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SELECTION OF OPPORTUNITIES FOR IMPROVEMENT

Blood samples rejection in pathology laboratory is a major problem that negatively affects patient care and management. As in 2018, it was reported that the average rejection rate in Pathology Department IKN was 1.83% with the highest rejection rate was 2.15% in June 2018.

It is known that 70% of clinical management depends on accurate laboratory results. Furthermore, repetitions of blood draw cause pain and distress to the patient and consequently, lead to wastage of cost and time. Rejection rate is one of the MSQH quality indicator.

KEY MEASURES FOR IMPROVEMENT

Our general objective for this study is to improve the rejection rate in Pathology Department, Institut Kanser Negara to be less than 1.0%. The specific objectives of this study are:

1. To identify the rate of rejection
2. To identify the causes that lead to the rejection of samples
3. To formulate and carry out strategies and plan appropriate remedial measures to overcome identified problem
4. To evaluate the effectiveness of remedial measures implemented

The indicator used for this study is percentage of blood samples rejected out of total samples received in our laboratory.

Our verification study that has been conducted from January to April 2019 showed that process of visual inspection upon sample receipt and after samples centrifugation did not meet the standard. This is probably due to no standardization and rejection is totally depend on personnel's visual interpretation

PROCESS OF GATHERING INFORMATION

A cross-sectional study was performed from January to December 2019. For this study, we adopted the standard rejection criteria from our standard operating procedure as our rejection guideline. All blood samples received in Pathology Department are included and rejections are based on standard rejection criteria.

Data of arranged sample and rejection criteria were extracted from Laboratory Information System (LIS). Rejection rate is the percentage of samples that are rejected. Rate is calculated by monthly basis.

The formula used to calculate the rejection rate is as below:

$$\text{Rejection rate (\%)} = \frac{\text{Number of Rejected sample}}{\text{Total samples}} \times 100$$

The standard is set at less than 1.0% (<1.0%) as per MSQH requirement.

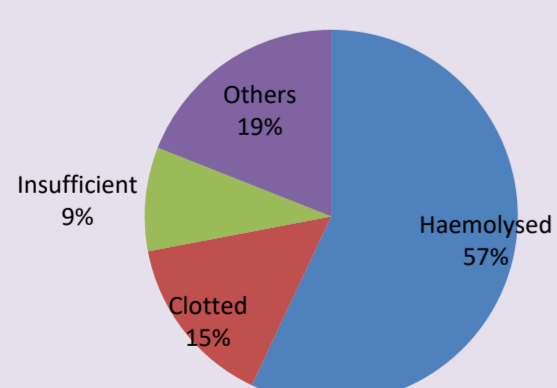
Implementation of remedial measures was carried out in May 2019 and post-remedial evaluation was conducted from June to December 2019.

ANALYSIS AND INTERPRETATION

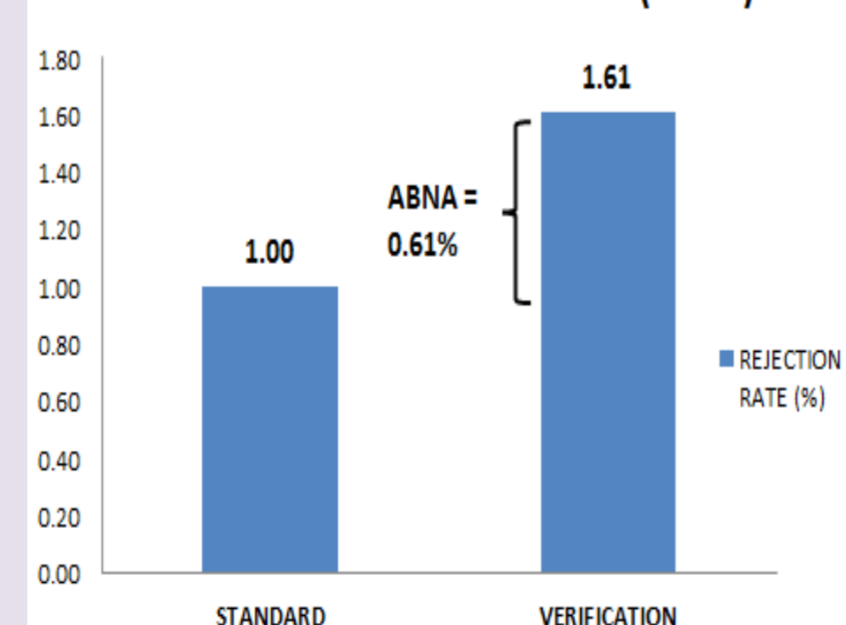
A verification study conducted from January to April 2019 showed the average rejection rate was 1.61% with Achievable Benefit Not Achieved (ABNA) being 0.61%. Sample rejections were due to haemolysed (57%), clotted (15%), insufficient samples (9%) and others. Out of 57% of haemolysed sample the largest proportion of haemolysed samples come from biochemistry routine test.

