

The RaER Reference list

A search of the literature associated with error in radiology

Based on work by the University of Queensland

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1. Introduction

In preparation for the commencement of the QUDI Radiology Events Register project, the University of Queensland conducted a literature search using a number of terms associated with errors in the referral, diagnosis and reporting process, which may be used to inform clinically relevant outcomes of future RaER analysis. Results are presented below, grouped by search term.

2. Scope of Literature Review

To encompass the continuity of radiology practice from the formulation of clinical diagnostic problem by the referring clinician to clinical action based on radiologic diagnosis. The review is to capture the current state of the literature regarding frequency of error; sources of error, methodology of capture of information about error, classification systems of error, mitigation strategies and any other relevant information.

3. Results:

1. Clinical Information

Question: Evidence around the affect of clinical information provided to the reporting radiologist. This includes the affect of current clinical information, historical information, related laboratory tests and previous imaging and reports.

Search Strategy:

Using Radiology as a Major MeSH heading (11622)

AND Report – 433 results – if used as Major heading, yielded 0

- AND Clinical information – 2 – both useful
 - Used related articles to access in total 700 more – not many useful
- AND History or historical information was not useful – but the information included in this heading was mainly incorporated in clinical information
- AND Laboratory techniques and procedures as a MeSH heading – very few useful articles

Old reports – 10 articles – were able to use related articles to find more

Using Radiography as a Major MeSH heading (165104)

Reporting

- Previous imaging
- Previous reports
- Clinical history
- Influence

Results: 30 relevant articles found – mainly on clinical information and old reports. Nothing was found on related lab tests.

- 1 Aideyan U, Berbaum K, Smith W. Influence of prior radiologic information on the interpretation of radiographic examinations. *Acad Radiol.* 1995; 2: 205-208.
- 2 Babcook C, Norman G, Coblenz C. Effect of clinical history on the interpretation of chest radiographs in childhood bronchiolitis. *Invest Radiol.* 1993; 28: 214-217.

- 3 Berbaum K, el-Khoury G, Franken EJ, Kathol M, Montgomery W, Hesson W. Impact of clinical history on fracture detection with radiography. *Radiology*. 1988; 168: 507-511.
- 4 Berbaum K, Franken EJ, Anderson K, et al. The influence of clinical history on visual search with single and multiple abnormalities. *Invest Radiol*. 1993; 28: 191-201.
- 5 Berbaum K, Franken EJ, Dorfman D, Lueben K. Influence of clinical history on perception of abnormalities in pediatric radiographs. *Acad Radiol*. 1994; 1: 217-223.
- 6 Berbaum K, Smith W. Use of reports of previous radiologic studies. *Acad Radiol*. 1998; 5: 111-114.
- 7 Callaway M, Boggis C, Astley S, Hutt I. The influence of previous films on screening mammographic interpretation and detection of breast carcinoma. *Clin Radiol*. 1997; 52: 527-529.
- 8 Cooperstein L, Good B, Eelkema E, et al. The effect of clinical history on chest radiograph interpretations in a PACS environment. *Invest Radiol*. 1990; 25: 670-674.
- 9 Dalla LP, Stacul F, Meduri S, Geitung J. Relationships between radiologists and clinicians: results from three surveys. *Clin Radiol*. 2000; 55: 602-605.
- 10 Doubilet P, Herman P. Interpretation of radiographs: effect of clinical history. *American Journal of Roentgenology*. 1981; 137: 1055-1058.
- 11 Ehara S, Katsuragawa S. Influence of clinical information on the detection of wrist fractures in children. *Tohoku J Exp Med*. 1999; 189: 147-153.
- 12 Elmore J, Wells C, Howard D, Feinstein A. The impact of clinical history on mammographic interpretations. *JAMA*. 1997; 277: 49-52.
- 13 Good B, Cooperstein L, DeMarino G, et al. Does knowledge of the clinical history affect the accuracy of chest radiograph interpretation? *American Journal of Roentgenology*. 1990; 154: 709-712.
- 14 Houssami N, Irwig L, Simpson J, McKessar M, Blome S, Noakes J. The contribution of work-up or additional views to the accuracy of diagnostic mammography. *Breast*. 2003; 12: 270-275.
- 15 Houssami N, Irwig L, Simpson J, McKessar M, Blome S, Noakes J. The influence of clinical information on the accuracy of diagnostic mammography. *Breast Cancer Res Treat*. 2004; 85: 223-228.
- 16 Houssami N, Irwig L, Simpson J, McKessar M, Blome S, Noakes J. The influence of knowledge of mammography findings on the accuracy of breast ultrasound in symptomatic women. *Breast J*. 2005; 11: 167-172.
- 17 Irwig L, Macaskill P, Walter S, Houssami N. New methods give better estimates of changes in diagnostic accuracy when prior information is provided. *J Clin Epidemiol*. 2006; 59: 299-307.
- 18 Knight J, Libstug A, Moravan V, Boyd N. An assessment of the influence of clinical breast examination reports on the interpretation of mammograms in a breast screening program. Ontario Breast Screening Program Radiologists Research Group. *Breast Cancer Res Treat*. 1998; 48: 65-71.
- 19 Leslie A, Jones A, Goddard P. The influence of clinical information on the reporting of CT by radiologists. *The British Journal of Radiology*. 2000; 73: 1052-1055.
- 20 Loy C, Irwig L. Accuracy of diagnostic tests read with and without clinical information: a systematic review. *JAMA*. 2004; 292: 1602-1609.
- 21 Mullins M, Lev M, Schellingerhout D, Koroshetz W, Gonzalez R. Influence of Availability of Clinical History on Detection of Early Stroke Using Unenhanced CT and Diffusion-Weighted MR Imaging. *American Journal of Roentgenology*. 2002; 179: 223-228.

