Electronic Kanban Replenishment Inventory System (E-KRIS)

**Tan K.[1], Lai F.W.[2], Tan H.A.[3], Lai C.[2], Koh S.L.[2], Leong F.W.A.[2],
Chan C.P.J.[5], Yeo A.L.[2], Lim A.S.H.[6], Phua C.L.[6], Tan I. [6], Yip C.C.[4]**

[1]Operations (Ops), [2]Day Surgery Centre (DSC),
[3]Biomedical Engineering (BME), [4]Ophthalmology & Visual Sciences (OVS),
[5]Materials Management (MMD), [6]Finance
Khoo Teck Puat Hospital (KTPH), Admiralty Medical Centre (AdMC)
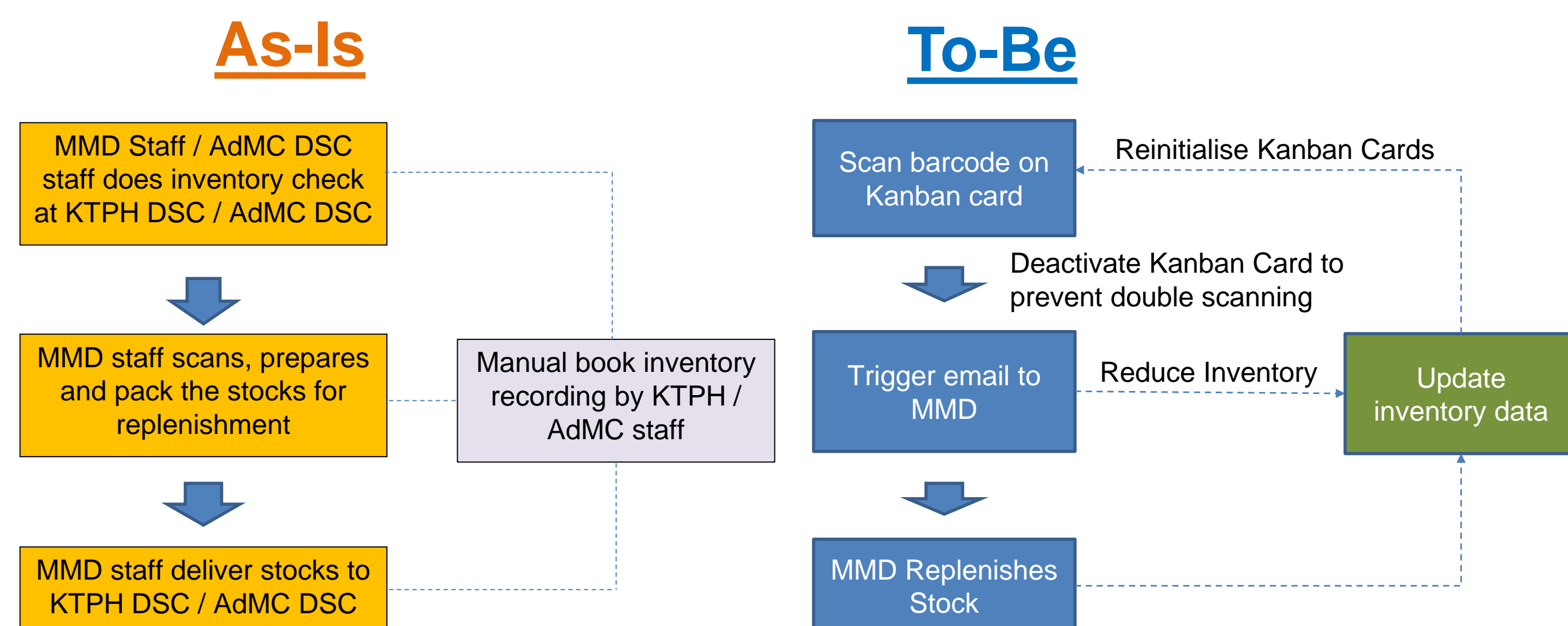
Singapore Healthcare
Management 2018

