

**Intensive Care Unit Patients  
EVIDENCE TABLE**

Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
1. Oba Y, Zaza T. Abandoning daily routine chest radiography in the intensive care unit: meta-analysis. <i>Radiology</i> . 2010;255(2):386-395.	Review/Other-Dx	8 studies with 7,078 patients	Meta-analysis of clinical trials to determine whether abandoning daily routine CXR would adversely affect outcomes, such as mortality and length of stay, and identify a subgroup in which daily routine CXR might be beneficial.	Pooled analysis showed that elimination of daily routine radiography did not affect either hospital or ICU mortality (OR, 1.02; 95% CI, 0.89–1.17; P=.78 and OR, 0.92; 95% CI, 0.76–1.11; P=.4, respectively). There was no significant difference in ICU length of stay (WMD = 0.19 days; 95% CI: –0.13, 0.51; P=.25), hospital length of stay (WMD = –0.29 days; 95% CI, –0.71–0.13; P=.18), and ventilator days (WMD = 0.33 days; 95% CI, –0.12–0.78; P=.15) between the on-demand and daily routine groups. Systematic but unselective daily routine radiography can likely be eliminated without increasing adverse outcomes in adult patients in ICUs.	4
2. Hejblum G, Chalumeau-Lemoine L, Ioos V, et al. Comparison of routine and on-demand prescription of chest radiographs in mechanically ventilated adults: a multicentre, cluster-randomised, two-period crossover study. <i>Lancet</i> . 2009;374(9702):1687-1693.	Observational-Dx	849 total patients: 424 had 4,607 routine CXRs and 425 had 3,148 on-demand CXRs	Prospective multicentre study to assess the efficiency and effectiveness of routine vs on-demand CXRs for optimum care of mechanically ventilated patients, using a 2-period cluster-randomized design.	424 patients had 4,607 routine CXRs (mean per patient-day of mechanical ventilation 1.09, 95% CI, 1.05–1.14), and 425 had 3,148 on-demand CXRs (mean 0.75, 0.67–0.83), which corresponded to a reduction of 32% (95% CI, 25–38) with the on-demand strategy (P<0.0001). Results strongly support adoption of an on-demand strategy in preference to a routine strategy to decrease use of CXRs in mechanically ventilated patients without a reduction in patients' quality of care or safety.	2

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3. Lakhali K, Serveaux-Delous M, Lefrant JY, Capdevila X, Jaber S. Chest radiographs in 104 French ICUs: current prescription strategies and clinical value (the RadioDay study). <i>Intensive Care Med.</i> 2012;38(11):1787-1799.	Observational-Dx	854 CXRs in 804 patients	To analyze the current practices of CXR prescription and their clinical impact.	On RadioDay, 854 CXRs (in 804 patients) were ordered. For the “CXRs morning round,” the prescription policy was declared to be “on-demand” (in 63% of the ICUs), “daily routine only in mechanically ventilated patients (MV)” (30 %) or, less frequently, “daily routine in all patients” (7 %). When analyzing the 2 main local policies, as compared with “daily routine only in mechanically ventilated” ICUs, in “on-demand” ICUs: (1) fewer CXRs were ordered (0.6 +/- 0.3 vs 0.9 +/- 0.2 CXRs/patient, P<0.001) with no increase in the rate of unscheduled CXRs (ie, CXRs performed outside the morning round), and (2) individual CXRs were more often followed by a therapeutic intervention (which would not have occurred without the CXR): 34% vs 25% of the CXRs (P<0.05). Last, in case of severe respiratory disease (low PaO <sub>2</sub> /FiO <sub>2</sub> ratio), it is noteworthy that the clinical value of “on-demand” individual CXRs was still markedly higher than that of “daily routine” CXRs.	3
4. Leong CS, Cascade PN, Kazerooni EA, Bolling SF, Deeb GM. Bedside chest radiography as part of a postcardiac surgery critical care pathway: a means of decreasing utilization without adverse clinical impact. <i>Crit Care Med.</i> 2000;28(2):383-388.	Observational-Dx	3 groups of 100 patients each	Retrospective study. Cohort observational study to evaluate the use of bedside CXR and patient outcome before and after implementation of a cardiac surgery critical care pathway that included guidelines for bedside radiography. Groups were: before the introduction of the critical care pathway; 2 months after introduction of the pathway in 1991; and 4 years after introduction in 1995.	Total length of hospital stay was shorter for the 1995 group (7.6 +/- 6.6 days) compared with other groups (prepathway, 11.1 +/- 10.3 days; 1991 postpathway, 10.2 +/- 9.6 days; P<.05). More patients had the proposed number of two bedside radiographs described in the pathway in the 1995 group compared with the other groups (prepathway, P<.0001; the two-month postpathway group, P=.01). 23 malpositioned catheters/tubes were found in the prepathway and 1991 groups compared with 11 in the 1995 group (P=.02). Introduction of a critical care pathway can decrease the use of bedside radiography without adversely affecting near-term patient outcomes.	3

