

**Routine Admission and Preoperative Chest Radiography
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Strength of Evidence
1. Malone DE, Becker CD, Muller NL, Burhenne HJ. Is routine chest radiography required with biliary lithotripsy? <i>AJR</i> 1989; 152(5):987-989.	13	75 patients 107 lithotripsy sessions	Retrospective study to determine need for routine preoperative and postoperative chest radiographs (CXR) in patients undergoing lithotripsy.	No pulmonary disease detected before or after procedure. Routine prelithotripsy and postlithotripsy CXR are not necessary in patients undergoing biliary lithotripsy.	3
2. Grier DJ, Watson LJ, Hartnell GG, Wilde P. Are routine chest radiographs prior to angiography of any value? <i>Clin Radiol</i> 1993; 48(2):131-133.	13	240	Prospective study to determine role of CXR prior to angiography.	116 radiographs were normal. 117 abnormalities on radiographs of 104 patients, mainly cardiac enlargement and heart failure. Preangiography radiographs had no effect on the practice of peripheral angiography. Routine CXR is not necessary.	2
3. Tobin K, Klein J, Barbieri C, Heffner JE. Utility of routine admission chest radiographs in patients with acute gastrointestinal hemorrhage admitted to an intensive care unit. <i>Am J Med</i> 1996; 101(4):349-356.	10	161	Retrospective study to determine diagnostic yield of CXR in patients with gastrointestinal hemorrhage.	<ul style="list-style-type: none"> • Minor abnormalities in 23 (14.3%) patients; no intervention. • Major abnormalities in 21 (13.0%) patients; only 5.6% interventions. • Low yield; CXR should be determined on clinical grounds. 	2
4. Sagar G, Riley P, Vohrah A. Is admission chest radiography of any clinical value in acute stroke patients? <i>Clin Radiol</i> 1996; 51(7):499-502.	13	435	Retrospective analysis to assess the value of routine CXR in patients admitted with acute stroke.	16.4% had radiological abnormality. 3.8% had clinical management altered and abnormality missed by clinical evaluation in only 4. Admission CXR in patients with an acute stroke is not indicated in the absence of appropriate clinical indications.	2
5. Gupta SD, Gibbins FJ, Sen I. Routine chest radiography in the elderly. <i>Age Ageing</i> 1985; 14(1):11-14.	13	1,000 consecutive admissions	To determine if CXR is necessary in geriatric unit admissions based on a prospective survey.	35%-50% had little or no clinical indication for CXR examination. Radiography did not contribute to management.	2
6. Gomez-Gil E, Trilla A, Corbella B, et al. Lack of clinical relevance of routine chest radiography in acute psychiatric admissions. <i>Gen Hosp Psychiatry</i> 2002; 24(2):110-113.	13	200	To assess value CXR in acute psychiatric admissions. Records of the 332 first consecutive admissions to the psychiatric ward were assessed and CXR requested in 200 patients (60%).	Radiograph normal in 81.5% of patients. CXR in acute psychiatric inpatients is not necessary.	3
7. Hubbell FA, Greenfield S, Tyler JL, Chetty K, Wyle FA. The impact of routine admission chest x-ray films on patient care. <i>N Engl J Med</i> 1985; 312(4):209-213.	13	294	Review charts of patients to evaluate the impact of routine admission CXR on patient care.	Abnormalities noted in 106 (36%) of 294 patients. Treatment was changed because of CXR results in 12 (4%) of patients. Impact of routine admission CXR on patient care is very small, even in a population with a high prevalence of cardiopulmonary disease. Recommend that such radiographs not be ordered solely because of admission.	3
8. Marcello PW, Roberts PL. "Routine" preoperative studies. Which studies in which patients? <i>Surg Clin North Am</i> 1996; 76(1):11-23.	12	N/A	Review effectiveness of preoperative studies.	Better system for ordering preoperative studies is necessary.	4

