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Simplification of Methacholine Challenge Test (MCT) Reports using Computerized Template

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Background

Methacholine Challenge Test (MCT) is a bronchoprovocation test routinely ordered by respiratory physicians to assess airway hyper-responsiveness. The patients will perform the actual test on BreezeSuite and the measured Forced Expiratory Volume in 1 second (FEV1) values at baseline, 4 different concentrations and post, are manually keyed into an Excel template. This, combined with the manual checking of data at multiple touchpoints, can potentially lead to inaccurate values. Technologists also reported eye fatigue on days with higher caseloads.

Aim

The aim of this project is to:

- ✓ Eliminate time spent on input of data without compromising on accuracy of reports
- ✓ Reduce manual data input and manual verification by 50%
- ✓ 80% satisfaction rate among Technologists

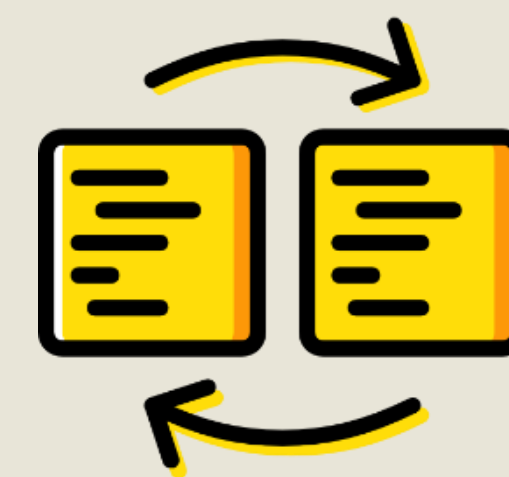
Methodology



1. Formed focus group discussion among Technologists to discuss areas for improvement



2. Identified areas in the old template that could be automated



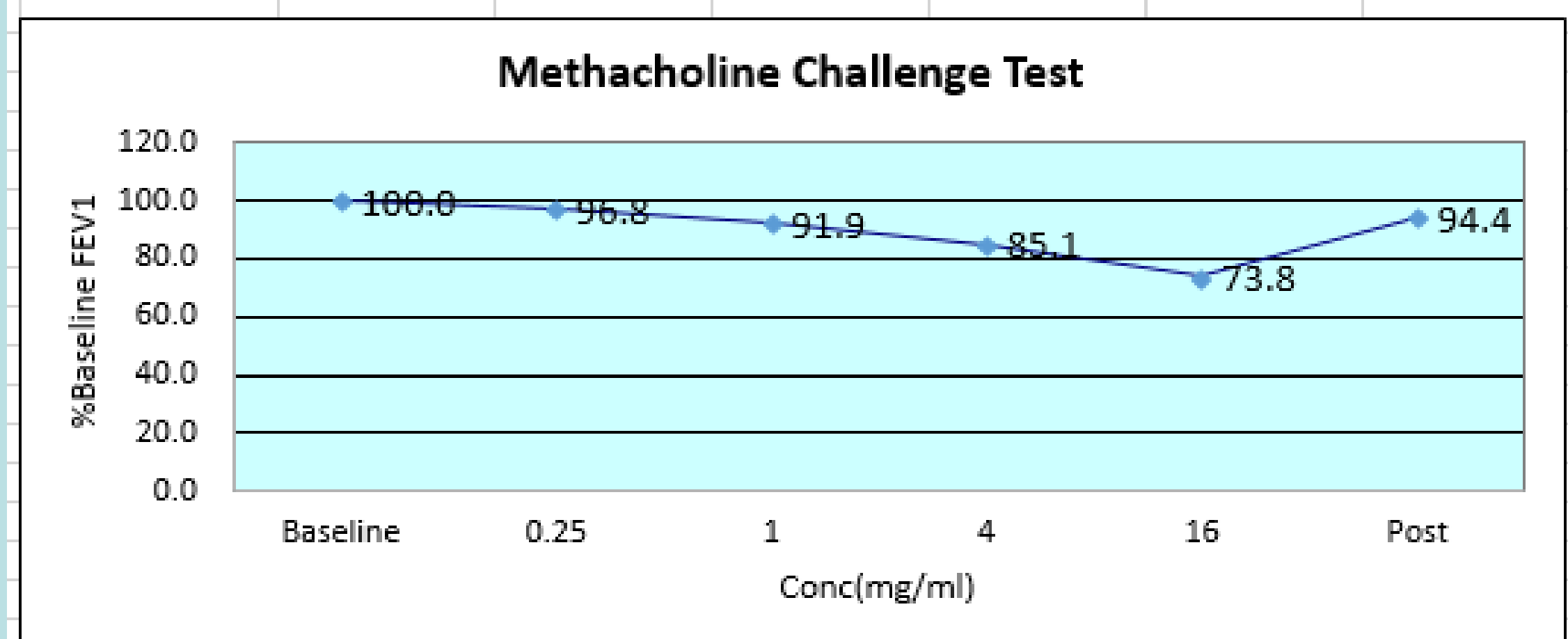
3. Designed system templates with reference to existing template to ensure high adoption rate



4. Implementation of new automated template

Past (Excel Sheet with Manual Data Input)

Conc(mg/ml)	Baseline	0.25	1	4	16	Post
FEV1	1 4.09	2 3.96	3 3.76	4 3.48	5 3.02	6 3.86
%Baseline	100.0	96.8	91.9	85.1	73.8	94.4
QC Grade	A	A	A	A	A	A



Bronchial Responsiveness PC 20 =	7 7.50 mg/ml
Interpretation : Test quality is acceptable.	
<input type="checkbox"/> Normal (PC 20 > 16mg/ml) <input checked="" type="checkbox"/> Borderline BHR (PC 20 = 4.0-16mg/ml) <input type="checkbox"/> Mild BHR (PC20= 1.0-4.0 mg/ml) <input type="checkbox"/> Moderate to severe BHR (PC20 < 1.0mg/ml)	

7 touchpoints (1 to 7) -> Manual input of data
8 touchpoints (1 to 8) -> Manual verification of data

Present (Automated System Template)

Stage	Pre	0.25 mg/ml	1 mg/ml	4 mg/ml	16 mg/ml	Post
Concentration	0.00	0.25	1.00	4.00	16.00	0.00
Dose Units	0.00	1.25	5.00	20.00	80.00	0.00
C.D.U.s	0.00	1.25	6.25	26.25	106.25	106.25

--- SPIROMETRY ---		Pre	0.25 mg/ml	1 mg/ml	4 mg/ml	16 mg/ml	Post
FEV1 (L)		3.20	2.95	2.95	2.58	1.82	3.04
% Change		+0	-7	-7	-19	-42	-4

1 PC = 4.14



0 touchpoint -> Manual input of data
1 touchpoint -> Manual verification of data

Results



1. Reduce time taken for each report from 2 minutes to 0 minute



2. Maintain accuracy of reports at 100% accuracy



3. Technologist satisfaction rate achieved 100% satisfaction



4. Reduce manual data input by 100%
Reduce manual checking by 87.5%

The department sees on average 57 MCT cases per month*. This initiative has resulted in time savings of 57 cases x 2 minutes = **114 min / month**
*Computed from October, November and December 2022

Conclusion

The computerized template improved efficiency and eliminated the risk of human errors. Since implementation, there has been no reported mistakes through the import of data from testing application to report. In addition, the time savings from the initiative has allowed our Technologists more time to focus on clinical work and also better staff satisfaction. Our team is exploring the template with other tests.

Acknowledgement

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