

APPENDIX I: SEARCH STINGS EMPLOYED DURING ARTICLE SEARCH

PUBMED (All fields)

Search		results
#1	(Junior doctor*) OR (House officer*) OR Houseman OR (Casualty officer*) OR intern OR (Foundation Doctor*) OR (Medical Officer*) OR Doctor*	433,590
#2	(Radiographic interpretation) OR (image interpretation) OR (x?ray interpretation) OR Misinterpretation	187,700
#3	Trauma OR fracture	1,616,900
#4	#1 AND #2 AND #3	209
#5	From 1990 to 2025	198

COCHRANE LIBRARY (All fields)

Search		results
#1	Junior NEXT (doctor*) OR House NEXT (officer*) OR houseman OR Casualty NEXT (officer*) OR intern* OR Foundation NEXT (doctor*) OR Medical NEXT (officer*) OR Doctor*	296640
#2	(Radiographic interpretation) OR (image interpretation) OR (x?ray interpretation) OR misinterpretation	4290
#3	trauma OR fracture	48521
#4	#1 AND #2 AND #3	405
#5	From 1990 to 2025	405

SCOPUS (All fields)

("Junior doctor*") OR ("House officer*") OR houseman OR ("Casualty officer*") OR intern OR ("Foundation Doctor*") OR ("Medical officer*") OR doctor* AND ("Radiographic interpretation") OR ("image interpretation") OR ("x?ray interpretation") OR misinterpretation AND trauma OR fracture

Total 796; From 1990-2025= 791

EMBASE

Search		Results
#1	'junior doctor*' OR 'house officer*' OR houseman OR 'casualty officer*' OR intern* OR 'foundation doctor*' OR 'medical officer*' OR doctor*	7,301,308
#2	'radiographic interpretation' OR 'image interpretation' OR 'x?ray interpretation' OR misinterpretation	15,812
#3	trauma OR fracture	990,378
#4	#1 AND #2 AND #3	142
#5	From 1990 to 2025	138

APPENDIX II: EXCLUDED ARTICLES AND JUSTIFICATION

Reference	Aim	PICO	Reason for exclusion
Beggs, I. and J. Davidson (1990). "Accident and emergency reporting in UK teaching departments." <i>Clinical Radiology</i> 41 (4): 264-267.	To survey UK training departments on their practices regarding accident and emergency (A&E) radiograph reporting, specifically focusing on when trainee radiologists commence reporting, their workload, supervision arrangements, and reporting delays. The paper also highlights issues such as the frequency of misinterpretation of radiographs in A&E and the need for improved supervision of less experienced trainees to reduce errors		It is irrelevant to the review. This was a survey on emergency department practices
Thomas, H. G., et al. (1992). "Value of radiograph audit in an accident service department." <i>Injury</i> 23 (1): 47-50.	It reports on an audit of trauma radiographs in an accident service, detailing the frequency and types of radiographic misinterpretations by casualty officers and the subsequent clinical impact.	Population: Patients attending an accident service department undergoing trauma plain radiography. Intervention: Interpretation and acute reporting of trauma radiographs by A&E casualty officers. Comparison: Not explicitly stated. Outcome: Rates of radiographic misinterpretations (missed fractures, suspected fractures, false positives), patient recalls for further imaging or treatment, and clinical audit benefits.	Inadequate information to construct 2x2 contingency table.
Brunswick, J.E., Ilkhanipour, K., Seaberg, D.C. and McGill, L., 1996. Radiographic interpretation in the emergency department. <i>The American journal of emergency medicine</i> , <i>14</i> (4), pp.346-348.	This study examined the concordance of radiographic readings between emergency department (ED) attending physicians and radiologists in a community teaching hospital. In addition, the incidents of misinterpretations leading to an alteration in patient care were also reviewed.	Population: Patients who underwent plain radiography regardless of clinical history. Intervention: Interpretation by board-certified or -eligible emergency medicine (EM) physicians, and EM, internal medicine, and surgical residents at the A&E. Comparison: Interpretation by a radiologist. Outcome: rate of misinterpretations.	Patients who underwent plain radiography for reasons other than traumatic injury or traumatic injury alone. Interpretation of plain trauma X-rays by other professionals. Inadequate information to construct 2x2 contingency table.
McLauchlan, C. A., et al. (1997). "Interpretation of trauma radiographs by junior doctors in accident and emergency departments: a cause for concern?" <i>J Accid Emerg Med</i> 14 (5): 295-298.	To investigate how well junior doctors in accident and emergency (A&E) were able to diagnose significant x ray abnormalities after trauma and	Population: Patient who underwent plain radiography with history of traumatic injury. Intervention: interpretation by senior	Inadequate information to construct 2x2 contingency table.

