

# Enhancing Timeliness in Reviewing CXR and Avoiding Oversight Through Targeted Interventions

Quality & Safety Division, NTWC

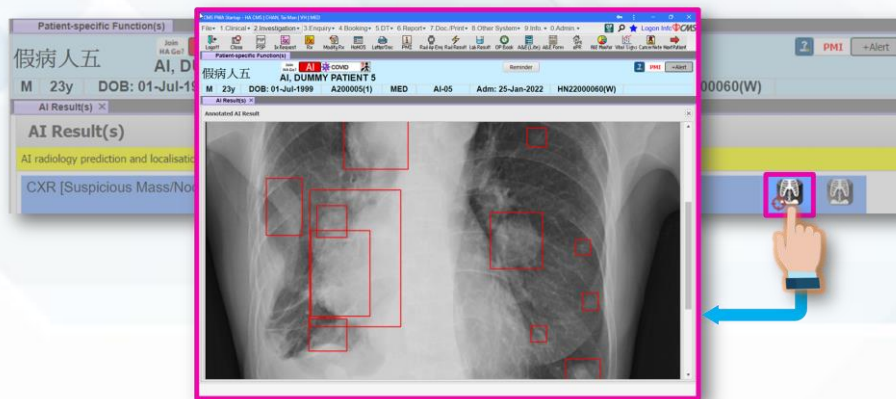
Information Technology and Health Informatics Division, HAHO

HA Convention

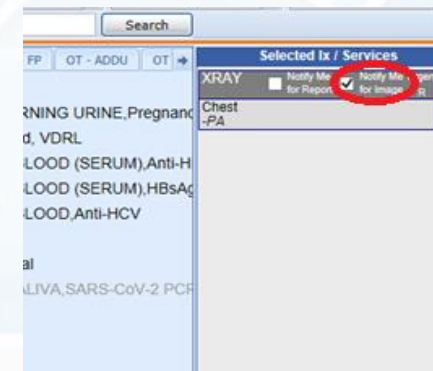


## Background

- In clinical practice, **hundreds of chest X-rays (CXRs)** were taken everyday.
- Several incidents in the past revealed that clinicians may
  - Inadvertently overlook CXRs**
  - Miss significant findings of CXRs**
- Resulting in missed critical pathologies, including malignant lung masses
- Potential harm to patients, our staff and the hospital**
- To tackle the potential risks, HA has developed and rolled out **AI tools and notification system** to
  - Provide real-time decision support to clinicians and
  - Remind clinicians to review the unread CXRs



Chest X-ray AI support



Notify Image Alert System



## Chest X-ray AI support

HA has developed and rollout Chest X-ray AI support

- Prioritize CXR cases
- Providing real-time decision support to clinicians
- Detecting/localizing abnormalities on CXR images.
- Mainly include the following
  - Suspicious Mass / Nodule with localization
  - Suspicious Pleural Effusion
  - NG tube recognized to be above diaphragm



- Provide valuable insights
- Flag potential abnormalities
- Help streamline the diagnostic process



But it has **its limitations** and **false –ve occurs**.  
It still requires clinicians to timely review and provide professional judgements

Patient-specific Function(s)

Patient Selection Panel

Select Print List Retrieve Chinese Reduce

Select from AI Results Patient List

AI Result List CXR From 28-Jan-20

Patient Type OP Specialty MED

No. of patient(s) display

English Name	HKID	Sex/Age	Case Number	Sp
AI, DUMMY PATIENT 57		M/61y	MED 2110195V	

CXR [Suspicious Mass/Nodule] on 28-Jan-2022 10:40 in VH by AI

AI Result(s) X

AI Result(s) Retrieve

AI radiology prediction and localisation is intended for decision support only. The healthcare professional shall bear the duty of care to patient.

Hip X-Ray [Suspicious fracture, femoral neck and trochanter region] on 08-Nov-2022 10:30 in VH by AI.

