

CLINICAL DECISION MAKING

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QUESTION

The researcher is seeking information regarding clinical decision-making, including frameworks and non-technological support.

RESULTS

ONLINE RESOURCES (GREY LITERATURE)

GOVERNMENT DOCUMENTS

Australian Commission on Safety and Quality in Health Care. (2020). **Implementing the comprehensive care standard: clinical assessment and diagnosis**. [Web link](#).

- Details strategies to improve clinical assessment including supervision, reflective reasoning, checklists, support tools, and education.

Queensland Health. (n.d.) **Potential responses to health care complexity**. [Web link](#).

- Describes learning and collaboration-orientated responses to address complex diagnoses and cases.

EBOOKS

Cooper, N., & Frain, J. (2016). **ABC of clinical reasoning**. Wiley Blackwell/BMJ Books. [Access online](#).

- Discusses specific models of clinical reasoning, educational strategies, biases, and error.

PEER-REVIEWED LITERATURE – MOST RECENT FIRST

Articles are grouped by theme:

- Models & Frameworks
 - Hypothetico - deductive model
 - Pattern recognition model
 - Dual process model
 - Pathway model
 - Prediction models
 - Sheffield Elicitation Framework
 - Other frameworks
- Decision Making Methods in the Hospital Setting
- Education Strategies
- Barriers & Enablers

- Bias
- Uncertainty
- Information overload
- Organisational barriers
- Evaluation of Decision Making

Each article summary contains excerpts from the abstract and an online link.

MODELS & FRAMEWORKS

HYPOTHETICO - DEDUCTIVE MODEL

Yazdani, S., et al. (2017). **Models of clinical reasoning with a focus on general practice: A critical review.** *Journal of advances in medical education & professionalism*, 5(4), 177–184. [Click for full-text.](#)

This model recommends that physicians should first gather extensive information of the patients through a complete history and physical exam and generate a list of differential diagnosis. The problems with this model were that it did not respond to the researchers' expectation of explaining the difference in the experts' better performance in diagnostic reasoning in comparison to novices since all practitioners at all levels were following a similar process.

PATTERN RECOGNITION MODEL

Archa, J. F., et al. (1993). **Hypothesis generation and the coordination of theory and evidence in novice diagnostic reasoning.** *Medical decision making*, 13(3), 198–211. [Request full-text.](#)

This study investigates hypothesis generation and evaluation in clinical problem solving by medical trainees. When faced with contradictory evidence: 1) second-year students ignored cues in the problem or reinterpreted them to fit the hypothesis; 2) third-year students generated concurrent hypotheses to account for different sets of data; and 3) fourth-year students generated several initial hypotheses and subsequently narrowed the hypothesis space by generating a single coherent diagnostic explanation.

DUAL PROCESS MODEL

Croskerry P. (2009). **A universal model of diagnostic reasoning.** *Academic medicine*, 84(8), 1022–1028. [Click for full-text.](#)

The author proposes a schematic model that uses the theory to develop a universal approach toward clinical decision making. Properties of the model explain many of the observed characteristics of physicians' performance. Yet the author cautions that not all medical reasoning and decision-making falls neatly into one or the other of the model's systems, even though they provide a basic framework incorporating the recognized diverse approaches.

Croskerry P. (2009). **Clinical cognition and diagnostic error: applications of a dual process model of reasoning.** *Advances in health sciences education*, 14 Suppl 1, 27–35. [Click for full-text.](#)

The model has important practical applications for decision making across the multiple domains of healthcare and may be used as a template for teaching decision theory, as well as a platform for future research. Importantly, specific operating characteristics of the model explain how diagnostic failure occurs.

PATHWAY FOR CLINICAL REASONING MODEL

Bonilauri Ferreira, A. P., et al. (2010). **Clinical reasoning in the real world is mediated by bounded rationality: implications for diagnostic clinical practice guidelines.** *PloS one*, 5(4), e10265. [Click for full-text.](#)

Physicians rely on simple heuristics associated with environmental factors. This model allows for robustness, simplicity, and cognitive energy saving. Since this model does not fit into current diagnostic clinical practice guidelines, the authors make some propositions to help its integration.

PREDICTION MODELS

Hagens, E. R. C., et al. (2023). **Preoperative Risk Stratification in Esophageal Cancer Surgery: Comparing Risk Models with the Clinical Judgment of the Surgeon.** *Annals of surgical oncology*, 30(8), 5159–5169. [Click for full-text.](#)

Prediction models tend to overestimate the risk of any complication, whereas surgeons tend to underestimate this risk. Overall, surgeons' estimations differ between surgeons and vary between similar to slightly better than the prediction models.

SHEFFIELD ELICITATION FRAMEWORK

Dolan, J. G., et al. (2019). **Harnessing Expert Judgment to Support Clinical Decisions When the Evidence Base Is Weak.** *Medical decision making*, 39(1), 74–79. [Click for full-text.](#)

This study sought to determine if clinically acceptable outcome estimates could be created using a modified version of the Sheffield Elicitation Framework (SHELF), a formal method for eliciting judgments regarding probability distributions of expected decision outcomes. Use of a formal protocol for eliciting expert judgments is feasible and can be used to promote evidence-based practice by providing a powerful tool to facilitate the combination of professional judgment with research evidence and patient preferences to guide clinical decisions.