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5. Graat ME, Choi G, Wolthuis EK, et al. The clinical value of daily routine chest radiographs in a mixed medical-surgical intensive care unit is low. <i>Crit Care</i> . 2006;10(1):R11.	Observational-Dx	754 patients, 2,457 CXRs	Prospective observational study to determine if daily routine CXRs reveal unexpected, clinically relevant abnormalities and whether it helps ICU patients.	Daily routine CXRs rarely reveal abnormalities and should not be used in ICU patients. Study proposes this examination be abandoned in ICU patients.	3
6. Krivopal M, Shlobin OA, Schwartzstein RM. Utility of daily routine portable chest radiographs in mechanically ventilated patients in the medical ICU. <i>Chest</i> . 2003;123(5):1607-1614.	Observational-Dx	Routine: 43 patients, 293 CXRs, Non-routine: 51 patients, 226 CXRs	Prospective randomized observational study to determine whether any differences exist in diagnostic, therapeutic, and outcome efficacy between protocols utilizing daily routine CXRs and those utilizing clinically indicated non-routine CXRs in mechanically ventilated patients.	CXRs with new findings was significantly larger in the non-routine CXR group (53.1%; 120 CXRs) compared to routine CXR group (33.4%; 98 CXRs; OR, 1.59; 95% CI, 1.16 to 2.18; P=0.004). CXRs with new findings that led to interventions was significantly larger in the non-routine CXR group (26.5%; 60 CXRs) compared to routine CXR group (13.3%; 39 CXRs; OR, 2.0; 95% CI, 1.29 to 3.08; P=0.002). No difference in mean duration of mechanical ventilation (routine CXR arm, 7.93 days; non-routine CXR arm, 6.76 days; P=0.2606), length of ICU stay (routine CXR arm, 11.93 days; non-routine CXR arm, 9.55 days; P=0.1936), and total length of hospital stay (routine CXR arm, 19.34 days; non-routine CXR arm, 16.45 days; P=0.2199) between two groups. For mechanically ventilated patients, no additional benefit was realized by a strategy that required daily CXRs in comparison to one that mandated only clinically indicated CXRs.	2

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Reference	Study Type	Patients/ Events	Study Objective (Purpose of Study)	Study Results	Study Quality
7. Clec'h C, Simon P, Hamdi A, et al. Are daily routine chest radiographs useful in critically ill, mechanically ventilated patients? A randomized study. <i>Intensive Care Med.</i> 2008;34(2):264-270.	Experimental-Dx	165 patients randomized	To compare the diagnostic, therapeutic and outcome efficacy of a restrictive prescription of CXRs with that of a routine prescription, focusing on delayed diagnoses and treatments potentially related to the restrictive prescription.	For each CXR, a questionnaire was completed addressing the reason for the CXR, the new findings, and any subsequent therapeutic intervention. The endpoints were the rates of new findings, the rates of new findings that prompted therapeutic intervention, the rate of delayed diagnoses, and mortality. 84 patients were included in the routine prescription group and 81 in the restrictive prescription group. The rates of new findings and the rates of new findings that prompted therapeutic intervention in the restrictive prescription group and in the routine prescription group were 66% vs 7.2% (P<0.0001), and 56.4% vs 5.5% (P<0.0001) respectively. The rate of delayed diagnoses in the restrictive prescription group was 0.7%. Mortality was similar.	3
8. Walker CM, Tang J, Richardson ML, Stern EJ. On-demand chest radiographs for hypoxia: impact on clinical care. <i>J Thorac Imaging.</i> 2012;27(3):152-155.	Observational-Dx	676 radiographic reports	To determine the therapeutic yield of on-demand CXRs in intubated patients experiencing acute oxygen desaturation/hypoxia.	A total of 676 radiographic reports were studied. 55.3%, 20.4%, and 24.3% of the radiographic findings were categorized into no change, minor new finding, and major new finding groups. A major radiographic finding was more likely to have new interventions compared with a no-change radiograph [OR, 6.44 (4.16–9.78)]. Most interventions were deemed appropriate for the radiographic findings.	3
9. Hendrikse KA, Gratama JW, Hove W, Rommes JH, Schultz MJ, Spronk PE. Low value of routine chest radiographs in a mixed medical-surgical ICU. <i>Chest.</i> 2007;132(3):823-828.	Observational-Dx	Part 1: 559 admissions, 1,780 CXRs; Part 2: 274 admissions, 433 CXRs	Prospective controlled trial to determine the diagnostic and therapeutic value of daily routine CXRs, and to determine the effect of abandoning this CXR from daily practice on total CXR volume, ICU length of stay, readmission rate, and ICU mortality.	Low diagnostic and therapeutic value of the daily routine CXR. CXRs can be abandoned in the ICU.	3
10. Hall JB, White SR, Karrison T. Efficacy of daily routine chest radiographs in intubated, mechanically ventilated patients. <i>Crit Care Med.</i> 1991;19(5):689-693.	Observational-Dx	74 patients, 538 CXRs	Prospective blinded study to determine efficacy of daily routine CXRs in intubated, mechanically ventilated patients.	354/538 CXRs did not disclose either new major or new minor findings as defined. 163 radiographs disclosed only new minor findings, 40.5% of which were anticipated by bedside assessment. In 13 (17.6%, 95% CI, 9% to 26%) of 74 patients, new major findings were discovered only by CXR. Findings support use of daily CXRs in critically ill patients.	2