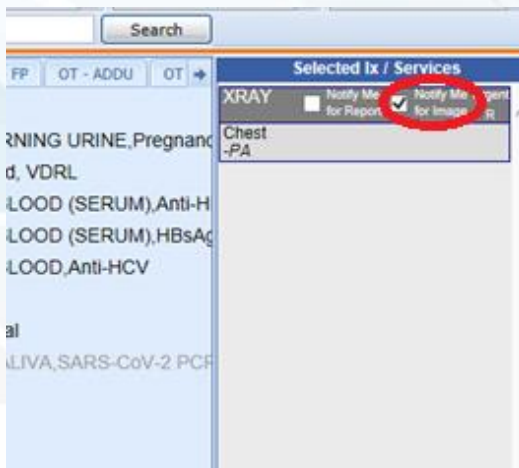
CXR [Suspicious Mass/Nodule, Pleural Effusion] on 24-Oct-2022 11:05 in VH by AI.



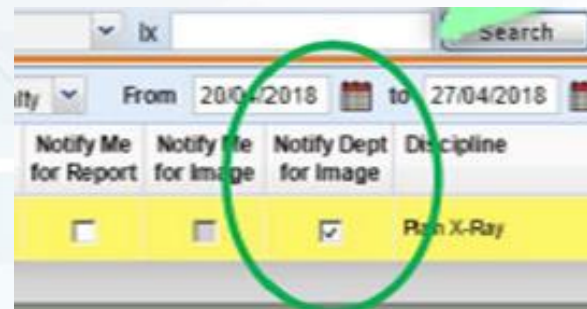
## Notify Image Alert System

- HA rolled out the enhancement programme on plain x-ray image notification
- To ensure timely and safe handling of radiological results
- **“Notify me” function in CMS was launched.**
- Notify clinicians when the image is ready for review

“**Notify Me** for Image” checkbox activated by default during request investigation



“**Notify Department** for Image” checkbox activated by default during request investigation



X-rays not reviewed by the requestor within 14 days would show in the **“Departmental Folder”** under **“Image Ready”** in **clinical in box** and viewable by other users in the same department

Important Result Reminder

My Consultation

Notify Me

Image Ready

Referral Feedback

Flagged

Read

Log

All Dates

From Date : 28-Dec-2017

To Date : 28-Jun-2018

Refresh

Clear

Number of new messages in specified period: 4

Message ID	Date	Patient Name	Sex	Modality	Exam Name	Ward / Clinic	Urgent	Exam Date	Status
Requesting Hospital: VH (Total number of messages: 4)									
19721736	26/06/2018 17:19	LAM CHING YEE	F	XRAY	Cephalometry	AN		26/06/2018 17:18	Unread
19721734	26/06/2018 17:18	LAM CHING YEE	F	XRAY	Cephalometry	AN		26/06/2018 17:17	Unread
19721722	26/06/2018 16:58	LAM CHING YEE	F	XRAY	Cephalometry	AN		26/06/2018 14:19	Unread
19721721	26/06/2018 16:58	LAM CHING YEE	F	XRAY	Cephalometry	AN		26/06/2018 14:18	Unread

# The loophole of CXRs management

Before  
2021

Several incidents revealed that clinicians may

- Inadvertently overlook CXRs
- Miss significant findings of CXRs

2022



## Chest X-ray AI support

- Real time decision support
- Detecting / localizing abnormalities on CXR images

## Notify Image Alert System

- Notify clinicians when the image is ready for review



2023



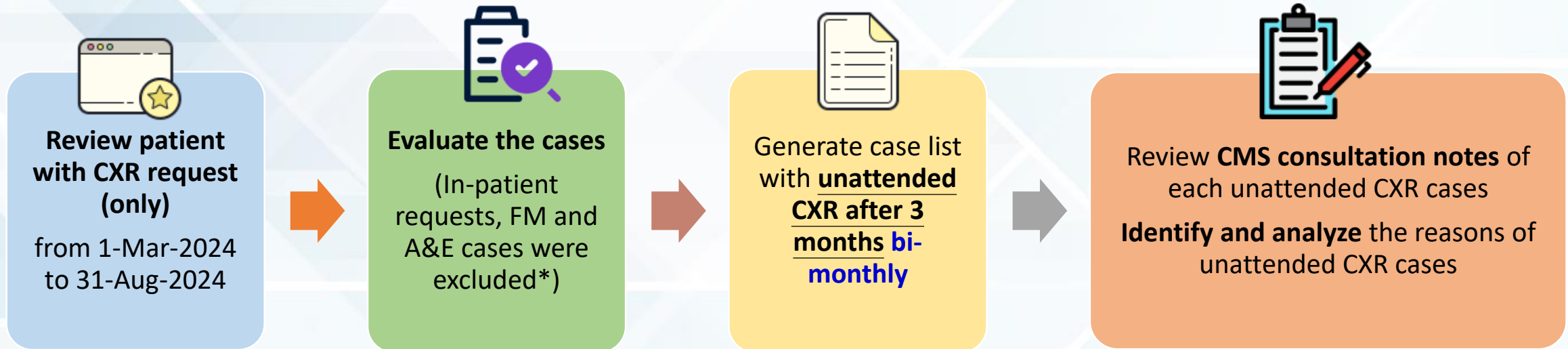
**But still...  
there were lesions missed  
due to unseen CXRs**



