

Project Title

3D Virtual Reality Apprenticeship Program (VRx) for Medication Safety Training

Project Lead and Members

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Organisation(s) Involved

Singapore General Hospital

Healthcare Family Group(s) Involved in this Project

Pharmacy, Medical

Applicable Specialty or Discipline

General Medicine, Internal Medicine, Pharmacology

Project Period

Start date: Mar 2021

Completed date: Jul 2023

Aims

Primary objective: Reduce median failure attempts in PPC from 51% to 35%, among Pharmacy new hires and trainees in 24 months.

Secondary objective: Reduce the time taken for completion of the PPC assessment for all new hires and trainees.

Background

Medication safety is a key concern when processing prescriptions and medication orders. Thus, healthcare staff need to be competent in skillsets in medication safety practices. Picking and packing medications is a core activity to deliver safe and effective medication. To prevent patient harm, pharmacy staff must undergo training and assessment to ensure they acquire skillsets and competencies in medication safety practices. To meet National Competency standards, new hires/trainees undergo 200-medication pick-and-pack competency (PPC) training and assessment. Our baseline data in 2019 observed 51% PPC failure rate, resulting in increased workload for trainers to conduct re-training to ensure new hire/trainees meet competency standards. We embarked on the development of “VR_x”, a three-dimensional Virtual Reality (VR) Apprenticeship Program to train pharmacy staff and trainees to process prescriptions and medication orders safely and accurately in an immersive and interactive virtual environment.

Methods

See poster appended/below

Results

See poster appended/below

Conclusion

VR_x provides a realistic, engaging and interactive way to train and assess skills in processing prescriptions and medication orders. VR_x simulation program improves PPC failure attempts and time taken to complete the PPC assessment, thus improve patient safety outcomes and training efficiency in a sustainable manner.

VR_x has been fully implemented in SGH Pharmacy and is used as part of our institution’s training program for new hires and students, prior to their individual OJT rotations.

Project Category

Technology

Digitalisation, Virtual Reality, Immersive VR

Training & Education

Learning Theories & Framework, Simulated Training

Keywords

Medication Safety, Prescription, Pick-and-Pack Competency, Training Curriculum

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3D VIRTUAL REALITY APPRENTICESHIP PROGRAM (VR_x) FOR MEDICATION SAFETY TRAINING

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INTRODUCTION

Medication safety is a key concern when processing prescriptions and medication orders. Thus, healthcare staff need to be competent in skillsets in medication safety practices. Picking and packing medications is a core activity to deliver safe and effective medication. To prevent patient harm, pharmacy staff must undergo training and assessment to ensure they acquire skillsets and competencies in medication safety practices. To meet National Competency standards, new hires/trainees undergo 200-medication pick-and-pack competency (PPC) training and assessment. Our baseline data in 2019 observed 51% PPC failure rate, resulting in increased workload for trainers to conduct re-training to ensure new hire/trainees meet competency standards. We embarked on the development of "VR_x", a three-dimensional **Virtual Reality (VR) Apprenticeship Program** to train pharmacy staff and trainees to process prescriptions and medication orders safely and accurately in an immersive and interactive virtual environment.^[1]

OBJECTIVES & METHODS

Primary objective: Reduce median failure attempts in PPC from 51% to 35%, among Pharmacy new hires and trainees in 24 months
Secondary objective: Reduce the time taken for completion of the PPC assessment for all new hires and trainees

Innovation: VR_x is a VR simulation training program of 1 virtual patient encounter (VPE) that (Figure 1):

- Comprises of 5 stages incorporating 6 key competency tasks;
- Uses the Oculus Rift S headset and hand-held controllers;
- Records learners' responses in real-time via a training dashboard for review and feedback.

Prototype pilot testing involved Phase 1 (Oct-Dec 2020, n = 30 pharmacy staff) & Phase 2 (Dec 2020-Aug 2021, n = 43 new hires). Their training experience was obtained through a self-administered questionnaire.