	to compare their results with those of more senior doctors.	house officers at the emergency department. Comparison: Pre-determined answer sheet. Outcome: mean scores	
Meek, S., et al. (1998). "Can accident and emergency nurse practitioners interpret radiographs? A multicentre study." <u>J Accid Emerg Med</u> 15 (2): 105-107.	To assess the ability of nurse practitioners in accident and emergency (A&E) to interpret distal limb radiographs, by comparison with senior house officers.	Population: Patient who underwent plain radiography with history of traumatic injury. Intervention: interpretation by senior house officers at the emergency department. Comparison: interpretation by three trauma radiologist and A&E registrars Outcome: mean scores	Inadequate information to construct 2x2 contingency table
Overton-Brown, P. and D. Anthony (1998). "Towards a partnership in care: nurses' and doctors' interpretation of extremity trauma radiology." <u>J Adv Nurs</u> 27 (5): 890-896.	To determine how accurate nurses interpretive abilities were in comparison to casualty officers.	Population: Patient who underwent plain radiography with history of traumatic injury. Intervention: interpretation by senior house officers at the emergency department. Comparison: interpretation by a radiologist. Outcome: Area under the ROC curve	Inadequate information to construct 2x2 contingency table.
Sakr, M., et al. (1999). "Care of minor injuries by emergency nurse practitioners or junior doctors: a randomised controlled trial." <u>Lancet</u> 354 (9187): 1321-1326.	To assess the care and outcome of patients with minor injuries who were managed by a nurse practitioner or a junior doctor in our accident and emergency department	Population: patients who underwent plain radiography with history of traumatic injury. Intervention: interpretation by junior doctors at the emergency department. Comparison: interpretation by a radiologist. Outcome: level of agreement	Inadequate information to construct 2x2 contingency table
Weatherburn, G., et al. (2000). "The effect of a Picture Archiving and Communications System (PACS) on diagnostic performance in the accident and emergency department." <u>Journal of Accident and Emergency Medicine</u> 17 (3): 180-184.	To identify the benefits to the accident and emergency (A&E) department of a hospital wide Picture Archiving and Communications System (PACS).	Population: patients who underwent plain radiography regardless of history. Intervention: interpretation by senior house officers at the emergency department. Comparison: interpretation by a radiologist.	Patients who underwent plain radiography for reasons other than traumatic injury or traumatic injury alone. Inadequate information to construct 2x2 contingency table.