* See Last Page for Key

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9. Asimakopoulos G, Harrison R, Magnussen PA. Pre-admission clinic in an orthopaedic department: evaluation over a 6-month period. <i>J R Coll Surg Edinb</i> 1998; 43(3):178-181.	15	232	To examine the efficacy of preoperative clinic. Article audits the activities of a clinic over a period of 6 months. Data regarding the patients who were invited to the preadmission clinic during the study period were analyzed.	180/232 had operation without any complications. Recommends more extensive use of preoperative clinics.	2
10. Brorsson B, Arvidsson S. The effect of dissemination of recommendations on use. Preoperative routines in Sweden, 1989-91. <i>Int J Technol Assess Health Care</i> 1997; 13(4):547-552.	15	N/A	Multicenter, prospective study to monitor changes in preoperative routines following recommendations.	Recommendations resulted in decreased testing but further reductions.	2
11. Clelland C, Worland RL, Jessup DE, East D. Preoperative medical evaluation in patients having joint replacement surgery: added benefits. <i>South Med J</i> 1996; 89(10):958-960.	13	238	Review records of patients who had screening for total joint replacement surgery to determine the importance of the preoperative evaluations.	76 (32%) of 238 patients benefited from findings on the preoperative evaluation. Preoperative evaluations in elderly are necessary.	2
12. Fowkes FG. The value of routine preoperative chest X-rays. <i>Br J Hosp Med</i> 1986; 35(2):120-123.	12	N/A	Review evidence on the effectiveness of preoperative CXR.	Preoperative CXR has low yield and is overused.	4
13. France FH, Lefebvre C. Cost-effectiveness of preoperative examinations. <i>Acta Clin Belg</i> 1997; 52(5):275-286.	15	N/A	Cost-benefit analysis to evaluate cost effectiveness of preoperative tests.	Preoperative testing should be based on history and physical examination.	4
14. Ishaq M, Kamal RS, Aqil M. Value of routine pre-operative chest X-ray in patients over the age of 40 years. <i>J Pak Med Assoc</i> 1997; 47(11):279-281.	13	452	To assess the usefulness of routine preoperative CXR in patients over 40 years old.	Frequency of lung field abnormalities increased with age from 3.2% in less than 60 years of age to 15.6% in patients above 60 years of age. Recommends routine preoperative CXR only in patients over 60 years old.	2
15. Narr BJ, Warner ME, Schroeder DR, Warner MA. Outcomes of patients with no laboratory assessment before anesthesia and a surgical procedure. <i>Mayo Clin Proc</i> 1997; 72(6):505-509.	13	1,044	To detect the frequency of negative outcomes in patients without preoperative labs. An electronic database search of medical records of patients who underwent surgical or diagnostic procedures and anesthesia was conducted and 1,044 patients were randomly selected.	Patients assessed by history and physical and determined not to need labs can safely undergo anesthesia.	2