Final prototype was incorporated in beta-version of VR_x and PDSA 1 (Mar 2021 – Jun 2022) and PDSA 2 (Jun 2022 – Feb 2023) were conducted to refine the program quality and workflow. The percentage of PPC failure attempts and time to complete PPC assessment were collated between Mar 2021 and Jul 2023 for analysis.

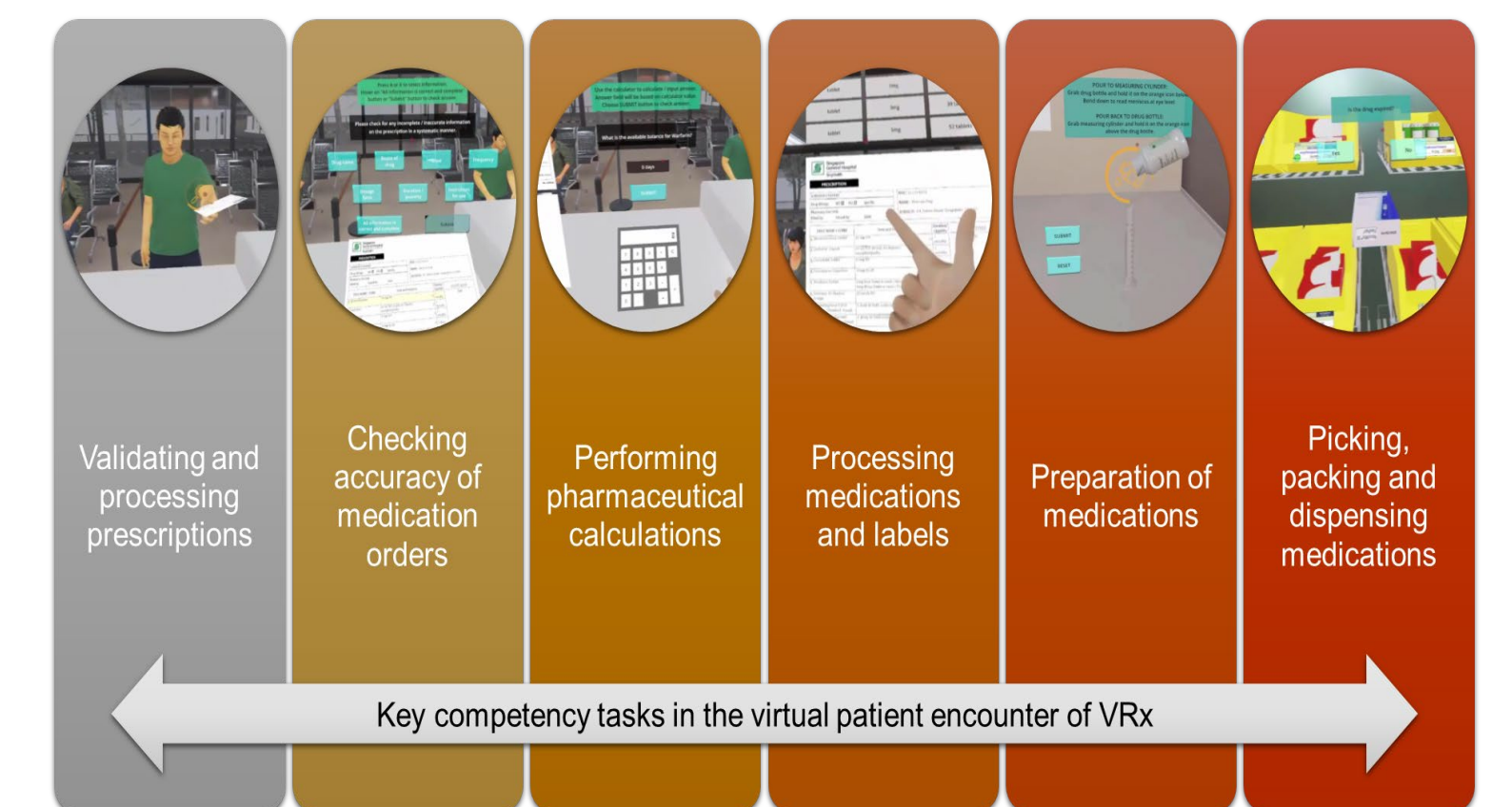


Figure 1. Key competency tasks in VR_x



Scan QR code to watch a video trailer of VR_x

RESULTS AND DISCUSSION

Majority of participants from pilot study (n = 73 pharmacists, pharmacy technicians, pre-reg pharmacists & pharmacy interns) felt that VR_x prototype (Figure 2):

- Was easy to use (77%);
- Was more interactive and fun than OJT (84%);
- Helped develop skills and proficiencies in prescription processing and medication safety (88%); and
- Should be part of their training curriculum (73%).

Strength of VR_x include (Figure 3):

- Providing an authentic hands-on learning experience;
- Reinforcing knowledge and concepts in a safe environment without the stress and pressures of a physical pharmacy;
- Learners being able to learn from their mistakes on-the-spot; and
- Learners applying the concepts to their work through immediate feedback and a more structured way of learning.