- 22 Pack J, Yuh W, Sonnad J, et al. Request form history, clinical indication, and yield of brain magnetic resonance studies. *J Magn Reson Imaging*. 2004; 20: 228-232.
- 23 Quekel L, Goei R, Kessels A, Engelshoven Jv. Detection of lung cancer on the chest radiograph: impact of previous films, clinical information, double reading, and dual reading. *J Clin Epidemiol*. 2001; 54: 1146-1150.
- 24 Rickett A, Finlay D, Jagger C. The importance of clinical details when reporting accident and emergency radiographs. *Injury*. 1992; 23: 458-460.
- 25 Seltzer S, Beard J, Adams D. Radiologist as consultant: direct contact between referring clinician and radiologist before CT examination. *American Journal of Roentgenology*. 1985; 144: 661-664.
- 26 Simons M, Parker J, Donohoe K, Udelson J, Gervino E. The impact of clinical data on interpretation of thallium scintigrams. *J Nucl Cardiol*. 1994; 1: 365-371.
- 27 Song K, Song H, Park S, et al. Impact of clinical history on film interpretation. *Yonsei Med J*. 1992; 33: 168-172.
- 28 Stavem K, Foss T, Botnmark O, Andersen O, Erikssen J. Inter-observer agreement in audit of quality of radiology requests and reports. *Clinical Radiology*. 2004; 59: 1018-1024.
- 29 Triantopoulou C, Tsalafoutas I, Maniatis P, et al. Analysis of radiological examination request forms in conjunction with justification of X-ray exposures. *European Journal of Radiology*. 2005; 53: 306-311.
- 30 White K, Berbaum K, Smith W. The role of previous radiographs and reports in the interpretation of current radiographs. *Invest Radiol*. 1994; 29: 263-265.

2. Request Forms

Question: Evidence regarding requests including adequacy of request forms, structured request forms, electronic order entry systems as relevant to radiology. The review should encompass any evidence of the effectiveness of these interventions in reducing error.
 EndNote ref search: "request forms"

Search Strategy:

Radiolog* AND radiog* → not a useful way to search as results are not within scope of radiology/radiography due to no limits on languages etc

Two windows – searching radiography and radiology respectively

Radiology AND request forms – 32

Radiography AND request forms – 25

Radiology AND request – 216

Radiography AND request – 169

*yielded similar results with appropriate articles being common to both search streams

- Additions
 - AND adequacy
 - AND structure
 - AND errors
 - AND electronic order
- Little use as best to review all articles given as a result of initial stream

Other forms of 'request' were tried

- Order/ordering – no useful results
- Referrals – too many results (1609)
 - Narrowed down with above additions did not yield any appropriate articles
 - Narrowed down with MeSH or MAJR did not yield any more appropriate articles

(Radiology [MeSH] OR Radiography [MeSH]) AND request – 250

(Radiology [MAJR] OR Radiography [MAJR]) AND request – 151

Looked at MeSH terms used in some articles – tried a few but most were random terms. The most common terms to them all were radiology or radiography.

Results: 19 articles:

- 1 Carton M, Auvert B, Guerini H, et al. Assessment of radiological referral practice and effect of computer-based guidelines on radiological requests in two emergency departments. *Clin Radiol.* 2002; 57: 123-128.
- 2 Chin H, Wallace P. Embedding guidelines into direct physician order entry: simple methods, powerful results. *Proc AMIA Symp.* 1999: 221-225.
- 3 Cohen M, Curtin S, Lee R. Evaluation of the quality of radiology requisitions for intensive care unit patients. *Acad Radiol.* 2006; 13: 236-240.
- 4 Garcia VC, Escudero RC, Jane ACy, Saturno P. A quality evaluation in requests for thoracic radiology in chronic pathology at a health centre. *Aten Primaria.* 1994; 13: 80-84.
- 5 Juluru K, Eng J. Internet-based radiology order-entry, reporting, and workflow management system for coordinating urgent study requests during off-hours. *AJR Am J Roentgenol.* 2005; 184: 1017-1020.
- 6 Jumah K, Gordon-Harris L, Agahowa J. Common faults in filling of radiological request forms. *East Afr Med J.* 1995; 72: 744-745.
- 7 Kahn CE, Jr., Michalski TA, Erickson SJ, et al. Appropriateness of imaging procedure requests: do radiologists agree? *AJR Am J Roentgenol.* 1997; 169: 11-14.
- 8 Kahn CJ. Improving outcomes in radiology: bringing computer-based decision support and education to the point of care. *Acad Radiol.* 2005; 12: 409-414.
- 9 Kahn CJ, Michalski T, Erickson S, et al. Appropriateness of imaging procedure requests: do radiologists agree? *American Journal of Roentgenology.* 1997; 169: 11-14.
- 10 Lai M, Yong S, Boo N. The effect of a user-guided request form for chest radiographs in a neonatal intensive care unit. *Med J Malaysia.* 2004; 59: 598-603.
- 11 Logan G, Brocklebank L. An audit of occipitontal radiographs. *Dentomaxillofac Radiol.* 1999; 28: 158-161.
- 12 Martinez A, Palacin H, Laborda C, Gutierrez S, Dominguez J, Viejo L. The degree of compliance with the radiology requests from primary care. *Aten Primaria.* 1996; 18: 32-34.
- 13 Roussel P, Lelievre N. [To improve the quality of requisitions for radiologic examinations]. *J Radiol.* 2002; 83: 621-625.
- 14 Sardanelli F, Quarenghi M, Fausto A, Aliprandi A, Cuppone M. How many medical requests for US, body CT, and musculoskeletal MR exams in outpatients are inadequate? *Radiol Med (Torino).* 2005; 109: 229-233.
- 15 Scally P. Design of a radiology request/referral form. *Australas Radiol.* 1993; 37: 201-204.

- 16 Stavem K, Foss T, Botnmark O, Andersen O, Erikssen J. Inter-observer agreement in audit of quality of radiology requests and reports. *Clinical Radiology*. 2004; 59: 1018-1024.
- 17 Triantopoulou C, Tsalafoutas I, Maniatis P, et al. Analysis of radiological examination request forms in conjunction with justification of X-ray exposures. *Eur J Radiol*. 2005; 53: 306-311.
- 18 Weiner S. Radiology by Nonradiologists: Is report documentation adequate? *Am J Manag Care*. 2005; 11: 781-785.
- 19 Weiner SN. Radiology by nonradiologists: is report documentation adequate? *Am J Manag Care*. 2005; 11: 781-785.

3. Time to performance

Objective: Evidence around the time to performance of radiology examination. Examining evidence of poor outcomes related to lack of access to examinations, delays in performance of examinations. In addition any evidence demonstrating improved outcomes as a result of increased utilisation or improved access.