		Outcome: rate of misdiagnosis	
Maxwell-Armstrong, C., et al. (2001). "A comparison of junior hospital doctors interpretation of acute radiographs using an X-ray box and a window." <u>Annals of the Royal College of Surgeons of England</u> 83 (6): 435.	To assess whether the practice of holding up X-rays could influence clinically significant radiographic abnormalities going undetected.		It is irrelevant to the review. This study assessed a possible factor that could influence image interpretation
Guly, H. R. (2001). "Diagnostic errors in an accident and emergency department." <u>Emerg Med J</u> 18 (4): 263-269.	To describe the diagnostic errors occurring in a busy district general hospital accident and emergency (A&E) department over four years.		Irrelevant to the review This was a description of errors that occur at the emergency department
Benger, J. R. (2002). "Can nurses working in remote units accurately request and interpret radiographs?" <u>Emerg Med J</u> 19 (1): 68-70.	To determine whether nurses working alone in a peripheral unit are able to appropriately request, and accurately interpret, peripheral limb radiographs.	Population: patients who underwent plain radiography with history of traumatic injury. Intervention: interpretation by nurse at the emergency department. Comparison: interpretation by a senior emergency medicine doctor Outcome: sensitivity, specificity, 2x2 contingency table values	Interpretation of plain trauma X-rays by other professionals
Guly, H. R. (2002). "Injuries initially misdiagnosed as sprained wrist (beware the sprained wrist)." <u>Emerg Med J</u> 19 (1): 41-42.	To describe the injuries misdiagnosed as a sprain of the wrist and to determine the approximate incidence of misdiagnosis in patients diagnosed as having a sprain of the wrist.		Irrelevant to the review This was a description of injuries interpreted as sprains at the emergency department
Chen, T. W., et al. (2003). "Interpretation of skull radiographs for facial fractures by medical staff working in UK emergency departments: a pilot study." <u>Dentomaxillofac Radiol</u> 32 (3): 166-172.	To determine the ability of hospital doctors (1) to assess the technical quality of occipitomenal (OM) radiographs and (2) to identify facial fractures	Population: Patient who underwent plain radiography with history of axial traumatic injury. Intervention: interpretation by junior doctors at the emergency department. Comparison: interpretation by a radiologist. Outcome: percentages of abnormalities identification	Inadequate information to construct 2x2 contingency table.
Hardy, M. and C. Barrett (2003). "Interpreting trauma radiographs." <u>Journal of advanced nursing</u> 44 (1): 81-87.	To ascertain the ability of accident and emergency doctors and nurses to interpret trauma radiographs, and identify whether there is a consistent standard of interpretive accuracy that could be used as a measure of competence.		Irrelevant to the review This was a literature review
Higginson, I., et al. (2004). "Do radiographs requested from a paediatric emergency department in New Zealand need reporting?"	To ascertain whether plain radiographs interpreted by doctors working in a paediatric	Population: patients who underwent plain	Patients who underwent plain radiography for reasons other than traumatic

EMA - Emergency Medicine Australasia 16(4): 288-294.	ED need reporting by radiologists	radiography regardless of history. Intervention: interpretation by senior house officers and registrars at the emergency department. Comparison: interpretation by a radiologist. Outcome: Level of agreement	injury or traumatic injury alone. Interpretation of plain trauma X-rays by other professionals. Inadequate information to construct 2x2 contingency table.
Scépi, M., et al. (2005). "Discordant results in x-ray interpretations between ED physicians and radiologists. a prospective investigation of 30 000 trauma patients [5]." <u>American Journal of Emergency Medicine</u> 23(7): 918-920.	To evaluate the role of specialized double reexamination in the prevention of radiological misinterpretation and in the reduction of inappropriate therapeutic interventions arising from these errors.	Population: Patient who underwent plain radiography with history of axial traumatic injury. Intervention: interpretation by non-radiologist emergency department physician and an emergency medicine physician. Comparison: interpretation by a radiologist. Outcome: level of agreement	Interpretation of plain trauma X-rays by other professionals. Inadequate information to construct 2x2 contingency table
Derksen, R. J., et al. (2005). "Diagnostic accuracy and reproducibility in the interpretation of Ottawa ankle and foot rules by specialized emergency nurses." <u>Am J Emerg Med</u> 23(6): 725-729.	To evaluate the diagnostic accuracy and reproducibility of SENs in assessing ankle sprains by applying the Ottawa Ankle Rules (OAR) and Ottawa Foot Rules (OFR).		Irrelevant to the review While it reports data on junior doctors (house officers) applying clinical decision rules for ankle/foot injury imaging, it does not evaluate their diagnostic accuracy in interpreting the plain trauma radiographs directly.
Derksen, R. J., et al. (2006). "Diagnostic accuracy of lower extremity X-ray interpretation by 'specialized' emergency nurses." <u>Eur J Emerg Med</u> 13(1): 3-8.	To compare the diagnostic accuracy of emergency nurses with that of senior house officers in interpreting ankle and foot radiographs.		The full text could not be retrieved despite repeated attempts; therefore, it was excluded
Willis, B. H. and S. D. Sur (2007). "How good are emergency department Senior House Officers at interpreting X-rays following radiographers' triage?" <u>Eur J Emerg Med</u> 14(1): 6-13.	To assess the accuracy of Senior House Officers at interpreting plain X-rays following their triage by radiographers in an emergency department.	Population: patients who underwent plain radiography regardless of history. Intervention: interpretation by senior house officers following radiographers triage. Comparison: non-specific. Outcome: percentage of abnormalities identified	Patients who underwent plain radiography for reasons other than traumatic injury or traumatic injury alone. Inadequate information to construct 2x2 contingency table
Aydın, S.A., Bulut, M., Topal, N.B., Akgoz, S., Koksall, O., Orcan, S., Turan, M., Aydın, T., Gültekin, E., Oncu, M.R. and Durmus, O., 2008. Performance of emergency	To assess the performance of residents in emergency	Population: Patient who underwent plain	Interpretation of plain trauma X-rays by other professionals.

