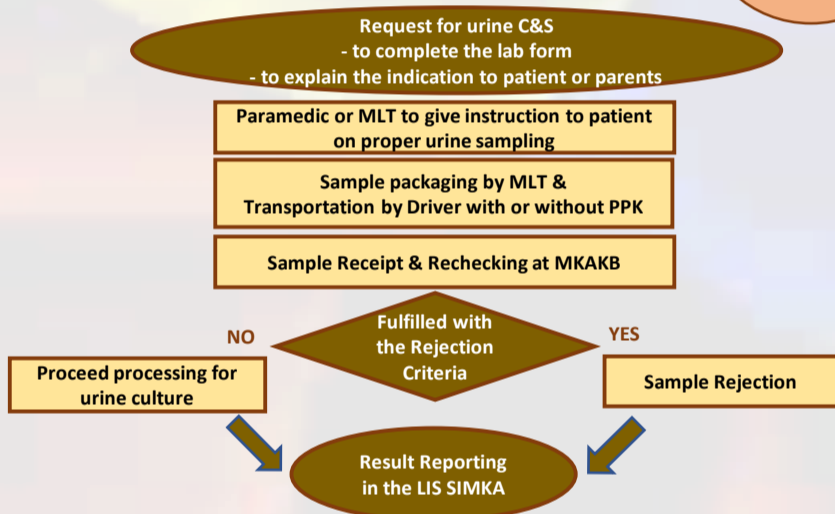
2.1 Rational for Selection

S Seriousness	Contamination rate of urine culture among infants is higher compared to standard (40% ; CAP – Q Probes Study)
M Measurable	Results of urine culture are reported in the Sistem Informasi Makmal Kesihatan Awam (SIMKA) and can be analyzed using Microsoft Excel
A Appropriateness	Managing the factors affecting the pre-analytical phase of urine culture
R Remediable	Can be reduced by controlling the factors affecting the collection, storage and transportation of urine sample
T Timeliness	The awareness, education and intervention towards of good quality of urine sample can be rectified and implemented within time frame given

2.2 Problem analysis



PROCESS OF CARE OF URINE C&S



MODEL OF GOOD CARE

Process	Criteria	Standard
Sample Collection	Medical Officer (MO) request for urine C&S and complete the lab form MO explain the indication for urine culture to patient/parents Paramedic and/or MLT to give instruction on urine sampling	100%
Sample packaging & Transportation	Sample receipt at clinic's lab Recheck the sample and do triple layer packaging Put adequate ice pack to maintain temperature 2-8 degree Celsius Send to reference lab within 4 hours, if delay keep in the chiller	100%
Sample Receipt & Rechecking at MKAKB	Sample receipt at receiving counter Check and record sample temperature Check the sample. Do rejection if fulfils rejection criteria	100%

3. KEY MEASURES FOR IMPROVEMENT

3.1 General Objective :

To reduce the urine culture contamination among infants at KK Ketereh

3.2 Specific Objectives :

- To determine the contamination rate of urine culture among infants.
- To define the contributing factors for high contamination rate of urine culture.
- To analyze and implement remedial actions to reduce the urine culture contamination rate.
- To re-evaluate the effectiveness of remedial actions taken.

3.3 Key Indicator :

The key indicator used was the percentage of contaminated samples among infants and the standard set was 40% as per the College of American Pathologists (CAP)- Q probes study.

INDICATOR	FORMULA	STANDARD
Contamination rate of urine C&S among infant	$\frac{\text{Total number of contaminated sample among infant}}{\text{Total number of urine sample received among infant}} \times 100\%$	40%

8. THE NEXT STEP

There is a need to continuously monitor the urine culture contamination rate among infants and sustaining the remedial measures. This study has been expanded to other health clinics in Kelantan.

- Every PKD need to organize *Kursus Pengurusan Sampel* at least once a year as part of the indicator in *Pelan Tindakan MKA Kota Bharu 2020*.
- In 2021, we had revised the Checklist in the *Lawatan Pemantauan Makmal* as to monitor the compliance of the clinic staffs towards the procedure on collection, storage, and transportation of the urine culture.
- Training of trainers (TOT) on Bladder Stimulation Technique in Clean Catch Urine in Infants to the representative from all PKDs in Kelantan was held on 22nd of June 2022.



4. PROCESS OF GATHERING INFORMATION

Study 1	Study Contamination Rate of Urine Culture (pre-remedial)
Type of Study	Cross-sectional
Sample Population	All urine culture received from KK Ketereh on March to April 2019
Tool	Laboratory Information System(LIS) SIMKA
Study 2	Study to determine the contributing factors for high urine contamination rate among infants received from KK Ketereh
Type of Study	Cross-sectional
Sample Population	40 staffs including medical officers, nurses/paramedics, MLTs, PPKs and drivers in KK Ketereh
Tool	Validated questionnaires to assess knowledge and practice towards urine collection, storage and transportation
Study 3	Study on Non-Compliance of MKAKB staffs to Rejection Procedure of Urine Sample
Type of Study	Cross-sectional
Sample Population	All urine culture received from KK Ketereh on March to April 2019
Tool	Urine lab forms and checklist

5. ANALYSIS AND INTERPRETATION

Pre-remedial study showed urine contamination rate of 69.2% (Figure 1). 75% of them never attend CME on the urine management. For the practice, 95% was documented as improper practice on urine collection. 15(37.5%) and 13(32.5%) of them had improper practiced on storage and transportation parts, respectively. Furthermore, 82.5% of the respondent preferred using urine bags rather than clean-catch urine method for collection (Figure 2). Thirteen (13) samples fulfilled the criteria for sample rejection but have been proceeded for culture by MKAKB staff.