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16. Rao PS, Abid Q, Khan KJ, et al. Evaluation of routine postoperative chest X-rays in the management of the cardiac surgical patient. <i>Eur J Cardiothorac Surg</i> 1997; 12(5):724-729.	13	300	Clinical study to evaluate role of routine postoperative CXR in cardiac surgery.	Total number of CXR in groups A, B and C were 304, 133 and 36, respectively. Numbers of CXR leading to interventions were five, four and four in groups A, B and C, respectively. CXR that helped in management were 36, 28, and 28, respectively, in the same groups. There was no mortality or morbidity attributable to nonperformance of routine CXR. CXR is recommended only when clinically indicated.	2
17. Ricciardi G, Angelillo IF, Del Prete U, et al. Routine preoperative investigation. Results of a multicenter survey in Italy. Collaborator Group. <i>Int J Technol Assess Health Care</i> 1998; 14(3):526-534.	15	60 hospitals	Multicenter study to assess current behavior of a sample of Italian surgeons and anesthesiologists about prescribing, interpreting, and using routine preoperative investigations.	Procedures were recommended based on personal experience not scientific knowledge. Practice was usually ineffective and inefficient. CXR should not be routine.	3
18. Tiret L, Hatton F, Desmots JM, Vourc'h G. Prediction of outcome of anaesthesia in patients over 40 years: a multifactorial risk index. <i>Stat Med</i> 1988; 7(9):947-954.	15	2,055	Multifactorial risk index in the assessment of prediction of outcome of anaesthesia in patients >40 years of age. Index was based on current preoperative factors recorded prospectively.	Four factors identified; American Society of Anesthesiologist grade (physical status), age, procedure, and type (emergency vs elective).	2
19. Walters G, McKibbin M. The value of pre-operative investigations in local anaesthetic ophthalmic surgery. <i>Eye</i> 1997; 11 (Pt 6):847-849.	13	100	To assess value of routine preoperative tests performed on ophthalmic patients undergoing local anesthetic surgery.	Abnormal results were found in 102/314 investigations performed in 100 patients. No patients had their perioperative management changed because of the investigations performed. History and physical examination is sufficient in most patients.	2
20. Wiencek RG, Weaver DW, Bouwman DL, Sachs RJ. Usefulness of selective preoperative chest x-ray films. A prospective study. <i>Am Surg</i> 1987; 53(7):396-398.	13	403 consecutive patients	Prospective study to determine the usefulness of selective preoperative CXR studies.	Radiographic studies on 136/237 patients who had preoperative CXR were considered normal. Different abnormalities were found in the remaining 101 patients. Most abnormalities detected were already known or were considered insufficient for further evaluation. Preoperative CXR is widely overused.	2
21. Preoperative chest radiology. National study by the Royal College of Radiologists. <i>Lancet</i> 1979; 2(8133):83-86.	13	10,619	Eight hospitals in England, Wales, and Scotland took part in an investigation into the use of preoperative CXR in patients undergoing non-acute, non-cardiopulmonary surgery.	Preoperative CXR did not seem to influence the decision to operate or the choice of anesthetic; nor was there any evidence that preoperative CXR, at the levels of utilization observed in this study, would be of much value as a baseline against which subsequent radiographs in patients with postoperative pulmonary complications could be judged.	1

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22. Rucker L, Frye EB, Staten MA. Usefulness of screening chest roentgenograms in preoperative patients. <i>JAMA</i> 1983; 250(23):3209-3211.	13	905	To develop clinical criteria for preoperative CXR.	368 had no risk factors. One patient (0.3%) of 368 had an abnormal radiograph. No material abnormalities were found in the remainder of the group without risk factors. 504 patients had identifiable risk factors. Of these, 114 (22%) were found to have serious abnormalities on preoperative CXR.	2
23. Charpak Y, Blery C, Chastang C, Szatan M, Fourgeaux B. Prospective assessment of a protocol for selective ordering of preoperative chest x-rays. <i>Can J Anaesth</i> 1988; 35(3 (Pt 1)):259-264.	13	3,866	Prospective evaluation of a protocol for selective ordering of preoperative CXR.	568 radiographs (52%) were abnormal. 166 (15%) were considered useful by the anaesthetists. Routine ordering of preoperative CXR should be abandoned.	1
24. Gagner M, Chiasson A. Preoperative chest x-ray films in elective surgery: a valid screening tool. <i>Can J Surg</i> 1990; 33(4):271-274.	13	1,000	Retrospectively review patients who had a preoperative CXR made and who underwent elective surgery.	5.8% of women and 10.5% of men (7.4% of all patients) had abnormal preoperative CXR. Abnormalities were more frequent (30%) in patients >50 years of age than in younger patients (3%). Guidelines recommended for selective ordering of preoperative CXR.	2
25. Archer C, Levy AR, McGregor M. Value of routine preoperative chest x-rays: a meta-analysis. <i>Can J Anaesth</i> 1993; 40(11):1022-1027.	11	21 reports	Meta-analysis. To estimate the frequency with which routine postoperative CXR lead to clinically relevant new information.	0.1% of preoperative CXR caused modification of management. Concludes that in North American or European populations when a reliable history and a clinical examination are carried out, the cost of test is so high in relation to the clinical information provided that it is no longer justifiable.	2
26. Munro J, Booth A, Nicholl J. Routine preoperative testing: a systematic review of the evidence. <i>Health Technol Assess</i> 1997; 1(12):i-iv; 1-62.	11	N/A	Systematically review evidence on the value of routine preoperative testing in healthy or asymptomatic adults.	Available evidence does not support policy of preoperative CXR for all patients.	4
27. Ramaswamy A, Gonzalez R, Smith CD. Extensive preoperative testing is not necessary in morbidly obese patients undergoing gastric bypass. <i>J Gastrointest Surg</i> 2004; 8(2):159-164; discussion 164-155.	13	193	Analyze prospectively collected data to assess value of preoperative CXR in morbidly obese patients having weight loss surgery.	Preoperative testing identified abnormalities on 8 CXR (4%) and 29 electrocardiograms (15%), none of which required preoperative intervention. Small number of abnormalities on CXR, none required preoperative intervention.	2
28. Catheline JM, Bihan H, Le Quang T, et al. Preoperative cardiac and pulmonary assessment in bariatric surgery. <i>Obes Surg</i> 2008; 18(3):271-277.	13	77	To assess the value of cardiopulmonary tests routinely performed before bariatric surgery.	Recommend preoperative assessment by clinical evaluation, electrocardiography, and polysomnography. For patients with cardiac or pulmonary histories and/or ECG abnormalities, recommend echocardiography, spirometry, and blood gases.	2

