Ambulatory image-guided lung biopsy as a safe and feasible approach to reduce hospital stay

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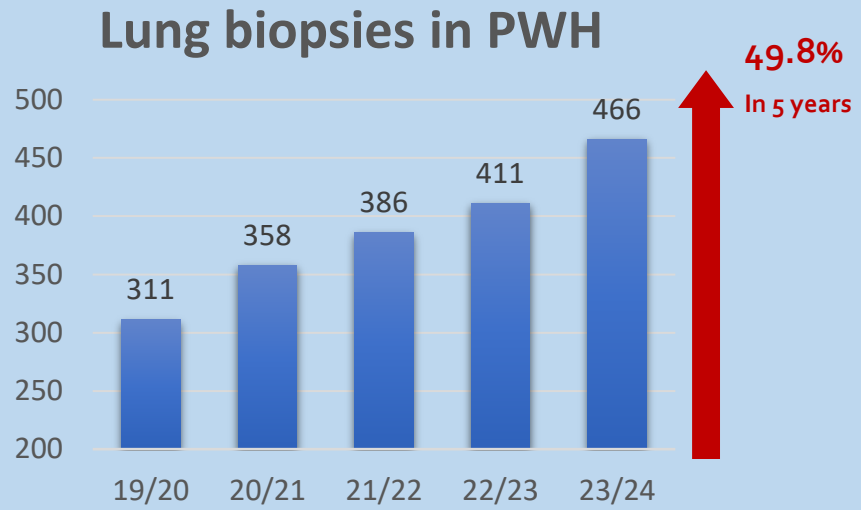
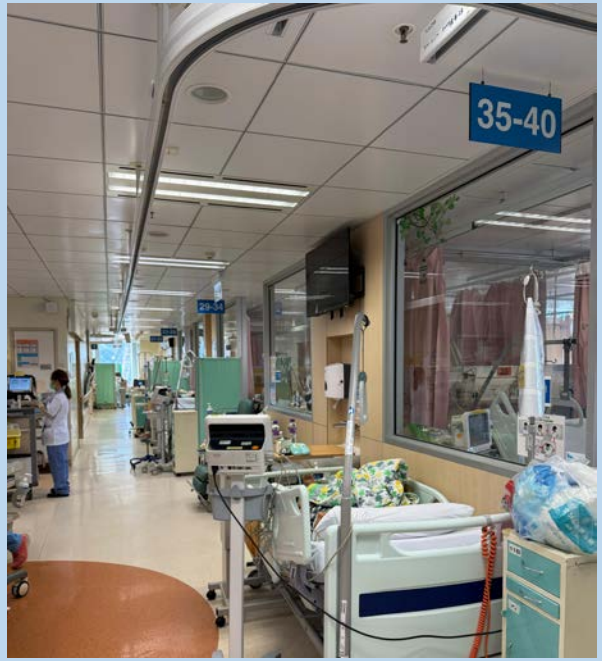
Oral presentation F1.4 (Better manage growing demands I) – HA Convention 2025

Introduction

- Huge volume of interventional radiology procedures performed everyday in each major hospital
- Growing demand for lung biopsies
- Inpatient bed-stay normally required for overnight monitoring of lung biopsies
  - Almost all of these patients ended up uneventful
  - But… overnight sleep in unfamiliar environments





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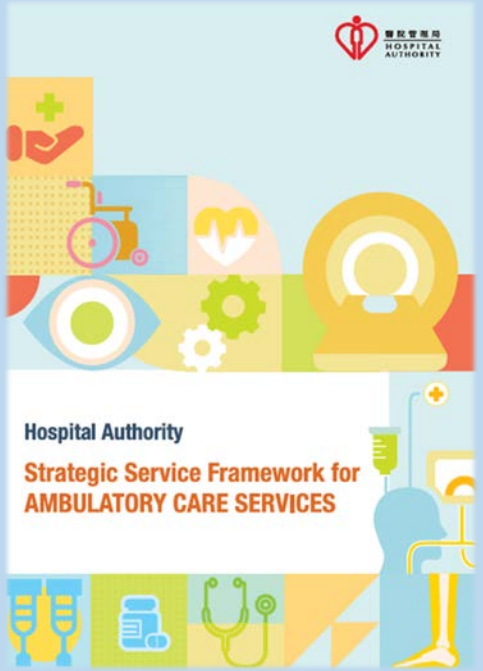
Introduction

- Increasing trend of ambulatory care in international literatures for radiology
- In line with HA strategic framework for ambulatory care services
- Can we adopt this model in image-guided lung biopsies?