Haemolyses is the breakdown of red blood cells, which can have an effect on laboratory results. In our practice, visual interpretation and grading of lysed sample varies individually among laboratory technologists. Sample which is visually graded as slightly haemolysed is accepted for testing while sample which is visually graded as grossly haemolysed is rejected. There is no standard or guideline for rejection of lysed sample.

Causes Of Rejection



Achievable Benefit Not Achieve (ABNA)



STRATEGIES FOR CHANGES

We formulated our remedial actions based on risk factors identified. Based on the major causes of rejection, which is haemolysis. We decided to used Haemolysis Index.

The haemolyses index is a measurement of the red colour of serum. This colour is normally due almost exclusively to the presence of haemoglobin, which comes from ruptured red blood cell membranes. The haemolyses index is expressed as a number of "plus" signs (from zero to 4+). Since the major rejection samples are from Chemistry Unit, we implement this technique on chemistry routine analyser called Abbott Chemistry ci4000.

Haemolyses index of zero is normal and proceed to test analysis. Haemolyses index of 1+ also not affected to any of the biochemistry tests. For sample with haemolysis index of 2+, several tests are affected by haemolyses which are Aspartate Transaminases (AST), Direct and Indirect Bilirubin, Lactate Dehydrogenase. More tests are affected with larger haemolyses index. Only gross haemolysed samples with Haemolysis Index of larger than 4+ are rejected.

Secondly, we conducted Continuous Medical Education (CME), and hands-on to educate all the medical staff on the proper method of blood taking. Apart from teaching we also encourage them to use close system blood taking using butterfly needle. We also performed onsite visits and audit.

Haemolysis index and list of tests affected (rejected)

0	1+	2+	3+	4+
Normal Serum. No Haemolysis.	All tests not affected by haemolysis 1+	AST Bilirubin LDH Magnesium Uric acid	All tests as in 2+ Potassium Iron Phosphate Total Protein	All tests as in 2+ and 3+ ALT Triglyceride Cholesterol Creatinine Albumin

EFFECT OF CHANGE

Implementation of all remedial measures are done in May 2019. Data for evaluation are taken from June to December 2019.