medicine residents in the interpretation of radiographs in patients with trauma. <i>Emergency Medicine Journal</i> , 25(8), pp.482-485.	medicine in the interpretation of trauma radiographs	radiography with history of traumatic injury. Intervention: interpretation by third year emergency medicine residents and radiology residents. Comparison: interpretation by a radiologist. Outcome: sensitivity, specificity, PPV, NPV, level of agreement	Inadequate information to construct 2x2 contingency table
Piper, K. J. and A. Paterson (2009). "Initial image interpretation of appendicular skeletal radiographs: A comparison between nurses and radiographers." <i>Radiography</i> 15(1): 40-48.	To examine the effect of a short training programme on nurses and radiographers, exploring differences between their performance before and after training	Population: Patient who underwent plain radiography with history of traumatic injury. Intervention: interpretation by nurses and radiographers. Comparison: pre-determined score sheet. Outcome: sensitivity, specificity, 2x2 contingency table	Interpretation of plain trauma X-rays by other professionals. Inadequate information to construct 2x2 contingency table.
Swaby-Larsen, D. (2009). "X-ray interpretation by emergency nurse practitioners." <i>Emergency Nurse</i> 17(6): 24-28.	An audit of the ability of emergency nurse practitioners to interpret X-rays accurately		Irrelevant to the review A short communique on the subject to nurses at the university hospital Lewisham
van der Linden, C., et al. (2010). "Diagnostic accuracy of emergency nurse practitioners versus physicians related to minor illnesses and injuries." <i>J Emerg Nurs</i> 36(4): 311-316.	To determine the incidence of missed injuries and inappropriately managed cases in patients with minor injuries and illnesses and to evaluate diagnostic accuracy of the emergency nurse practitioners (ENPs) compared with junior doctors/senior house officers (SHOs).		Irrelevant to the review This was about the evaluation of illness and injuries at the emergency department
Kelly, B. S., et al. (2012). "Collaboration between radiological technologists (radiographers) and junior doctors during image interpretation improves the accuracy of diagnostic decisions." <i>Radiography</i> 18(2): 90-95.	This study investigates whether collaboration between junior doctors and radiographers impacts on diagnostic accuracy	Population: Patient who underwent plain radiography with history of traumatic injury. Intervention: interpretation by junior doctors at the emergency department. Comparison: interpretation by radiologist. Outcome: area under the curve	Inadequate information to construct 2x2 contingency table
Lee, G. A., et al. (2014). "The accuracy of adult limb radiograph interpretation by emergency nurse practitioners: A prospective comparative study." <i>International journal of nursing studies</i> 51(4): 549-554.	To compare the accuracy in interpreting isolated adult limb radiographs between emergency nurse practitioners and emergency physicians.	Population: Patient who underwent plain radiography with history of traumatic injury. Intervention: interpretation by	Interpretation of plain trauma X-rays by other professionals.