**We need an ultimate solution to cover the gap!!!  
終極包底**

## What have we done?

The Quality & Safety Division of the New Territories West Cluster (NTWC) collaborated with the Head Office Information Technology and Health Informatics



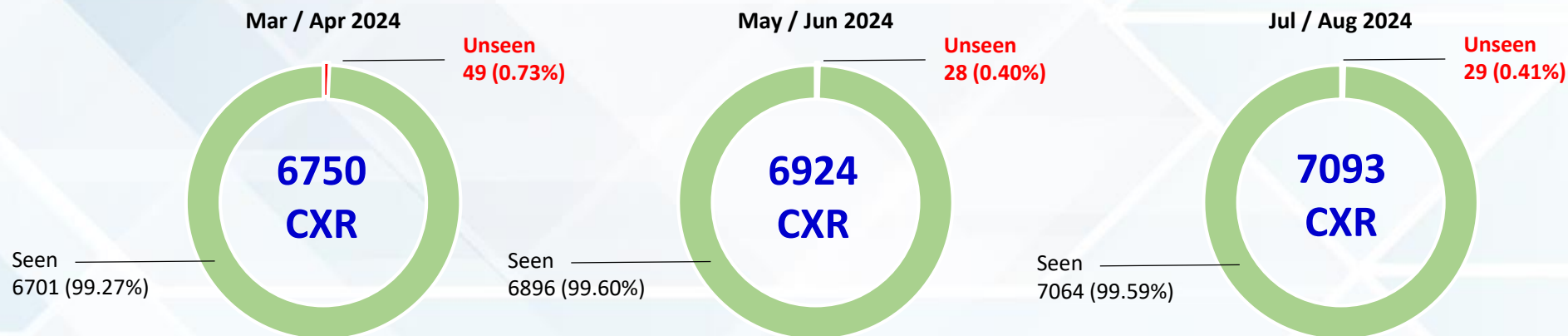
# NTWC Unattended CXR List

ATTD_HOSP_CD	CASE_NO	REF_DOCTOR_CD	REF_DOCTOR_NAME	ATTD_SPEC_CD	EXAM_TAKEN_DTM	IMG_READY_DTM	EXAM_DESC	STD_MODALITY_GROUP
POH				DRHE	2024-07-04 10:35:59.000000000	2024-07-04 10:43:06.636000000	Chest	S1
TMH				HEON	2024-07-05 16:22:59.000000000	2024-07-05 16:46:49.306000000	Chest	S1
TMH				THO	2024-07-08 09:01:19.000000000	2024-07-08 09:12:14.420000000	Chest	S1
TMH				THO	2024-07-12 14:58:33.000000000	2024-07-12 15:01:32.756000000	Chest	S1
POH				ORT	2024-07-15 14:04:42.000000000	2024-07-15 14:25:02.676000000	Chest	S1
TMH				THO	2024-07-15 11:00:50.000000000	2024-07-15 11:09:52.883000000	Chest	S1
TMH				HCTS	2024-07-22 15:50:08.000000000	2024-07-22 16:13:28.333000000	Chest	S1
TMH				HCTS	2024-07-22 11:27:55.000000000	2024-07-22 11:52:46.410000000	Chest	S1
TMH				GYN	2024-07-25 14:59:08.000000000	2024-07-25 15:06:04.640000000	Chest	S1
TMH				PED	2024-07-25 15:37:52.000000000	2024-07-25 15:58:05.650000000	Chest	S1
TMH				THO	2024-07-29 11:06:38.000000000	2024-07-29 11:12:27.846000000	Chest	S1
TMH				THO	2024-08-01 14:20:08.000000000	2024-08-01 14:48:20.080000000	Chest	S1
