The background of the slide features a dynamic, abstract pattern of blue and white wavy lines that create a sense of depth and movement, resembling a tunnel or a series of overlapping layers.

Pilot Change Project: Evaluation of an
**Electronic Result Screening (ERS)
System** to Improve Patient Care in
Inpatient Settings in Hong Kong Hospitals

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INTERMEDIATE (BATCH 1)

Introduction

- BACKGROUND
- AFFIRMING THE NEED
- OBJECTIVES AND SIGNIFICANCE OF THE STUDY

Background

- Clinical Management System (CMS) in Hong Kong is an advanced electronic health record (EHR) system that has been widely used across the healthcare sector
- Manual handling of laboratory and radiology reports is still adopted due to the lack of a closed-loop communication system for result screening in CMS.
- Reports are printed for doctors to review and sign, and follow-up actions are documented on paper for team communication.



Affirming the Need

	Pilot site	Rollout
Hospital A	Medical day ward	20 Aug 2024
	Paediatric inpatient ward 1	11 Sep 2024
	Paediatric inpatient ward 2	11 Sep 2024
Hospital B	EM inpatient ward	16 Sep 2024
Hospital C	O&T inpatient ward	30 Jul 2024
	SUR inpatient ward	30 Jul 2024
Hospital D	Medical day ward	14 Aug 2024
	Paediatric day ward	14 Aug 2024
	ENT/SUR day ward	21 Aug 2024

- 4 Hospitals were chosen as the pilot sites in 2024 (5 inpatient wards; 4 day wards)

Manual handling of paper report

Workflow Inefficiencies

- Time consuming on report filing:
(~1-2hr for inpatient ward, better allocated on direct patient care)

- **Delays in Screening and Treatment:**

The need for onsite handling of paper reports, which slows down clinical decision-making and treatment initiation.

Patient Safety Risk and team communication

- **Filing errors**, leading to critical errors in treatment
- **Illegible Treatment Orders**, leading to misinterpretation and potential errors in patient care.
- **Reliance on verbal orders for remote communication**, leading to risk of miscommunication, particularly in urgent situations.

Resource and Environmental Impact

- **Valuable storage space** which could be repurposed for clinical use.
- **Paper wastage**

Electronic Result Screening (ERS) System

- A function in CMS developed and adopted at outpatient settings since Mar 2020



Paperless

Minimize the printing of paper results in clinical areas



Closed-loop Communication

Timestamps and documentation shared in CMS



Automation

Reduce manual distribution and allocation of paper result printouts



Mobility

Facilitate screening process with the use of HA clinical iPads



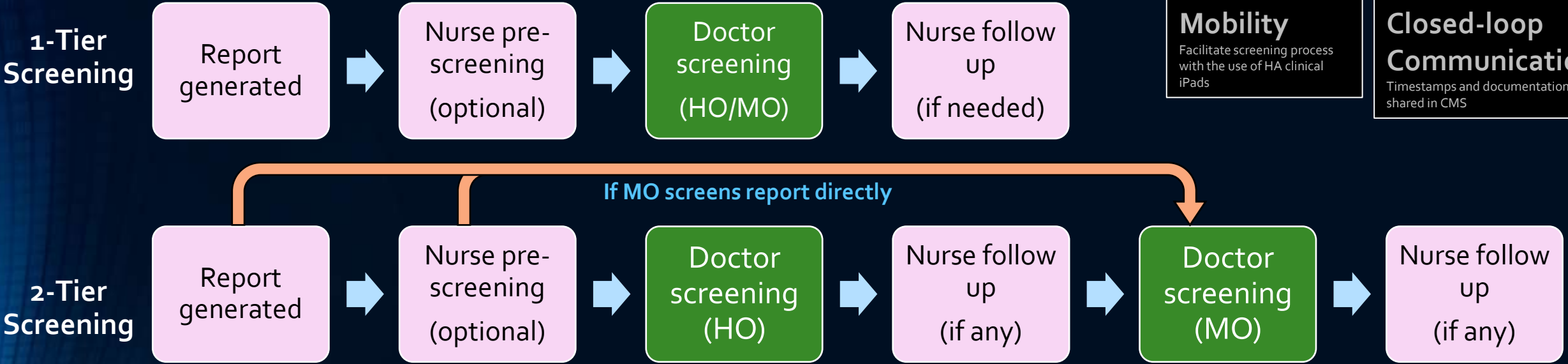
Can ERS be applied at inpatient settings ?

Paperless
Minimize the printing of paper results in clinical areas

Automation
Reduce manual distribution and allocation of paper result printouts

Mobility
Facilitate screening process with the use of HA clinical iPads

Closed-loop Communication
Timestamps and documentation shared in CMS



Alert of report status at TV Clinical Dashboard (CDB)

Laboratory Result

6
0

For Acknowledge For Follow up

Report Ready for screening : 6

Bed	Report Ready on	Test Profile
6B/	23-Aug-2023 12:09	Axilla + Na
D/C	02-Jul-2023 16:32	Bag Urine

Updates of report status at TV Clinical Dashboard (CDB)

Laboratory Result

5
1

For Acknowledge For Follow up

Objectives and Significance of the Study (PICOT)