1 Introduction & Background

A collaborative project initiated by KTPH DSC, BME, MMD and Ops with spread to AdMC. E-KRIS is a **hassle-free E-inventory system** to **track and replenish stock** timely without inventory checks.
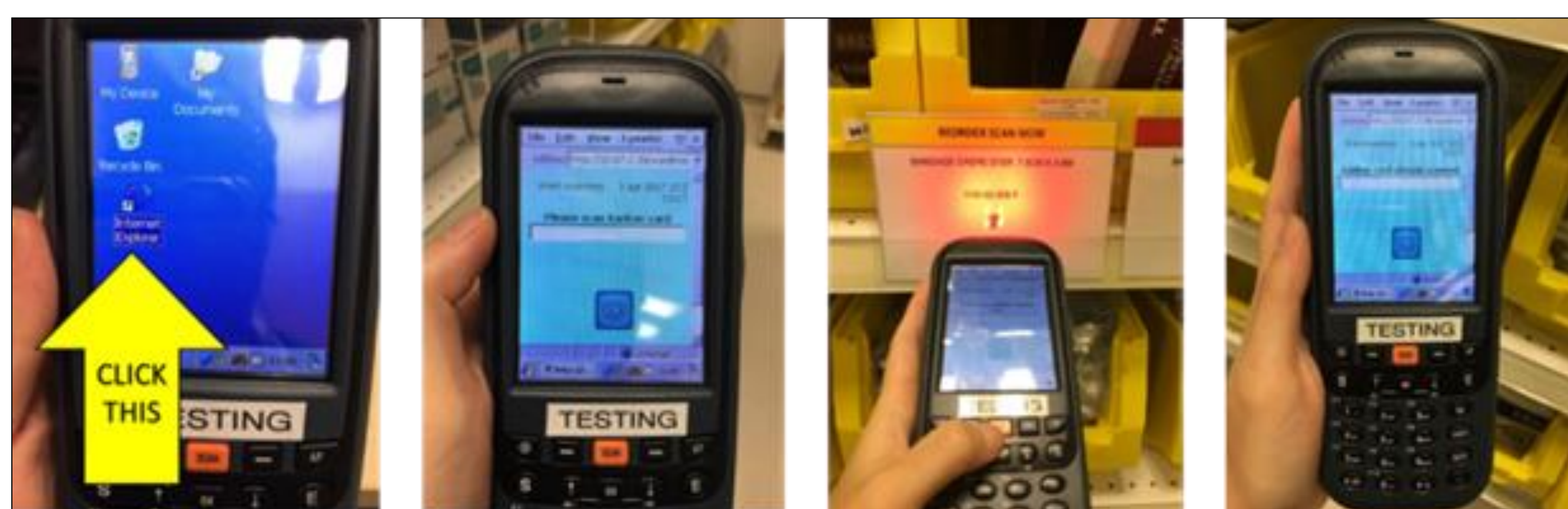
2 Aim

To **improve the overall efficiency** in surgical consumables **stock management.**

3 Methodology

As-Is

MMD Staff / AdMC DSC staff does inventory check at KTPH DSC / AdMC DSC

↓

MMD staff scans, prepares and pack the stocks for replenishment

↓

MMD staff deliver stocks to KTPH DSC / AdMC DSC

Manual book inventory recording by KTPH / AdMC staff

To-Be

Scan barcode on Kanban card — Reinitialise Kanban Cards

↓ Deactivate Kanban Card to prevent double scanning

Trigger email to MMD — Reduce Inventory — Update inventory data

↓

MMD Replenishes Stock

E-KRIS adopted the **Kanban concept**, using **barcode scanning** to trigger **replenishment** and **shelf-stocking technique.**

Each stock container has a pre-defined quantity and card system to indicate stock level.

🟨 **Yellow card** – sited **midway** (**50%** stock level)

🟥 **Red card** – sited **behind bin** (**10%** stock level)

On scanning the barcode, an **automated email** will be sent to **MMD for stock replacement** (Figure 1).

