To Improve the Workflow of Specimen Receipt from the Laboratory Reception to the Clinical Laboratory

Dr Edward TH Tan/ Johnson WS Setoh/ Peh Siew Peng/ Lee Chuen Yan/ Julian YH Lee/ Hadi Hadrianto / Eric CH Tan

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INTRODUCTION

When a patient visits KK Hospital, she is given a registered visit number (RVN). Doctors may order multiple Computerized Physician Order Entry (CPOE) tests belonging to different laboratory locations under the same RVN. Prior to the improvement project, the laboratory used a 3rd party software called 'SCM Hotkeys' which presented unsorted CPOE tests on the Laboratory Information Software (LIS) Cerner Computer Screen at the laboratory reception. The workflow before is illustrated in Figure 1.
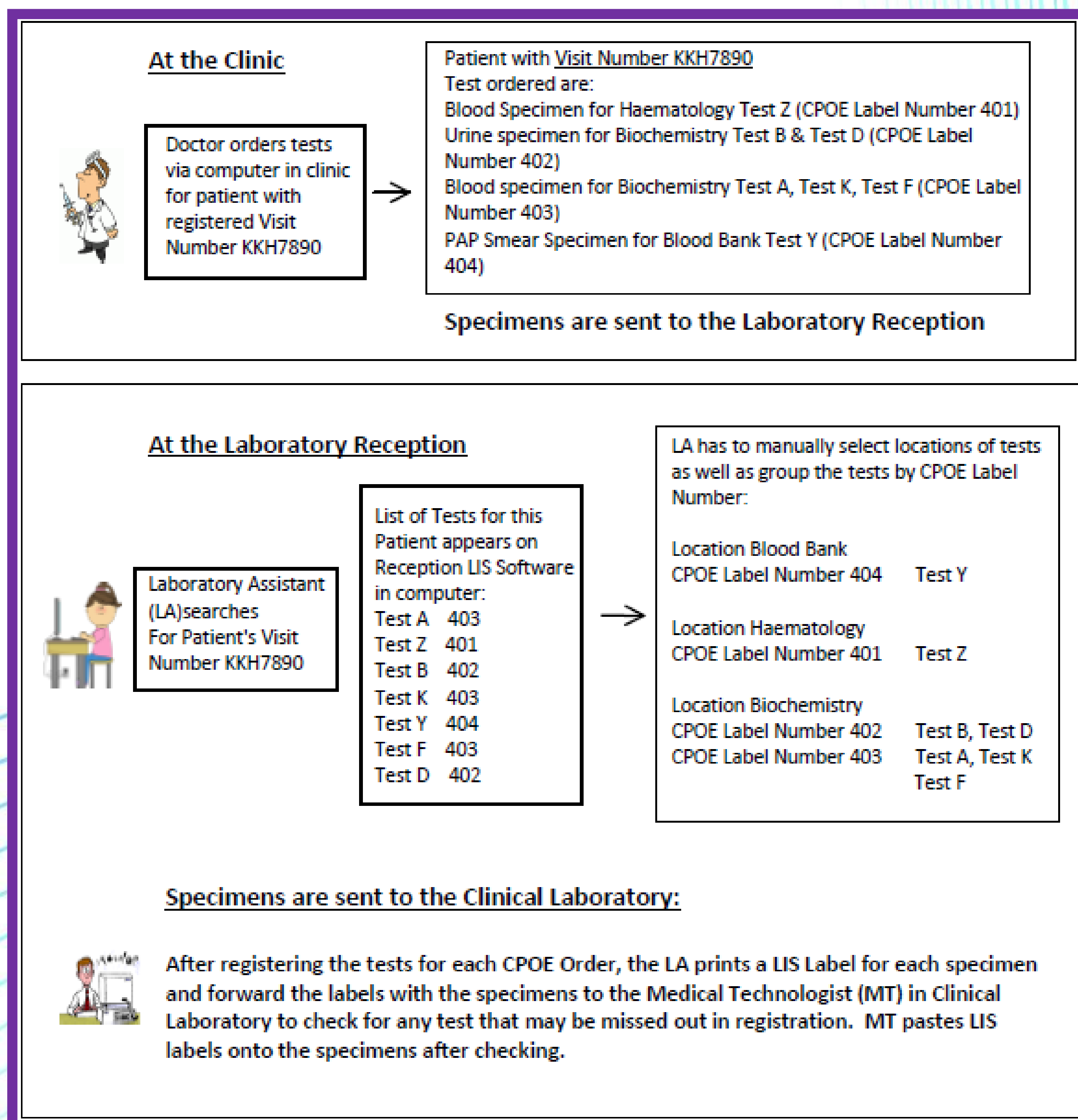

At the Clinic

Doctor orders tests via computer in clinic for patient with registered Visit Number KKH7890

