

**Project Title**

Inpatient Pharmacy Automation System (IPAS): Redesigning the Medication Supply Process

**Organisation(s) Involved**

Ng Teng Fong General Hospital

**Project Category**

Technology, Robotics & Automation, Process Improvement

**Keywords**

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# Inpatient Pharmacy Automation System (IPAS): Redesigning the Medication Supply Process

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## The Problem

### Inefficient and untimely supply of medications to wards

Previously, only 20% of medications in the hospital formulary were kept as ward stocks (WS), resulting in **40% of ordered medication doses requiring supply from Inpatient Pharmacy**. Several issues were encountered:

- Highly labour-intensive process** which requires Inpatient Pharmacy to order, pack and check the ordered medications in addition to constant replenishment of the ward stocks.
- Ordered medications may take up to two hours before they reach the wards**, this could delay medication serving times.
- Incidents of inaccurate drugs being supplied and subsequently administered** to patients have been documented.

## The Intervention

### IPAS as part of the Closed Loop Medication Management (CLMM) system

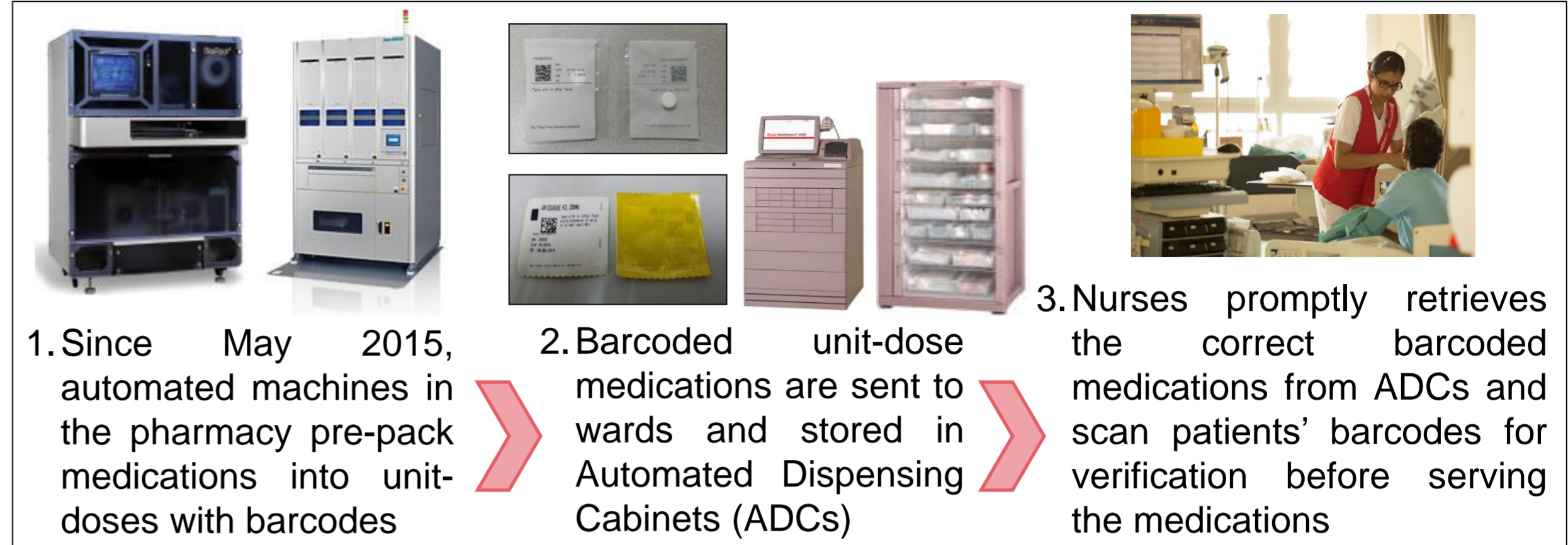


Figure 1. IPAS concept and process

## Methods

### ❖ Study intervention

- **Implementation of IPAS from May 2015 onwards** (Process as depicted in Figure 1 above)

### ❖ Study period:

- **Ten months before and after IPAS implementation** (Jul'14 – Apr'15 vs Jul'15 – Apr'16)

### ❖ Improvement measures:

1. **Cost avoidance** based on actual manpower vs projected manpower requirement (if IPAS was not implemented)
2. **Percentage of medication doses supplied through ADC** (obtained through hospital's electronic medication record system)
3. **Error rate** of medication supply for ward orders

### ❖ Data analysis:

- Microsoft Excel 2010 was used for data analysis
- GraphPad Prism version 6.04 was used for graphing