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29. Goldstein LB. Stroke code chest radiographs are not useful. <i>Cerebrovasc Dis</i> 2007; 24(5):460-462.	13	113	Retrospective study to examine value of routine CXR in acute stroke.	CXR were completely normal in 70% with 25.2% having incidental and 3.8% having potentially relevant findings. Routine CXR not recommended.	2
30. Evens RG. Appropriateness of routine chest radiography. <i>JAMA</i> 1996; 275(4):326.	12	N/A	Review appropriateness of routine CXR.	Routine CXR is not warranted by available literature.	4
31. Macario A, Roizen MF, Thisted RA, Kim S, Orkin FK, Phelps C. Reassessment of preoperative laboratory testing has changed the test-ordering patterns of physicians. <i>Surg Gynecol Obstet</i> 1992; 175(6):539-547.	15	2,093 medical records	Review medical records of patients having four surgical procedures to evaluate change in ordering of preoperative tests over time.	Better system for preoperative testing is needed.	3
32. Roizen MF. Preoperative evaluation of patients: a review. <i>Ann Acad Med Singapore</i> 1994; 23(6 Suppl):49-55.	12	N/A	Review necessity of preoperative studies.	Preoperative CXR should only be ordered if warranted by a patient's history and physical.	4
33. Mendelson DS, Khilnani N, Wagner LD, Rabinowitz JG. Preoperative chest radiography: value as a baseline examination for comparison. <i>Radiology</i> 1987; 165(2):341-343.	13	369 consecutive general surgical patients	Retrospective study to determine if baseline radiographs are helpful in surgical patients.	In 65 patients undergoing CXR postoperatively, a preoperative baseline was essential in making an accurate interpretation in 33 (51%). In about 9% of patients the preoperative CXR had a significant impact on postoperative management.	2
34. Thomsen HS, Gottlieb J, Madsen JK, et al. [Routine x-ray examination of the thorax prior to surgical intervention under general anesthesia]. <i>Ugeskr Laeger</i> 1978; 140(14):765-768.	13	1,262	To determine the usefulness of routine preoperative radiographic examination of the thorax by review of the case-histories of 1,922 patients >40 years of age prior to surgery.	Postoperative radiographic examination of the thorax performed in 198/1,262 patients and 88 presented new abnormal radiological findings. Routine preoperative baseline CXR is not necessary.	2
35. Tape TG, Mushlin AI. How useful are routine chest x-rays of preoperative patients at risk for postoperative chest disease? <i>J Gen Intern Med</i> 1988; 3(1):15-20.	13	341	Retrospective study to assess the value of routine CXR for vascular surgery patients.	Patients who had major abnormalities had a 40% postoperative complication rate, compared with 9% for those with normal radiographs; but only 13% of the complications occurred in patients with major abnormalities. Routine preoperative CXR were not helpful in improving patient outcomes.	3
36. Vogt AW, Henson LC. Unindicated preoperative testing: ASA physical status and financial implications. <i>J Clin Anesth</i> 1997; 9(6):437-441.	15	312 consecutive patients	Prospective, cross-sectional study to determine if the ordering of unindicted preoperative laboratory tests is different for healthy (ASA physical status I and II) vs sicker (ASA physical status III) patients, and examine the financial implications.	Large percentage of preoperative testing is not indicated.	2