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Objective

To evaluate the
feasibility, safety and cost-effectiveness
of an ambulatory interventional radiology
model for image-guided lung biopsy

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Methodology

- Conventional care model for image-guided lung biopsies

Referral from respiratory clinic

Admission to medical ward (+/- overnight observation)

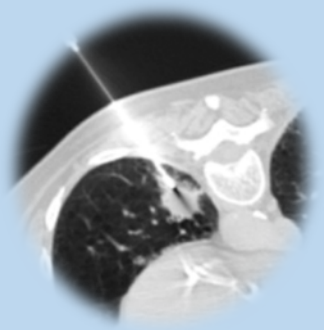

Image-guided biopsy

Overnight observation in medical ward

Review results in clinic

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Methodology

- Pilot of Ambulatory Care Pathway (May – November 2024)

Referral from respiratory clinic

Pre-procedural assessment in IR clinic By nurse and radiologist

Deemed not fit for ambulatory care

Admission to medical ward

Same-day admission to IR Ambulatory centre (IRAC)

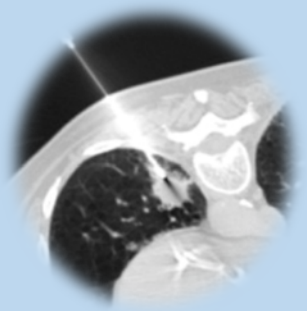

Image-guided biopsy

Complication requiring observation

Post-procedural observation in medical ward

Same-day discharge home And follow-up by nurse-led clinic next day

Review results in clinic

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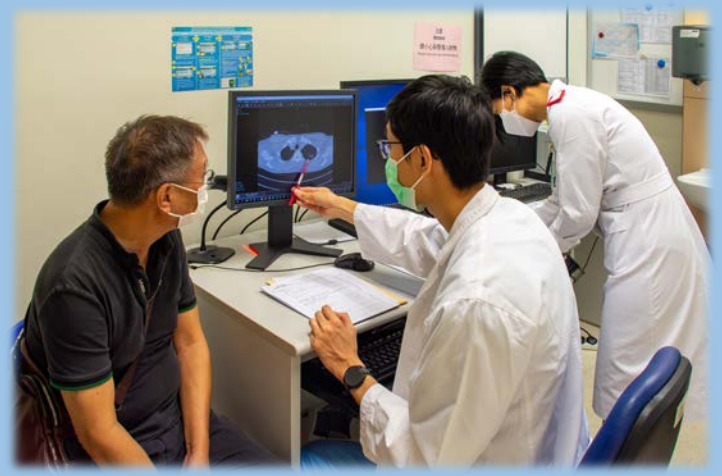
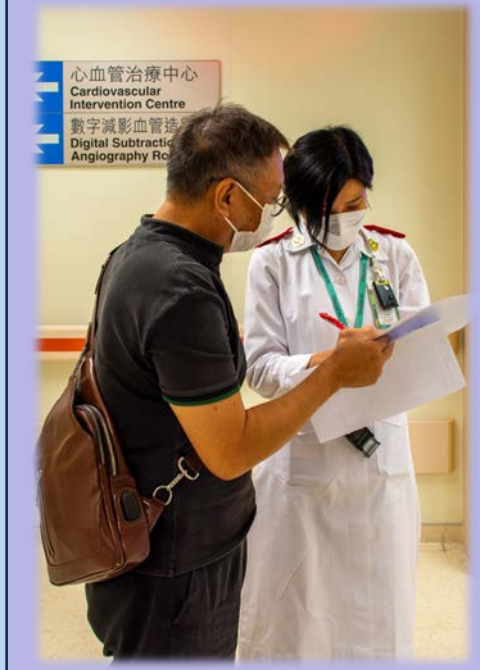
Dedicated Interventional Radiology Clinic



Role of Radiologist:

- Review previous imaging studies
- **Point-of-care USG** for feasibility of biopsy
- **Explain procedure** and answer queries
- **Informed Consent**



Role of IR Case Nurse:

- **Patient education** on condition and procedure
- **Patient empowerment** of periprocedural care
- **Sedation risk assessment**
- Arrange **pre-procedural investigations** and relevant follow-up
- **Close communication** with clinical teams

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Interventional Radiology Ambulatory Centre

