

Implementation of One Person Electronic Computerised Physician Order Entry Group and Cross Match In Singapore General Hospital.



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Introduction

Background

Singapore General Hospital (SGH) adopted the mandatory two witness signatures for the collection of Group and Cross Match (GXM) (see Workflow 1) in September 2018 to reduce the occurrence of Wrong Blood In Tube (WBIT) incidence (see Table 1). However the initiative was unsuccessful in reducing this occurrence.

Year	No. of WBIT	% of GXM error (Target = 0%)
2020	7	0.014%
2019	7	0.013%
2018	8	0.015%
2017	5	0.009%
2016	4	0.007%

Table 1: Incidence of Wrong Blood In Tube (WBIT)

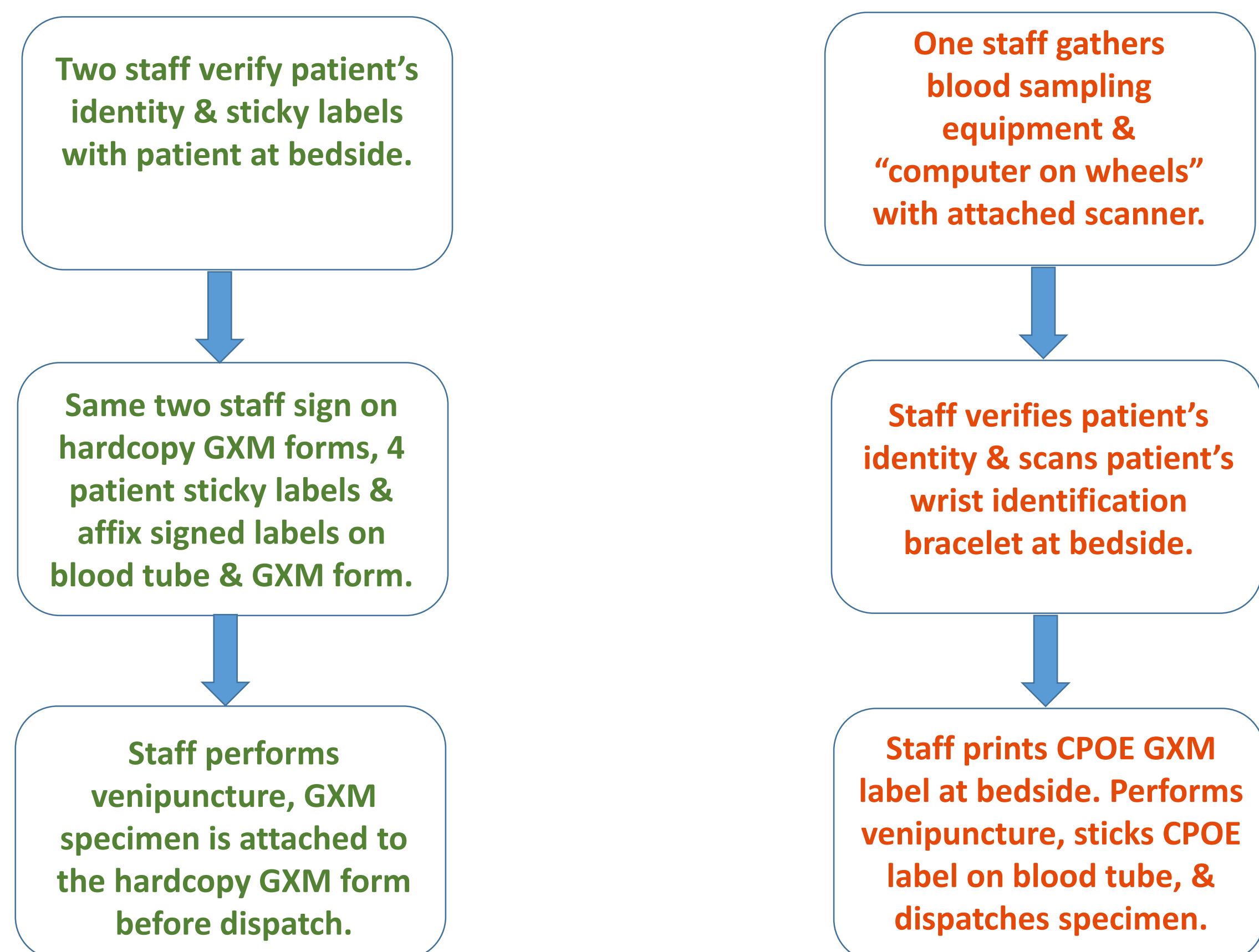
Objectives

- To reduce the occurrences of patient misidentification and resultant WBIT during GXM blood sampling.
- To adhere to the latest College of American Pathologists (CAP) / Association for the Advancement of Blood & Biotherapies (AABB) accreditation agencies recommendation on the use of electronic identification verification system for GXM blood sampling.