EndNote ref search: "time parameters"

Search Strategy:

Two windows – searching radiology and radiography separately

Could not find any relevant MESH terms regarding time parameters

Radiology AND delays – 13 (but a number of references about radiation therapy – not relevant)

Radiography AND delays – 395 (yields mostly irrelevant articles)

Radiography AND availability – 1322

Radiography AND delay to imaging – 707 (irrelevant articles)

"Radiography"[MeSH] AND imaging delays – 107 (irrelevant articles)

"Radiology"[MeSH] AND imaging delays – 4 (irrelevant articles)

"Radiography/supply and distribution"[MeSH] – 15 (irrelevant articles)

"Radiology/supply and distribution"[MeSH] – 0

"Radiology Department, Hospital/standards"[MeSH] – 535 (160 with limits – abstract, humans, English)

 AND delays – 6 (mostly irrelevant)

 AND access – 10 (irrelevant articles)

Results: 10 articles

- 1 Benson S. Improving patient care in MRI. *Radiol Manage*. 1994; 16: 30-31.
- 2 Blane CE, Dunnick NR, Cotton LA, Cascade PN. Continuous quality improvement process to track lost radiographs and reduce losses. *Can Assoc Radiol J*. 2001; 52: 373-378.
- 3 Bluth EI, Havrilla M, Blakeman C. Quality improvement techniques: value to improve the timeliness of preoperative chest radiographic reports. *AJR Am J Roentgenol*. 1993; 160: 995-998.
- 4 Lewis P, McAllen K, West R. Reducing delays in the CT scanning process at Bloomington Hospital. *Qual Lett Healthc Lead*. 1994; 6: 79-82.

- 5 Menes TS, Aufses AH, Jr., Rojas M, Bickell NA. Increased use of computed tomography does not harm patients with acute appendicitis. *Am Surg.* 2006; 72: 326-329.
- 6 Nonthasoot B, Tullavardhana T, Sirichindakul B, Suphapol J, Nivatvongs S. Acute mesenteric ischemia: still high mortality rate in the era of 24-hour availability of angiography. *J Med Assoc Thai.* 2005; 88 Suppl 4: S46-50.
- 7 Rahman SH, Larvin M, McMahon MJ, Thompson D. Clinical presentation and delayed treatment of cholangitis in older people. *Dig Dis Sci.* 2005; 50: 2207-2210.
- 8 Reiner BI, Siegel EL, Hooper FJ, Glasser D. Effect of film-based versus filmless operation on the productivity of CT technologists. *Radiology.* 1998; 207: 481-485.
- 9 Smith SD, Gardner MJ, Rowe MI. Renal artery occlusion in pediatric blunt abdominal trauma--decreasing the delay from injury to treatment. *J Trauma.* 1993; 35: 861-864.
- 10 Yu RF, San Jose MC, Manzanilla BM, Oris MY, Gan R. Sources and reasons for delays in the care of acute stroke patients. *J Neurol Sci.* 2002; 199: 49-54.

4. Decision rules

Objective: Evidence of validated decision rules and effectiveness in relation to radiology (post pre and post intervention studies).

EndNote ref search: "decision rules"

Search Strategy:

"Intervention Studies"[MeSH] AND radiology and decision rules – 0

"Intervention Studies"[MeSH] AND radiology and decision – 5

"Intervention Studies"[MeSH] AND (radiology OR radiography) AND decision – 5

What are 'validated decision rules'?

- Searched 'validated decision rules' in MeSH – 0
- Searched 'decision' in MeSH – 33

Decision making in general:

("Decision Support Techniques"[MeSH] OR "Decision Making, Computer-Assisted"[MeSH] OR "Decision Making, Organizational"[MeSH] OR "Decision Making"[MeSH]) AND "Intervention Studies"[MeSH] AND (radiology OR radiography) – 6

Validated decision rules as part of organization of radiology:

("Radiology"[MeSH] OR "Radiology/organization and administration"[MeSH]) AND "Decision Making"[MeSH] – 87

AND "Intervention Studies"[MeSH] – 1 (irrelevant)

("Radiography"[MeSH] OR "Radiography/organization and administration"[MeSH]) AND "Decision Making"[MeSH] – 451

AND "Intervention Studies"[MeSH] – 1 (irrelevant)

Validated decision rules as clinical practice guidelines (yielded most articles):

"Radiology"[MeSH] AND "Practice Guidelines"[MeSH] – 59

"Radiography"[MeSH] AND "Practice Guidelines"[MeSH] – 464

AND effectiveness – 28

AND "Intervention Studies"[MeSH] – 3

Results: 22 articles

- 1 Adriaensen M, Kock M, Stijnen T, et al. Peripheral arterial disease: therapeutic confidence of CT versus digital subtraction angiography and effects on additional imaging recommendations. *Radiology*. 2004; 233: 385-391.
- 2 Ammendolia C, Hogg-Johnson S, Pennick V, Glazier R, Bombardier C. Implementing evidence-based guidelines for radiography in acute low back pain: a pilot study in a chiropractic community. *J Manipulative Physiol Ther*. 2004; 27: 170-179.
- 3 Auleley G, Ravaud P, Giarudeau B, et al. Implementation of the Ottawa ankle rules in France. A multicenter randomized controlled trial. *JAMA*. 1997; 277: 1935-1939.
- 4 Bearcroft P, Small J, Flower C. Chest radiography guidelines for general practitioners: a practical approach. *Clin Radiol*. 1994; 49: 56-58.
- 5 Burhenne LW, Wood S, D'Orsi C, et al. Potential contribution of computer-aided detection to the sensitivity of screening mammography. *Radiology*. 2000; 215: 554-562.
- 6 Cadarette S, Jaglal S, Murray T, McIsaac W, Joseph L, Brown J. Evaluation of decision rules for referring women for bone densitometry by dual-energy x-ray absorptiometry. *JAMA*. 2001; 286: 57-63.
- 7 Carton M, Auvert B, Guerini H, et al. Assessment of radiological referral practice and effect of computer-based guidelines on radiological requests in two emergency departments. *Clin Radiol*. 2002; 57: 123-128.
- 8 Freeborn D, Shye D, Mullooly J, Eraker S, Romeo J. Primary care physicians' use of lumbar spine imaging tests: effects of guidelines and practice pattern feedback. *J Gen Intern Med*. 1997; 12: 619-625.
- 9 Gerhardt R, Nelson B, Keenan S, Kernan L, MacKersie A, Lane M. Derivation of a clinical guideline for the assessment of nonspecific abdominal pain: the Guideline for Abdominal Pain in the ED Setting (GAPEDS) Phase 1 Study. *Am J Emerg Med*. 2005; 23: 709-717.
- 10 Holroyd B, Wilson D, Rose B, Mayes D, Noseworthy T. Uptake of validated clinical practice guidelines: experience with implementing the Ottawa Ankle Rules. *Am J Emerg Med*. 2004; 22: 149-155.
- 11 Morey A, Iverson A, Swan A, et al. Bladder rupture after blunt trauma: guidelines for diagnostic imaging. *J Trauma*. 2001; 51: 683-686.
- 12 Naoum J, Mileski W, Daller J, et al. The use of abdominal computed tomography scan decreases the frequency of misdiagnosis in cases of suspected appendicitis. *Am J Surg*. 2002; 184: 587-589.
- 13 Oakeshott P, Kerry S, Williams J. Randomized controlled trial of the effect of the Royal College of Radiologists' guidelines on general practitioners' referrals for radiographic examination. *Br J Gen Pract*. 1994; 44: 197-200.
- 14 Preston C, 3rd JM, Amaraneni K, Suthar B. Reduction of 'callbacks' to the ED due to discrepancies in plain radiograph interpretation. *Am J Emerg Med*. 1998; 16: 160-162.
- 15 Sanden Wvd, Mettes D, Passchaert A, Grol R, Mulder J, Verdonshot E. Effectiveness of clinical practice guideline implementation on lower third molar management in improving clinical decision-making: a randomized controlled trial. *Eur J Oral Sci*. 2005; 113: 349-354.
- 16 Scally P. Decision making in diagnostic radiology. *Australas Radiol*. 1993; 37: 336-341.
- 17 Shekelle P, Kravitz R, Beart J, Marger M, Want M, Lee M. Are nonspecific practice guidelines potentially harmful? A randomized comparison of the effect of nonspecific versus specific guidelines on physician decision making. *Health Serv Res*. 2000; 34: 1429-1448.