- Dedicated day-care beds for Interventional Radiology patients incorporated in observation area
- Pre-procedural preparation by nursing staff
- Continuous monitoring by nurse at recovery bay after procedure

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Image-guided lung biopsy procedure

- Image-guided lung biopsy as per department protocol

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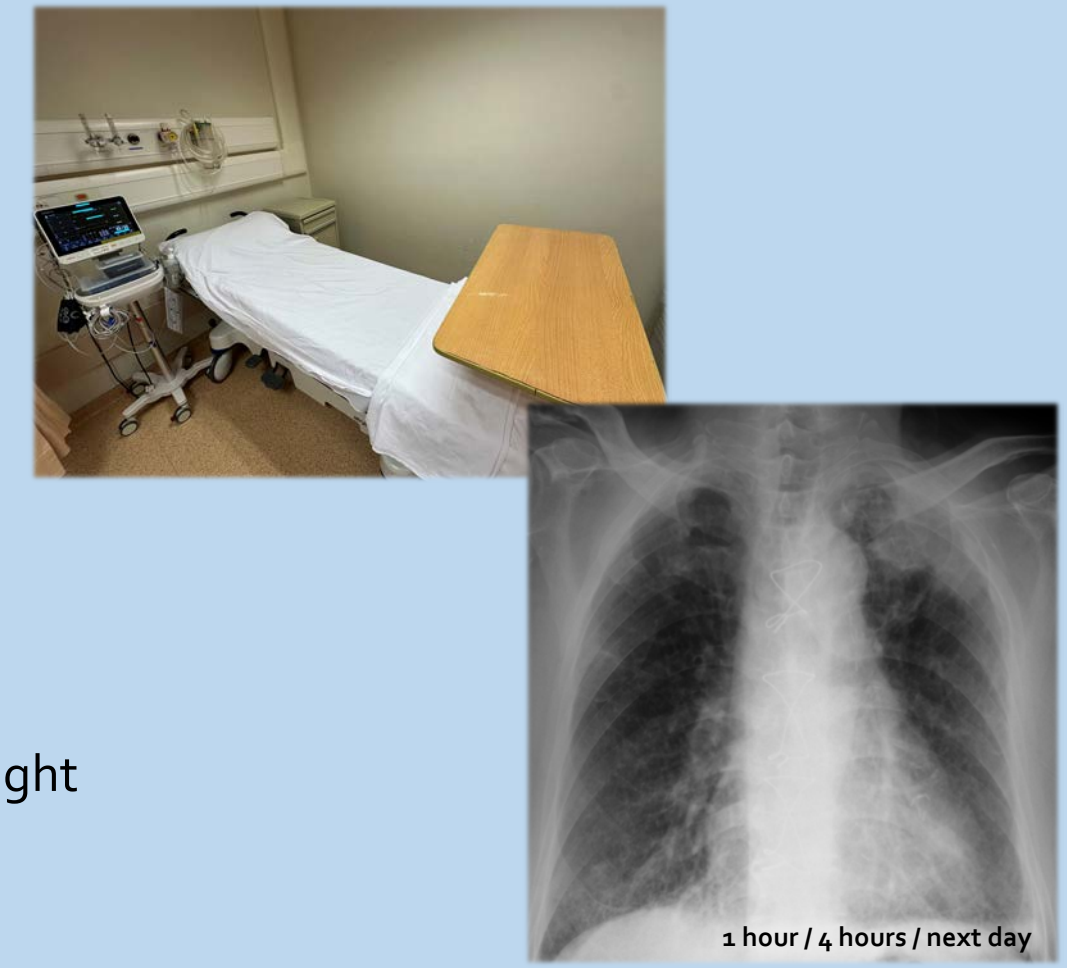
Monitoring after lung biopsy

- Monitoring at IR Ambulatory centre

- Post-procedural CT, and CXR (1 and 4 hours) to detect pneumothorax

- Fit for discharge if:
  - No pneumothorax on serial CXRs
  - No new symptoms after biopsy
  - ADL independent and accompany at home overnight