MMD staff can login to the web application to **view the inventory detail** and **export data** which can be uploaded to SAP to generate the pick list for replenishment.
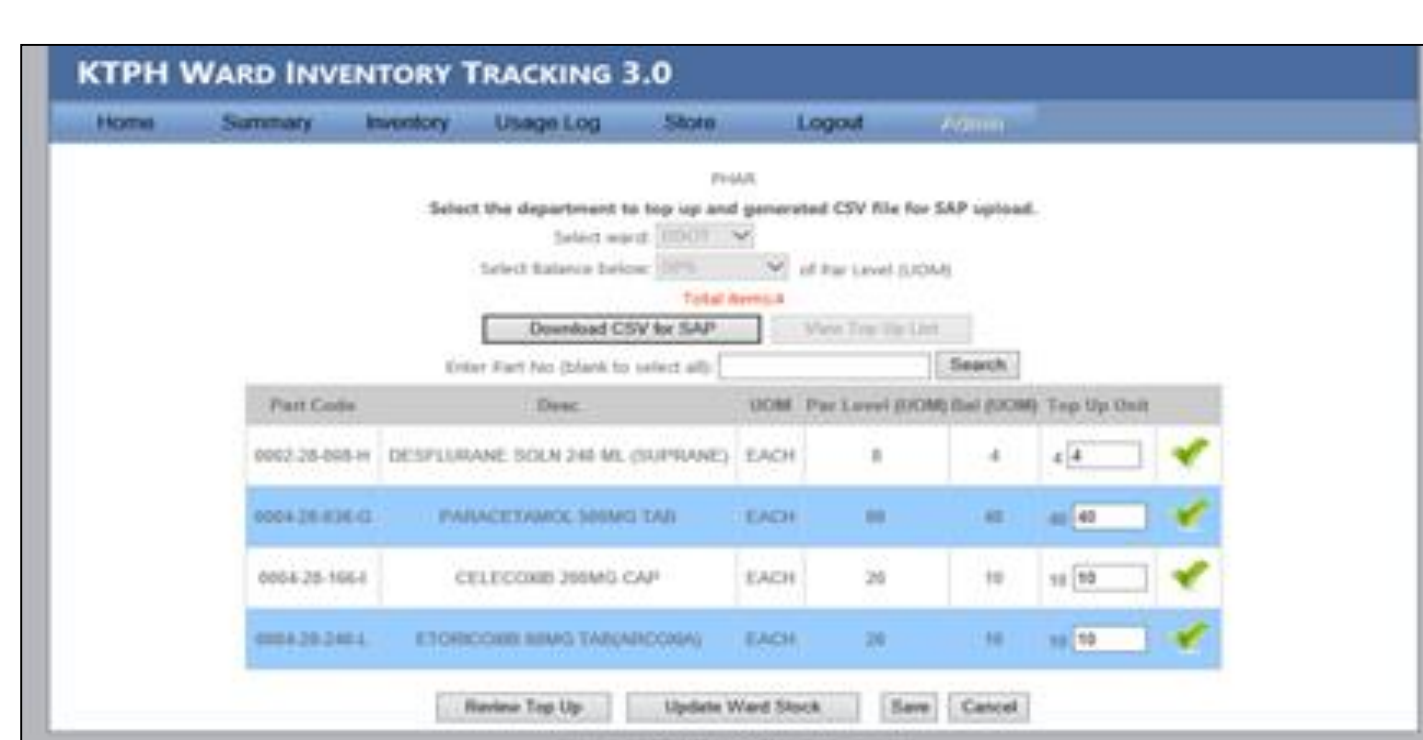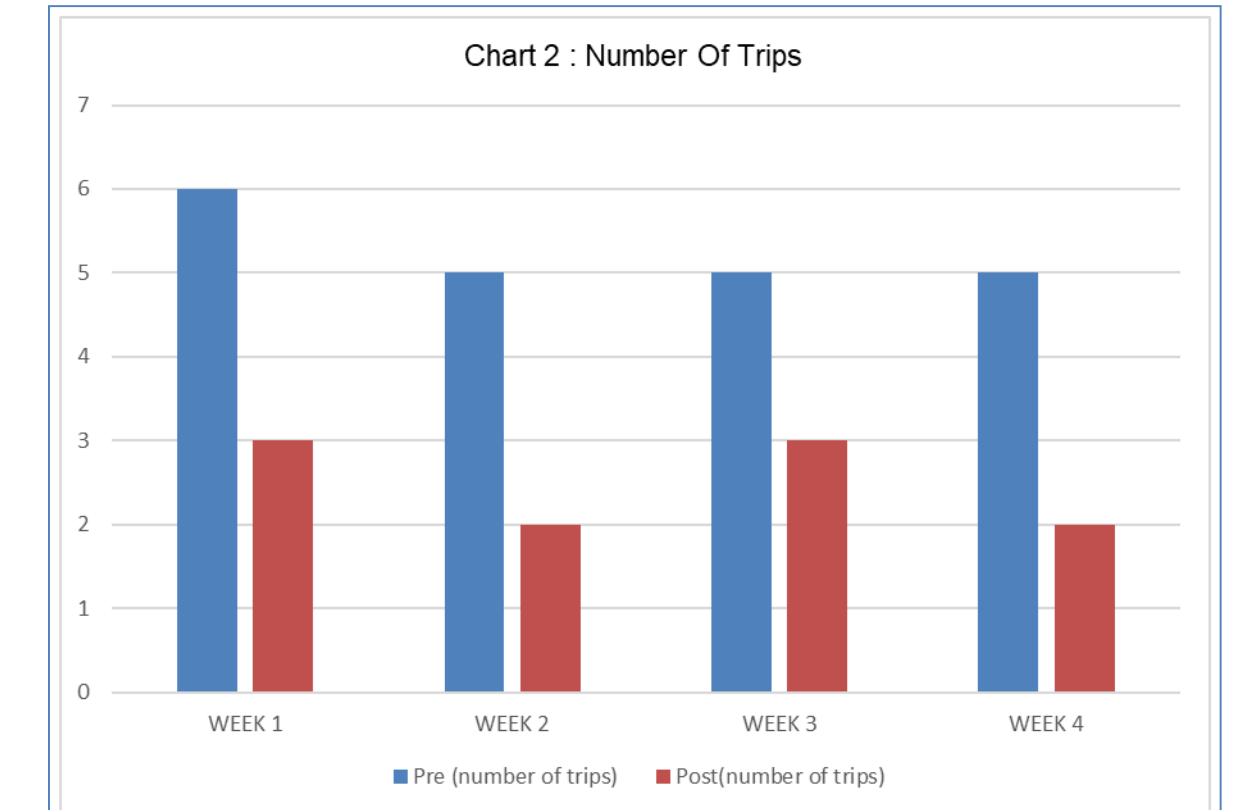