OPTIMIZATION OF MANUAL SLIDE REVIEW RATE IN FULL BLOOD COUNT

MEMBERS: CC SOON, MF GO, BP TAN, ML TUNG

- ☐ SAFETY
- ☑ PRODUCTIVITY
- ☐ PATIENT EXPERIENCE
- ☑ QUALITY
- ☐ VALUE

Define Problem/Set Aim

Opportunity for Improvement

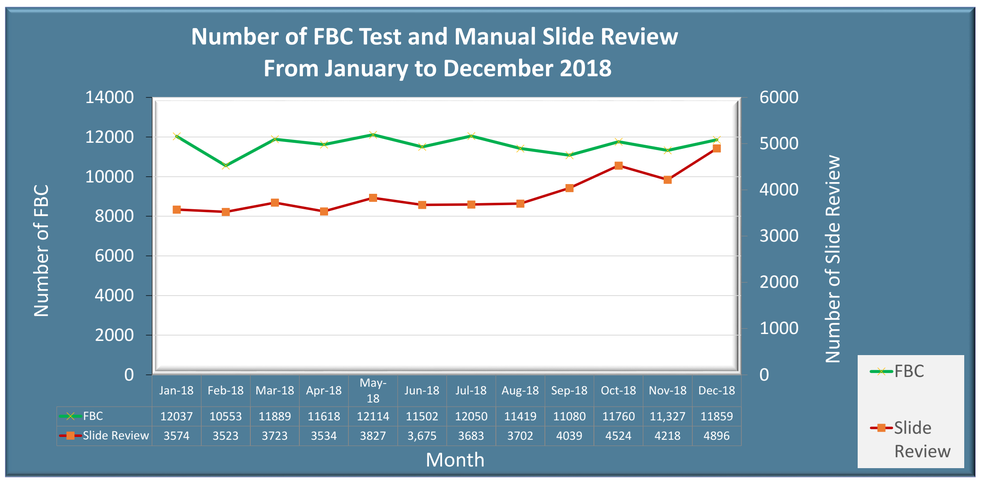
Laboratory observed an increment of 20.1% of slide review rate in Full Blood Count (FBC) testing since September 2018, in view of a mandatory manufacturer software upgrade in August 2018. Average FBC turnaround time (TAT) in Q4 2018 is 24.2 minutes, while the average TAT in Q4 2017 was 18.1 minutes.

Aim

To reduce the slide review rate by 20% by June 2019, with minimal compromise on patient safety.

Establish Measures

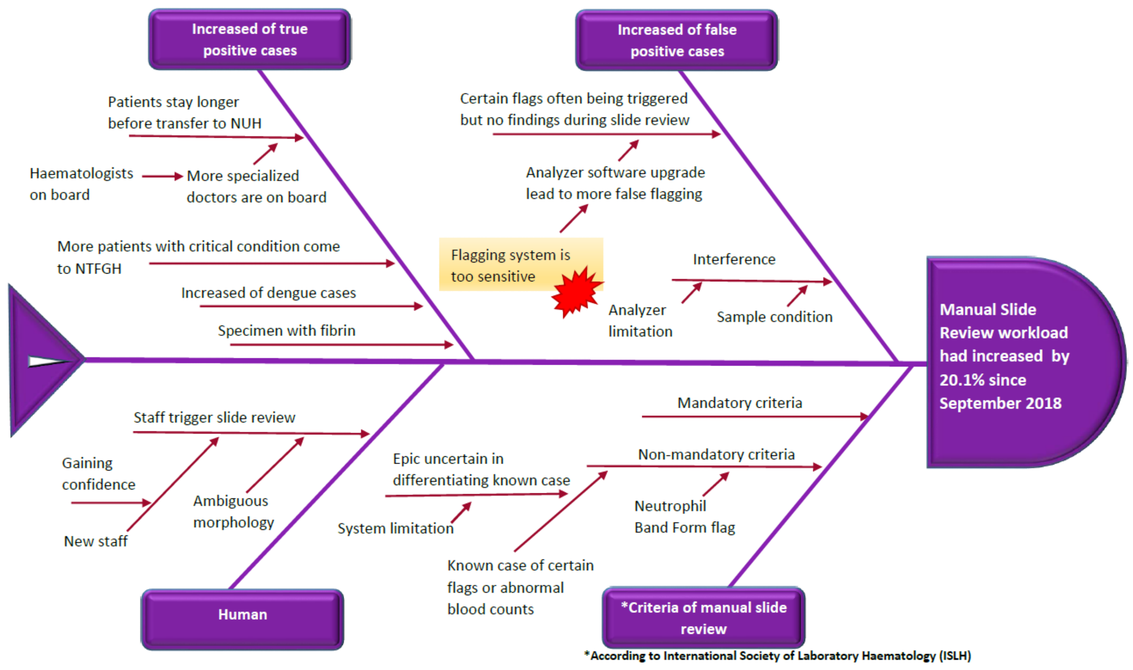
Slide review increased steadily while the number of FBC test ordered is relatively stable. Data from April to December2018 shows an increment of 20.1% for slide review.