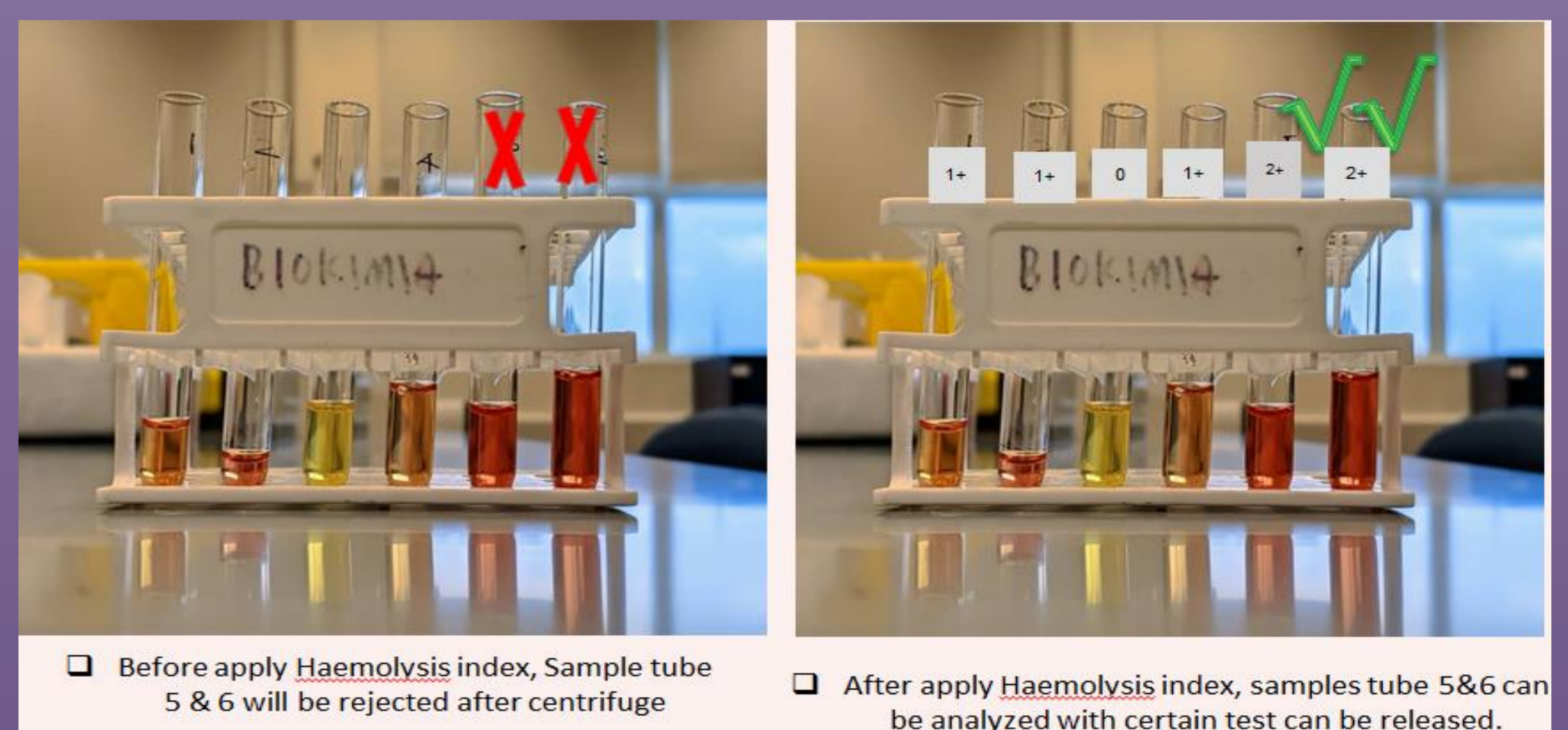
Haemolysis Index has reduced the rejection of haemolysed samples, thus significantly reducing the total rejection rate in Pathology Department. Starting from June 2019, the rejection rate ranges from 0.76% to 0.99%. It was successfully brought down to average of 0.88% which suggested the sustainability of remedial measures.

ABNA value before remedial measures is 0.61%. ABNA analysis post intervention was successfully brought down to zero. This reduction suggests sustainability of our remedial measures.

THE NEXT STEP

All strategies will be continued to maintain the lower rejection rate less than 1.0%. Measurement of Haemolysis Index will be incorporated for all samples as this will improve the quality of laboratory results.

Other than Haemolysis Index, we plan to implement other parameters which are 'Icteric' and 'Lipaemic' on the same analyser and also on the other analyser. This HIL index will be incorporated as part of tests for all samples. We plan to analyse other causes of rejection and take appropriate measures to maintain the standard.



Before apply Haemolysis index, Sample tube 5 & 6 will be rejected after centrifuge

After apply Haemolysis index, samples tube 5&6 can be analyzed with certain test can be released.

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