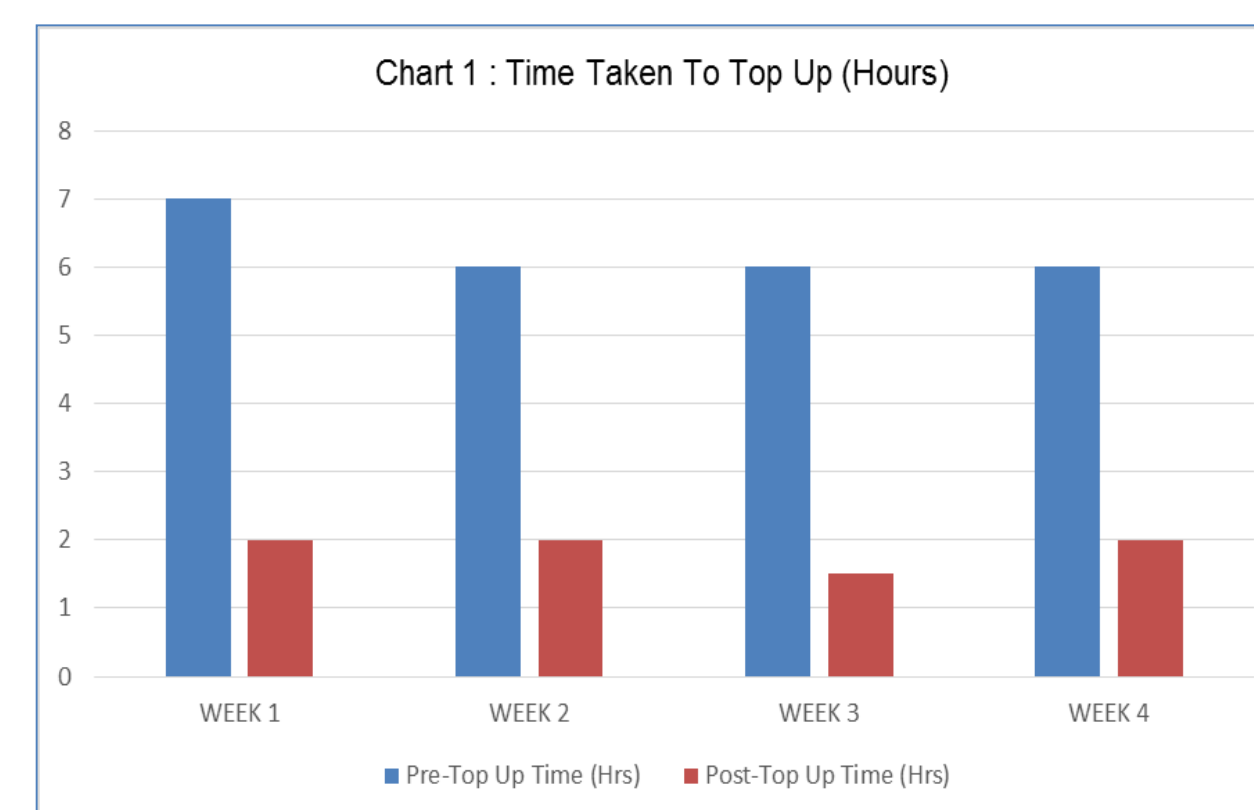
Once MMD staff replenishes to DSC, he **will update the stock level in the Web application** (Figure 2).

