Using Six Sigma DMAIC to improve the Inventory Management System





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Introduction

Since the inception of Biochemistry Laboratory, the inventory management has been a manual process. This process involved a lot of material and manpower wastages as we have to manually keep track of approximately 170 reagents and consumables. Some of the wastages were caused by transcription errors, lack of compliance, paper storage, duplicate entries, incomplete or no audit trail and the laborious process of flipping through the files to input entries and to check balance before ordering.

The project aims to utilise the functions within excel to create a lean inventory management system to tackle challenges faced with paper based entries for the diverse range of items associated with the proper functioning of the routine biochemistry analysers.

Methodology

Identifying problems in

the current processes

A small team was formed to look into the issues faced with the inventory management system by adopting a lean six sigma DMAIC (Design, measure, analyse, improve, control) methodology. At the end of the process, the team decided on a macro-enabled spreadsheet to replace the manual inventory system.

Define

Measure

Reviewing current processes

Analyse Investigate what can be extracted from the QR code unique to each item and appropriate programs for

Improve

Brainstorm on what can be done to improve the processes

Control

Put end product in use and continuously review and improve the processes

Before

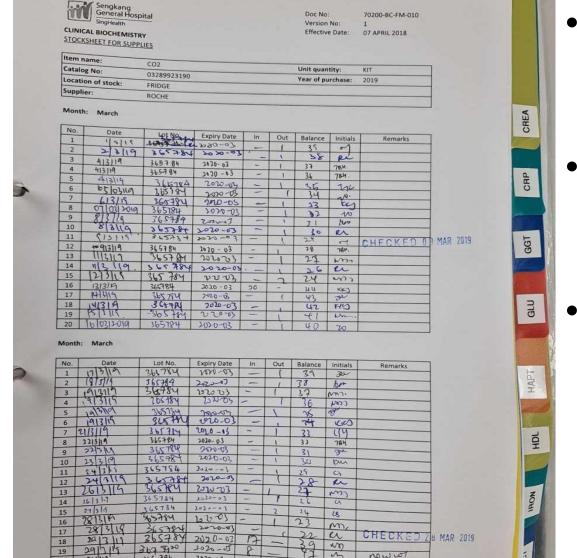
After

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Manual records of "In" and "out" for each

inventory management

- Multiple erroneous entries due to illegible handwriting
- Time consuming task of flipping through the files to check for items which are low

Figure 1: Manual inventory file and form

Figure 2: Summary page for inventory excel sheet

Out item in their respective sheets 09/06/2021 Date QR or inventory folder for barcode Quantity Submit Initials in stock or expiring before ordering

Userform (Figure 3)

- Ease of logging in and out of stock by scanning the QR or barcode
- Essential information will populate in the respective fields in either the log in page or the log out page

Figure 3: Userform for logging in or out items >>>> OUT <<<<<

1	eneral Hospital gHealth	manuall entry for halogen lamp and reaction cells. Item	2. Enter Quantity 3.Check entry		Aut	d New	LII	.1 y
CLINICAL BIOCI	HEMISTRY							
Date 🚅		QR or Barcode	GTIN	ITEM NAME	LOT NO	Expiry	Qty 🗸	INITIALS
03/03/2021	01076133361603	8110485088011721073124008498610190	07613336160381	Anti-HBs G2 Elecsys E2G 300 V2	485088	2021-07-31	2	CL
03/03/2021	01040156309398	4810446892051721073124007028121190	04015630939848	Vit B12 II ELECSYS E2G	446892	2021-07-31	1	RL
03/03/2021	01040156309400	7310485005011721083124007301715190	04015630940073	PCT BRAHMS ELECSYS E2G	485005	2021-08-31	1	RL
03/03/2021	01040156309183	7910513501011721083124003028542122	04015630918379	E2/P4 Diluent	513501	2021-08-31	1	RL
03/03/2021	01076133361589	6810474941021721083124008469873190	07613336158968	TNT HS ELECSYS E2G 300 V2	474941	2021-08-31	1	RL
03/03/2021	01040156309189	1110501492011721083124003183700190	04015630918911	Lactate	501492	2021-08-31	1	nsss
03/03/2021	01076133361589	6810474941021721083124008469873190	07613336158968	TNT HS ELECSYS E2G 300 V2	474941	2021-08-31	1	KF
03/03/2021	01040156309165	1110522712011721093024003002721122	04015630916511	GGT	522712	2021-09-30	1	nsss
03/03/2021	01040156309289	2710491582011721093024005850797190	04015630928927	ALT	491582	2021-09-30	1	nsss
03/03/2021	01040156309248	3710523952011721103124005166888190	04015630924837	ALP IFCC GEN.2	523952	2021-10-31	1	RL
03/03/2021	01040156309248	3710523952011721103124005166888190	04015630924837	ALP IFCC GEN.2	523952	2021-10-31	1	nsss
03/03/2021	01076133361539	7010520701011722013124007976887190	07613336153970	FT4 III ELECSYS E2G	520701	2022-01-31	1	RL
03/03/2021	01076133361539	7010520701011722013124007976887190	07613336153970	FT4 III ELECSYS E2G	520701	2022-01-31	1	KF
03/03/2021	01040156309252	6110504872011722022824005172179190	04015630925261	NACL 9% SI GEN 2, COBAS C702	504872	2022-02-28	1	ТВН
03/03/2021	01040156309399	7810499712011722022824007027087190	04015630939978	CK-MB ELECSYS E2G	499712	2022-02-28	1	RL
03/03/2021	01040156309174	1910482997011722022824003015050122	04015630917419	Transferrin	482997	2022-02-28	1	nsss
03/03/2021	01040156309398	2410504894011722022824007027966190	04015630939824	TOTAL PSA ELECSYS E2G	504894	2022-02-28	1	KF
03/03/2021	01040156309399	7810499712011722022824007027087190	04015630939978	CK-MB ELECSYS E2G	499712	2022-02-28	1	KF
3/03/2021	01040156309399	7810499712011722022824007027087190	04015630939978	CK-MB ELECSYS E2G	499712	2022-02-28	1	RL
ITEMS	IN OUT INVENT	TORY REAGENT & CONSUMABLES INVENTORY C	CAL QC check +	: (1				