P opulation	9 inpatient settings of different specialties across four acute hospitals (4 inpatient wards and 5 day wards)
I ntervention	Implementation of Electronic Result Screening (ERS)
C omparison	Current manual result screening process
O utcome	<p>Primary outcomes: Improved efficiency in report screening, enhanced documentation accuracy, and improved team communication (based on staff satisfaction survey).</p> <p>Secondary outcomes: Paper saving and time saving in filing reports</p>
T ime	At least 1 months post-implementation to allow for adaptation and data collection

Pilot site	
Hospital A	Medical day ward
	Paediatric inpatient ward 1
	Paediatric inpatient ward 2
Hospital B	EM inpatient ward
Hospital C	O&T inpatient ward
	SUR inpatient ward
Hospital D	Medical day ward
	Paediatric day ward
	ENT/SUR day ward

Target of Sustainable Development Goals (SDGs)

SDG 3: Good Health and Well-Being

- The project improves healthcare efficiency and enhances patient safety by ensuring timely, accurate, and reliable handling of diagnostic reports, contributing to higher quality care delivery.

SDG 9: Industry, Innovation, and Infrastructure

- By implementing an Electronic Result Screening (ERS) system, the project fosters innovation in healthcare through the adoption of advanced digital solutions, improving infrastructure and processes.

SDG 12: Responsible Consumption and Production

- The project reduces paper usage in healthcare settings, promoting sustainable resource management and minimizing waste, aligning with responsible consumption and production goals.

SDG 13: Climate Action

- By significantly reducing paper waste, the project contributes to climate action efforts by lowering the environmental footprint of healthcare operations and supporting more sustainable practices.

Literature Review

- DISCUSS EXISTING LITERATURE TO SUPPORT THE NEEDS OF THE STUDY
- HIGHLIGHT THE RESEARCH GAP
- FORMULATE THE HYPOTHESIS THROUGH THE FRAMEWORK

Literature Review

Search Tool: eKG

Database: CINAHL Complete, PubMed

Search Terms:

“electronic result screening”, “digital health solutions”, “digital documentation in healthcare”, “electronic health record”, “workflow efficiency”, “patient safety”, “communication”, “systematic review”

Timeframe: Last 10 years (2014 – 2024)

Identification

Records identified through eKG
N = 63,212

Screening

Title and abstracts screened
N = 40

Eligibility

Full-text articles assessed for eligibility
N = 20

Included

Final articles included
N = 14

Research Gap

EHR systems

Strong evidence showing the contribution to improving hospital workflow, efficiency, and overall patient care. However, **the effectiveness of EHR systems is highly dependent on system design, usability, and workflow integration**

ERS (new)

No specific published systematic review.

→→ →→ Need further evaluation to determine ERS unique impact on hospital operations and clinical outcome

Hypothesis

- The implementation of an electronic result screening (ERS) system in inpatient healthcare settings will significantly improve workflow efficiency, reduce result reporting delays, and minimize documentation errors, ultimately enhancing patient safety compared to traditional manual methods.

Methodology

- STUDY DESIGN
- ANALYSIS APPROACH
- ETHICAL CONSIDERATION

Pilot Evaluation Study Design

Mixed-methods evaluation design (cross-sectional approach)

Questionnaire via Google Form (Quantitative and Qualitative) [LINK](#)



Questionnaire

- **Inclusion Criteria:** Healthcare staff (nurses, doctors) working in pilot wards
- **Exclusion Criteria:** Staff not using the ERS system
- **Sampling Method:** Convenience sampling, at least 5 nurses and 2 doctors per pilot site
- **Pilot Sites:** 5 inpatient wards and 4 day wards across 4 hospitals
- **Evaluation Period:** 28 Oct – 3 Nov 2024 (2 weeks)
- **Data Collection:** A custom-designed structured questionnaire in Google Forms:
 1. Likert-scale questions to evaluate staff satisfaction, perceived time savings, and system feasibility.
 2. Open-ended questions to gather qualitative feedback.

Pilot Evaluation Study Design

Mixed-methods evaluation design (cross-sectional approach)

Questionnaire via Google Form (Quantitative and Qualitative) [LINK](#)



Questionnaire

Analysis:

- Descriptive statistics (percentages, means, medians) were used to summarize questionnaire results.
- The use of inferential statistical tests were excluded due to the exploratory nature of the pilot study and the small sample size

Questionnaire

In comparison with conventional method for result screening via paper printout, please indicate your comments on ERS
(Rating from 1 – 6, with 1 as totally disagree and 6 as totally agree)

1	Reduce risk in incorrect report filing
2	Reduce time in filing or searching patient reports
3	Promote faster response time for doctor screening
4	Promote faster response time for nurse to follow up with doctor order
5	Facilitate result screening anytime anywhere
6	Facilitate overall workflow for patient monitoring
7	Enhance closed loop communication in team for result management
8	Integration with eDoc is satisfactory*
9	CDB displays clear information for result management
10	Nurse acknowledgement feature is useful
11	User friendliness
12	Enhance patient safety
13	Overall satisfaction

Others

- Do you spend less or more time in accessing / managing patient reports after ERS
(much more time than before, More time than before, Similar as before, Less time than before, Much less time than before)

Open-ended questions

- What challenges have you encountered while using ERS and how do you manage?
- What improvements would you suggest for ERS?
- Other comment

Ethical Consideration

- Evaluation was endorsed in Hospital Nursing Informatics Meeting.
- Pilot sites were informed and agreed for data collection.
- No patient data will be collected.