- Follow-up in IR clinic mane with 3rd CXR



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Outcomes

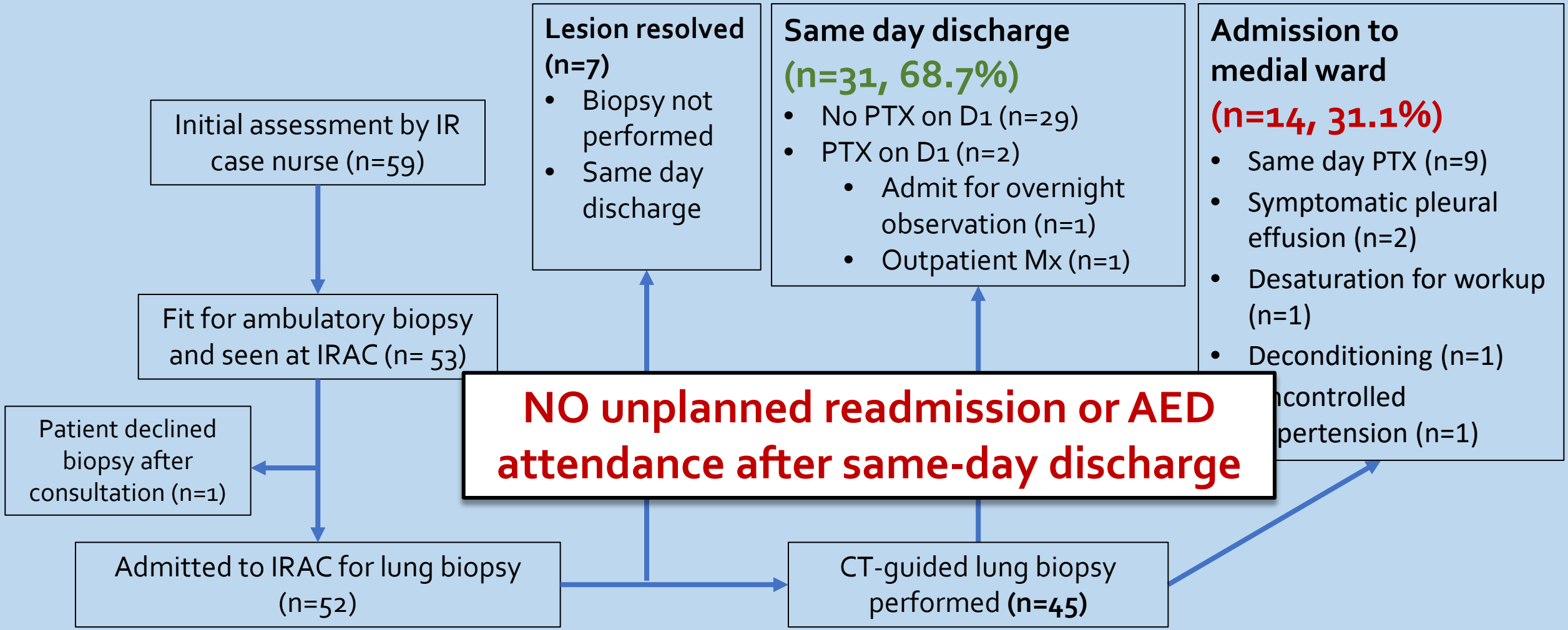
Domains	Parameters

Patient safety	• **Admission rate from IRAC**
	  • In accordance with protocol –percentage and causes
	  • Unplanned admission rate (after direct discharge from IRAC)

Procedural safety	• **Procedural success rate** – rate of patients with biopsy samples obtained
	• **Histological diagnostic accuracy rates** – rate of definitive diagnosis on biopsy
	• **Complication rate of lung biopsies** benchmarked against international standards
	  • Pneumothorax (with or without chest drain insertion)
	  • Significant haemoptysis requiring medical attention
	  • Other major complications

Cost effectiveness	• **Number of in-patient bed-days saved**
	  • Pre-procedure, on day of procedure, post-procedural monitoring
	  • Comparison against a historical cohort of patients between May and November 2023

Results – Flowchart and Patient safety



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Results – Procedural safety

Parameters	Results	Quality Improvement threshold[1]
Procedural success rate	**100% (45/45)**	N/A
Histological diagnosis rate	**95.6% (43/45)** • 34 carcinoma (SCC or adenocarcinoma) • 3 other malignancies • 6 benign (4 granulomatous inflammation) • 2 non-diagnostic requiring additional sampling	75%
Pneumothorax	**22.2% (10/45)** **4.4% (2/45)** requiring chest drain insertion	45% 20%
Other major complications	**0% (0/45)** e.g. massive haemoptysis, air embolism, injury to adjacent vasculature	0.1-2%

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[1]Gupta S et al. Society of Interventional Radiology Standards of Practice Committee. Quality improvement guidelines for percutaneous needle biopsy. J Vasc Interv Radiol. 2010 Jul;21(7):969-75.