## Results

### 1 Projected savings of \$3,330,000 per year in manpower costs due to job redesign through IPAS

Type of employee	NTFGH & JCH (1100 beds) - Without IPAS	NTFGH & JCH (1100 beds) - With IPAS	Savings in manpower
Pharmacist	11	2	9
Pharmacy technician	42	6	36
Storekeepers/ Logistics associate	22	14	8
No. of full time employees	75	22	53
<b>Projected savings per year</b>	<b>\$3,330,000</b>		

Table 1. Projected savings in manpower with and without IPAS

### 2 More than 85% of inpatient medication orders are now supplied from ADC and ward stocks

- ✓ Medications are now readily available for nurses to facilitate timely administration to patients

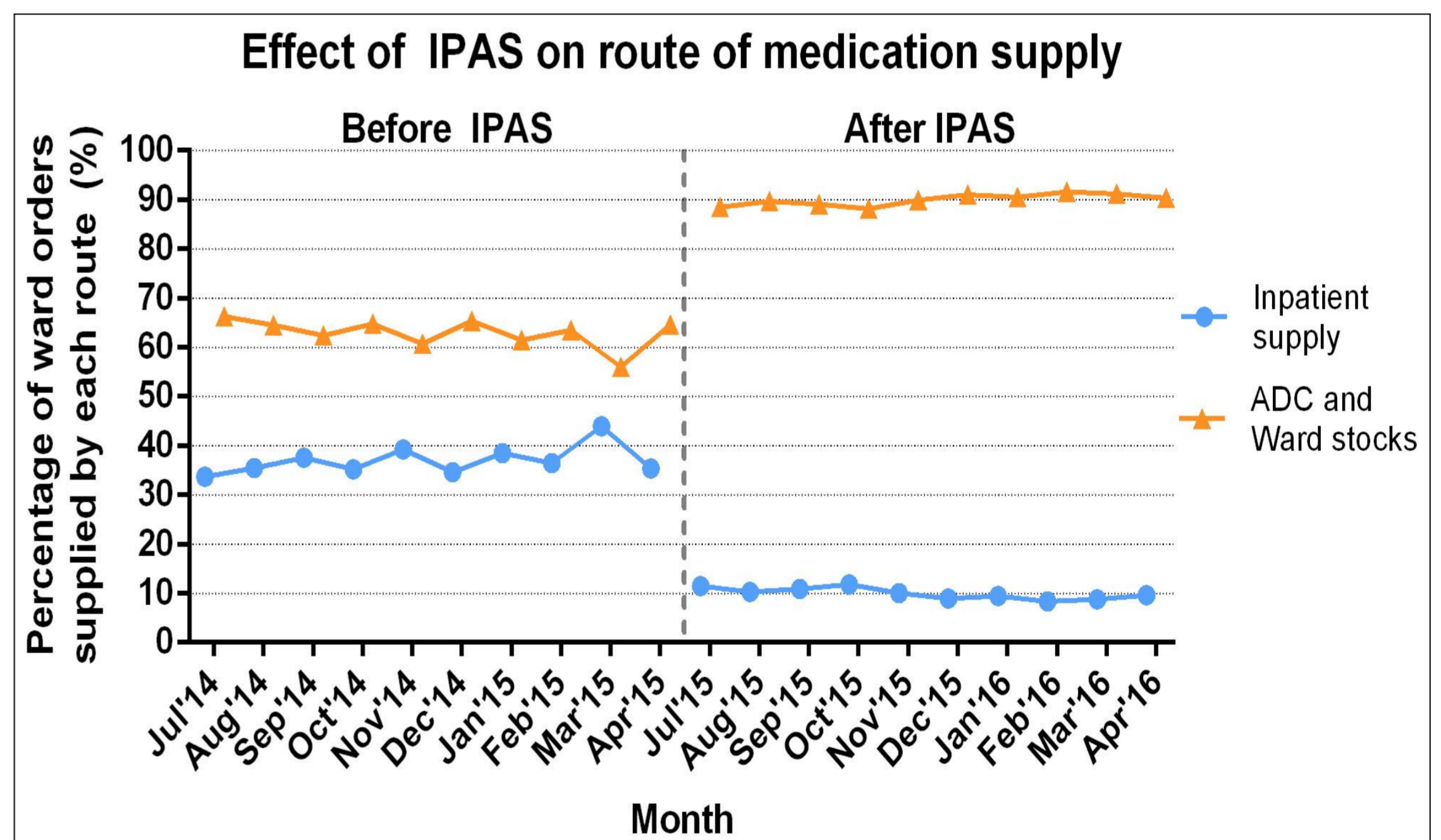


Figure 2. Effect of IPAS on route of medication supply

### 3 Mean medication error rates were significantly reduced by 2.5 fold

- ✓ Improvement in patient safety and reduction in need for resupply due to wrong supply