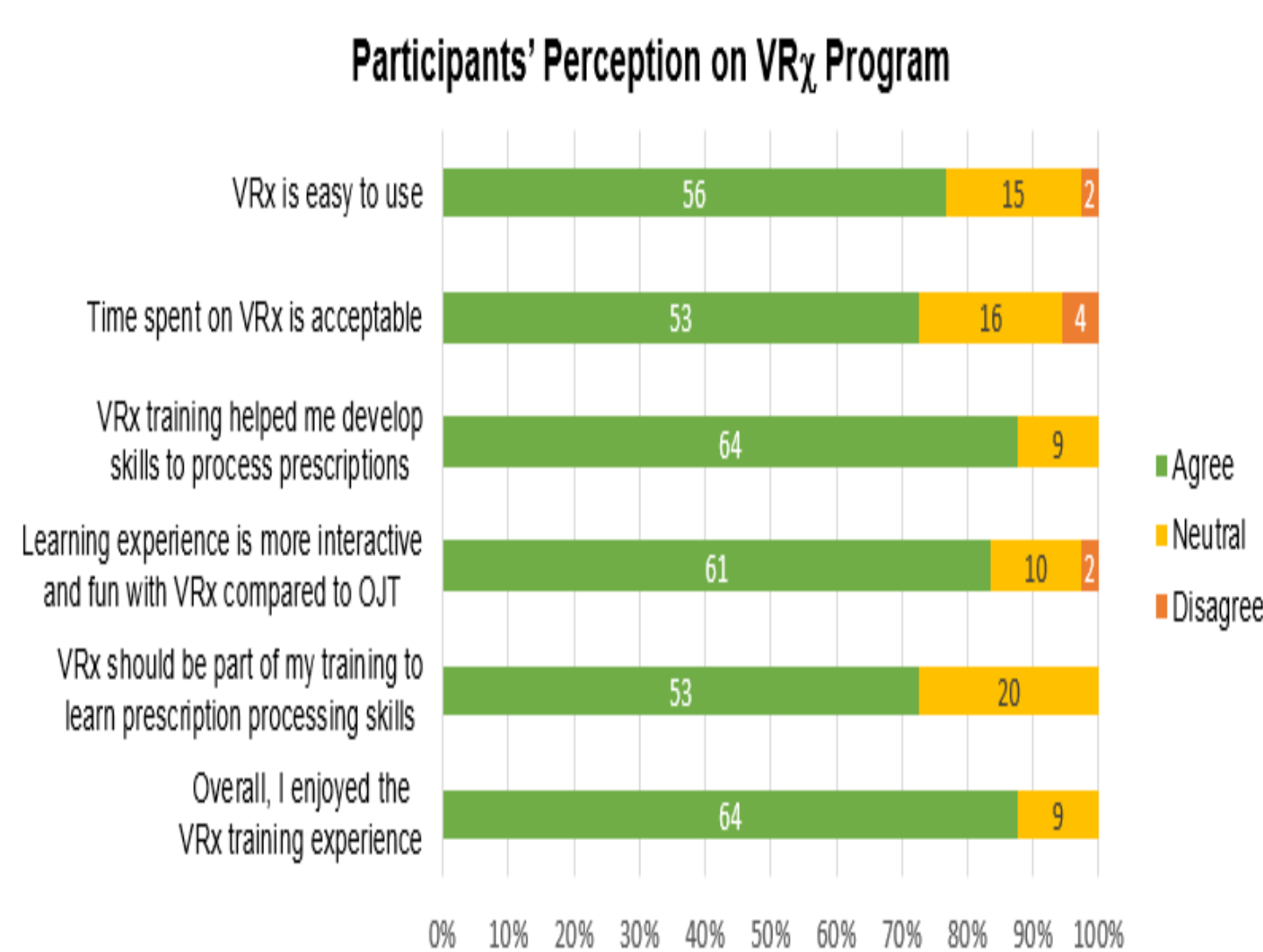


Figure 2. Participants' perception of VR_x



Figure 3. Strengths of VR_x

Overall, the percentage of failure attempts decreased from 51% to 35% (Figure 4.). Based on PDSA 1 results, trainees who underwent beta-version of VR_x before commencing PPC assessment performed better versus those underwent VR_x during or after PPC assessment. Hence, beta-version of VR_x training was conducted before PPC assessment for PDSA 2. The percentage of failure attempts continued to improve 6 months post PDSA from 35% to 25% (Figure 4).

The team's secondary objective of reducing the number of days taken to complete the PPC assessment was observed in both PDSA 1 and 2, from 13.7 calendar days to 8.6 calendar days (improvement of 34.7%) (Figure 5).