Result

Questionnaire distributed via Google Form

Target Group

- Pilot sites with ERS implemented over 1 month
- Inpatient ward x5 , Day ward x4
- At least 5 nurses and 2 doctors for each pilot sites

	Pilot site	Rollout
Hospital A	Medical day ward	20 Aug 2024
	Paediatric inpatient ward 1	11 Sep 2024
	Paediatric inpatient ward 2	11 Sep 2024
Hospital B	EM inpatient ward	16 Sep 2024
Hospital C	O&T inpatient ward	30 Jul 2024
	SUR inpatient ward	30 Jul 2024
Hospital D	Medical day ward	14 Aug 2024
	Paediatric day ward	14 Aug 2024
	ENT/SUR day ward	21 Aug 2024

Period

- 28 Oct – 3 Nov 2024 (2 week)

Sample size (79)

	Inpatient ward	Day ward	Total
Doctor	8	9	17
Nurse	38	24	62
Total	46	33	79

In comparison with conventional method for result screening via paper printout, please indicate your comments on ERS (Overall)

(Rating from 1 – 6, with 1 as totally disagree and 6 as totally agree)

		Mean	SD	Median	IQR	%positive (4-6)	N (exclude NA)
1	Reduce risk in incorrect report filing	4.8	1.4	5	2	86%	79
2	Reduce time in filing or searching patient reports	4.4	1.4	5	2.5	73%	79
3	Promote faster response time for doctor screening	3.8	1.6	4	3	58%	79
4	Promote faster response time for nurse to follow up with doctor order	3.9	1.6	4	2	57%	79
5	Facilitate result screening anytime anywhere	4.5	1.3	5	2	84%	79
6	Facilitate overall workflow for patient monitoring	4.3	1.4	4	2.5	73%	79
7	Enhance closed loop communication in team for result management	4.2	1.5	4	2.5	67%	79
8	Integration with eDoc is satisfactory*	3.5	1.4	4	1.5	63%	8
9	CDB displays clear information for result management	4.1	1.4	4	2	72%	76
10	Nurse acknowledgement feature is useful	4.0	1.4	4	2	64%	74
11	User friendliness	3.8	1.6	4	3	59%	79
12	Enhance patient safety	4.2	1.4	5	2	71%	79
13	Overall satisfaction	4.0	1.6	4	2	63%	79

*Only hospital B has implemented eDoc by Oct 2025 which is an electronic platform under CMS for documentation.

Overall data shows relatively positive score (mean >4.0) in general
 High variability (SD and IQR) highlights inconsistent perceptions between groups

Mean >= 4.0 (Green)
 Mean = 3.6 - 4.0 (Yellow)
 Mean <= 3.5 (Pink)

In comparison with conventional method for result screening via paper printout, please indicate your comments on ERS (Day ward)

(Rating from 1 – 6, with 1 as totally disagree and 6 as totally agree)

		Mean	SD	Median	IQR	%positive (4-6)	N (exclude NA)
1	Reduce risk in incorrect report filing	5.1	1.2	5	1	91%	33
2	Reduce time in filing or searching patient reports	4.8	1.2	5	2	85%	33
3	Promote faster response time for doctor screening	4.3	1.4	5	2	73%	33
4	Promote faster response time for nurse to follow up with doctor order	4.6	1.3	5	1	76%	33
5	Facilitate result screening anytime anywhere	5.1	1.0	5	1	91%	33
6	Facilitate overall workflow for patient monitoring	4.9	1.1	5	1	85%	33
7	Enhance closed loop communication in team for result management	4.9	1.3	5	2	85%	33
8	Integration with eDoc is satisfactory*	NA	NA	NA	NA	NA	0
9	CDB displays clear information for result management	4.5	1.2	5	1	83%	30
10	Nurse acknowledgement feature is useful	4.6	1.0	5	1	86%	29
11	User friendliness	4.5	1.3	5	1	82%	33
12	Enhance patient safety	4.8	1.1	5	1	85%	33
13	Overall satisfaction	4.7	1.3	5	2	79%	33

*Only hospital B has implemented eDoc by Oct 2025 which is an electronic platform under CMS for documentation.

Overall, Day Ward satisfaction scores are **positive and consistently higher** compared to Inpatient Ward, reflecting a generally favorable perception of the system.

Mean >= 4.0 (Green)
 Mean = 3.6 - 4.0 (Yellow)
 Mean <= 3.5 (Pink)

In comparison with conventional method for result screening via paper printout, please indicate your comments on ERS (Day ward - Dr)

(Rating from 1 – 6, with 1 as totally disagree and 6 as totally agree)

		Mean	SD	Median	IQR	%positive (4-6)	N (exclude NA)
1	Reduce risk in incorrect report filing	4.4	1.8	5	3	67%	9
2	Reduce time in filing or searching patient reports	4.2	1.6	5	2	67%	9
3	Promote faster response time for doctor screening	3.8	1.8	5	3	56%	9
4	Promote faster response time for nurse to follow up with doctor order	3.9	1.8	4	2	56%	9
5	Facilitate result screening anytime anywhere	4.8	1.3	5	2	78%	9
6	Facilitate overall workflow for patient monitoring	4.8	1.2	5	2	78%	9
7	Enhance closed loop communication in team for result management	4.4	1.7	5	3	67%	9
8	Integration with eDoc is satisfactory*	NA	NA	NA	NA	NA	0
9	CDB displays clear information for result management	3.3	1.4	3.5	1	50%	6
10	Nurse acknowledgement feature is useful	4.2	1.2	4	1.5	67%	6
11	User friendliness	4.0	1.7	4	2	67%	9
12	Enhance patient safety	4.2	1.8	5	3	56%	9
13	Overall satisfaction	4.1	1.8	4	3	56%	9

*Only hospital B has implemented eDoc by Oct 2025 which is an electronic platform under CMS for documentation.