Patient with Visit Number KKH7890
Test ordered are:
Blood Specimen for Haematology Test Z (CPOE Label Number 401)
Urine specimen for Biochemistry Test B & Test D (CPOE Label Number 402)
Blood specimen for Biochemistry Test A, Test K, Test F (CPOE Label Number 403)
PAP Smear Specimen for Blood Bank Test Y (CPOE Label Number 404)

Specimens are sent to the Laboratory Reception

At the Laboratory Reception

Laboratory Assistant (LA)searches For Patient's Visit Number KKH7890

List of Tests for this Patient appears on Reception LIS Software in computer:
Test A   403
Test Z   401
Test B   402
Test K   403
Test Y   404
Test F   403
Test D   402

LA has to manually select locations of tests as well as group the tests by CPOE Label Number:

Location Blood Bank
CPOE Label Number 404   Test Y

Location Haematology
CPOE Label Number 401   Test Z

Location Biochemistry
CPOE Label Number 402   Test B, Test D
CPOE Label Number 403   Test A, Test K
                            Test F

Specimens are sent to the Clinical Laboratory:

After registering the tests for each CPOE Order, the LA prints a LIS Label for each specimen and forward the labels with the specimens to the Medical Technologist (MT) in Clinical Laboratory to check for any test that may be missed out in registration. MT pastes LIS labels onto the specimens after checking.

Figure 1

PROBLEMS

The processes involved in CPOE specimen registration are time consuming and unproductive:

1. Missed out CPOE tests: Inadvertent omission of some CPOE tests during the specimen registration which can compromise on service quality, especially patient safety.

2. CPOE second-specimen-login step: In order to capture any omitted tests during the registration by reception laboratory assistants, two medical technologists in the Clinical Laboratory had to log-in and check the tests ordered by the them on the LIS Cerner and thus prolonging the time of specimen receipt for analysis by the Clinical Laboratory.

METHODOLOGY

Our team presented its needs to the LIS Cerner vendor and worked with the vendor IT specialists to develop a solution. We customized the LIS CERNER application to the needs of the users and came up with the 'Cerner Laboratory Console' add-on software to replace the existing 'SCM Hotkeys' software. The Cerner Console application can automatically select the tests ordered for a patient and group them by specific CPOE orders (that is by CPOE Label Numbers). It also links the tests to the various laboratory locations. Therefore the medical technologists of the Clinical Laboratory need not have to check the tests registered by the laboratory assistants for missed out tests.

RESULTS

- With the the 'Cerner Laboratory Console' add-on software, the workflow of specimen registration at the laboratory reception was significantly simplified as illustrated in Figure 2.

At the Clinic

Doctor orders tests via computer in clinic for patient with registered Visit Number KKH7890

Patient with Visit Number KKH7890
Test ordered are:
Blood Specimen for Haematology Test Z (CPOE Label Number 401)
Urine specimen for Biochemistry Test B & Test D (CPOE Label Number 402)
Blood specimen for Biochemistry Test A, Test K, Test F (CPOE Label Number 403)
PAP Smear Specimen for Blood Bank Test Y (CPOE Label Number 404)

Specimens are sent to the Laboratory Reception

At the Laboratory Reception

Laboratory Assistant (LA) searches for Patient's Visit Number KKH7890

LIS Cerner Console automatically links the locations of tests as well as groups the tests by CPOE Label Numbers:

Location Blood Bank
CPOE Label Number 404   Test Y

Location Haematology
CPOE Label Number 401   Test Z

Location Biochemistry
CPOE Label Number 402   Test B, Test D
CPOE Label Number 403   Test A, Test K
                            Test F

