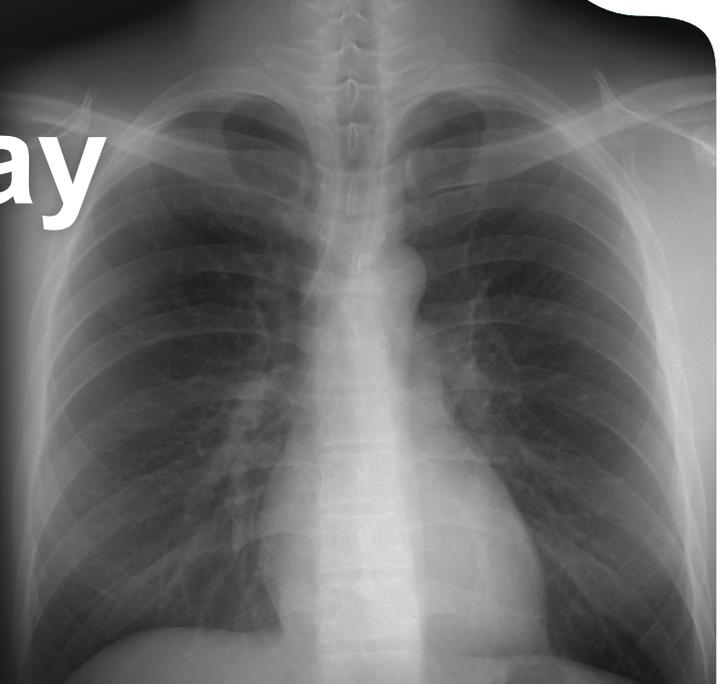




When *not* to order Chest X-ray



Objective

To enhance appropriate use of chest X-ray

Scope

Common clinical contexts in which chest X-ray is unlikely to confer clinical benefits

Target audience

This clinical guidance is relevant to all healthcare professionals ordering chest X-ray

Chest X-ray (CXR) is one of the most common imaging tests performed in clinical practice worldwide, including in Singapore. Its widespread use across various settings encompasses diverse indications. However, for most individuals with neither symptoms nor significant findings from history and physical examination suggesting that CXR may be required, current evidence shows that the test does not confer clinical benefits.

Statement of Intent

This ACE Clinical Guidance (ACG) provides concise, evidence-based recommendations and serves as a common starting point nationally for clinical decision-making. It is underpinned by a wide array of considerations contextualised to Singapore, based on best available evidence at the time of development. The ACG is not exhaustive of the subject matter and does not replace clinical judgement. The recommendations in the ACG are not mandatory, and the responsibility for making decisions appropriate to the circumstances of the individual patient remains at all times with the healthcare professional.



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College of Surgeons



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Clinical utility of CXR

The decision regarding whether to order CXR, like any clinical decision-making, involves weighing the expected benefits against the potential risks. The potential risks with CXR include adverse effects of radiation exposure and morbidity arising from investigation or management of incidental findings.¹⁻⁴

CXR is typically not indicated for individuals with neither symptoms nor significant findings from history and physical examination suggesting a clinical need for it. In such instances, CXR is generally of low yield, not adding meaningful information to reliable history and physical examination.¹ Conversely, CXR can be a helpful test when used in a **targeted** manner in response to an identified clinical need.

This clinical guidance outlines some common clinical contexts in which CXR is unlikely to confer clinical benefits.

CXR for general medical examination

Recommendation 1

General medical examination

 CXR may not be indicated

CXR is common as part of general medical examination, including for employment and admission into higher learning institutions.¹⁻³ Historically, the main reason for CXR in general medical examination has been to screen for possible underlying pathology, particularly active pulmonary tuberculosis (TB).¹

Current evidence points to CXR contributing little to detection of new TB cases in the absence of risk factors for or symptoms of active pulmonary TB.⁵⁻⁷ In line with this evidence, the World Health Organization (WHO) recommends **targeted** screening for active pulmonary TB, namely in individuals at higher risk of active pulmonary TB (such as those with human immunodeficiency virus (HIV) or close contacts of TB cases).⁸

Other examples of **targeted** use of CXR as part of general medical examination in Singapore may include:

- Individuals undergoing pre-employment or pre-enrolment medical examination for certain jobs or courses, including those involving interaction with vulnerable populations (such as healthcare or early childhood education)
- Individuals employed for particular vocations (such as commercial divers or those with occupational exposure to respiratory hazards)
- Foreigners applying for work pass, dependent pass, student pass, or long-term visit pass⁹



Note on general medical examination in Singapore

Individuals should be advised to check and adhere to prevailing medical examination requirements stipulated by the employer, admitting higher learning institution, or other relevant agencies (for example, Ministry of Manpower or Ministry of Education).