TMH				PED	2024-08-02 12:24:00.000000000	2024-08-02 12:24:47.933000000	Chest	S1
TMH				THO	2024-08-05 14:40:08.000000000	2024-08-05 14:47:29.610000000	Chest	S1
POH				MG	2024-08-06 10:31:01.000000000	2024-08-06 10:32:33.960000000	Chest	S1
TMH				SUR	2024-08-06 16:25:51.000000000	2024-08-06 16:25:44.300000000	Chest	S1
TMH				THO	2024-08-08 14:13:22.000000000	2024-08-08 14:20:25.203000000	Chest	S1
TMH				THO	2024-08-12 14:38:31.000000000	2024-08-12 14:45:37.816000000	Chest	S1
TMH				THO	2024-08-12 10:16:44.000000000	2024-08-12 10:26:38.626000000	Chest	S1
POH				MG	2024-08-16 11:34:17.000000000	2024-08-16 11:36:55.703000000	Chest	S1
TMH				SUR	2024-08-16 14:48:12.000000000	2024-08-16 15:02:41.993000000	Chest	S1
TMH				THO	2024-08-19 11:38:37.000000000	2024-08-19 12:03:27.426000000	Chest	S1
POH				MRHE	2024-08-20 16:04:07.000000000	2024-08-20 16:28:28.206000000	Chest	S1
TMH				GYN	2024-08-22 14:18:39.000000000	2024-08-22 14:22:36.433000000	Chest	S1
POH				SUR	2024-08-23 12:47:17.000000000	2024-08-23 12:49:16.463000000	Chest	S1
TMH				THO	2024-08-26 15:05:08.000000000	2024-08-26 15:22:12.200000000	Chest	S1

## Results and outcome

From 1 March 2024 to 31 August 2024,

**20,767** CXR were performed



**< 1%** were unread after three months

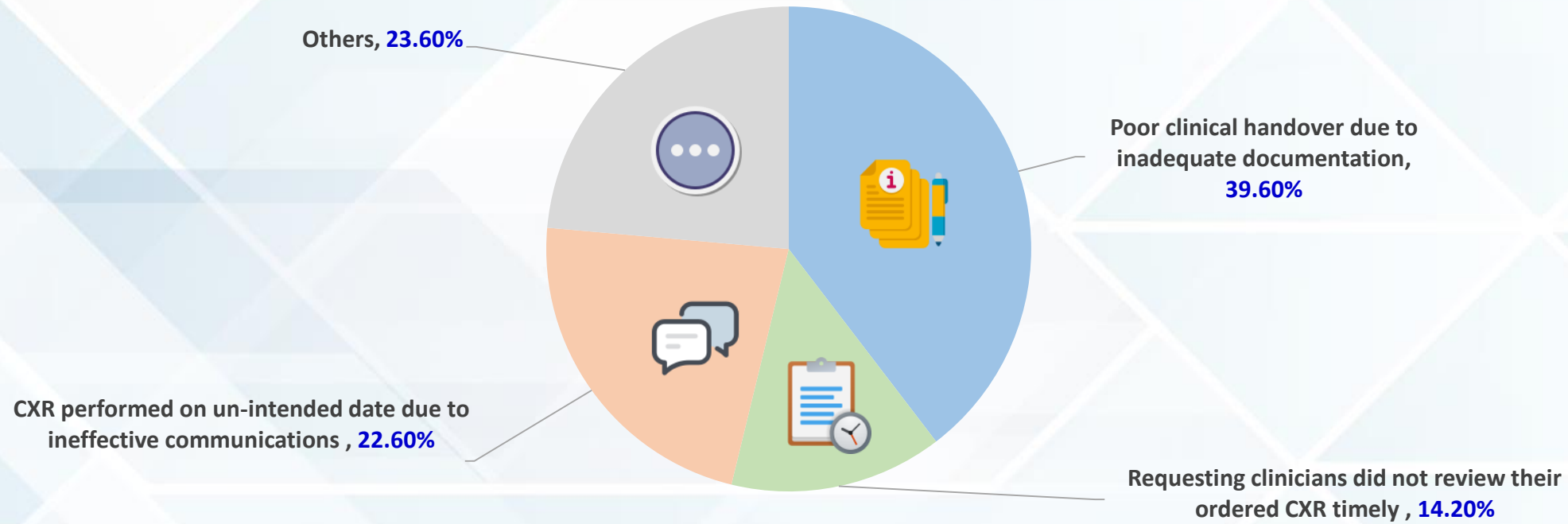


It still poses **significant risk** to **delay in clinical management** and **medico-legal consequences**