After registering the tests for each CPOE Order, the LA prints a LIS Label for each specimen and pastes LIS labels onto the specimens. LA forward the specimens to the MT for testing. CPOE second-specimen-login step at the Clinical Laboratory has been eliminated.
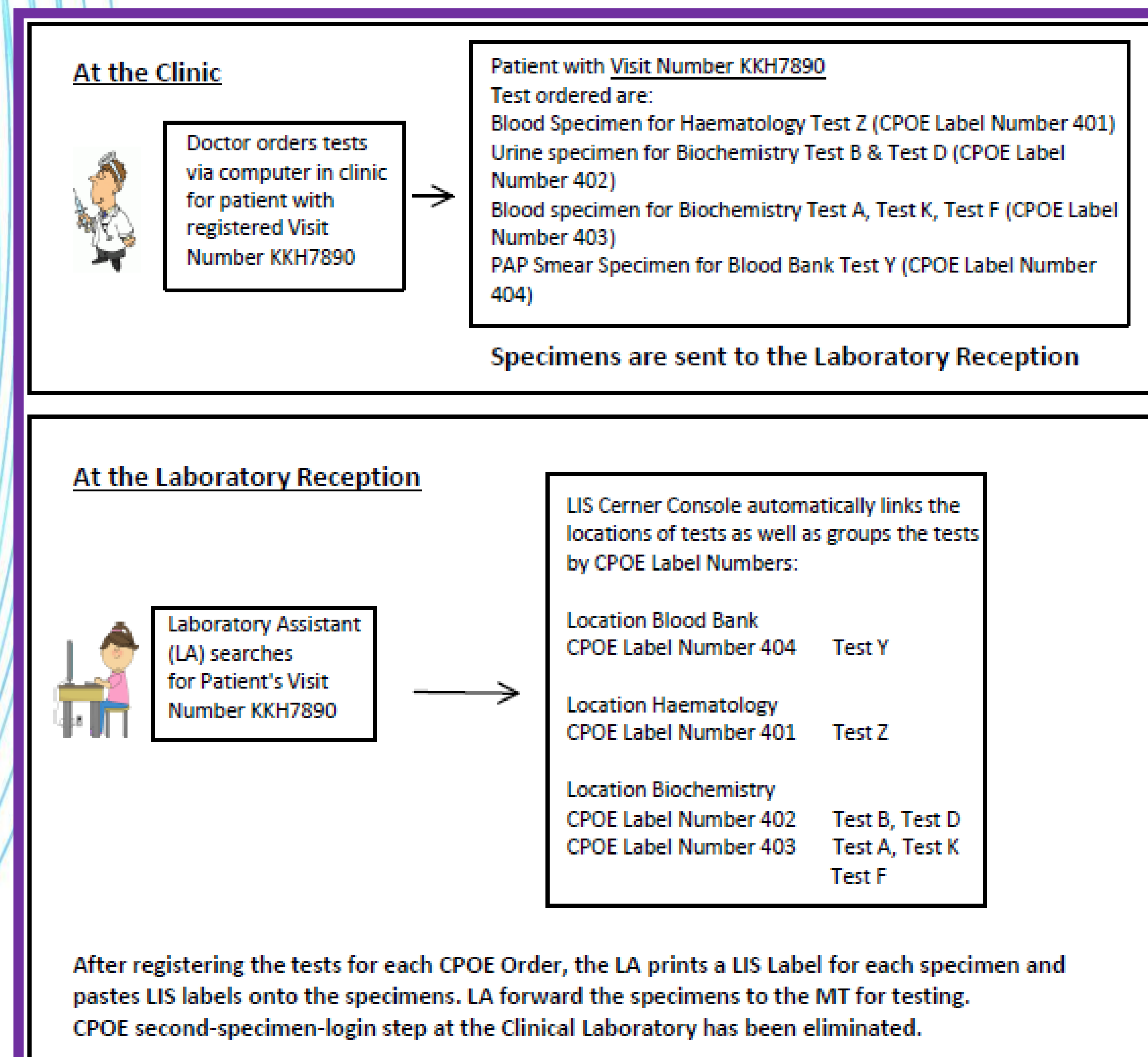
Figure 2

- We have eliminated the CPOE second-specimen-login step. As a result the time spent in CPOE specimen registration has declined from an average of 5 minutes to 1 minute per CPOE specimen. The time saved can be channeled to analytical work and thus improves the turn-around-time of laboratory tests.
- The number of missed out CPOE tests has declined from an average of 6 tests per month to zero per month. With the elimination of missed out CPOE tests, there is improved patient safety. There is always a potential risk of infection with venipuncture. Re-drawing of blood specimens can be a challenge in neonates especially in preterm babies.
- There is increased employee satisfaction with the medical technologists viewing the improved work process as more productive and efficient.
- We can save an operation cost of $375,485 over 5 years.

CONCLUSION

By improving the turn-around-time of specimen registration and by eliminating the number of missed out tests, we have enhanced customer service quality, improved patient safety and added value to the organization's performance. In addition, the project supports the hospital's Strategic Objectives (as well as the institution's Core Values) as shown in the table below:

No.	KKH Strategic Objectives:	Impact to Organization:
1.	• Integrated Resource Management	• With the operational cost saving of $375,485 over 5 years, we are able to meet this company's strategic objective of integrated resource management in our laboratory.
2.	• Patient- centered Processes & Services	• Our project is patient centered. It improves the registration process and thereby enables faster movement of specimen from the Lab Reception to clinical lab.
3.	• Patient Safety & Relationships	• Our project enhances patient safety with the elimination of missed out tests.
4.	• Research, Innovation & Evidence-led improvement	• The development of the Cerner Lab Console by the LIS vendor specialists was tailored specifically to the Laboratory's needs. This is an innovative approach that yielded evidence-led improvement in the CPOE registration processes, resulting in improved service quality.