		emergency medicine consultants at the emergency department. Comparison: interpretation by radiologist. Outcome: sensitivity, specificity, 2x2 contingency table values	
Christiansen, J. M., et al. (2014). "Poor interpretation of chest X-rays by junior doctors." <u>Dan Med J</u> 61(7): A4875.	To determine whether basic clinical education (BCE) doctors are capable of meeting the minimum standards for a BCE doctor's diagnostic skills using thorax X-ray, as required by the Danish medical degree and by the Danish Health and Medicines Authority	Population: Patient who underwent plain chest radiography with varying histories. Intervention: interpretation by BCE doctors at the emergency department. Comparison: interpretation by radiologist. Outcome: sensitivity, specificity	Patients who underwent plain radiography for reasons other than traumatic injury or traumatic injury alone
McConnell, J. R. and M. A. Baird (2017). "Could musculo-skeletal radiograph interpretation by radiographers be a source of support to Australian medical interns: A quantitative evaluation." <u>Radiography (Lond)</u> 23(4): 321-329.	The study measured the interpretive ability of final year medical students and radiographers in musculo-skeletal trauma (MSK) plain radiographic images	Population: Patient who underwent plain radiography with history of traumatic injury. Intervention: interpretation by radiographers and medical students at the emergency department. Comparison: interpretation by radiologist. Outcome: sensitivity, specificity, 2x2 contingency table values	Interpretation of plain trauma X-rays by other professionals
Cheung, T., et al. (2018). "Low accuracy and confidence in chest radiograph interpretation amongst junior doctors and medical students." <u>Internal Medicine Journal</u> 48(7): 864-868.	To compare the competency and confidence of chest radiograph interpretation in junior doctors and senior medical students at a tertiary Australian teaching hospital and identify areas where radiology teaching could be improved.	Population: Patient who underwent plain chest radiography with varying histories. Intervention: interpretation by junior doctors. Comparison: interpretation by radiologist. Outcome: mean scores and confidence rates	Patients who underwent plain radiography for reasons other than traumatic injury or traumatic injury alone
Aitkenhead, A. and G. A. Lee (2019). "The accuracy of paediatric limb radiograph interpretation by nurse practitioners in a single centre." <u>International emergency nursing</u> 45: 36-42.	To compare the accuracy in interpreting isolated paediatric limb radiographs between NPs and consultant radiologists	Population: Patient who underwent plain radiography with history of traumatic injury. Intervention: interpretation by nurse practitioners at the emergency department.	Interpretation of plain trauma X-rays by other professionals Inadequate information to construct 2x2 contingency table