Cost-effectiveness of lung biopsy

	Conventional Pathway (n=119)	Ambulatory Care Pilot (n=52)
Pre-procedural ward admission	**36 bed days** in 119 patients (32 1-day, 2 2-day)	**0 bed days** in 52 patients
Procedural day admission	**119 bed days** in 119 patients (inpatient bed)	**52 bed days** in 52 patients (Day bed)
Post-procedure hospital stay for patients without pneumothorax	**52 bed-days** in 65 patients 14 x same-day d/c, 50 x 1-day, 1 x 2-day	**0 bed days** in 40 patients
Post-procedure hospital stay for patients with pneumothorax	**190 bed days** in 54 patients Average length of stay = 3.52 days	**29 bed days** in 15 patients Average length of stay =1.93 days
Total number of bed days	**397 bed days** **= 3.36 bed days/ pt**	**81 bed days** **= 1.56 bed days/ pt**

↓ 1.8 bed day/ pt

= 93 Bed days for 52 patients

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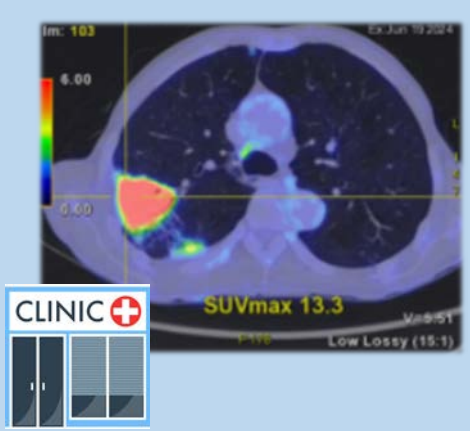
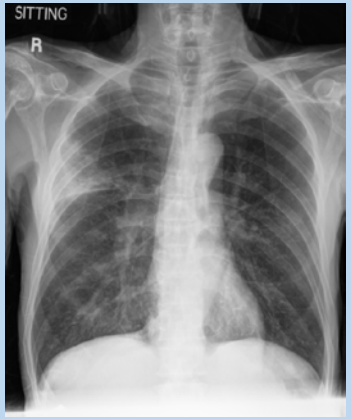
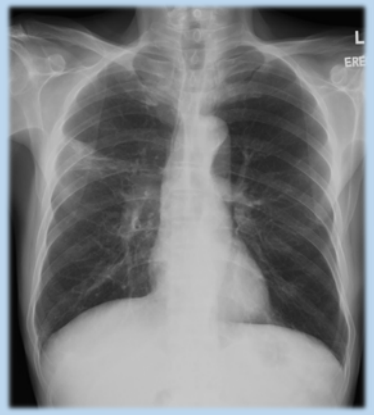
Putting into patient's context