Methodology

In year 2022, SGH implemented the Computerised Physician Order Entry (CPOE) GXM test in Sunrise Clinical Manager (SCM). The new workflow (see Workflow 2) involves the mandatory patient bed-side electronic identification check by one staff and the scanning of patient's wrist Identification bracelet prior to venipuncture.

GXM sampling workflow in SGH:



Workflow 1: Mandatory two witness signatures hardcopy GXM sampling.

Workflow 2: New one person electronic CPOE GXM sampling.

Phase 1: Pilot of one person electronic CPOE GXM at Haematology Centre (HC) & Ward 72 Haematology (W72) from 1 April – 31 May 2022.

- All staff from the department of Haematology, SGH blood bank, HC and W72 were briefed in February 2022.
- Junior Medical Residents (JMRs) attached to Haematology and all Registered Nurses (RNs) from HC and W72 completed the mandatory SingHealth Learning Management System (LMS) module & quiz on CPOE GXM specimen collection.
- At the end of pilot, the one person electronic CPOE GXM continued as the primary GXM sampling workflow for both the pilot units.

Phase 2- Implementation of CPOE GXM in SGH from 1 November 2022.

- All doctors and nurses in SGH were informed 3 months prior to the implementation of the one person electronic CPOE GXM across SGH via email. Department of emergency medicine, operating theatre and National Heart Centre wards in SGH were excluded from this implementation.
- An electronic copy of the SingHealth LMS CPOE GXM module was shared with all medical heads of departments and senior doctors, whilst all JMRs and all RNs completed the mandatory SingHealth LMS module & quiz.
- The two witness signatures hardcopy GXM continues as the primary GXM sampling workflow for the excluded units and remained as the system downtime workflow for the rest of SGH that has adopted the new electronic CPOE GXM.

Results

Phase 1- Pilot

A total of 1,619 one person electronic CPOE GXM specimens were received from HC and W72 between the period of 1 April – 31 October 2022. **This pilot achieved zero incidence of wrong blood in tube and specimen labeling errors as compared to historical data.** During the same period, a total of 218 GXM specimens collected according to two witness signatures hardcopy GXM workflow were rejected (see Table 2).

	One Person Electronic CPOE GXM	Two witness signatures hardcopy GXM
Wrong Blood In Tube	0	0
Mislabeled Blood Specimen	0	218

Table 2: Numbers of Rejected GXMs Specimens Between 1 Apr – 31 Oct 2022.

Phase 2- Hospital Wide Implementation

SGH blood bank received a total of 14,261 CPOE GXM specimens between the period of 1 November 2022 – 31 March 2023. There were no reported specimen rejections due to specimen mislabeling for the one person electronic CPOE GXM workflow as compared to 49 cases of GXM specimens rejections for the two witness signatures hardcopy GXM workflow (see Chart 1).