Figure 1: Barcode scanning

Figure 2: E-KRIS Web Application

4 Results & Project Impact

Inventory Surveillance Time (IST) & Number of Trips to KTPH DSC (NT-DSC) are measured.

Time savings

Description	Before Implementation	After Implementation	% Improvement
*Time taken to top up (Hour)	25.0	7.5	70%
No of MMD visits	21.0	10.0	52%

Total time savings of **210 hours per year** or equivalent to **11% FTE**
- **70% reduction** in IVT (375 min/week **vs112.5 min/week**)
- **50% reduction** in NT-DSC (6 trips/week vs **3 trips/week**)

Manpower savings

KTPH DSC	As Is	To Be
No. of Storekeeper	1.00 FTE	0.89 FTE
Manpower cost savings per year	**$2,400* per year**	

*Information from Finance Department.

AdMC DSC	As Is	To Be
No. of Temporary Staffs	3 FTE	1 FTE
Manpower cost per year	$36,720	$12,240
Manpower cost savings per year	**$24,480* per year**	

Information from Materials Management Department
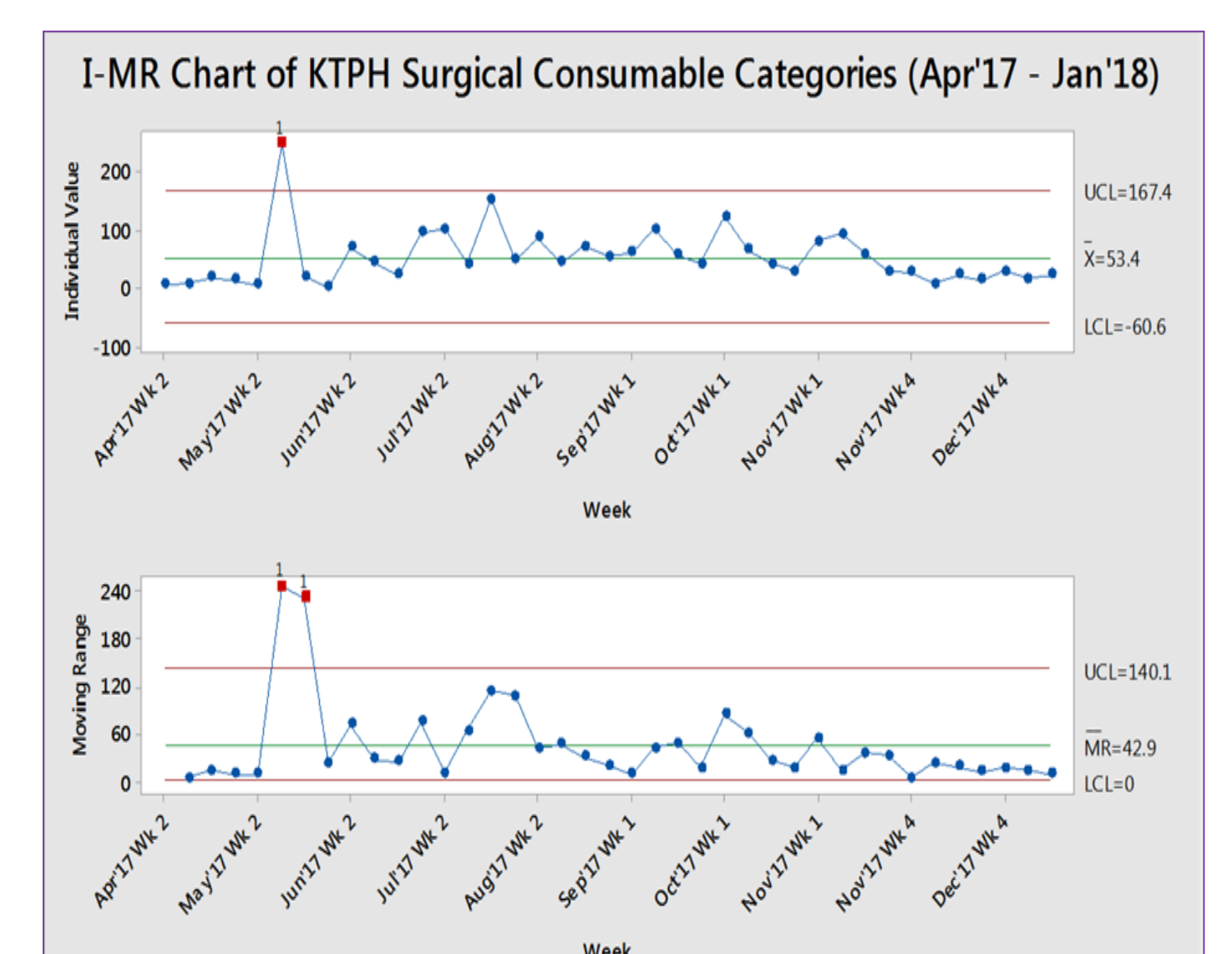
Staff satisfaction survey scores

- **KTPH DSC Staff Survey** (n=15) on 6 domains (**Time, Recording, Ordering, User-friendliness, Hassle-free & Productivity**) showed that users are **generally satisfied.**
- **AdMC DSC Staff Survey** (n=5) on 5 domains (**Confidence, Convenience, User-friendliness, Fairness & Overall**) showed that median satisfaction scores between pre and post-implementation **were not different (p=0.23)**

Impact

- **Faster** inventory surveillance & replacement
- **More efficient** ordering process
- **Less manpower** to check & replace stock
- **Less stock check errors** than visual inspection
- **Less data entry errors** in stock ordering
- **Saves time & stock replacement** trips
- **Frees up time** for value-add processes or work

5 Sustainability

- **Audit & balance checks** to uphold standards.

- **Staff feedback (MMD & DSC)** to resolve concerns and refine processes.

- **Run charts** to monitor the number of top-up consumables categories.

No. of top-up consumables categories has remained constant with time, indicating process stability

6 Conclusion

E-KRIS is a **hassle-free & cost-effective inventory system** to **manage many hospital items**.