Day Ward doctors report **positive satisfaction**. However, **large variability**, likely due to a small sample size across specialties, highlights the need for **improvements in response time and CDB clarity**.

Mean >= 4.0 (Green)
 Mean = 3.6 - 4.0 (Yellow)
 Mean <= 3.5 (Pink)

In comparison with conventional method for result screening via paper printout, please indicate your comments on ERS (**Day ward - Nurse**)
 (Rating from 1 – 6, with 1 as totally disagree and 6 as totally agree)

		Mean	SD	Median	IQR	%positive (4-6)	N (exclude NA)
1	Reduce risk in incorrect report filing	5.4	0.7	5.5	1	100%	24
2	Reduce time in filing or searching patient reports	5.1	0.9	5	1	92%	24
3	Promote faster response time for doctor screening	4.5	1.2	5	1	79%	24
4	Promote faster response time for nurse to follow up with doctor order	4.9	1.0	5	0.25	83%	24
5	Facilitate result screening anytime anywhere	5.2	0.8	5	1	96%	24
6	Facilitate overall workflow for patient monitoring	5.0	1.1	5	1	88%	24
7	Enhance closed loop communication in team for result management	5.0	1.1	5	1.25	92%	24
8	Integration with eDoc is satisfactory*	NA	NA	NA	NA	NA	0
9	CDB displays clear information for result management	4.8	1.0	5	1	92%	24
10	Nurse acknowledgement feature is useful	4.7	1.0	5	1	91%	23
11	User friendliness	4.8	1.2	5	1.25	88%	24
12	Enhance patient safety	5.0	0.8	5	0	96%	24
13	Overall satisfaction	5.0	1.1	5	1	88%	24

*Only hospital B has implemented eDoc by Oct 2025 which is an electronic platform under CMS for documentation.

Day Ward nurse satisfaction is positive and consistently high.

Mean >= 4.0 (Green)
 Mean = 3.6 - 4.0 (Yellow)
 Mean <= 3.5 (Pink)

In comparison with conventional method for result screening via paper printout, please indicate your comments on ERS (**Inpatient ward**)

(Rating from 1 – 6, with 1 as totally disagree and 6 as totally agree)

		Mean	SD	Median	IQR	%positive (4-6)	N (exclude NA)
1	Reduce risk in incorrect report filing	4.5	1.5	5	2	83%	46
2	Reduce time in filing or searching patient reports	4.1	1.5	4	2	65%	46
3	Promote faster response time for doctor screening	3.4	1.6	3	2	48%	46
4	Promote faster response time for nurse to follow up with doctor order	3.5	1.6	3	2	43%	46
5	Facilitate result screening anytime anywhere	4.1	1.4	4	1	78%	46
6	Facilitate overall workflow for patient monitoring	3.8	1.5	4	2	65%	46
7	Enhance closed loop communication in team for result management	3.7	1.5	4	1.75	54%	46
8	Integration with eDoc is satisfactory*	3.5	1.4	4	1.5	63%	8
9	CDB displays clear information for result management	3.8	1.4	4	2	65%	46
10	Nurse acknowledgement feature is useful	3.6	1.5	3	3	49%	45
11	User friendliness	3.2	1.6	3	2	43%	46
12	Enhance patient safety	3.8	1.5	4	2	61%	46
13	Overall satisfaction	3.5	1.6	4	2	52%	46

*Only hospital B has implemented eDoc by Oct 2025 which is an electronic platform under CMS for documentation.

Inpatient ward nurses and doctors agree that the product is **helpful for filing and screening results anytime, anywhere**. However, other areas require **significant improvement**.

Mean >= 4.0 (Green)
 Mean = 3.6 - 4.0 (Yellow)
 Mean <= 3.5 (Pink)

In comparison with conventional method for result screening via paper printout, please indicate your comments on ERS (Inpatient ward - Dr)

(Rating from 1 – 6, with 1 as totally disagree and 6 as totally agree)

		Mean	SD	Median	IQR	%positive (4-6)	N (exclude NA)
1	Reduce risk in incorrect report filing	3.9	1.8	4	2.5	63%	8
2	Reduce time in filing or searching patient reports	3.8	1.4	3	2	38%	8
3	Promote faster response time for doctor screening	3.1	1.6	2.5	1.5	25%	8
4	Promote faster response time for nurse to follow up with doctor order	3.5	1.7	3	2.5	38%	8
5	Facilitate result screening anytime anywhere	4.4	1.2	4.5	1	88%	8
6	Facilitate overall workflow for patient monitoring	4.0	1.4	4	1.5	63%	8
7	Enhance closed loop communication in team for result management	3.8	1.3	3.5	1.25	50%	8
8	Integration with eDoc is satisfactory*	3.0	1.4	3	1	50%	2
9	CDB displays clear information for result management	4.3	1.2	4	0.75	75%	8
10	Nurse acknowledgement feature is useful	3.5	1.4	3	1.5	38%	8
11	User friendliness	3.5	1.5	4	1.25	63%	8
12	Enhance patient safety	3.6	1.8	3.5	1.75	50%	8
13	Overall satisfaction	3.3	1.5	3	1.25	38%	8

*Only hospital B has implemented eDoc by Oct 2025 which is an electronic platform under CMS for documentation.