\* See Last Page for Key

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11. Strain DS, Kinasewitz GT, Vereen LE, George RB. Value of routine daily chest x-rays in the medical intensive care unit. <i>Crit Care Med.</i> 1985;13(7):534-536.	Observational-Dx	94 patients, 507 CXRs	Prospective study to determine the value of the daily routine CXR in the medical ICU.	76 (15%) of 507 CXRs revealed an unsuspected abnormality, 71 (93%) of which led to a management change. There was significantly ( $P<.02$ ) more unsuspected abnormalities and management changes in the pulmonary and unstable cardiac patients, independent of ventilator status. Patients with two or more catheters and/or tubes visible on the CXR also had significantly more management changes (51/312 vs 11/150, $P<.05$ ). Concludes that while CXR affect the management of pulmonary and unstable cardiac patients in the ICU, routine films rarely influence management of uncomplicated cardiac patients and those without heart or lung disease, and are not needed in this group.	3
12. Graham RJ, Meziane MA, Rice TW, et al. Postoperative portable chest radiographs: optimum use in thoracic surgery. <i>J Thorac Cardiovasc Surg.</i> 1998;115(1):45-50; discussion 50-42.	Observational-Dx	99 patients, 769 CXRs	Prospective review to assess the efficacy and cost of routine daily portable CXR and determine the optimum use of postoperative radiograph studies.	Radiography findings altered management in 43/769 CXRs (5.6%): in 33 routine (4.5%), in 10 non-routine (26.3%), in 13 A (2.3%), in 22 B (37.3%), and in 8 C (17.4%). Results show routine daily portable CXR studies have a minimal impact on management.	3
13. O'Brien W, Karski JM, Cheng D, Carroll-Munro J, Peniston C, Sandler A. Routine chest roentgenography on admission to intensive care unit after heart operations: is it of any value? <i>J Thorac Cardiovasc Surg.</i> 1997;113(1):130-133.	Review/Other-Dx	404	To determine the value of routine CXR on admission to ICU after heart operations.	18 (4.5%) of 404 required intervention because of abnormalities detected by CXR but not predicted by the initial physical and laboratory assessment. Concludes that CXR is recommended if clinical and laboratory assessment indicates the possibility of underlying pathologic conditions that can only be confirmed or diagnosed by CXR.	4
14. Gray P, Sullivan G, Ostryzniuk P, McEwen TA, Rigby M, Roberts DE. Value of postprocedural chest radiographs in the adult intensive care unit. <i>Crit Care Med.</i> 1992;20(11):1513-1518.	Observational-Dx	316	Prospective controlled study to evaluate the necessity for post-procedural CXR after catheterization of central veins, insertion of PAC, and placement of ETT.	Ability to predict the absence of complications after cordis catheter insertions via the subclavian vein or internal jugular vein (151/152; $P<.001$ ) and ability to predict uncomplicated pulmonary artery catheterization (110/111; $P<.001$ ) were high. Unsuspected complications were more frequent with central vein multilumen catheter insertions (3/24; $P<.001$ ). Physicians were unable to predict the majority of complications associated with endotracheal intubations (28/32; $P>.50$ ).	2