- 18 Stiell I, Wells G, Vandemheem K, et al. The Canadian CT Head Rule for patients with minor head injury. *Lancet*. 2001; 357: 1391-1396.
- 19 Van Breuseghem I, Geusens E. Assessment of the appropriateness of requested radiological examinations for outpatients and the potential financial consequences of guideline application. *Jbr-Btr*. 2006; 89: 8-11.
- 20 van der Sanden WJ, Mettes DG, Plasschaert AJ, Grol RP, Mulder J, Verdonchot EH. Effectiveness of clinical practice guideline implementation on lower third molar management in improving clinical decision-making: a randomized controlled trial. *Eur J Oral Sci*. 2005; 113: 349-354.
- 21 Warren Burhenne LJ, Wood SA, D'Orsi CJ, et al. Potential contribution of computer-aided detection to the sensitivity of screening mammography. *Radiology*. 2000; 215: 554-562.
- 22 Worley G, Kotnis R, Jacomb-Hood J, Salama N. The effectiveness of guidelines in reducing inappropriate CT scans of the paranasal sinuses. *Rhinology*. 2001; 39: 125-127.

5. Diagnostic thinking

Objective: Evidence related to cognitive strategies or other interventions to improve radiology diagnostic thinking/clinical decision making.

EndNote ref search: "diagnostic thinking"

Search Strategy:

"Radiology"[MeSH]AND diagnostic thinking – 97

"Radiography"[MeSH] AND diagnostic thinking – 964 □ mostly related to different specific diseases, not relevant

"Radiology"[MeSH]AND cognitive strategies in diagnosis – 1 (article is in French)

"Radiography"[MeSH] AND cognitive strategies in diagnosis – 29 □ articles are about cognitive ability in patients, not radiologist

"Radiology"[MeSH]AND diagnostic improvement – 131 (irrelevant articles)

"Radiography"[MeSH] AND diagnostic improvement – 8291 (irrelevant articles)

"Radiology"[MeSH]AND diagnostic thinking AND improvement - 4

"Radiology"[MeSH]AND improve diagnostic thinking – 5

("Radiology"[MeSH] OR "Radiography"[MeSH]) AND "Clinical competence/standards"[MeSH] AND ("diagnosis"[Subheading] OR "diagnosis"[MeSH Terms] OR diagnosis[Text Word]) – 43 – many possibly relevant articles

("Radiology"[MeSH] OR "Radiography"[MeSH]) AND "Cognition"[MeSH] AND ("diagnosis"[Subheading] OR "diagnosis"[MeSH Terms] OR diagnosis[Text Word]) – 432 (not relevant as mostly regarding patients, not doctors/radiologists etc)

Relevant articles: 27

- 1 Ball CG, Kirkpatrick AW, Fox DL, et al. Are occult pneumothoraces truly occult or simply missed? *J Trauma*. 2006; 60: 294-298 discussion 298-299.
- 2 Beam C, Conant E, Sickles E. Correlation of radiologist rank as a measure of skill in screening and diagnostic interpretation of mammograms. *Radiology*. 2006; 238: 446-453.