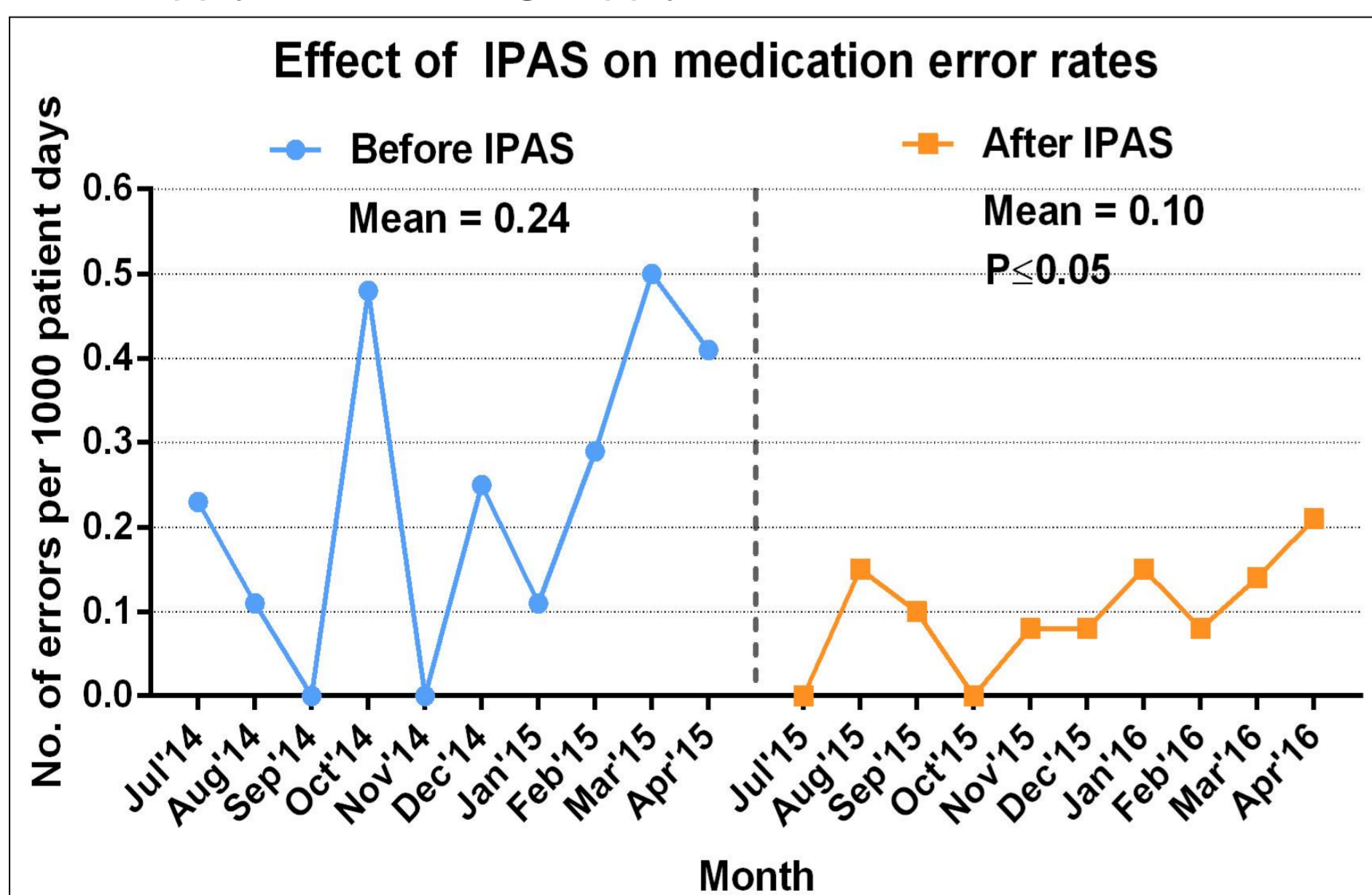


Figure 3. Effect of IPAS on medication error rates

## Conclusion

- ✓ IPAS was able to show **consistent benefits in all improvement measures** across the ten months post-implementation
- ✓ IPAS allowed for **job redesign** towards less skilled workers and the need for less of them resulting in a **projected \$3.3 million manpower cost avoidance per year**
- ✓ IPAS enabled **more than 85% of ward orders to be supplied by ADC and ward stocks** across ten months despite marked increase in total medication orders
- ✓ Patient safety was improved due to the **2.5 fold reduction in supply related medication errors**
- ✓ Overall, medication supply to wards was made **more efficient, more timely and much safer with the implementation of IPAS**

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