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15. Silverstein DS, Livingston DH, Elcavage J, Kovar L, Kelly KM. The utility of routine daily chest radiography in the surgical intensive care unit. <i>J Trauma</i> . 1993;35(4):643-646.	Review/Other-Dx	University center: 256 patients; Suburban hospital: 269 patients, 525 CXRs	Prospective study to assess the impact of routine daily CXR in the surgical ICU.	1,028 medical devices were evaluated. 55 (5.4%) were considered to be in a minor incorrect position and 13 (1.3%) required repositioning. 78 CXRs were normal. There were 775 cardiopulmonary findings on the remaining 477 CXRs. When compared with previous CXRs, only 12% (89/775) of the findings were considered new, 65% were unchanged, 14% were improved, and 15% demonstrated worsening of a known finding. Of the 89 new cardiopulmonary findings, only 3 had any potential clinical impact (pneumothorax in 2, effusion in 1). Study concludes that routine daily CXR should be abandoned and need for a morning CXR be based on clinical necessity.	4
16. Henschke CI, Pasternack GS, Schroeder S, Hart KK, Herman PG. Bedside chest radiography: diagnostic efficacy. <i>Radiology</i> . 1983;149(1):23-26.	Review/Other-Dx	140 patients, 1,132 CXRs	Prospective study to evaluate the efficacy of a bedside CXR in patients admitted to the surgical and medical ICU.	Endotracheal or tracheostomy tubes were present in 54% of exams; 12% were malpositioned. Central venous catheters were present in 47%; 9% were malpositioned. Interval changes (cardiopulmonary findings) were present in 44% of the radiographs. 65% of the radiographs had findings or changes affecting the patient's management. Recommends use of bedside radiography.	4
17. Horst HM, Fagan B, Beute GH. Chest radiographs in surgical intensive care patients: a valuable "routine". <i>Henry Ford Hosp Med J</i> . 1986;34(2):84-86.	Observational-Dx	262 patients, 411 CXRs	Evaluation of CXR to determine their clinical value for surgical ICU patients. Radiographic findings, previous CXR and clinical expectations were compared.	138 unexpected findings on 112 CXR. The unexpected findings were equally divided between pulmonary problems (72) and device malposition (66). 30% of unexpected findings were considered potentially life threatening. Study recommends routine CXR for monitoring surgical ICU patients.	3
18. Brunel W, Coleman DL, Schwartz DE, Peper E, Cohen NH. Assessment of routine chest roentgenograms and the physical examination to confirm endotracheal tube position. <i>Chest</i> . 1989;96(5):1043-1045.	Review/Other-Dx	219	Prospective study to evaluate the accuracy of the physical examination in assessing ETT position and the appropriateness of taking routine CXR after intubation in the ICU.	Techniques to minimize risk of tube malposition were not completely reliable. Study confirms unreliability of the physical examination to assess ETT position. CXRs after intubation are recommended to verify tube position, particularly after emergency intubations.	4

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19. Marik PE, Janower ML. The impact of routine chest radiography on ICU management decisions: an observational study. <i>Am J Crit Care.</i> 1997;6(2):95-98.	Review/Other-Dx	200 patients, 47 CXRs	Observational study to determine the impact of routine CXR on ICU treatment decisions.	At least one change in therapy was made for 91 (66%) of the 138 intubated patients but for only 14 (23%) of the 62 non-intubated patients; this difference was significant. Concludes that routine CXR may be justified in critically ill patients in a medical ICU because most of these patients have management decisions based on information obtained from CXR.	4
20. Bekemeyer WB, Crapo RO, Calhoun S, Cannon CY, Clayton PD. Efficacy of chest radiography in a respiratory intensive care unit. A prospective study. <i>Chest.</i> 1985;88(5):691-696.	Observational-Dx	167 patients, 1,354 CXRs	Prospective study to determine diagnostic and therapeutic efficacy of CXR in a respiratory ICU.	In a respiratory ICU, routine morning radiographic examination frequently demonstrates unexpected or changing abnormalities. Post-procedure radiographic examination uncommonly demonstrates complications related to the procedure, but frequently demonstrates abnormalities of tube or catheter placement.	3
21. Bhagwanjee S, Muckart DJ. Routine daily chest radiography is not indicated for ventilated patients in a surgical ICU. <i>Intensive Care Med.</i> 1996;22(12):1335-1338.	Observational-Dx	34 patients, 164 CXRs	To determine whether clinical examination can accurately predict radiological change and if routine CXR is effective in ventilated patients in a surgical ICU.	Two significant radiographically changes were missed on clinical examination: catheter malposition and pneumothorax, representing a yield from radiography of 1%. Study concludes that clinical examination can effectively predict the need for radiography and therefore CXR is not recommended for ventilated patients.	2
22. Kollef MH, Legare EJ, Damiano M. Endotracheal tube misplacement: incidence, risk factors, and impact of a quality improvement program. <i>South Med J.</i> 1994;87(2):248-254.	Review/Other-Dx	Retrospective review: 278 patients, Prospective: 246 patients	Comparative study in an adult ICU to assess the impact of a quality improvement program on the occurrence of serious complications related to ETT misplacement and to identify risk factors.	113 (46%) of 246 patients were identified as having at least one ETT misplacement requiring immediate repositioning. The incidence of serious complications related to ETT misplacement was significantly less during the implementation of the quality improvement program (0 of 246 patients) than during the retrospective period (5 of 278 patients). Multivariate analysis showed that a longer duration of endotracheal intubation, the lack of chemical paralysis, and the occurrence of cardiac arrest were independently predictive of ETT misplacement. Results suggest a specific ICU quality improvement program can have a favorable impact on patient outcome.	4

