

## Project Title

Microbiology Laboratory Automation Project: Quality Improvement, Productivity & Challenges

## Project Lead and Members

- Adj Asst Prof Partha Pratim De
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- Ms Joyce Yuen Suh Shin
- Ms Tham Mee Eng
- Ms Christine Chu Jia Huey
- Dr Pooja Rao
- Dr Jonathan Chia Wei Zhong
- Dr Yang Huina
- Adj Asst Prof Timothy Barkham

## Organisation(s) Involved

Tan Tock Seng Hospital

## Healthcare Family Group(s) Involved in this Project

Allied Health

## Applicable Specialty or Discipline

Medical & Laboratory Technology

## Project Period

Start date: November 2020

Completed date: July 2022

## Aim(s)

To sustainably improve efficiency, quality & productivity through transformation & workflow redesign by leveraging on automation.

## **Background**

See poster appended/ below

## **Methods**

See poster appended/ below

## **Results**

See poster appended/ below

## **Conclusion**

See poster appended/ below

## **Additional Information**

This project is related to a 2022 project titled Microbiology Laboratory Automation.

## **Project Category**

Technology, Product Development

Care & Process Redesign, Productivity, Manpower Saving

## **Keywords**

Laboratory Automation, Turnaround Time, Sample Throughput

## **Name and Email of Project Contact Person(s)**

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# Microbiology Laboratory Automation Project: Quality Improvement, Productivity & Challenges

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## INTRODUCTION

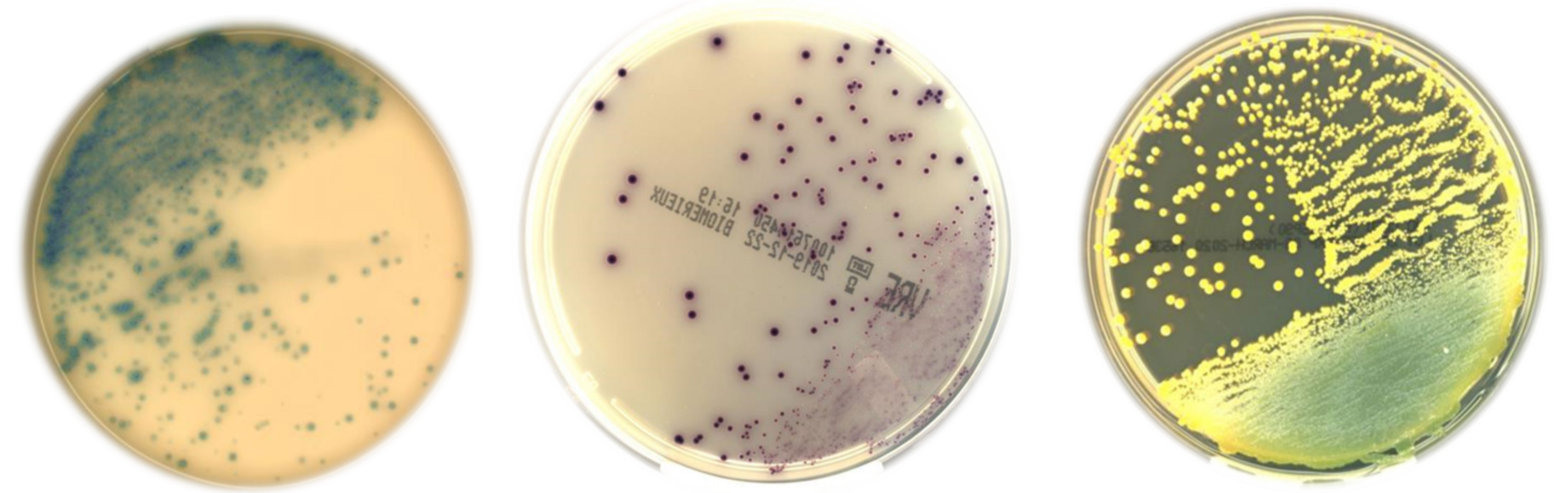
Rapid diagnosis of infection improves patient care & reduces morbidity & mortality. Culture methods have remained relatively unchanged since the development of solid culture. Our systematic review of conventional processes identified bottlenecks & solutions for quality improvement. We sought to sustainably improve efficiency, quality & productivity through transformation & workflow redesign by leveraging on automation. Our lab is the first and only hospital in Southeast Asia to have BD Kiestra™ total laboratory automation system.