**1個都不能少**



## Major factors for CXR being unseen



- In response, we have implemented targeted **strategies to mitigate the risk of oversights**:
  - **Reminders** were sent regularly to clinicians to review their ordered CXR.
  - **Bi-monthly reports** on unread CXR were sent to their respective department heads to follow.
  - **Booking process** was enhanced
  - **Training** that focused on effective clinical-handover and accurate documentation were on-going.
- Unseen CXRs decreased from 0.7% to 0.4%

## Case sharing

20 Nov 2024



- M/89, history of chronic lung disease and pulmonary fibrosis
- Follow up medical clinic



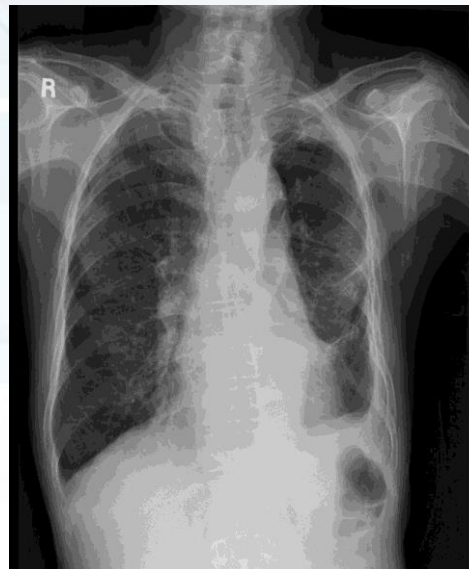
### Following the consultation:

- Planned to follow up the patient **4 months later with a CXR prior**
- However, a scheduled follow-up appointment set for **30 June 2025**
- Outside the recommended 4-month interval

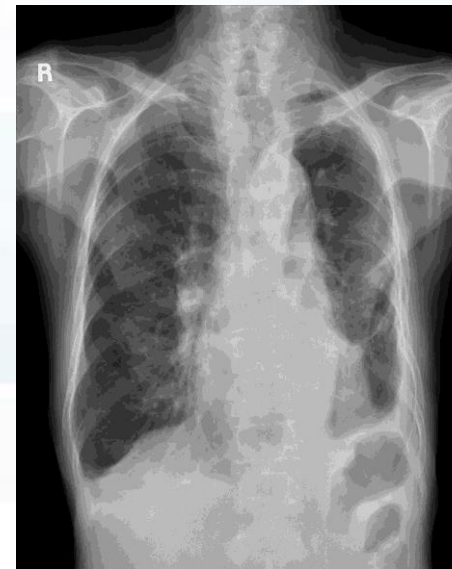
15 Jan 2025



- CXR taken, Notify Image System alerted the clinician that the CXR was ready for review



Jul 2024



Sep 2024



15 Jan 2025

# Case sharing

31 Mar 2025



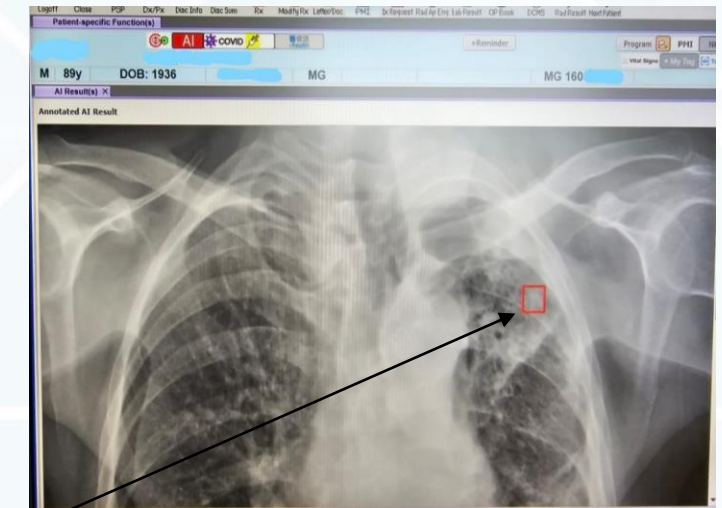
- Found that the CXR **was not acknowledged as "Read"**
- Not reviewed for more than 2 months, **appear in the NTWC Unattended CXR List**