Figure 4: Log out sheet for inventory excel sheet

Summary page (Figure 2)

- Provides details about stocks logged in and out and quantity at hand
- Easily keep track of the amount of stocks and gauge the amount to be replenished

>>>> INVENTORY <<<<

Log in and Log out sheets

- Contain various logical functions which extract information, such as item name, reagent lot and expiry date from the QR or barcode (Figure 4)
- Table filters allow for sorting of items for investigation or tracking purposes

Results

The new system has thus led to the following improvements in the inventory management:

- 1. Staff are able to reduce time required for processes involved in inventory management (Figure 5) and focus on other tasks at hand
- 2. Data from February 2019 shows that transcriptional errors accounts for 18.8% of the monthly entries, with the new system in place, such issues are eliminated (Figure 6)
- 3. Departmental cost savings in terms of supplies used for manual system which are absent in the electronic system, such as files, paper, dividers, etc.

Amount of time spent on Manual vs **Electronic Inventory System** Minutes 30 Logging in/out of Ordering of stocks Investigations stock ■ Manual ■ Electronic

Figure 5: Comparison of time taken between manual vs electronic systems

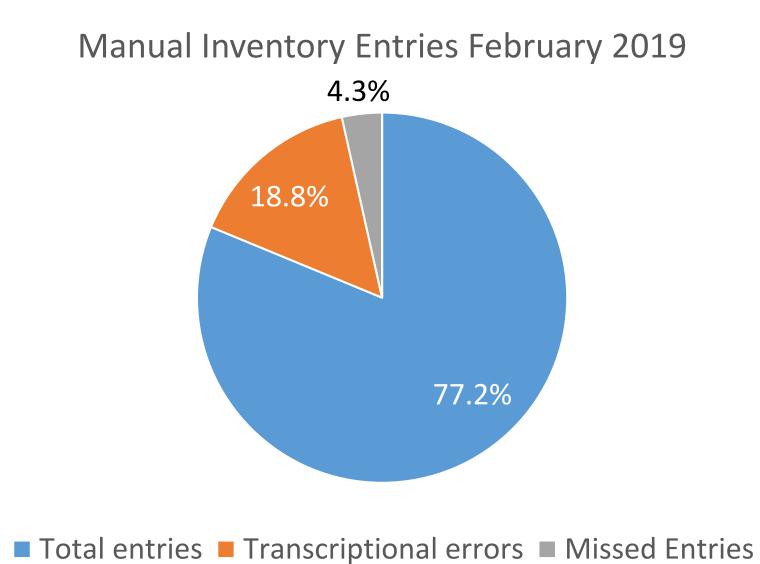


Figure 6: Comparison of time taken between manual vs electronic systems

Conclusion

Inventory management has to do with keeping precise records of goods that are not only available but also viable for use on site. Through the lean six sigma approach, the team established a new set of workflow to enhance performance and eliminate unprofitable activities for better organisation of the great multitude of items under our charge. The team continuously works on the system to further improve and eliminate wastes generated as per the six sigma approach.