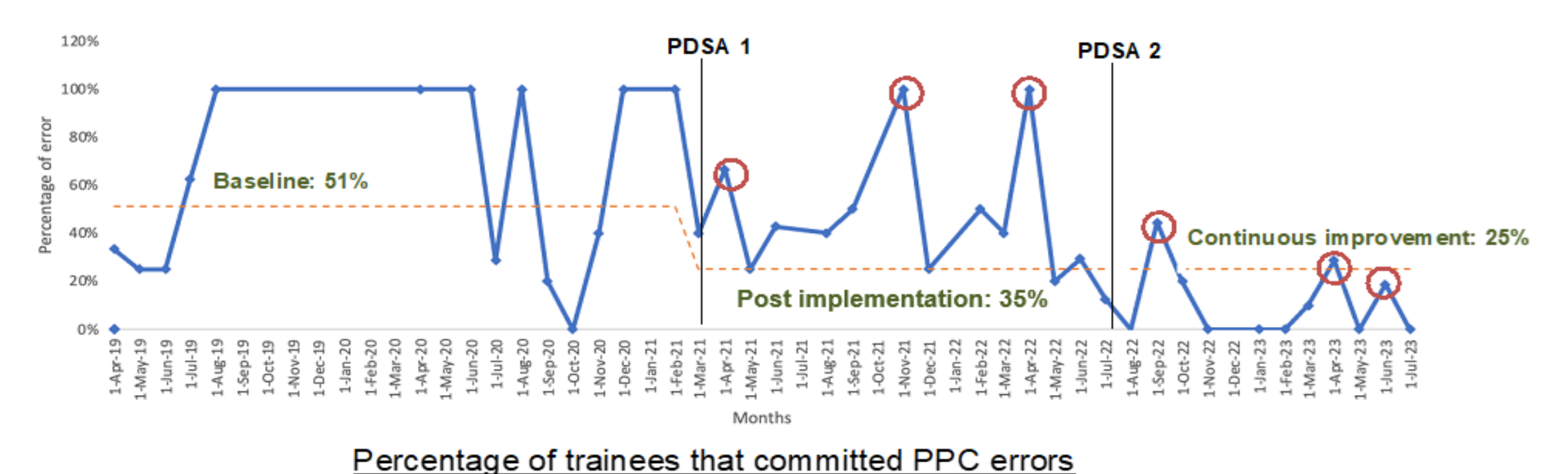


Figure 4. Percentage of PPC failed attempted at PDSA 1, PDSA 2 cycles and 6 months post PDSA 2

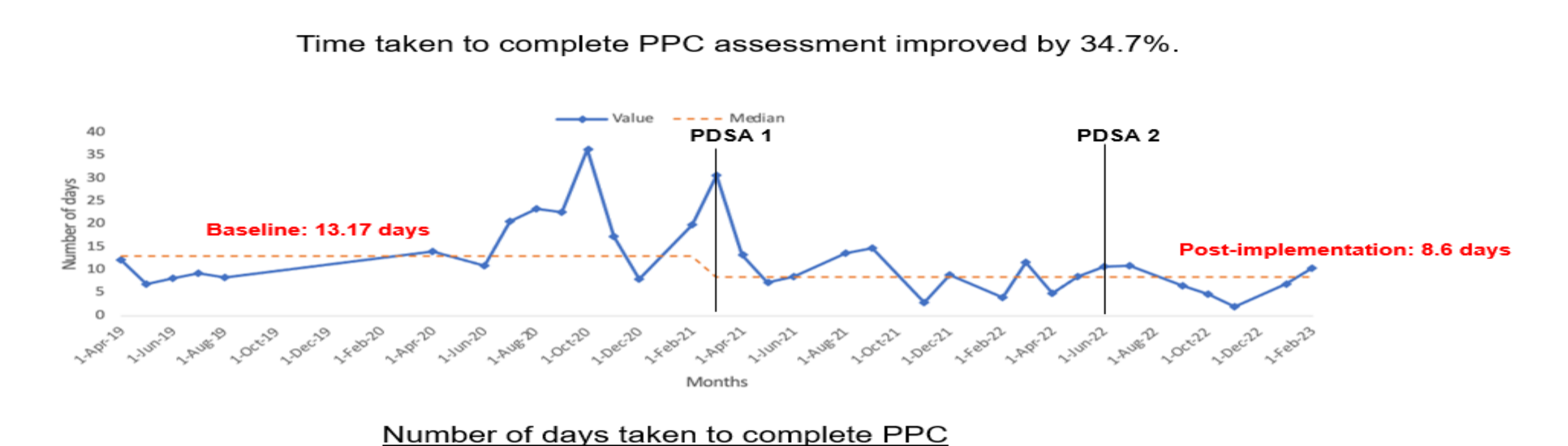


Figure 5. Time taken (days) to complete PPC assessment

CONCLUSION

VR_x provides a realistic, engaging and interactive way to train and assess skills in processing prescriptions and medication orders. VR_x simulation program improves PPC failure attempts and time taken to complete the PPC assessment, thus improve patient safety outcomes and training efficiency in a sustainable manner.

VR_x has been fully implemented in SGH Pharmacy and is used as part of our institution's training program for new hires and students, prior to their individual OJT rotations.

REFERENCES

1. Tsang WY, Fan P, Raj SDH, Tan ZJ, Lee IYY, Boo I, Yap KY. Development of a three-dimensional (3D) virtual reality apprenticeship program (VR_x) for training of medication safety practices. *Int J Dig Health*. 2022; 2(1): 4, 1-16. DOI: 10.29337/ijdh.45

ACKNOWLEDGEMENT

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