	Jan-18	Feb-18	Mar-18	Apr-18	May-18	Jun-18	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18
FBC	12037	10553	11889	11618	12114	11502	12050	11419	11080	11760	11,327	11859
Slide Review	3574	3523	3723	3534	3827	3,675	3683	3702	4039	4524	4218	4896

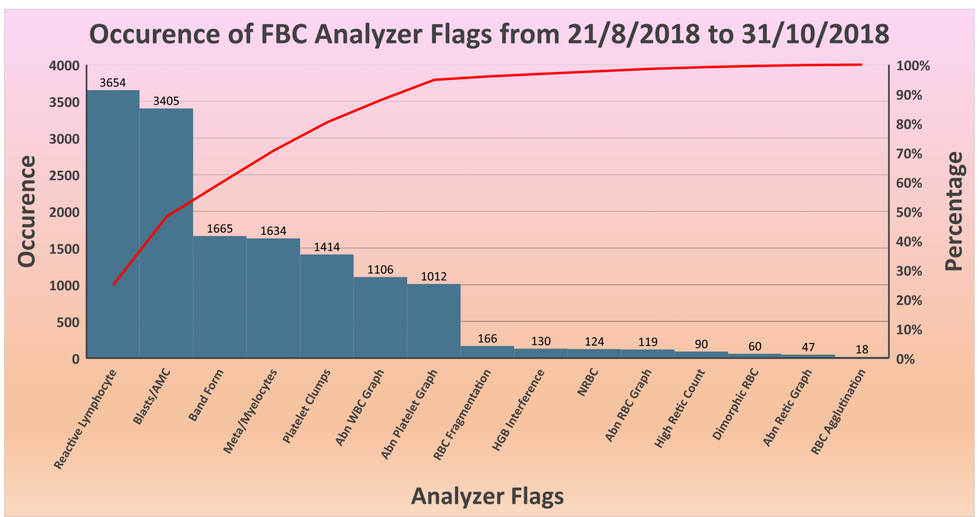
Analyse Problem

Haematology laboratory adopts recommendation from International Society of Laboratory Haematology (ISLH), whereby a FBC test requires manual slide review if there is specific analyzer flag(s) or abnormal test value. A typical slide review takes 22 minutes for blood film preparation and 6 minutes of employee time. Ishikawa diagram below identifies the root cause that is within laboratory's control, namely flagging system is too sensitive.



*According to International Society of Laboratory Haematology (ISLH)

Among various flags in the current analyzer, Reactive Lymphocyte flag and Blast/Atypical Mononuclear Cell (AMC) flag are identified as the major contributor to unnecessary manual slide review.

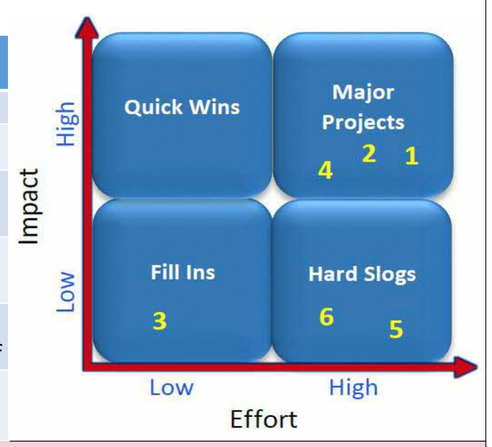


Reactive Lymphocyte	Blasts/AMC	Band Form	Meta/Myelocytes	Platelet Clumps	Abn WBC Graph	Abn Platelet Graph	RBC Fragmentation	HGB Interference	NRBC	Abn RBC Graph	High Retic Count	Dimorphic RBC	Abn Retic Graph	RBC Agglutination
3654	3405	1665	1634	1414	1106	1012	166	130	124	119	90	60	47	18

Select Changes

Solution 1 and 3 have been selected. Solution 2 and 4 have been initiated, however these require longer timeline for execution hence they are to be done as separate projects.