Inpatient ward doctors report moderate satisfaction in result screening anytime anywhere. But significant improvements are needed in workflow communication, user-friendliness, and eDoc integration

Mean >= 4.0 (Green)
 Mean = 3.6 - 4.0 (Yellow)
 Mean <= 3.5 (Pink)

In comparison with conventional method for result screening via paper printout, please indicate your comments on ERS (**Inpatient ward - Nurse**)
 (Rating from 1 – 6, with 1 as totally disagree and 6 as totally agree)

		Mean	SD	Median	IQR	%positive (4-6)	N (exclude NA)
1	Reduce risk in incorrect report filing	4.6	1.4	5	2	87%	38
2	Reduce time in filing or searching patient reports	4.2	1.6	4.5	2	71%	38
3	Promote faster response time for doctor screening	3.4	1.6	4	2	53%	38
4	Promote faster response time for nurse to follow up with doctor order	3.4	1.6	3	2	45%	38
5	Facilitate result screening anytime anywhere	4.0	1.5	4	1	76%	38
6	Facilitate overall workflow for patient monitoring	3.8	1.5	4	2.75	66%	38
7	Enhance closed loop communication in team for result management	3.6	1.5	4	2.5	55%	38
8	Integration with eDoc is satisfactory*	3.7	1.5	4	1.5	67%	6
9	CDB displays clear information for result management	3.7	1.5	4	2.75	63%	38
10	Nurse acknowledgement feature is useful	3.6	1.5	4	3	51%	37
11	User friendliness	3.2	1.6	3	2	39%	38
12	Enhance patient safety	3.9	1.4	4	2	63%	38
13	Overall satisfaction	3.5	1.6	4	2.75	55%	38

*Only hospital B has implemented eDoc by Oct 2025 which is an electronic platform under CMS for documentation.

Inpatient ward nurses highlight strengths in reducing filing errors but report low satisfaction with response times and user-friendliness (mean = 3.2), and workflow communication.

Mean >= 4.0 (Green)
 Mean = 3.6 - 4.0 (Yellow)
 Mean <= 3.5 (Pink)

In comparison with conventional method for result screening via paper printout, please indicate your comments on ERS (**Inpatient vs Day**)

(Rating from 1 – 6, with 1 as totally disagree and 6 as totally agree)

		Day Ward Mean (SD)	Inpatient Ward Mean (SD)	P-value	Significant diff (<0.05)
1	Reduce risk in incorrect report filing	5.1 (1.2)	4.5 (1.5)	0.10	N
2	Reduce time in filing or searching patient reports	4.8 (1.2)	4.1 (1.5)	0.06	N
3	Promote faster response time for doctor screening	4.3 (1.4)	3.4 (1.6)	0.04	Y
4	Promote faster response time for nurse to follow up with doctor order	4.6 (1.3)	3.5 (1.6)	0.01	Y
5	Facilitate result screening anytime anywhere	5.1 (1.0)	4.1 (1.4)	0.01	Y
6	Facilitate overall workflow for patient monitoring	4.9 (1.1)	3.8 (1.5)	0.01	Y
7	Enhance closed loop communication in team for result management	4.9 (1.3)	3.7 (1.5)	0.01	Y
8	Integration with eDoc is satisfactory*	NA	3.5 (1.4)	NA	NA
9	CDB displays clear information for result management	4.5 (1.2)	3.8 (1.4)	0.07	N
10	Nurse acknowledgement feature is useful	4.6 (1.0)	3.6 (1.5)	0.01	Y
11	User friendliness	4.5 (1.3)	3.2 (1.6)	0.01	Y
12	Enhance patient safety	4.8 (1.1)	3.8 (1.5)	0.02	Y
13	Overall satisfaction	4.7 (1.3)	3.5 (1.6)	0.01	Y

*Only hospital B has implemented eDoc by Oct 2025 which is an electronic platform under CMS for documentation.