- 3 Collins J, Abbott G, Holbert J, et al. Revised curriculum on cardiothoracic radiology for diagnostic radiology residency with goals and objectives related to general competencies. *Acad Radiol.* 2005; 12: 210-223.
- 4 Dawes T, Vowler S, Allen C, Dixon A. Training improves medical student performance in image interpretation. *Br J Radiol.* 2004; 77: 775-776.
- 5 de Rijke JM, Schouten LJ, Schreutelkamp JL, Jochem I, Verbeek AL. A blind review and an informed review of interval breast cancer cases in the Limburg screening programme, the Netherlands. *J Med Screen.* 2000; 7: 19-23.
- 6 Eaton DM, Cottrell D. Structured teaching methods enhance skill acquisition but not problem-solving abilities: an evaluation of the 'silent run through'. *Med Educ.* 1999; 33: 19-23.
- 7 Fincham A, Baehner R, Chai Y, et al. Problem-based learning at the University of Southern California School of Dentistry. *J Dent Educ.* 1997; 61: 417-425.
- 8 Gigerenzer G. The psychology of good judgment: frequency formats and simple algorithms. *Med Decis Making.* 1996; 16: 273-280.
- 9 Gracias V, Frankel H, Gupta R, et al. Defining the learning curve for the Focused Abdominal Sonogram for Trauma (FAST) examination: implications for credentialing. *Am Surg.* 2001; 67: 364-368.
- 10 Hillier J, Tattersall D, Gleeson F. Trainee reporting of computed tomography examinations: do they make mistakes and does it matter? *Clin Radiol.* 2004; 59: 159-162.
- 11 Jacob K, Vivian G, Steel J. X-ray dose training: are we exposed to enough? *Clin Radiol.* 2004; 59: 928-934.
- 12 Jeffrey D, Goddard P, Callaway M, Greenwood R. Chest radiograph interpretation by medical students. *Clin Radiol.* 2003; 58: 478-481.
- 13 Johnson S, Healey A, Evans J, Murphy M, Crawshaw M, Gould D. Physical and cognitive task analysis in interventional radiology. *Clin Radiol.* 2006; 61: 97-103.
- 14 Kan L, Olivotto I, Burhenne LW, Sickles E, Coldman A. Standardized abnormal interpretation and cancer detection ratios to assess reading volume and reader performance in a breast screening program. *Radiology.* 2000; 215: 563-567.
- 15 Krupinski E. Visual scanning patterns of radiologists searching mammograms. *Acad Radiol.* 1996; 3: 137-144.
- 16 Laming D, Warren R. Improving the detection of cancer in the screening of mammograms. *J Med Screen.* 2000; 7: 24-30.
- 17 Luo P, Qian W, Romilly P. CAD-aided mammogram training. *Acad Radiol.* 2005; 12: 1039-1048.
- 18 Malik A, Shetty A, Targett C, Compson J. Scaphoid views: a need for standardisation. *Ann R Coll Surg Engl.* 2004; 86: 165-170.
- 19 Manning D, Ethell S, Donovan T. Detection or decision errors? Missed lung cancer from the posteroanterior chest radiograph. *Br J Radiol.* 2004; 77: 231-235.
- 20 McLauchlan C, Jones K, Guly H. Interpretation of trauma radiographs by junior doctors in accident and emergency departments: a cause for concern? *J Accid Emerg Med.* 1997; 14: 295-298.
- 21 Murdoch Eaton D, Cottrell D. Structured teaching methods enhance skill acquisition but not problem-solving abilities: an evaluation of the 'silent run through'. *Med Educ.* 1999; 33: 19-23.
- 22 Nandi R, Luk T, Henson J. The need for radio-opaque side markers on CT of the paranasal sinuses. *Clin Radiol.* 2003; 58: 808-810.

- 23 Pescarini L, Inches I. Systematic approach to human error in radiology. *Radiol Med (Torino)*. 2006; 111: 252-267.
- 24 Peterson C. Factors associated with success or failure in radiological interpretation: diagnostic thinking approaches. *Med Educ*. 1999; 33: 251-259.
- 25 Taylor S, Halligan S, Burling D, et al. CT colonography: effect of experience and training on reader performance. *Eur Radiol*. 2004; 14: 1025-1033.
- 26 Wood P, Smith W, Altmaier E, Tarico V, Jr EF. A prospective study of cognitive and noncognitive selection criteria as predictors of resident performance. *Invest Radiol*. 1990; 25: 855-859.
- 27 Woods N, Brooks L, Norman G. The value of basic science in clinical diagnosis: creating coherence among signs and symptoms. *Med Educ*. 2005; 39: 197-112.

6. Report Turnaround

Objective: Evidence related to adverse affects from delayed report turn around time or loss of examinations or alternatively evidence of improved outcomes as a result of a decreased report turn around times and lost examinations.

EndNote ref search: "report turnaround"

Search Strategy:

Two windows – searching radiology and radiography separately

MeSH Term = Time and Motion Studies

"Radiography"[MeSH] AND "Time and Motion Studies"[MeSH] – 64

"Radiology"[MeSH] AND "Time and Motion Studies"[MeSH] – 22

"Radiography"[MeSH] AND report turnaround – 7

"Radiology"[MeSH] AND report turnaround – 8

"Radiography"[MeSH] AND lost films – 22

"Radiology"[MeSH] AND lost films – 4

Results: 13 articles

- 1 Bryan S, Weatherburn G, Watkins J, et al. Radiology report times: impact of picture archiving and communication systems. *American Journal of Roentgenology*. 1998; 170: 1153-1159.
- 2 Edwards A, Ricketts C, Dubbins P, Roobottom C, Wells I. The effect of reporting speed on plain film reporting errors. *Clinical Radiology*. 2003; 58: 971-979.
- 3 Marquez L, Stewart H. Improving medical imaging report turnaround times: the role of technology. *Radiol Manage*. 2005; 27: 26-31.
- 4 Mattern C, King BJ, Hangiandreou N, et al. Electronic imaging impact on image and report turnaround times. *J Digit Imaging*. 1999; 12: 155-159.
- 5 Mehta A, Dreyer K, Boland G, Frank M. Do picture archiving and communication systems improve report turnaround times? *J Digit Imaging*. 2000; 13: 105-107.
- 6 Mehta M, Lee T. A comparison of film-screen, CR and DR: a community hospital time-motion study. *Radiol Manage*. 2003; 25: 38-42.
- 7 Reiner B, Siegel E, Hooper F, Pomerantz S, Dahlke A, Rallis D. Radiologists' productivity in the interpretation of CT scans: a comparison of PACS with conventional films. *Am J Roentgenol*. 2001; 176: 861-864.

- 8 Rohana J, Boo N, Yong S, Ong L. Turn-around-time of radiographs in a neonatal intensive care unit. *Med J Malaysia*. 2005; 60: 338-344.
- 9 Seltzer R, Reimer G, Cooperman L, Rossiter S. Computerized radiographic reporting in a community hospital: a consumer's report. *Am J Roentgenol*. 1977; 128: 825-829.
- 10 Seltzer S, Kelly P, Adams D, et al. Expediting the turnaround of radiology reports: Use of total quality management to facilitate radiologists' report signing. *American Journal of Roentgenology*. 1994; 162.
- 11 Starren J, Chan S, Tahil F, White T. When seconds are counted: tools for mobile, high-resolution time-motion studies. *Proc AMIA Symp*. 2000: 833-837.
- 12 Tamm E, Raval B, West O, Dinwiddie S, Holmes R. Evaluating the impact of workstation usage on radiology report times in the initial 6 months following installation. *J Digit Imaging*. 1999; 12: 152-154.
- 13 Worrell J, Federspiel C, Creasy J, et al. Clinical impact of picture archiving and communication systems: evaluation of a prototype system. *J Digit Imaging*. 1992; 5: 118-125.