## METHODOLOGY

High throughput tests such as methicillin-resistant *Staphylococcus aureus* (MRSA) screens, vancomycin-resistant *Enterococcus* (VRE) screens & urine cultures are processed through microbiology automation.

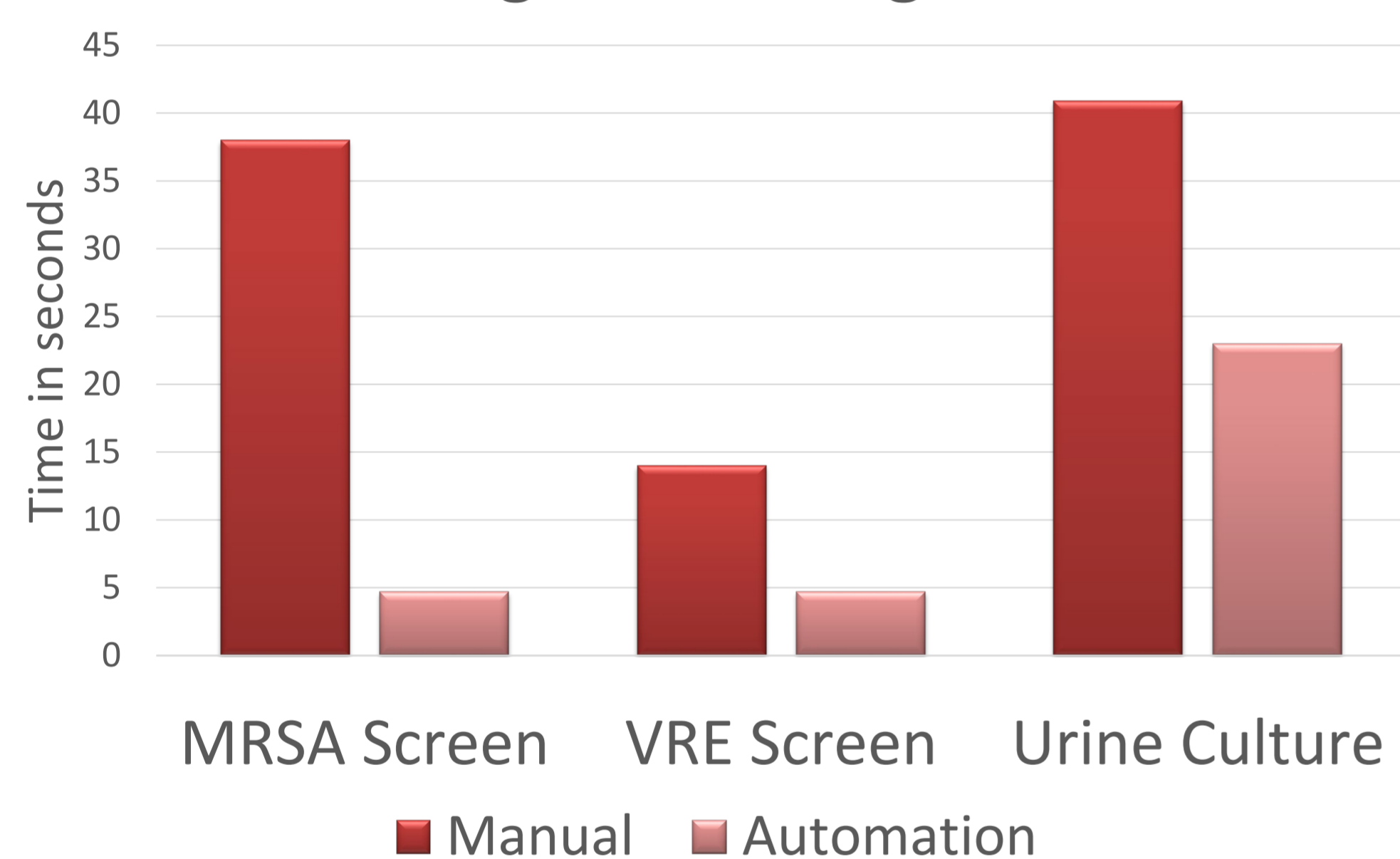
Monthly workload data was captured for a period of 3 months before & after automation. This includes sample volume, turnaround times (TAT), percentage of reports completed within 24 or 48 hours, hands-on-time & manpower required.