The screenshot shows the 'Authority Clinical Management System' interface. It displays a table of unattended CXR messages. The table has columns for Date, Exam Date, Patient Name, Sex, Exam Name, Modality, Specialty, Ward / Clinic, Bed No, Case No, Recipient Name, and Status. The status for all listed messages is 'Unread'.

Date	Exam Date	Patient Name	Sex	Exam Name	Modality	Specialty	Ward / Clinic	Bed No	Case No	Recipient Name	Status
24/01/2025 14:56	24/01/2025 14:43		M	Chest	XRAY	MRES	RESP				Unread
21/01/2025 15:58	21/01/2025 15:27		F	Chest	XRAY	MG	AIM2				Unread
21/01/2025 15:23	21/01/2025 14:42		F	Chest	XRAY	MG	AIM2				Unread
20/01/2025 09:50	20/01/2025 08:46		M	Foot	XRAY	MGTC	RH02				Unread
15/01/2025 17:18	15/01/2025 16:04		M	Chest	XRAY	MRES	RESP		MG 160		Unread



- Q&S reviewed the NTWC Unattended CXR List for patient safety and hospital safety purpose
- CXR revealed significant findings
- Increasing opacities indicative of possible infective changes (PTB)**
- Medical team & Rad Dept were informed
- Radiological formal report was received
- Pt was called back for further evaluation on 7 Apr



The role of AI: Clinical Decision Support  
Alert for lung mass/nodule at the moment

**\*AI will not alert for TB infections**

## Benefits of Enhancing Timeliness in Reviewing CXR

### Patients

- **Improve patient survival rates and outcomes** by timely diagnosis and earlier treatments
- **Increase patient satisfactions**

### Staff

- **Provide medicolegal protection for our staff**
- **Reduce anxiety** of missing review CXR
- **Reinforce a culture of accountability**

### Corporate

- Promote a **culture of accountability and continuous improvement**
- **Minimize delayed treatment for patients** due to missed lesions on unseen CXRs



**NO extra costs was added for this project**



# Conclusions and Way forward

! All CXR should be read timely !

## Unattended Radiology Image List on CMS

Unattended Radiology Image List – POH – Jan-2025

Demographics	Episode	Exam Date/Time	Modality	Exam Name	Request Type	Request Specialty
--- 64y APACHE, TESTING PATIENT 1	HN25000005	28-Jan-2025 11:02	XRAY	Chest	IP	MG
--- 27m APPLE, PIE 0819	MED1234567	27-Jan-2025 15:02	XRAY	Chest	OP	MG
陳健康 28y CHAN, HEALTHY	HN25000001	12-Jan-2025 11:02	XRAY	Hip	IP	ORT
何蘋果 23y HO, APPLE	AE25000004	08-Jan-2025 17:20	XRAY			

Filter

Exam Period

Modality

Exam Name

Request Type

Request Specialty

Smart Patient List

List Title	Unattended Radiology Image List – POH – Jan-2025									
Filter										
Modality	XRAY									
Exam Name	Chest									
Request Type	OP									
List Retrieval Time:	24-Mar-2025 14:41									
No. of Records:	1									
Exported By:	CHAN, Siu Ming ( Medical Officer ) on 24-Mar-2025 14:41									
<b>Disclaimer</b> Patient list should be accessed on "Patient-under-care" and "Need-to-know" basis. Your access is subject to audit check. Unauthorized access will lead to disciplinary action.										
English Name	Chinese Name	Age	Sex	Episode	Exam Date/Time	Modality	Exam Name	Request Type	Request Specialty	Requested By
APPLE, PIE 0819	-	27m	M	MED1234567	27-Jan-2025 15:02	XRAY	Chest	OP	MG	CHAN, TAI MAN

## Acknowledgement

- DR. YC Wong, CCE, NTWC
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  - Ms. Sena Sze

**Thank you!**