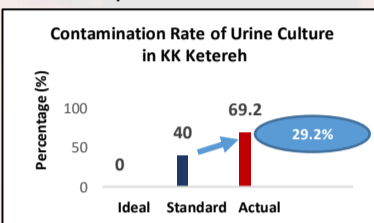


Figure 1 : Contamination rate Pre

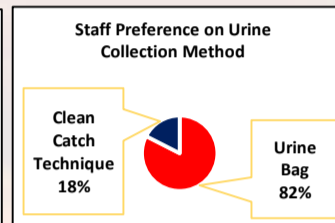


Figure 2 : Staff preference on urine collection method



Figure 3 : Staff knowledge on the management of urine culture

6. STRATEGIES FOR CHANGE

Problems	Strategies	
	Cycle 1 (March-August 2019)	Cycle 2 (Sept-Dec 2019)
Inappropriate urine sampling, storage and transportation	<ul style="list-style-type: none"> CME on urine management Practical session on Bladder Stimulation Technique in Infant Distribution of Flyers, Poster and CDs to KK Ketereh and all PKDs in Kelantan 	<ul style="list-style-type: none"> Organized Hari Bersama Pelanggan: CME, exhibition & flyers were distributed during the event. Discussion session with FMS Revisit KK Ketereh and conduct an audit in KK Ketereh's lab (Lawatan Pemantauan Makmal)
Non-compliance towards rejections procedure by MKAKB staff	<ul style="list-style-type: none"> Internal CME to MKAKB staff to give awareness to the counter staff to strictly reject the sample that fulfil the rejection criteria for urine C&S as stated in <i>Borang Penolakan Sampel</i> Staff to refer 'Buku Panduan Makmal' and Standard Operation Procedure (SOP) as references 	<ul style="list-style-type: none"> MLTs at Bacteriology unit as second screener to re-screen and rechecked the lab forms to identify the non-compliance towards rejection procedure in urine culture sample



Figure 4 : QAP team giving CME on Proper Urine Collection, Storage and Transportation and Practical session on Bladder Stimulation Technique at Klinik Kesihatan Ketereh



Figure 5 : Poster, Flyer and CD on the urine culture management and Bladder Stimulation Technique for urine collection in infant



Figure 6 : Hari Bersama Pelanggan MKAKB



Figure 7 : Left to Right: Discussion session with FMS, Buku Panduan Makmal MKAKB & Rejection form

7. EFFECT OF CHANGE

We subsequently conducted a re-evaluation after implementation of the above remedial actions. The percentage of staff preference on clean catch urine for urine collection was increased post-intervention from 17.5% to 32.5%. There was improvement for the level of knowledge under poor category as the percentage has been reduced from 5% to 0%. The contamination rate had decreased from 69.2% to 43.2% in cycle 1 then improved to 40.6% in cycle 2. This study also gives a positive impact for the Kelantan State as the contamination rate decreased from 63.2% to 55.1% and we able to produce more significant and good quality of result from 7.8% to 9.8%.

PRACTICE	COLLECTION		STORAGE		TRANSPORTATION	
	pre(%)	post(%)	pre(%)	post(%)	pre(%)	post(%)
Proper (Good)	5(5.4%)	11(30%)	25(62.5%)	30(75%)	27(67.5%)	32(80%)
Improper	35(95%)	26(70%)	15(37.5%)	10(25%)	13(32.5%)	8(2%)
Not Applicable (NA)	3	3	0	0	0	0

Figure 8 : Staff Practice on Urine Collection, Storage and Transportation

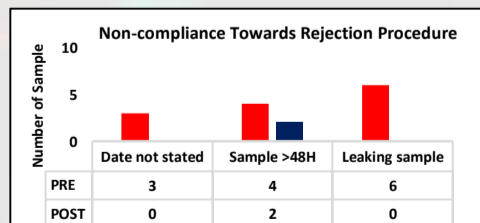


Figure 9 : Non-compliance towards sample rejection procedure by MKAKB staff Pre vs Post

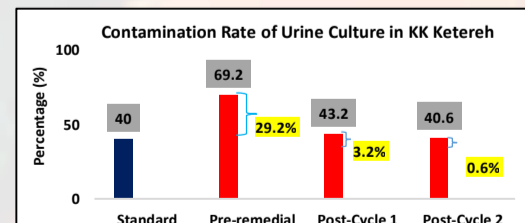


Figure 10 : ABNA Pre vs Post. ABNA had reduced from 29.2% to 0.6%

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REFERENCES :

- Bekeris, Leonas G., et al. "Urine culture contamination: a College of American Pathologists Q-Probes study of 127 laboratories." *Archives of pathology & laboratory medicine* 132.6 (2008): 913-917.
- Valenstein, Paul, and Frederick Meier. "Urine culture contamination: a College of American Pathologists Q-Probes study of contaminated urine cultures in 906 institutions." *Archives of pathology & laboratory medicine* 122.2 (1998): 123.
- Collection of Urine Specimen by Bladder Stimulation. Jodie Dacluan 2014