P-value < 0.05 (Yellow)

•**Test type:** Independent **T-test**

•**Tail:** One-tailed (Day Ward expected to have higher scores)

In comparison with conventional method for result screening via paper printout, please indicate your comments on ERS (**Dr vs Nurse - Day**)
 (Rating from 1 – 6, with 1 as totally disagree and 6 as totally agree)

		Dr (SD)	Nrs (SD)	P-value	Significant diff (<0.05)
1	Reduce risk in incorrect report filing	4.4 (1.8)	5.4 (0.7)	0.08	Y
2	Reduce time in filing or searching patient reports	4.2 (1.6)	5.1 (0.9)	0.08	Y
3	Promote faster response time for doctor screening	3.8 (1.8)	4.5 (1.2)	0.13	Y
4	Promote faster response time for nurse to follow up with doctor order	3.9 (1.8)	4.9 (1.0)	0.07	Y
5	Facilitate result screening anytime anywhere	4.8 (1.3)	5.2 (0.8)	0.21	Y
6	Facilitate overall workflow for patient monitoring	4.8 (1.2)	5.0 (1.1)	0.32	Y
7	Enhance closed loop communication in team for result management	4.4 (1.7)	5.0 (1.1)	0.18	Y
8	Integration with eDoc is satisfactory*	NA	NA	NA	NA
9	CDB displays clear information for result management	3.3 (1.4)	4.8 (1.0)	0.02	N
10	Nurse acknowledgement feature is useful	4.2 (1.2)	4.7 (1.0)	0.15	Y
11	User friendliness	4.0 (1.7)	4.8 (1.2)	0.13	Y
12	Enhance patient safety	4.2 (1.8)	5.0 (0.8)	0.13	Y
13	Overall satisfaction	4.1 (1.8)	5.0 (1.1)	0.10	Y

*Only hospital B has implemented eDoc by Oct 2025 which is an electronic platform under CMS for documentation.

P-value < 0.05 (Yellow)

•**Test type:** Independent T-test

•**Tail:** One-tailed (Nurse expected to have higher scores)

In comparison with conventional method for result screening via paper printout, please indicate your comments on ERS (**Dr vs Nurse - Inpatient**)
 (Rating from 1 – 6, with 1 as totally disagree and 6 as totally agree)

		Dr (SD)	Nrs (SD)	P-value	Significant diff (<0.05)
1	Reduce risk in incorrect report filing	3.9 (1.8)	4.6 (1.4)	0.15	N
2	Reduce time in filing or searching patient reports	3.8 (1.4)	4.2 (1.6)	0.24	N
3	Promote faster response time for doctor screening	3.1 (1.6)	3.4 (1.6)	0.32	N
4	Promote faster response time for nurse to follow up with doctor order	3.5 (1.7)	3.4 (1.6)	0.47	N
5	Facilitate result screening anytime anywhere	4.4 (1.2)	4.0 (1.5)	0.23	N
6	Facilitate overall workflow for patient monitoring	4.0 (1.4)	3.8 (1.5)	0.34	N
7	Enhance closed loop communication in team for result management	3.8 (1.3)	3.6 (1.5)	0.41	N
8	Integration with eDoc is satisfactory*	3.0 (1.4)	3.7 (1.5)	0.32	N
9	CDB displays clear information for result management	4.3 (1.2)	3.7 (1.5)	0.14	N
10	Nurse acknowledgement feature is useful	3.5 (1.4)	3.6 (1.5)	0.42	N
11	User friendliness	3.5 (1.5)	3.2 (1.6)	0.30	N
12	Enhance patient safety	3.6 (1.8)	3.9 (1.4)	0.35	N
13	Overall satisfaction	3.3 (1.5)	3.5 (1.6)	0.32	N

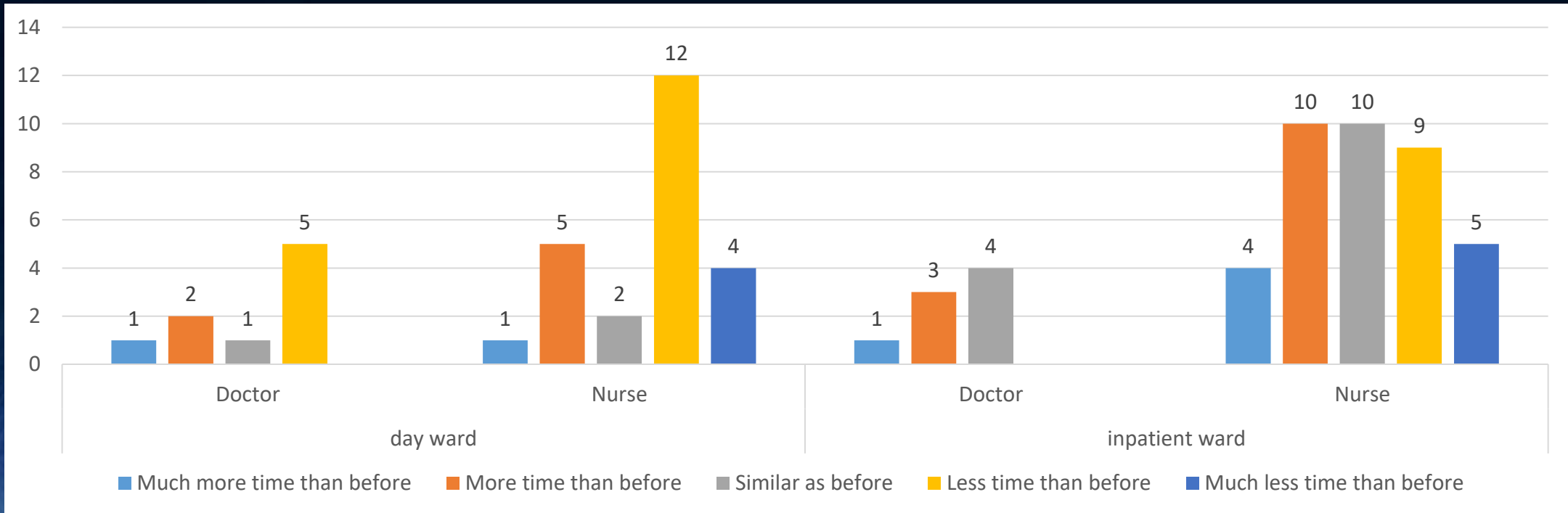
*Only hospital B has implemented eDoc by Oct 2025 which is an electronic platform under CMS for documentation.