- Mr. Tse, referred for biopsy of suspected lung mass

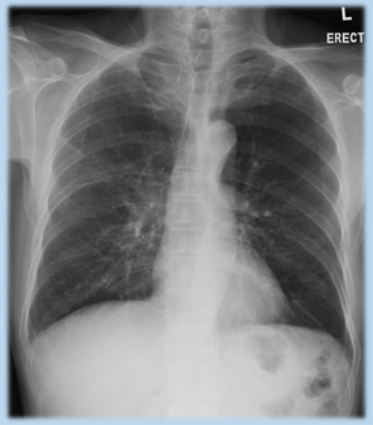




Workup for new lung collapse
PET-CT showed hypermetabolic lesion



Assessment in IR Clinic shows
resolving lesion, confirmed by low-dose CT



Pneumonia completely
resolved 3 months later

Reassurance and biopsy cancelled

- Avoids unnecessary procedural risk
- Better resource utilization

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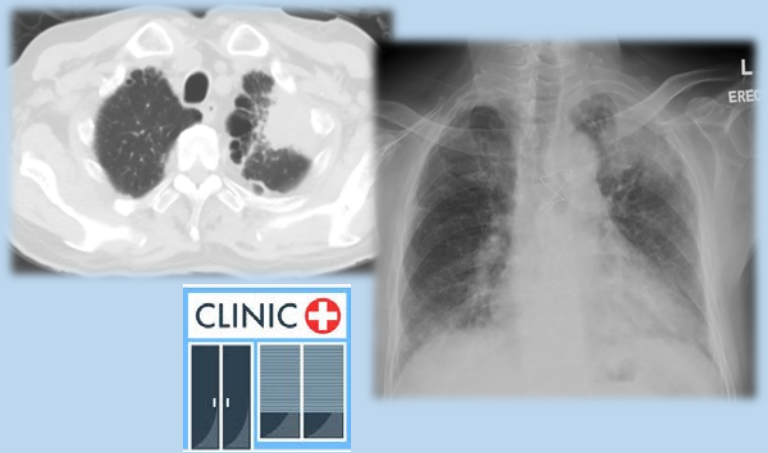
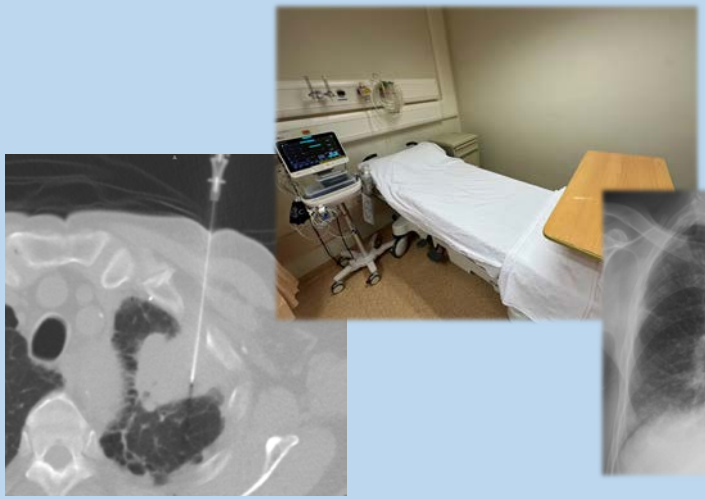
Putting into patient's context

- Another patient, Mr. Sze, is available and was called back

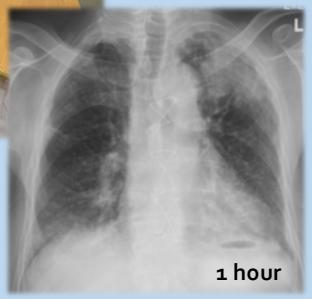


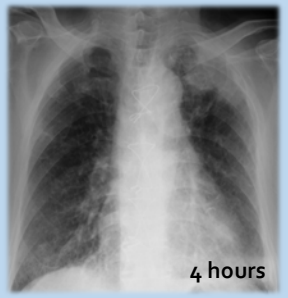
Referred for workup for left upper lobe mass suspicious of lung cancer

Prompt assessment in IR clinic and deemed fit



Attend IRAC following week with successful Biopsy





Same day discharge

Final Histology: Adenocarcinoma

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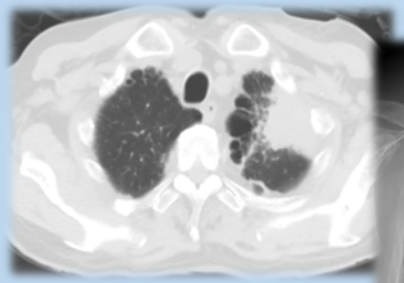
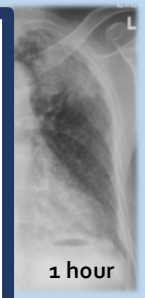
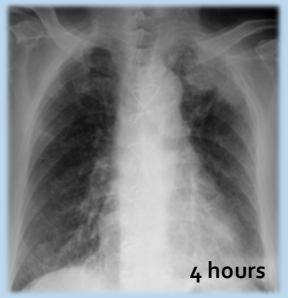
Putting into patient's context

- Another patient, Mr. Sze, is available and was called back







- **Hasten diagnosis of patients in-need**
- **Better patient rapport and satisfaction**
- **Reduce burden on inpatient service**

Referred for workup
mass suspicious of lung cancer

IR clinic and deemed fit

successful Biopsy

Same day discharge

Final Histology:
Adenocarcinoma

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Conclusion

- Image-guided lung biopsy by ambulatory care pathway is:

Feasible

More than two-third of patients can achieve same day discharge

Safe

No unplanned readmission after biopsy

Cost effective

Saves 1.8 bed days per patient enrolled in program

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Thank you

Special Thanks to our Ambulatory IR team

- Radiologists: Dr. KT Wong, Dr. Marwin Law
- Nurses: Ms. Grace Wong, Ms. Kay Tsang
- Radiographer: Mr. Tom Lee
- Respiratory physicians: Dr. Jenny Ngai, Dr. KP Chan

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