## RESULTS

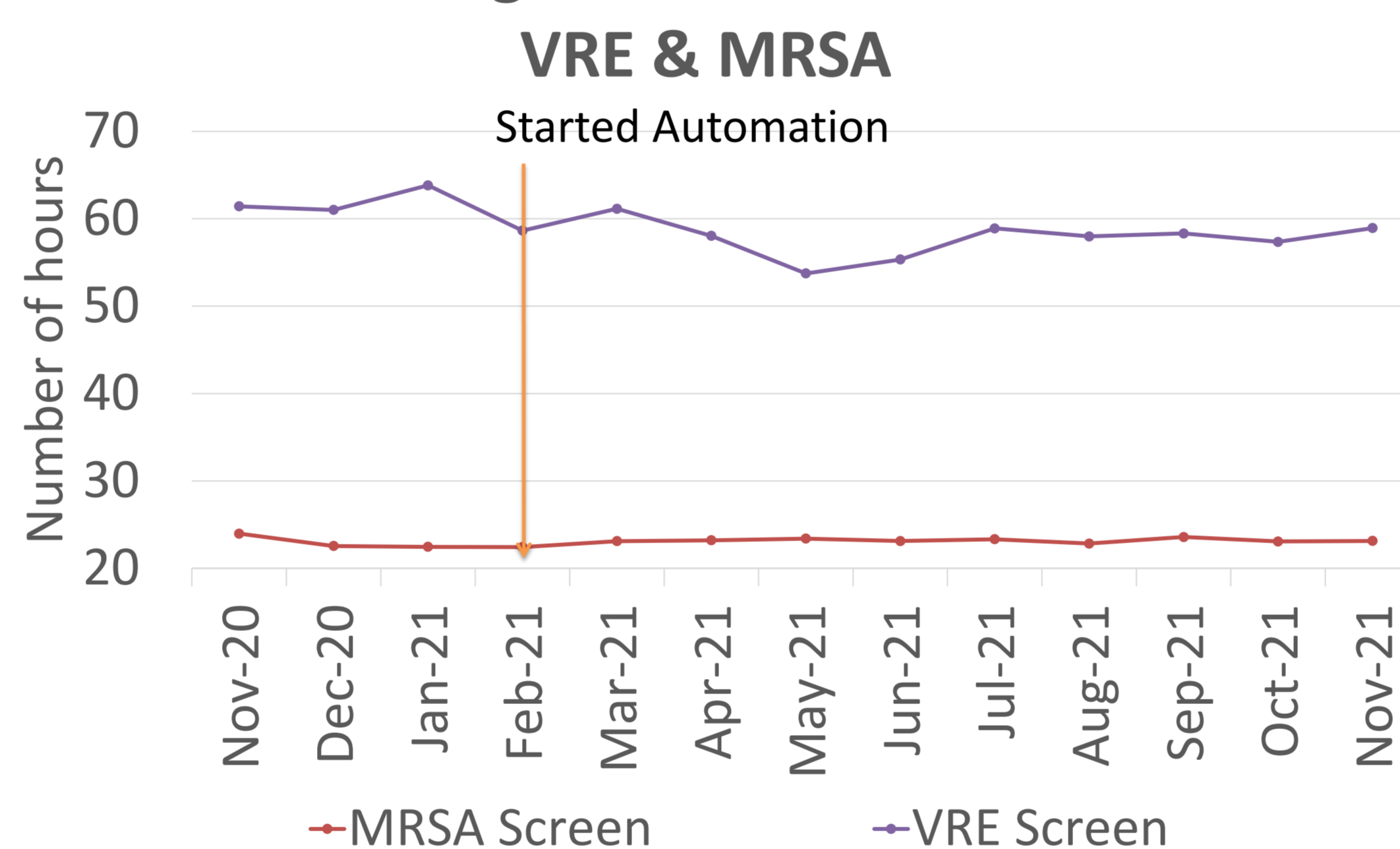
### Significant Decrease in Hands-On Time