7. Test performance

Objective: Evidence relating to sources of interpretive errors. Test performance studies, in particular studies, which identify or classify systematic sources error. May also drawn on related disciplines e.g. Histopathology

EndNote ref search: 'test performance'

Search Strategy:

Limits – Abstracts

("Medical Errors"[MeSH] OR "Diagnostic Errors"[MeSH]) AND (Radiology [MeSH] OR Radiography [MeSH])

- 7316 articles

("Medical Errors"[MeSH] OR "Diagnostic Errors"[MeSH]) AND (Radiology [MeSH] OR Radiography [MeSH]) AND test performance

- 164 articles

("Medical Errors"[MeSH] OR "Diagnostic Errors"[MeSH]) AND (Radiology [MeSH] OR Radiography [MeSH]) AND test performance AND system*

- 44 articles

("Medical Errors"[MeSH] OR "Diagnostic Errors"[MeSH]) AND (Radiology [MeSH] OR Radiography [MeSH]) AND test performance AND system* AND classification

- 9 articles – 2 relevant

("Pathology"[MeSH] OR "Pathology, Clinical"[MeSH] OR "Image Cytometry"[MeSH] OR Radiology [MeSH] OR Radiography [MeSH]) AND ("Medical Errors"[MeSH] OR "Diagnostic Errors"[MeSH]) AND "Technology, Medical"[MeSH]

- 4 articles – 2 relevant

("Pathology"[MeSH] OR "Pathology, Clinical"[MeSH] OR "Image Cytometry"[MeSH] OR Radiology [MeSH] OR Radiography [MeSH]) AND error* AND test performance

- 93 articles – some relevant

("Pathology"[MeSH] OR "Pathology, Clinical"[MeSH] OR "Image Cytometry"[MeSH] OR Radiology [MeSH] OR Radiography [MeSH]) AND interpretive error* AND (test performance OR accuracy)

- 1 article

("Pathology"[MeSH] OR "Pathology, Clinical"[MeSH] OR "Image Cytometry"[MeSH] OR Radiology [MeSH] OR Radiography [MeSH]) AND test performance AND error* and interpret*

- 28 articles – some relevant

("Pathology"[MeSH] OR "Pathology, Clinical"[MeSH] OR "Image Cytometry"[MeSH] OR Radiology [MeSH] OR Radiography [MeSH]) AND error* AND interpret* AND (source OR pitfall*)

- 98 articles – some relevant

(reader vari* diagnostic errors radiology

- Note : No Limits
- Details:

(reader variability[All Fields] OR reader variance[All Fields] OR reader variation[All Fields]) AND (("diagnostic errors"[MeSH Terms] OR diagnostic errors[Text Word]) AND ("radiology"[MeSH Terms] OR ("radiography"[TIAB] NOT Medline[SB]) OR "radiography"[MeSH Terms] OR radiology[Text Word]))

- Results - 10 articles (some relevant)

Results: 56 articles

- 1 Barrau V, Rufat P, Charrada L, Menu Y. [Audit procedure of radiology reports in a hospital service]. *J Radiol.* 2002; 83: 717-721.
- 2 Beam CA, Guse CE, Sullivan DC. A sequential chart for the audit-based evaluation of screening mammogram interpretation. *Acad Radiol.* 1999; 6: 216-223.
- 3 Bechtold RE, Chen MY, Ott DJ, et al. Interpretation of abdominal CT: analysis of errors and their causes. *J Comput Assist Tomogr.* 1997; 21: 681-685.
- 4 Beiden SV, Wagner RF, Campbell G. Components-of-variance models and multiple-bootstrap experiments: an alternative method for random-effects, receiver operating characteristic analysis. *Acad Radiol.* 2000; 7: 341-349.
- 5 Benedetto AR. Six Sigma: not for the faint of heart. *Radiol Manage.* 2003; 25: 40-53.
- 6 Brody AS, Kosorok MR, Li Z, et al. Reproducibility of a scoring system for computed tomography scanning in cystic fibrosis. *J Thorac Imaging.* 2006; 21: 14-21.
- 7 Brown ML, Houn F. Quality assurance audits of community screening mammography practices: availability of active follow-up for data collection and outcome assessment. *AJR Am J Roentgenol.* 1994; 163: 825-829.
- 8 Ciatto S, Houssami N, Apruzzese A, et al. Reader variability in reporting breast imaging according to BI-RADS assessment categories (the Florence experience). *Breast.* 2006; 15: 44-51.
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- 10 Duseja R, Feldman JA. Missed acute cardiac ischemia in the ED: limitations of diagnostic testing. *Am J Emerg Med.* 2004; 22: 219-225.
- 11 Fenlon HM. CT colonography: pitfalls and interpretation. *Abdom Imaging.* 2002; 27: 284-291.
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- 16 Gur D, Klym AH, King JL, et al. The effect of image display size on observer performance an assessment of variance components. *Acad Radiol.* 2006; 13: 409-413.
- 17 Hardesty LA, Ganott MA, Hakim CM, Cohen CS, Clearfield RJ, Gur D. "Memory effect" in observer performance studies of mammograms. *Acad Radiol.* 2005; 12: 286-290.
- 18 Hendrick RE, Cutter GR, Berns EA, et al. Community-based mammography practice: services, charges, and interpretation methods. *AJR Am J Roentgenol.* 2005; 184: 433-438.
- 19 Hillier JC, Tattersall DJ, Gleeson FV. Trainee reporting of computed tomography examinations: do they make mistakes and does it matter? *Clin Radiol.* 2004; 59: 159-162; discussion 157-158.
- 20 Hobby JL, Tom BD, Todd C, Bearcroft PW, Dixon AK. Communication of doubt and certainty in radiological reports. *Br J Radiol.* 2000; 73: 999-1001.
- 21 Hofer TP, Hayward RA. Are bad outcomes from questionable clinical decisions preventable medical errors? A case of cascade iatrogenesis. *Ann Intern Med.* 2002; 137: 327-333.
- 22 Howanitz PJ. Errors in laboratory medicine: practical lessons to improve patient safety. *Arch Pathol Lab Med.* 2005; 129: 1252-1261.
- 23 Irie H, Honda H, Kuroiwa T, et al. Pitfalls in MR cholangiopancreatographic interpretation. *Radiographics.* 2001; 21: 23-37.
- 24 Krieger PA. Strategies for reducing Papanicolaou smear screening errors: principles derived from data and experience with quality control. *Arch Pathol Lab Med.* 1997; 121: 277-281.
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- 27 Majid AS, de Paredes ES, Doherty RD, Sharma NR, Salvador X. Missed breast carcinoma: pitfalls and pearls. *Radiographics.* 2003; 23: 881-895.
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- 31 Mannino DM, Kennedy RD, Hodous TK. Pneumoconiosis: comparison of digitized and conventional radiographs. *Radiology.* 1993; 187: 791-796.
- 32 Meier FA, Jones BA. Point-of-care testing error: sources and amplifiers, taxonomy, prevention strategies, and detection monitors. *Arch Pathol Lab Med.* 2005; 129: 1262-1267.
- 33 Mirvis SE, Bidwell JK, Buddemeyer EU, et al. Value of chest radiography in excluding traumatic aortic rupture. *Radiology.* 1987; 163: 487-493.