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23. Sise MJ, Hollingsworth P, Brimm JE, Peters RM, Virgilio RW, Shackford SR. Complications of the flow-directed pulmonary artery catheter: A prospective analysis in 219 patients. <i>Crit Care Med.</i> 1981;9(4):315-318.	Review/Other-Dx	219 patients, 320 catheters	Prospective study to determine and analyze the complications of the flow-directed PAC.	Major complications occurred in 3% of catheterizations. Findings suggest that, when indicated in the care of critically ill patients, the properly placed and maintained PAC has an acceptably low morbidity and mortality rate, particularly when used for 72 hours or less.	4
24. Sepehrpour AH, Farid S, Shah R. Is routine chest radiography indicated following chest drain removal after cardiothoracic surgery? <i>Interact Cardiovasc Thorac Surg.</i> 2012;14(6):834-838.	Review/Other-Dx	6 articles	To determine whether routine CXR is indicated following chest drain removal in patients undergoing cardiothoracic surgery.	The authors conclude that there is evidence that routine post drain removal CXR provides no diagnostic or therapeutic advantage over clinically indicated CXR or simple clinical assessment. The best evidence studies reported the detection of pathology on routine CXR ranging from 2% to 40% compared with 79% in clinically indicated CXRs (P=0.005). Whilst the rate of intervention following routine CXR was as high as 4% in the smallest study, clinical signs and symptoms suggestive of pathology were a significant predictor of major re-intervention (P<0.01).	4
25. Eisenberg RL, Khabbaz KR. Are chest radiographs routinely indicated after chest tube removal following cardiac surgery? <i>AJR Am J Roentgenol.</i> 2011;197(1):122-124.	Review/Other-Dx	400 patients	To determine the incidence and clinical significance of pneumothoraces detected on routine radiography after chest tube removal following cardiac surgery and correlate those findings with an immediate postprocedure assessment of the likelihood of new pneumothorax.	Of 9.3% of cases (37/400) of new pneumothoraces after chest tube removal, 70.3% were tiny (barely perceptible), 27.0% were small (<1 cm from the pleural line to the apex of the hemithorax), and 2.7% were medium (6–10 cm from the pleural line to the apex of the hemithorax). The incidences of small and medium pneumothoraces were substantially greater in patients with higher levels of clinical suspicion. All tiny pneumothoraces had no clinical importance. Not obtaining routine CXRs after chest tube removal in the 345 patients (86.3%) with the lowest level of clinical suspicion would have resulted in missing six small pneumothoraces (1.7%), none of which led to medical or surgical intervention or a delay in discharge.	4