P-value < 0.05 (Yellow)

•**Test type:** Independent **T-test**

•**Tail:** One-tailed (Nurse expected to have higher scores)

Do you spend less or more time in accessing / managing patient reports after ERS?



Day Ward staff, particularly nurses, report spending **less time managing patient reports after ERS**, with 64% (21/33) reporting time savings. In contrast, Inpatient Ward staff show **mixed results**, with only 30% (14/46) indicating time savings and 39% (18/46) reporting spending more time.

Open ended Questions

What challenges have you encountered while using ERS and how do you manage?

What improvements would you suggest for ERS?

Other comment

Positive (1)	<ul style="list-style-type: none">• Easy to use (D)
Doctor compliance in report screening (5)	<ul style="list-style-type: none">• Require to remind doctor to access Result Screening (C,D)• Intern not familiar with the product (D)• Hard to check whether the report has been screened or not (D)
User friendliness (5)	<ul style="list-style-type: none">• Time to login PC (A,B,C,D)• Time to understand each button function (A,B,C,D)
Doctor workflow (5)	<ul style="list-style-type: none">• For doctors, how to review report previously screened by self? (D)• When result is abnormal, it cannot mark done after screened by houseman (D)• Still need to document via paper CMS (C)• 病人 牌板少左記錄(A)
Nurse workflow (3)	<ul style="list-style-type: none">• Handover workflow for transfer between pilot and non-pilot site (C,D)• 要用MEMO紙記下搵左的血！要記幾時番！（A）

Open ended Questions

What challenges have you encountered while using ERS and how do you manage?

What improvements would you suggest for ERS?

Other comment

Acknowledgement workflow (5)	<p>Nurse hesitate to press “Acknowledge CDB” when result normal (A,B,C,D)</p> <ul style="list-style-type: none"> • Suggest changing button of “Acknowledge CDB” into “Pending Dr screening” • Directly display report “pending doctor screening” onto CDB without mouse over <p>Dr unable to screen report if nurse created documentation but temporarily save only</p> <ul style="list-style-type: none"> • Screening should be allowed if previous user is temp save only (A)
Enhance doctor function (4)	<ul style="list-style-type: none"> • Add a function “Refer to CMO” when result require seeking CMO advice (D)
Enhance patient list for doctor and nurse (3)	<ul style="list-style-type: none"> • Allow filter function at patient list, e.g. bed number, ward code (A, B, C, D) • Auto refresh patient list without clicking “Search” again and again (A, B, C, D) • Indicate report with deranged value (C)
Notification (3)	<ul style="list-style-type: none"> • Review the trigger threshold of email notification for unscreened report, esp day ward • Explore message notification via phone or flashing notifications at CMS (C)
Enhance system integration (2)	<ul style="list-style-type: none"> • ePR/eDoc integration to match with usual report screening workflow (B)
Printing function (2)	<ul style="list-style-type: none"> • Allow mandatory printing for specific type of result, e.g. T&S (D)
Bookmark result for review (1)	<ul style="list-style-type: none"> • Allow doctor / nurse to bookmark reports for further review, even FU action done (D)
Access right issue (1)	<ul style="list-style-type: none"> • Access right to new doctors should be auto assigned based on CMS role rather than relying on team administrator (C)
Enhanced enquiry function (1)	<ul style="list-style-type: none"> • Indicate the time of doctor screening at “Log Enquiry” and allow sorting (B)
Others (2)	<ul style="list-style-type: none"> • No need to spend much time to check lab results during handover duty (A) • Show next FU date in lab result screening page (D)

Discussion

- FINDINGS INTERPRETATION
- IMPLICATION ON SDG
- LIMITATION

Key Findings (1)

Day Ward Staff

- All, esp. nurses, reported high satisfaction and efficiency with ERS, with 64% (21/33) indicating time savings.
- Satisfaction scores were significantly higher than Inpatient Ward for most items, with overall satisfaction at mean = 4.7 (SD = 1.3).

Inpatient Ward Staff

- Satisfaction is mixed due to challenges in:
 - User-friendliness (mean = 3.2, 43% positive)
 - And overall system design in supporting communication, screening workflow and system integration, leading to challenges in Dr response times (mean = 3.4, 48% positive)

Doctors in Inpatient Ward

- Only **25% (2/8)** indicating improved response times
- **Longer time spent on result screening,** contributing to lower satisfaction (**mean = 3.3, SD = 1.5, 38% positive**)

Interpretation and Suggestion

Key factors of user acceptance on new technology are related to:

- **System design**, which impacts user-friendliness and workflow efficiency.
- **Workflow alignment**, ensuring the system meets practical, day-to-day needs.
- **Integration with existing system**, minimizing disruptions and ensuring seamless operation.
- **Staff training**, which is critical for adapting to and effectively utilizing new systems.