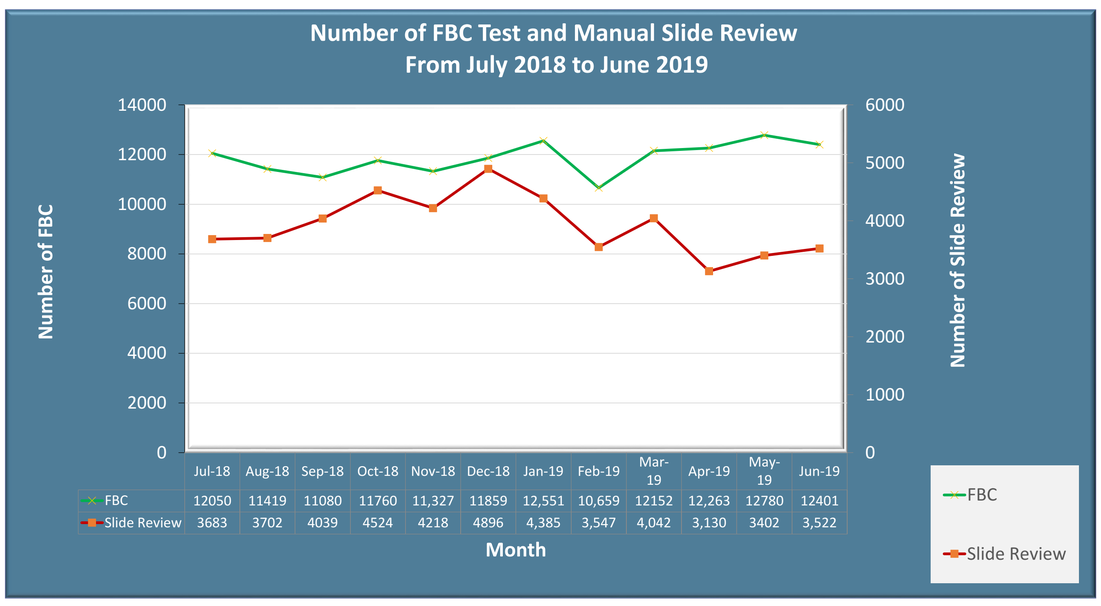
Root Cause		Potential Solutions
False Positive cases	1	Adjust flagging sensitivity
	2	Analyzer improvement by vendor
Non mandatory criteria	3	Remove non-crucial criteria: Band Form Neutrophil flag
	4	Remove non-crucial criteria: Repeated flags/abnormal FBC value by Epic
	5	**Manually** remove non-crucial criteria: Repeated flags/abnormal FBC value by staff
True positive cases	6	Reduce specimen with fibrin (pre-laboratory)



Test & Implement Changes

To adjust the flagging sensitivity, the flagging threshold known as Q-flag needs to be adjusted. We selected the flags associated with Reactive Lymphocytes and Blast/AMC, as they are most frequently triggered and many are false positives. We examined 211 FBC cases that carry the evaluated flag(s), with Q-flag value ranges from 100 to 200, where the optimized Q-flag value most likely falls within. Two medical technologists performed isolated 200-cell differential count on each case, without knowing the automated differential counts. Manual differential counts are analyzed to identify True Positive flags and False Negative flags. The Q-flag value with the highest True Positive rate and minimal False Negative rate is to be set as the optimized Q-flag value.

Changes have been implemented in Q1 2019. In January 2019, Band Form Neutrophil flag have been removed. By 1st April 2019, the optimized Q-flag values have been setup and piloted for 3 months. The number of FBC and Slide Review are shown below.



	Jul-18	Aug-18	Sep-18	Oct-18	Nov-18	Dec-18	Jan-19	Feb-19	Mar-19	Apr-19	May-19	Jun-19
FBC	12050	11419	11080	11760	11,327	11859	12,551	10,659	12152	12,263	12780	12401
Slide Review	3683	3702	4039	4524	4218	4896	4,385	3,547	4,042	3,130	3402	3,522

Comparing the data in Q4 2018 and Q2 2019, number of slide reviews have reduced by 26.3%, which equals to 1195 Slide Review per month. The average TAT for FBC is 18.8 minutes in Q2 2019.

Spread Change/Learning Points

The data and conclusion of the optimization has been reviewed and approved by Haematologist before implementation.

There is no workflow change after the implementation, however, adjusted flags are expected to be more specific. All Haematology staff are informed of the setup and the improved specificity of flagging in May 2019 via Tiger Text and Section Meeting.

With decreased Haematology manpower of 17% since September 2018, staff are now enabled to be more focus on crucial cases.

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