CXR for preoperative testing

Recommendation 2

Preoperative testing

 CXR may not be indicated

When there are no symptoms and no significant findings from history and physical examination suggesting that CXR may be required, CXR findings usually do not alter the management decision or clinical outcomes.^{1,10} CXR would still be useful for specific clinical presentations, with some examples below of **targeted** use of CXR for preoperative assessment:

- Chest-related surgery
- Suspicion of acute or potentially unstable chronic cardiopulmonary disease
- Elderly patients (especially those aged 70 years and older)
- Increased patient-related or procedure-related risk (such as history of cardiopulmonary disease, unreliable history or physical examination, high-risk surgery)

CXR for lung cancer screening

Recommendation 3

Lung cancer screening

 CXR is not indicated

Lung cancer screening is aimed at detecting lung cancer in individuals at higher risk of the disease before symptom onset. Not having adequate sensitivity or specificity as a lung cancer screening test,¹¹ CXR has not been found to be beneficial in lung cancer screening.^{12,13} Low-dose computed tomography (CT) is the imaging modality and test of choice to screen for lung cancer in individuals at higher risk of the disease.¹⁴

References

1. McComb BL, Chung JH, Crabtree TD, et al. ACR Appropriateness Criteria® – Routine chest radiography. 2015. Available from: <https://acsearch.acr.org/docs/69451/Narrative> [Accessed 9 February 2021].
2. Tigges S, Roberts DL, Vydareny KH, et al. Routine chest radiography in a primary care setting. *Radiology*. 2004;233(2):575-578.
3. Izamin I, Rizal AM. Chest x-ray as an essential part of routine medical examination: is it necessary? *Med J Malaysia*. 2012;67(6):606-609.
4. Bouck Z, Calzavara AJ, Ivers NM, et al. Association of low-value testing with subsequent health care use and clinical outcomes among low-risk primary care outpatients undergoing an annual health examination. *JAMA Intern Med*. 2020;180(7):973-983.
5. Lohiya GS, Tan-Figueroa L, Lohiya P, et al. The futility of universal pre-employment chest radiographs. *J Natl Med Assoc*. 2006;98(12):2019-2023.
6. Samuel VJ, Gibikote S, Kirupakaran H. The routine pre-employment screening chest radiograph: should it be routine? *Indian J Radiol Imaging*. 2016;26(3):402-404.
7. Chukwuani AE, Osanaiye A, Eneje OF, et al. An audit of routine chest X-ray done during pre-employment medical screening in South-Western Nigeria. *Central African J Public Health*. 2017;3(4):51-54.
8. World Health Organization. Systematic screening for active tuberculosis: principles and recommendations. Geneva: WHO. 2013. Available from: <https://www.who.int/tb/tbscreening/en/> [Accessed 9 February 2021].
9. Clinical Quality, Performance & Technology Division, Ministry of Health, Singapore. Prevention, diagnosis and management of tuberculosis. MOH Clinical Practice Guidelines. 2016.
10. Archer C, Levy AR, McGregor M. Value of routine preoperative chest x-rays: a meta-analysis. *Can J Anaesth*. 1993;40(11):1022-1027.
11. Moyer VA, on behalf of the U.S. Preventive Services Task Force. Screening for lung cancer: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med*. 2014;160(5):330-338.
12. US Preventive Services Task Force. Screening for lung cancer: US Preventive Services Task Force recommendation statement. *JAMA*. 2021;325(10):962-970.
13. Canadian Task Force on Preventive Health Care. Recommendations on screening for lung cancer. *CMAJ*. 2016;188(6):425-432.
14. Liew CJY, Leong LCH, Teo LLS, et al. A practical and adaptive approach to lung cancer screening: a review of international evidence and position on CT lung cancer screening in the Singaporean population by the College of Radiologists Singapore. *Singapore Med J*. 2019;60(11):554-559.

Expert group

Chairperson

Clin Asst Prof Gan Wee Hoe,
Occupational Medicine (SGH)

Members

Adj A/Prof Gregory Kaw Jon Leng,
Diagnostic Radiology (TTSH)

Asst Prof Adrian Kee, Respiratory
Medicine (NUH)

Clin A/Prof Phua Ghee Chee,
Respiratory Medicine (SGH)

Adj A/Prof Edwin Seet Chuen Ping,
Anaesthesiology (KTPH)

Clin Asst Prof Gilbert Tan Choon
Seng, Family Medicine (SHP)

Clin A/Prof Tan Swee Yaw,
Cardiology (NHCS)

Project lead

Adj A/Prof Tan Cher Heng,
Diagnostic Radiology (TTSH)

About the Agency

The Agency for Care Effectiveness (ACE) was established by the Ministry of Health (Singapore) to drive better decision-making in healthcare by conducting health technology assessments (HTA), publishing healthcare guidance and providing education. ACE develops ACE Clinical Guidances (ACGs) to inform specific areas of clinical practice. ACGs are usually reviewed around five years after publication, or earlier, if new evidence emerges that requires substantive changes to the recommendations. To access this ACG online, along with other ACGs published to date, please visit www.ace-hta.gov.sg/acg

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Agency for Care Effectiveness (ACE)
College of Medicine Building
16 College Road Singapore 169854

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