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26. Khan T, Chawla G, Daniel R, Swamy M, Dimitri WR. Is routine chest X-ray following mediastinal drain removal after cardiac surgery useful? <i>Eur J Cardiothorac Surg.</i> 2008;34(3):542-544.	Review/Other-Dx	151 patients	To determine if routine CXR following mediastinal drain removal after cardiac surgery is useful.	There were 113 males and 38 females with a mean age of 67.5 years. 14 patients (9%) had obstructive airway disease. The left and right pleurae were opened in 62% and 11% of patients respectively and a chest drain was inserted in all of them intraoperatively. 3 patients (2%) developed pneumothorax following drain removal. 2 of these patients had clinical signs and symptoms, which would have warranted a CXR. 1 patient had a moderate pneumothorax but was not clinically compromised. 2 patients needed chest drain reinsertion that was subsequently removed after 3 and 4 days. The third patient was monitored clinically and the pneumothorax resolved spontaneously on subsequent CXR. In the remaining 148 patients, postdrain removal CXR did not provide any additional information to alter the management. The cost saving of omitting an additional CXR was calculated to be about £10,000 per year.	4
27. McCormick JT, O'Mara MS, Papasavas PK, Caushaj PF. The use of routine chest X-ray films after chest tube removal in postoperative cardiac patients. <i>Ann Thorac Surg.</i> 2002;74(6):2161-2164.	Observational-Dx	703 patients	To assess the yield and clinical impact of routine CXR after chest tube removal in postoperative cardiac patients and determine the safety of omitting them.	Tubes were removed on postoperative days 1 to 7 (average, 1.45 days). The 2 groups of patients were comparable in age, gender, procedure, and co-morbidity (P>.01). 703 patients underwent routine postoperative tube removal CXRs. Abnormal findings were present in 282 patients. Resultant therapeutic intervention was undertaken in 13 patients and 9 were symptomatic. No imaging after routine postoperative CXRs was conducted in 283 patients. These patients remained asymptomatic and required no intervention. 14 patients had clinically indicated CXRs after chest tube removal. 2 of these patients had additional tubes placed, and 1 patient had follow-up films. In total, there was a 1.5% incidence of therapeutic intervention after chest tube removal. All patients were discharged without further sequelae of their tubes.	3

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28. Pacharn P, Heller DN, Kammen BF, et al. Are chest radiographs routinely necessary following thoracostomy tube removal? <i>Pediatr Radiol.</i> 2002;32(2):138-142.	Observational-Dx	374 patients	To examine whether clinical signs and symptoms may be a sensitive predictor of pneumothorax in all pediatric patients following thoracostomy tube removal.	51/374 children (13.6%) had a radiographically defined pneumothorax within 6 hours after thoracostomy tube removal. The pneumothorax was large (>40%) in 2 children, moderate (20%–40%) in 5 children, and small (<20%) in 44 children. Symptoms (dyspnea, tachypnea, respiratory distress) or signs (increased oxygen requirement, worsening arterial blood gas and/or hypotension) of respiratory distress were present at the time of the initial CXR in 6/7 patients, who later underwent a major clinical intervention, and in 1 patient who did not. Major clinical interventions were performed in all patients with a large pneumothorax, 4/5 patients with a moderate pneumothorax, and 1 patient with a small pneumothorax that later enlarged.	4
29. Whitehouse MR, Patel A, Morgan JA. The necessity of routine post-thoracostomy tube chest radiographs in post-operative thoracic surgery patients. <i>Surgeon.</i> 2009;7(2):79-81.	Observational-Dx	74 patients	To determine whether routine CXRs post-operatively and post-thoracostomy tube removal directly influenced patient management.	In the cohort of 74 patients, 66 (89%) patients had postoperative CXRs. Only 3 (5%) patients who had a CXR had change in their management. 25 (34%) patients had a CXR post-thoracostomy tube removal. Only 1 (4%) patient in this group who had a CXR after thoracostomy tube removal had a change of management. Interestingly, the decision to change patient management was not made on the basis of the CXRs alone; the clinical situation was the main determinant. Patients that did not have a CXR postoperatively (8 patients, 11%) and post-thoracostomy tube removal (49 patients, 66%) did not suffer any adverse sequelae.	3

## Evidence Table Key

### Study Quality Category Definitions

- *Category 1* The study is well-designed and accounts for common biases.
- *Category 2* The study is moderately well-designed and accounts for most common biases.
- *Category 3* There are important study design limitations.
- *Category 4* The study is not useful as primary evidence. The article may not be a clinical study or the study design is invalid, or conclusions are based on expert consensus. For example:
  - a) the study does not meet the criteria for or is not a hypothesis-based clinical study (e.g., a book chapter or case report or case series description);
  - b) the study may synthesize and draw conclusions about several studies such as a literature review article or book chapter but is not primary evidence;
  - c) the study is an expert opinion or consensus document.

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Dx = Diagnostic

Tx = Treatment

## Abbreviations Key

CI = Confidence interval

CXR = Chest radiograph

ETT = Endotracheal tubes

ICU = Intensive care unit

OR = Odds ratio

PAC = Pulmonary artery catheters

WMD = Weighted mean difference