- 34 Obuchowski NA, Beiden SV, Berbaum KS, et al. Multireader, multicase receiver operating characteristic analysis: an empirical comparison of five methods. *Acad Radiol.* 2004; 11: 980-995.
- 35 Peters AM, Bomanji J, Costa DC, et al. Clinical audit in nuclear medicine. *Nucl Med Commun.* 2004; 25: 97-103.
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- 41 Rockette HE, Gur D, Kurs-Lasky M, King JL. On the generalization of the receiver operating characteristic analysis to the population of readers and cases with the jackknife method: an assessment. *Acad Radiol.* 1995; 2: 66-69.
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- 53 Wagner RF, Beam CA, Beiden SV. Reader variability in mammography and its implications for expected utility over the population of readers and cases. *Med Decis Making.* 2004; 24: 561-572.
- 54 Warren JS, Lara K, Connor PD, Cantrell J, Hahn RG. Correlation of emergency department radiographs: results of a quality assurance review in an urban community hospital setting. *J Am Board Fam Pract.* 1993; 6: 255-259.
- 55 Williams SM, Connelly DJ, Wadsworth S, Wilson DJ. Radiological review of accident and emergency radiographs: a 1-year audit. *Clin Radiol.* 2000; 55: 861-865.
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8. Clinical Outcomes

Objective: Evidence of the effect of radiology interventions on a time to clinical action and in particular any evidence of improved clinical outcome result from this.

NB the above to only include studies with a clinical outcome measure not purely reporting times alone..

EndNote ref search: 'clinical outcomes'

Search Strategy:

Limits – Abstracts

(Radiology [MeSH] OR Radiography [MeSH]) AND outcome AND (improve* or positive) AND time

- Results – 1612 articles

(Radiology [MeSH] OR Radiography [MeSH]) AND outcome AND (improve* or positive) AND report* time

- Results – 409 articles

"Time Factors"[MeSH] AND (Radiology [MeSH] OR Radiography [MeSH]) AND outcome AND (improve* or positive)

- Results – 685 articles

"Time Factors"[MeSH] AND (Radiology [MeSH] OR Radiography [MeSH]) AND clinical outcome AND (improve* or positive) AND report* time

- Results – 82 articles

(Radiology [MeSH] OR Radiography [MeSH]) AND (time OR speed) AND clinical outcome AND (improve* or positive) AND report* time AND imag*

- Results – 74 articles

(Radiology [MeSH] OR Radiography [MeSH]) AND reporting speed AND outcome – 1 article (irrelevant)

(Radiology [MeSH] OR Radiography [MeSH]) AND (time OR turnaround) AND clinical outcome

- Results – 3174 articles

(Radiology [MeSH] OR Radiography [MeSH]) AND (time OR turnaround) AND clinical outcome AND (intervention OR action)

- Results – 419 articles

(Radiology [MeSH] OR Radiography [MeSH]) AND (time OR speed) AND clinical outcome AND (intervention OR action) AND investig*

- Results 73 articles – 2 relevant

Most related to specific interventions, with no emphasis on radiology or importance of time.

(Delay* radiolog* outcome*

- (Limits - Default tag - 'All fields', Language 'English only')
- Returned 764 results.

Results: 89 articles

- 1 Abubaker W, Abdulrahman M. Quality assurance guides health reform in Jordan. QA Brief. 1996; 5: 19-21.
- 2 Adickes ED, Sims KL. Enhancing autopsy performance and reporting. A system for a 5-day completion time. Arch Pathol Lab Med. 1996; 120: 249-253.
- 3 Ahmed A. Quality and outcomes of heart failure care in older adults: role of multidisciplinary disease-management programs. J Am Geriatr Soc. 2002; 50: 1590-1593.
- 4 Bagian JP, Lee C, Gosbee J, et al. Developing and deploying a patient safety program in a large health care delivery system: you can't fix what you don't know about. Jt Comm J Qual Improv. 2001; 27: 522-532.
- 5 Beckmann U, Bohringer C, Carless R, et al. Evaluation of two methods for quality improvement in intensive care: facilitated incident monitoring and retrospective medical chart review. Crit Care Med. 2003; 31: 1006-1011.
- 6 Benedetto AR. Six Sigma: not for the faint of heart. Radiol Manage. 2003; 25: 40-53.
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- 9 Bethell C, Peck C, Schor E. Assessing health system provision of well-child care: The Promoting Healthy Development Survey. Pediatrics. 2001; 107: 1084-1094.
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- 12 Bruce J, Russell EM, Mollison J, Krukowski ZH. The measurement and monitoring of surgical adverse events. Health Technol Assess. 2001; 5: 1-194.
- 13 Burke MJ, Bonaminio G, Walling A. Implementing a systematic course/clerkship peer review process. Acad Med. 2002; 77: 930-931.
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- 15 Carter YH, Shaw S, Macfarlane F. Primary Care Research Team Assessment (PCRTA): development and evaluation. Occas Pap R Coll Gen Pract. 2002: iii-vi, 1-72.
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- 19 Curtis JR, Cook DJ, Wall RJ, et al. Intensive care unit quality improvement: a "how-to" guide for the interdisciplinary team. *Crit Care Med.* 2006; 34: 211-218.
- 20 Davoli M, Amato L, Minozzi S, Bargagli AM, Vecchi S, Perucci CA. [Volume and health outcomes: an overview of systematic reviews]. *Epidemiol Prev.* 2005; 29: 3-63.
- 21 Deitch CH, Chan WC, Sunshine JH, Zininger MD, Cascade PN, Cochran ST. Quality assessment and improvement: what radiologists do and think. *AJR Am J Roentgenol.* 1994; 163: 1245-1254.
- 22 Dixon JF, Wielgosz C, Pires ML. Description and outcomes of a custom Web-based patient occurrence reporting system developed for Baylor University Medical Center and other system entities. *Proc (Bayl Univ Med Cent).* 2002; 15: 199-202; discussion 208-111.
- 23 Dockray KT. Solo practice management: value of a computerized reporting system. *AJR Am J Roentgenol.* 1994; 162: 1439-1441.
- 24 Dundar Y, Dodd S, Dickson R, Walley T, Haycox A, Williamson PR. Comparison of conference abstracts and presentations with full-text articles in the health technology assessments of rapidly evolving technologies. *Health Technol Assess.* 2006; 10: iii-iv, ix-145.
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- 29 Ganguli S, Pedrosa I, Yam CS, Appignani B, Siewert B, Kressel HY. Part I: preparing first-year radiology residents and assessing their readiness for on-call responsibilities. *Acad Radiol.* 2006; 13: 764-769.
- 30 Gauger PG, Davis JW, Orr PJ. A novel Web-based graduate medical education management system including ACGME compliance algorithms. *Acad Med.* 2002; 77: 928.
- 31 Geller BM, Ichikawa LE, Buist DS, et al. Improving the concordance of mammography assessment and management recommendations. *Radiology.* 2006; 241: 67-75.
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- 35 Holliman CJ, Swope G, Mauger L, Wuerz RC, Meador SA. Comparison of two systems for quality assurance of prehospital advanced life support services. *Prehospital Disaster Med.* 1993; 8: 303-310.
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- 67 Purdy JA, Harms WB, Michalski J, Bosch WR. Initial experience with quality assurance of multi-institutional 3D radiotherapy clinical trials. A brief report. *Strahlenther Onkol.* 1998; 174 Suppl 2: 40-42.
- 68 Ransom C, Zamora G, Jones L. The development and implementation of a quality assurance Master Audit Plan. *Qual Assur.* 1995; 4: 80-82.
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9. Validity