		Comparison: interpretation by radiologist. Outcome: sensitivity, specificity, 2x2 contingency table values	
Lockwood, P. and Pittock, L., 2019. Multi-professional image interpretation: performance in preliminary clinical evaluation of appendicular radiographs. <i>Radiography</i> , 25(4), pp.e95-e107.	The study evaluated the performance of a cohort of healthcare professionals in image interpretation of appendicular radiographic examinations following a preliminary clinical evaluation (PCE) course.	Population: Patient who underwent plain radiography with history of traumatic injury. Intervention: interpretation by nurse practitioners and allied health professionals. Comparison: interpretation by reporting radiographers. Outcome: sensitivity, specificity.	Interpretation of plain trauma X-rays by other professionals
Miranda, A. C. G., et al. (2019). "Radiological imaging interpretation skills of medical interns." <i>Revista Brasileira de Educação Médica</i> 43(3): 145-154.	To assess intern students' performance in the interpretation of radiographic images of the chest and abdomen	Population: Patient who underwent plain chest and abdomen radiography with varying histories. Intervention: interpretation by final year medical students. Comparison: interpretation by radiologist. Outcome: proportion of correct responses	Patients who underwent plain radiography for reasons other than traumatic injury or traumatic injury alone
Williams, I., et al. (2019). "Improvement of radiographer commenting accuracy of the appendicular skeleton following a short course in plain radiography image interpretation: A pilot study." <i>Journal of Medical Radiation Sciences</i> 66(1): 14-19.	To evaluate the effectiveness of two short training modules to improve the accuracy of image interpretation of the appendicular skeleton amongst a group of radiographers	Population: Patient who underwent plain radiography with history of traumatic injury. Intervention: interpretation by radiographers. Comparison: interpretation by radiologist. Outcome: sensitivity, specificity accuracy	Interpretation by other professionals
Bell, L. T. O., et al. (2019). "Undergraduate radiology education: foundation doctors' experiences and preferences." <i>Clinical Radiology</i> 74(6): 480-486.	To assess foundation doctors' experiences of undergraduate radiology teaching within the UK and preferences for radiology teaching delivery		It is Irrelevant to the review This was a retrospective survey about radiology teaching
Jimah, B. B., et al. (2020). "Competency in Chest Radiography Interpretation by Junior Doctors and Final Year Medical Students at a Teaching Hospital." <i>Radiol Res Pract</i> 2020: 8861206.	This study assessed the residents, medical officers, house officers, and final year medical students' competency in CXRs interpretation and how the patient's clinical history influences the interpretation.	Population: Patient who underwent plain chest radiography with varying histories. Intervention: interpretation by junior doctors.	Patients who underwent plain radiography for reasons other than traumatic injury or traumatic injury alone

		Comparison: interpretation by radiologist. Outcome: proportion of correct responses	
Wilson, C. (2022). "X-ray misinterpretation in urgent care: where does it occur, why does it occur, and does it matter?" <u>N Z Med J</u> 135 : 49-65.	To assess the error rate in plain film interpretation amongst urgent care doctors in the context of minor trauma, to determine where such errors occur and whether they affect patient care, and to identify possible causative factors	Population: Patient who underwent plain radiography with history of traumatic injury. Intervention: interpretation by urgent care doctors (residents, GPs, senior doctors). Comparison: interpretation by radiologist. Outcome: discrepancy in interpretation, cause of discrepancies and effect on clinical management	Interpretation by other professionals Inadequate information to construct 2x2 contingency table
Gompels, B., et al. (2023). "Diagnostic Accuracy and Confidence in Management of Forearm and Hand Fractures Among Foundation Doctors in the Accident and Emergency Department: Survey Study." <u>JMIR Form Res</u> 7 : e45820.	To evaluate the accuracy and confidence of foundation doctors (doctors within their first 2 years of qualifying) in correctly interpreting and managing forearm and hand fractures on plain radiographs	Population: Patient who underwent plain radiography with history of traumatic injury. Intervention: interpretation by foundation year doctors. Comparison: interpretation by radiologist. Outcome: percentage of correct responses and confidence	Inadequate information to construct 2x2 contingency table
Kinnersly, J., et al. (2025). "Skeletal radiograph interpretation discrepancies in the emergency department setting: A retrospective chart review." <u>Emerg Med Australas</u> 37 (1): e14539.	To determine the frequency and clinical consequences of discrepancies in skeletal radiograph interpretation between emergency and radiology doctors in an Australian ED	Population: Patient who underwent plain radiography with history of traumatic injury. Intervention: interpretation by emergency department doctors (interns, residents, registrars and consultants). Comparison: interpretation by radiologist. Outcome: misinterpretation rates and discrepancies	Interpretation by other professionals Inadequate information to construct 2x2 contingency table