Average Processing Time



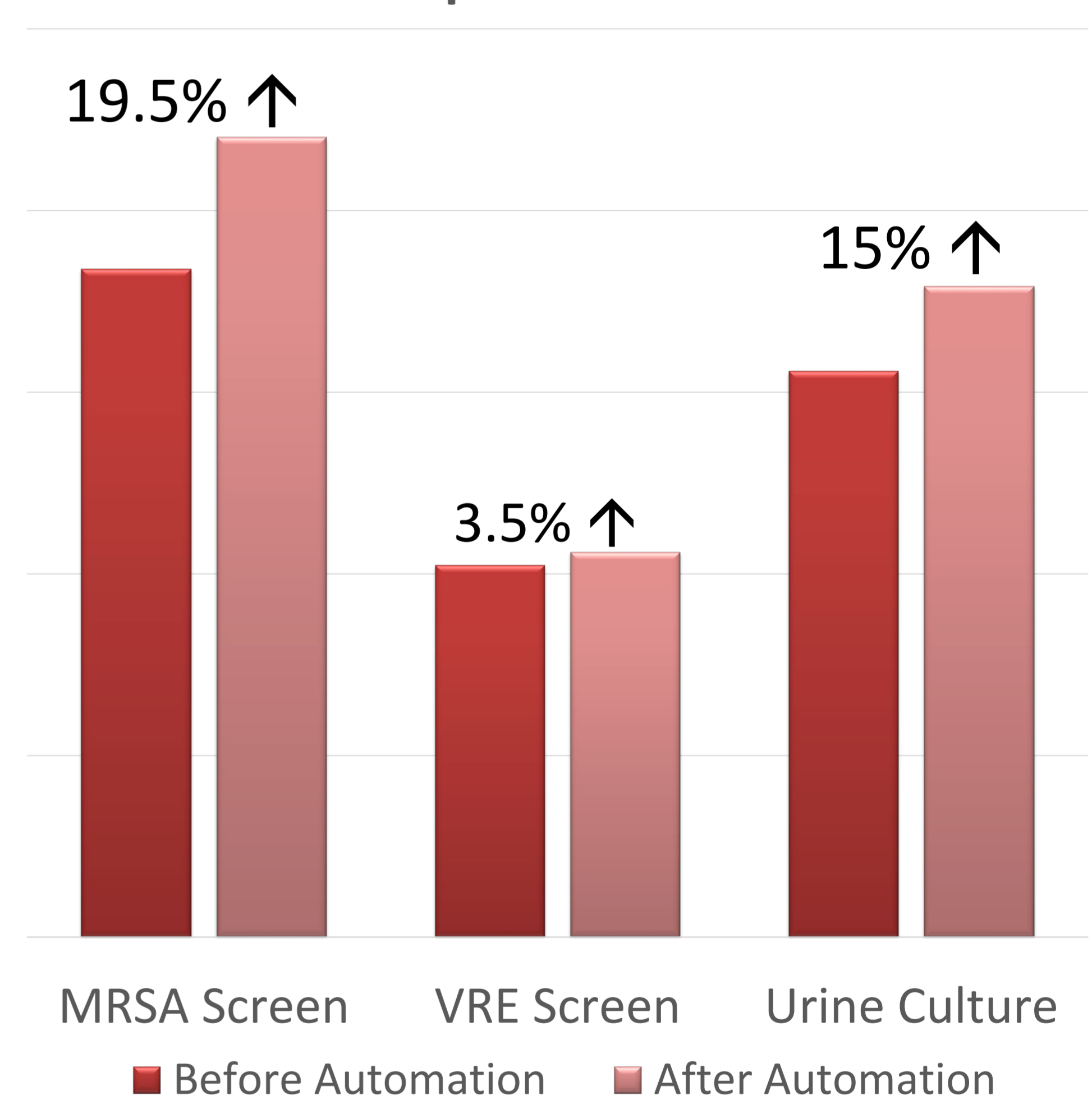
### Better Turnaround Times

Average turnaround times



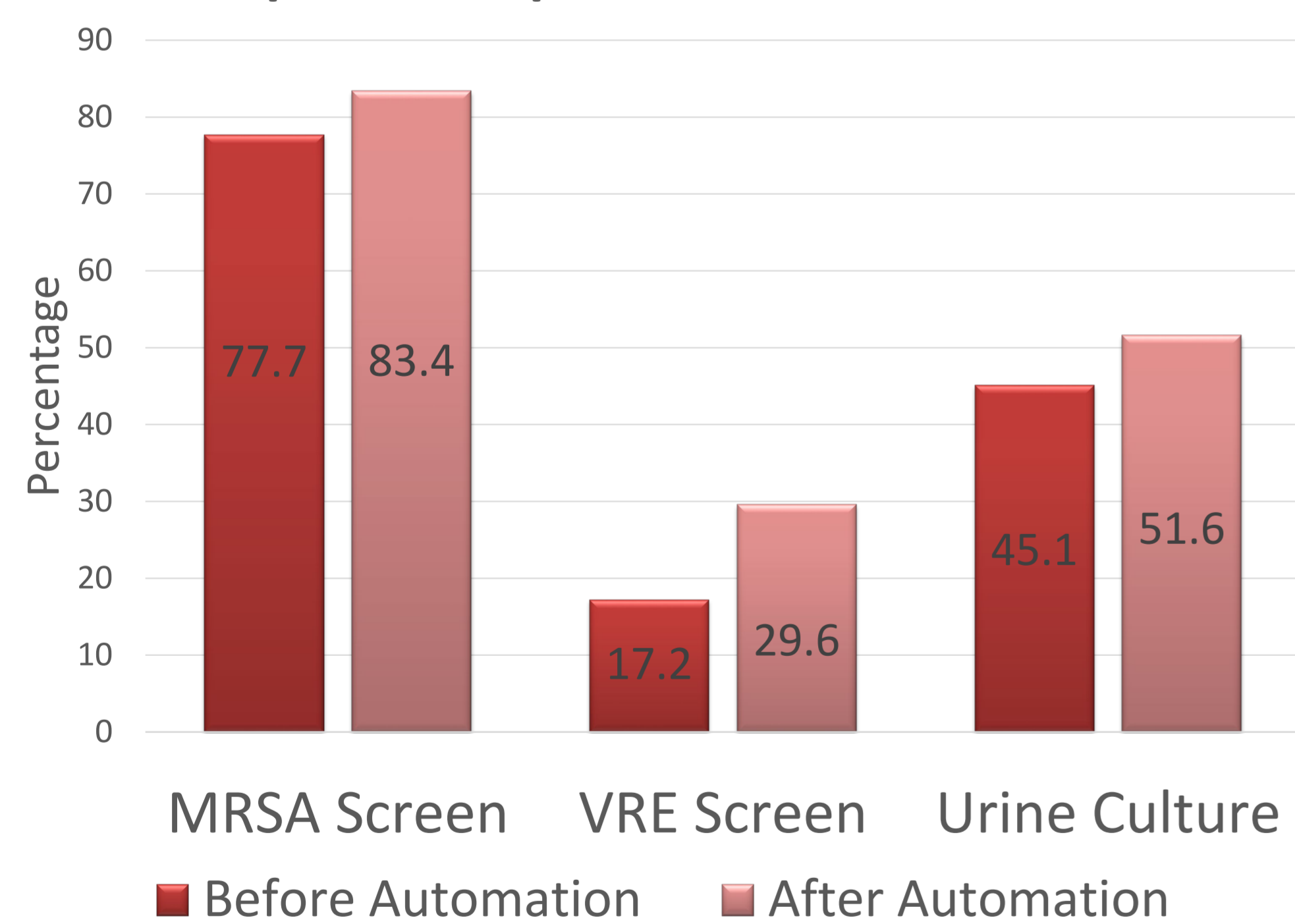
### Greater Sample Throughput

Sample Workload

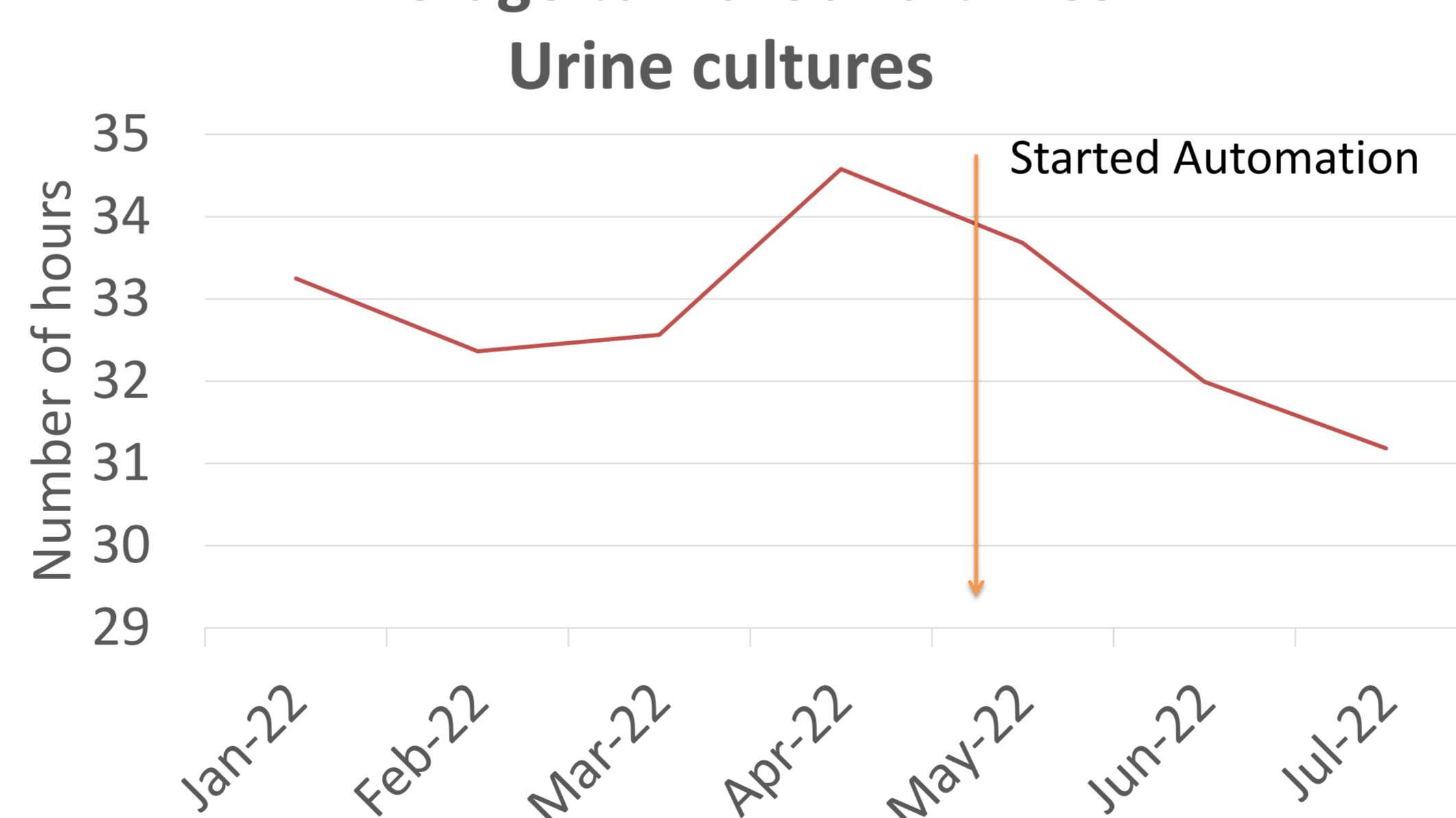


### Quicker Reports

Reports complete within 24h / 48h



Average turnaround times



Laboratory Productivity Index (LPI) increased from 74.0 to 102.3 samples completed per full time equivalent (FTE)

Annual manpower savings ≈ 790.8hrs per year

## CONCLUSION

- Better care** is delivered to patients as clinicians are able to access results within a shorter timeframe.
- Greater value** is delivered to community with increased productivity & keeping healthcare costs low
- Appropriate staff utilisation** allows specialist laboratory scientists to work at higher levels of competency, focusing on analytical, verification & personal developmental work.
- Implementation** of laboratory automation sparked critical review of laboratory processes & workflow redesign, which resulted in an increase in throughput, productivity & quality.
- Challenges** included data security, personnel changes, staffing skill mix, electronic data flow, validation of new processes, downtime & troubleshooting contingencies.