Objective: Evidence related to the validity of sources of information regarding radiology error

EndNote ref search: 'validity'

Search Strategy:

Limits—abstracts

(Radiology [MeSH] OR Radiography [MeSH]) AND ("Medical Errors"[MeSH] OR "Diagnostic Errors"[MeSH] OR "Observer Variation"[MeSH]) AND source AND validity

- 3 articles—none relevant

(Radiology [MeSH] OR Radiography [MeSH]) AND ("Medical Errors"[MeSH] OR "Diagnostic Errors"[MeSH] OR "Observer Variation"[MeSH]) AND source

- 112 articles—few relevant

(Radiology [MeSH] OR Radiography [MeSH]) AND source* of error AND (information OR document*) AND (reliab* OR validity)

- 9 articles—none relevant

(Radiology [MeSH] OR Radiography [MeSH]) AND ("Medical Errors"[MeSH] OR "Diagnostic Errors"[MeSH] OR "Observer Variation"[MeSH]) AND source* AND (information OR document*) AND (reliab* OR validity)

- 9 articles—none relevant

(Radiology [MeSH] OR Radiography [MeSH]) AND error* AND (source OR information OR data OR document*) AND (valid* OR effective* OR legitim* OR credib*)

- 407 articles

(Radiology [MeSH] OR Radiography [MeSH]) AND ("Medical Errors"[MeSH] OR "Diagnostic Errors"[MeSH] OR "Observer Variation"[MeSH]) AND (source OR information OR data OR document*) AND (valid* OR effective* OR legitim* OR credib*)

- 332 articles

(Error radiology report*

- (Note: Limits: English only)
- Details: (error[All Fields] AND (radiology report[All Fields] OR radiology reporting[All Fields] OR radiology reports[All Fields])) AND English[lang]

Results: 3 articles

- 1 Kanal KM, Hangiandreou NJ, Sykes AM, et al. Initial evaluation of a continuous speech recognition program for radiology. *J Digit Imaging.* 2001; 14: 30-37.
- 2 Klein EE, Drzymala RE, Purdy JA, Michalski J. Errors in radiation oncology: a study in pathways and dosimetric impact. *J Appl Clin Med Phys.* 2005; 6: 81-94.
- 3 Seltzer SE, Kelly P, Adams DF, et al. Expediting the turnaround of radiology reports: use of total quality management to facilitate radiologists' report signing. *AJR Am J Roentgenol.* 1994; 162: 775-781.

Classification

Question: Evidence relating to classification of errors specific to radiology.

EndNote ref search: 'classification'

Search Strategy:

Limits—abstracts and English

Search criteria:

(classif* radiolo* errors

- Outcome: 160

Results: 85 articles

- 1 Radiology devices; classifications for five medical image management devices; correction--FDA. Final rule; correction. Fed Regist. 1998; 63: 44998.
- 2 Mammographic computer-aided detection systems. Health Devices. 2003; 32: 141-164.
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Audit

Question: Evidence relating to audit of image interpretation performance in radiology.

Including evidence relating to audit tools, availability and implementation to assess image interpretation performance and error in radiology including specific audit tools for example RadPeer, eCare, AIMS..

EndNote ref search: `audit`

Search Strategy:

Limits – Abstracts

(Radiology [MeSH] OR Radiography [MeSH]) AND Medical audit [MeSH]

- 265 articles

(Radiology [MeSH] OR Radiography [MeSH]) AND Medical audit [MeSH] AND interpretation

- 25 articles

(Radiology [MeSH] OR Radiography [MeSH]) AND Medical audit [MeSH] AND performance

- 26 articles

(Radiology [MeSH] OR Radiography [MeSH]) AND Medical audit [MeSH] AND image interpretation

- 22 articles

(Radiology [MeSH] OR Radiography [MeSH]) AND Medical audit [MeSH] OR Image interpretation, Computer-assisted [MeSH] – 166393

(Radiology [MeSH] OR Radiography [MeSH]) AND Medical audit [MeSH] AND Image interpretation, Computer-assisted [MeSH] – 60

- 2 relevant articles

(Radiology [MeSH] OR Radiography [MeSH]) AND errors AND audit AND image interpretation

- 8 articles – few relevant

(Radiology [MeSH] OR Radiography [MeSH]) AND errors AND audit tool AND interpretation

- 1 article

(Radiology [MeSH] OR Radiography [MeSH]) AND error* AND audit AND interpret*

- 12 articles – few relevant

(Radiology [MeSH] OR Radiography [MeSH]) AND audit tool AND interpret*

- 4 articles – 2 relevant

(Audit quality radiolo*

- (Note – Limits: English only)
- 127 articles some relevant
- Refined to: (Audit quality radiolo* varia*) (Limits English only)
- 20 articles - most relevant

Results: 55 articles

- 1 Ataman OU, Barrett A, Davidson S, et al. Audit of effectiveness of routine follow-up clinics after radiotherapy for cancer: a report of the REACT working group of ESTRO. *Radiother Oncol*. 2004; 73: 237-249.
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