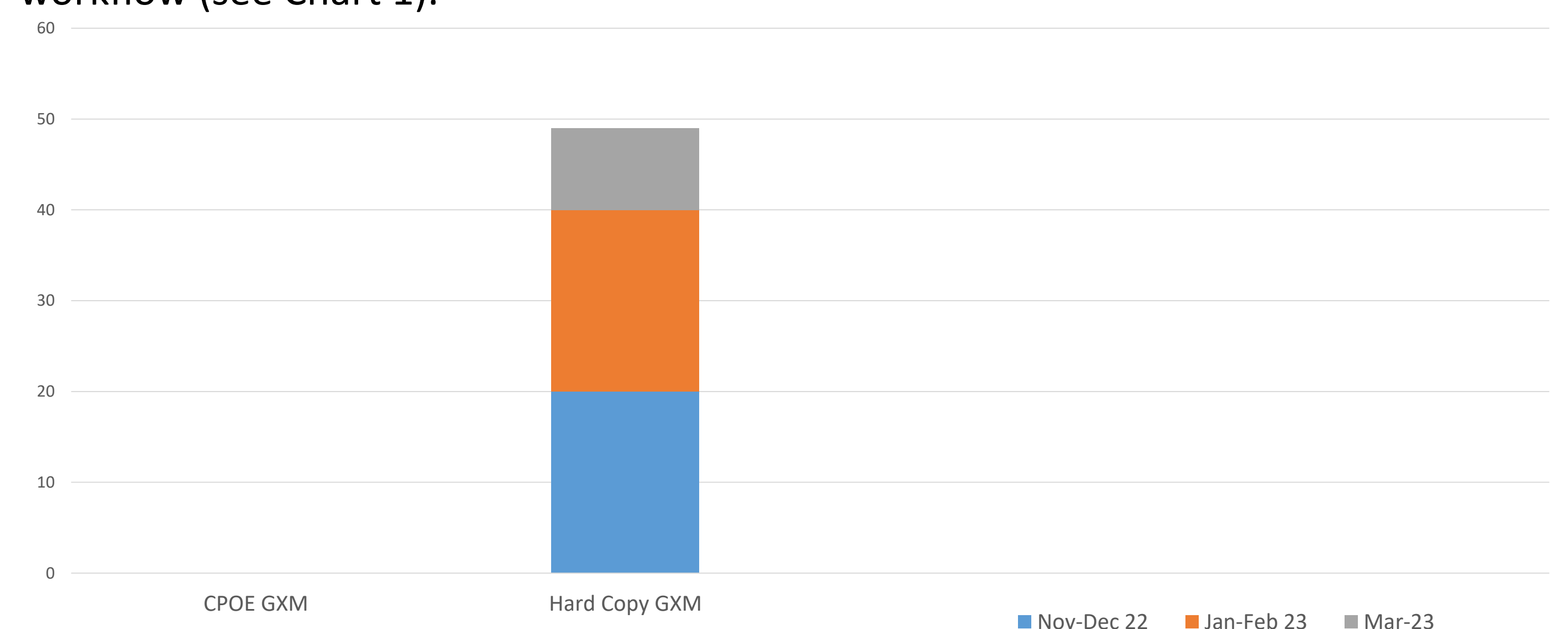
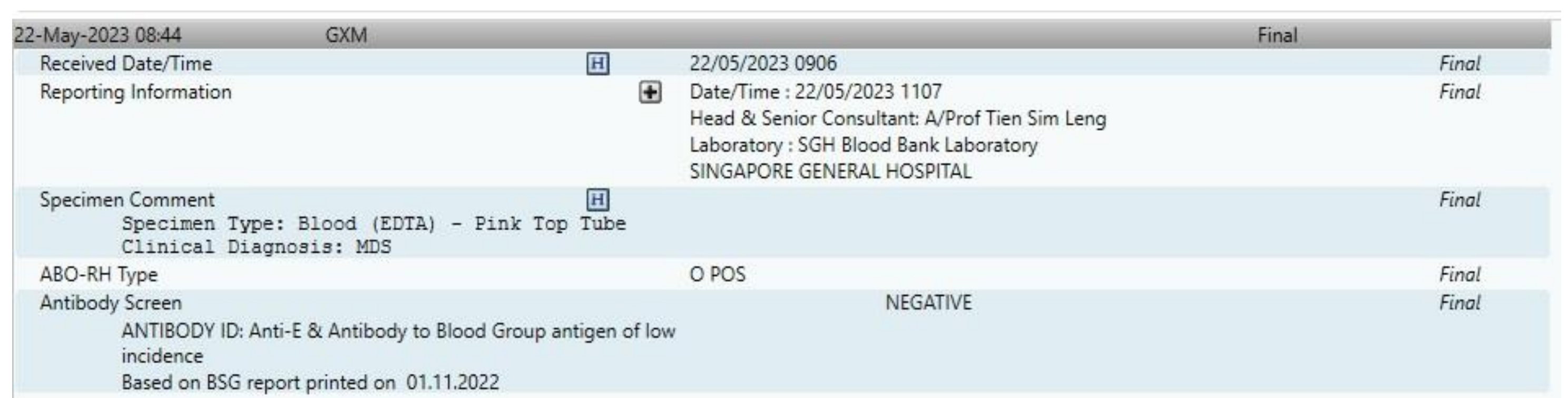


Chart 1: Comparison of The Numbers of Rejected GXMs Specimens Collected Via CPOE GXM and Hard Copy GXM Between 1 Nov 2022 – 31 Mar 2023.

Additional Benefits of CPOE GXM

The adoption of CPOE GXM had also translated into the following benefits:

- Ease of access and review of electronic record for traceability.
- Seamless transmission of test request and test result via interface connectivity. The finalized GXM results and test dates can be accessed conveniently on the SCM result module (see Picture 1).
- Saving of man-hours due to the reduction of 1 phlebotomist and 1 independent checker versus 1 phlebotomist and the scanning of patient's wrist identification bracelet as the second independent checker.



Picture 1: Example of CPOE GXM Result Displayed on The SCM Result Module.

Conclusion

Preliminary results from the implementation of one person electronic CPOE GXM between the period of 1 November 2022 –31 March 2023 have reported zero incidences of GXM specimen-related mislabeling and consequently, wrong blood in tube errors. Importantly, the test order dates and results of all CPOE GXMs can be easily accessed by any healthcare providers under the selected patient's results tab in the SCM system. This reduces the need for doctors or nurses to contact SGH blood bank to verify patients' blood group and the validity of patients' GXM. The new one person electronic CPOE GXM workflow has proven not only to be safe, it has also contributed to man-hour savings with the removal of a physical second person checker.

In summation, Singapore General Hospital has successfully implemented the one person electronic CPOE GXM workflow as part of phase 1 of the vein-to-vein closed loop system for blood products in SingHealth.