System design #user-friendliness #workflow efficiency

Literature (Highfill, 2020; Mullins et al., 2020; McDowell et al., 2017; Aronson & Aronson, 2021):

- System design is a critical factor for user acceptance of new system.
- Poor usability and workflow disruptions are consistent barriers to successful implementation.

Suggestion:

- Low satisfaction among Inpatient Ward staff reflects the need for a **better system design tailored to complex inpatient workflows.**
- End-user involvement in system enhancements is essential to achieve a **user-centered design.**

Workflow alignment #ensuring the system meets practical, day-to-day needs

Literature (Barbieri et al., 2023; Fuller et al., 2018; Mace, 2016; Mullins et al., 2020):

- Workflow alignment is critical to avoid inefficiencies in digital systems. Design flaws and staff workarounds often hinder the time-saving potential.
- Significant variation in EHR outcomes based on healthcare settings and implementation strategies.

Suggestion:

- The **higher satisfaction in Day Wards** may stem from simpler workflows, e.g. handover process.
- The **inherent complexity of inpatient workflows** is the major factor affecting user satisfaction.
- The discrepancy highlights the importance of **tailoring system workflows to the specific demands of each setting**.

Integration with the existing system # seamless operation

Literature (AHC Media, 2015; Mace, 2016; Shafique et al., 2023):

- Seamless integration between systems is critical for time-saving and reducing errors.
- Lack of integration often results in **rework, incorrect information, and inefficient processes.**

Suggestion:

- User feedback strongly suggests **improving ERS integration** with eDoc, EPR and other existing system
- Integration is particularly critical for the Inpatient Ward, where workflows are more complex and require seamless data exchange across systems.

Staff training #adaptability to utilize new systems

Literature (Mullins et al., 2020; Fei et al., 2019; McDowell et al., 2017):

- Proper training is essential for successful new system adoption
- Insufficient training often leads to low utilization, misunderstanding, and workflow disruptions.

Suggestion:

- The dissatisfaction among Inpatient Ward staff highlights the need for **targeted training programs** to address competency gaps and reduce the learning curve.
- User feedback reveals difficulties and misunderstandings in using the ERS, further emphasizing the importance of comprehensive and ongoing training

Key Findings (2)

Common Benefits of ERS

Both groups agree that ERS:

- Facilitate filing (mean = 4.8, 86% positive)
- Reduce errors (mean = 4.4, 73% positive)
- Enables result screening anytime, anywhere (mean = 4.5, 84% positive)

Literature (Campanella et al., 2015; Fei et al., 2019; Taneva et al., 2024):

- The benefits of digital systems in improving accuracy and reducing errors are well-documented in research.

Suggestion:

- The consensus on filing accuracy, convenience, and result screening demonstrates a key strength of the ERS.
- However, the lack of significant improvement in time efficiency for inpatient workflows highlights **the need for further system enhancements**, particularly in complex settings.

Implication on SDG

	Pilot site	No. of report	
		Monthly	Daily
Hospital A	Medical day ward	157	5.23
	Paediatric inpatient ward 1	70	2.33
	Paediatric inpatient ward 2	104	3.47
Hospital B	EM inpatient ward	1889	62.97
Hospital C	O&T inpatient ward	1780	59.33
	SUR inpatient ward	3973	132.43
Hospital D	Medical day ward	1200	40.00
	Paediatric day ward	832	27.73
	ENT/SUR day ward	547	18.23

*Around 1min for each report filing

^One tree to make 8 333 sheets of paper, with reference to the HA Annual Report 2021 – 2022

More time on direct patient care

1-2hr time saving from report filing (for each inpatient ward)*

Enhanced patient safety

via accurate filing and accurate documentation

SDG 3: Good Health and Well-Being

The project improves healthcare efficiency and enhances patient safety by ensuring timely, accurate, and reliable handling of diagnostic reports, contributing to higher quality care delivery.

SDG 9: Industry, Innovation, and Infrastructure

By implementing an Electronic Result Screening (ERS) system, the project fosters innovation in healthcare through the adoption of advanced digital solutions, improving infrastructure and processes.

Reserve valuable storage space

which could be repurposed for clinical use.

Paper wastage^

4 inpatient wards consume 1 tree/month

SDG 12: Responsible Consumption and Production

- The project reduces paper usage in healthcare settings, promoting sustainable resource management and minimizing waste, aligning with responsible consumption and production goals.

SDG 13: Climate Action

- By significantly reducing paper waste, the project contributes to climate action efforts by lowering the environmental footprint of healthcare operations and supporting more sustainable practices.

Limitation

- Sample Size and Generalizability
- Focus on user perception and difficulty in motion study due to complicated workflow in result management
- Time constraint and lack of re-evaluation
- Validated assessment tool

Conclusion

Conclusion

- The ERS demonstrates **promising benefits**, by **reducing paper filing**, **minimizing errors**, and **facilitating anywhere-access**
- Overall satisfaction is higher in Day Wards, likely due to their simpler workflows compared to the more complex workflows of Inpatient Wards.
- **Inpatient Wards reported mixed satisfaction**, highlighting the need for improvements in **System design**, **Targeted user training**, and **Integration with existing systems** to unlock the system's full potential.
- Future studies should focus on **gathering detailed user feedback** through department-specific consultations to identify individual barriers and ensure the ERS is tailored to fit **unique workflow requirements**.

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