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37. Bouillot JL, Fingerhut A, Paquet JC, Hay JM, Coggia M. Are routine preoperative chest radiographs useful in general surgery? A prospective, multicentre study in 3959 patients. <i>Association des Chirugiens de l'Assistance Publique pour les Evaluations medicales. Eur J Surg</i> 1996; 162(8):597-604.	13	3,959 consecutive patients	Prospective, open multicentre study to determine the usefulness of routine preoperative CXR in general surgery.	912 (23%) of radiographs showed some abnormality. Preoperative radiographs were of some help in the management of about half the patients who developed postoperative cardiopulmonary complications. Preoperative CXR should be routine for patients about to undergo general and gastrointestinal operations with three or more risk factors, and done selectively for patients with one or two. Routine preoperative radiographs are unnecessary for patients with no risk factors.	1
38. Haug RH, Reifeis RL. A prospective evaluation of the value of preoperative laboratory testing for office anesthesia and sedation. <i>J Oral Maxillofac Surg</i> 1999; 57(1):16-20; discussion 21-12.	13	380	Prospective evaluation of the value of preoperative laboratory testing for office anesthesia and sedation.	Good history and physical examination and then reassessment of key portions of the history were the major factors in the development of the anesthetic treatment plan. Lab data had little, if any, effect on decision-making process.	2
39. McCleane GJ. Routine preoperative chest X-rays. <i>Ir J Med Sci</i> 1989; 158(3):67-68.	13	687	To evaluate use of preoperative CXR.	Patients in American Society of Anaesthesiologists (ASA) grade I were found to have abnormalities in 4% of cases, and the abnormalities were of no anesthetic significance. The incidence of abnormalities increased to 25% in grade II, 52% in grade III and 81% in grades IV and V. Patients in ASA grades III, IV and V and trauma should have CXR.	2
40. Wagner JD, Moore DL. Preoperative laboratory testing for the oral and maxillofacial surgery patient. <i>J Oral Maxillofac Surg</i> 1991; 49(2):177-182.	12	N/A	Review routine preoperative testing for the oral and maxillofacial surgery patient.	Protocol for preoperative testing presented. It requires a careful history and physical examination, with special attention to testing whenever indicators of disease entities are discovered. Protocol also allows the option for medical consultation, if indicated. Its use is cost-effective and reduces risk to patient and practitioner.	4
41. Joo HS, Wong J, Naik VN, Savoldelli GL. The value of screening preoperative chest x-rays: a systematic review. <i>Can J Anaesth</i> 2005; 52(6):568-574.	11	14 studies	Systematically review the literature on the value of screening CXR and establish evidence to support guidelines for the use of preoperative screening CXR.	Association between preoperative screening CXR and decrease in morbidity and mortality not established.	3

Evidence Table Key

Study Type Key

Numbers 1-7 are for studies of therapies while numbers 8-15 are used to describe studies of diagnostics.

1. Randomized Controlled Trial — Treatment
2. Controlled Trial
3. Observation Study
 - a. Cohort
 - b. Cross-sectional
 - c. Case-control
4. Clinical Series
5. Case reviews
6. Anecdotes
7. Reviews

8. Randomized Controlled Trial — Diagnostic
9. Comparative Assessment
10. Clinical Assessment
11. Quantitative Review
12. Qualitative Review
13. Descriptive Study
14. Case Report
15. Other (Described in text)

Strength of Evidence Key

- Category 1 - The conclusions of the study are valid and strongly supported by study design, analysis and results.
- Category 2 - The conclusions of the study are likely valid, but study design does not permit certainty.
- Category 3 - The conclusions of the study may be valid but the evidence supporting the conclusions is inconclusive or equivocal.
- Category 4 - The conclusions of the study may not be valid because the evidence may not be reliable given the study design or analysis.