OTHER FRAMEWORKS

Helou, M. A., et al. (2020). **Uncertainty in Decision Making in Medicine: A Scoping Review and Thematic Analysis of Conceptual Models.** *Academic medicine*, 95(1), 157–165. [Click for full-text.](#)

Based on the themes that emerged from their thematic analysis of the literature characterizing the effects of uncertainty and ambiguity on the decision-making process, the authors developed a framework depicting the interplay between these themes with a visual representation of the decision-making process under uncertain conditions. Future research includes further development and validation of this framework.

DECISION MAKING METHODS IN THE HOSPITAL SETTING

Granek, L., et al. (2021). **How Do Pediatric Neurosurgeons Make Intraoperative Decisions?** *World neurosurgery*, 150, e353–e360. [Click for full-text.](#)

This research suggests that new models of decision making are needed within the medical and neurosurgical context and inspire a new set of questions about the process by which surgeons make life and death decisions in the operating room.

Alexis Ruiz, A., et al. (2019). **Narrative Review of Decision-Making Processes in Critical Care.** *Anesthesia and analgesia*, 128(5), 962–970. [Click for full-text.](#)

The purpose of this review is to highlight the key intricacies associated with the decision-making process in the ICU, to describe the theoretical frameworks with a special emphasis on gaps of knowledge, and to offer some avenues for improvement. We suggest better matching of theoretical frameworks with strengths of the human decision-making process and balanced application computer aids, artificial intelligence, and organizational modifications. The key component of this integration is work to increase the self-awareness of decision-making processes among residents, fellows, and attending physicians.

Bösner, S., et al. (2019). **Diagnostic strategies in general practice and the emergency department: a comparative qualitative analysis.** *BMJ open*, 9(5), e026222. [Click for full-text.](#)

Strategies used by physicians in both settings seem to be well adapted to their respective environments. Whereas the physician-led diagnostic process in the emergency department is well suited to rule out life-threatening disease, diagnosis and appropriate treatment of everyday problems may require a more patient-centred style.

Pumphrey, O., et al. (2019). **Head, heart or checklist? How self-reported decision-making strategies change according to speciality and grade: a cross-sectional survey of doctors.** *Postgraduate medical journal*, 95(1121), 148–154. [Request full-text.](#)

Decision-making strategies may evolve with increasing clinical experience from a predominant use of rule-based approaches towards greater use of intuitive or analytical methods depending on the familiarity and acuity of the clinical situation. Rule-based strategies remain important for delivering evidence-based care, particularly for less experienced clinicians, and for physicians more than surgeons, possibly due to the greater availability and applicability of guidelines for medical problems. Anaesthetists and intensivists tend towards more analytical decision-making than physicians; an observation which might be attributable to the greater availability and use of objective data in the care environment. As part of broader training in non-technical skills and human factors, increasing awareness among trainees of medical decision-making models and their potential pitfalls might contribute to reducing the burden of medical error in terms of morbidity, mortality and litigation.

Van den Brink, N., et al. (2019). **Role of intuitive knowledge in the diagnostic reasoning of hospital specialists: a focus group study.** *BMJ open*, 9(1), e022724. [Click for full-text.](#)

Hospital specialists use intuitive elements in their diagnostic reasoning, in line with general human decision-making models. Nevertheless, they appear to disagree more on its role and value than previous research has shown among general practitioners. A better understanding of how to take advantage of intuition, while avoiding pitfalls, and how to develop 'skilled' intuition may improve the quality of hospital specialists' diagnostic reasoning.

EDUCATION STRATEGIES

Curtis, C., et al. (2023). **Competence committees decision-making; an interplay of data, group orientation, and intangible impressions.** *BMC medical education*, 23(1), 748. [Click for full-text.](#)

Increased awareness of the sources of bias in CC functioning and familiarity with the CC role in competency-based medical education would enable committees to provide valuable feedback to all trainees regardless of their trajectory.

Kalfsvel, L., et al. (2023). **Do junior doctors make more prescribing errors than experienced doctors when prescribing electronically using a computerised physician order entry system combined with a clinical decision support system? A cross-sectional study.** *European journal of hospital pharmacy, ejhpharm-2023-003859*. Advance online publication. [Request full-text.](#)

Doctors not in specialty training and doctors in specialty training, who are the less experienced doctors, make more prescribing errors than consultants, even with the use of a CPOE combined with CDSS. The type of errors differ between doctors of different experience levels. This finding provides a solid basis for specific additional education to medical students, doctors not in specialty training and doctors in specialty training.

Vinaykumar, N., et al. (2023). **Exploring Knowledge of Cognitive Disposition to Respond in Clinical Decision-Making among Early Clinical Learners.** *Maedica, 18(2)*, 317–322. [Click for full-text.](#)

The study concludes that medical graduates must be sensitized to CDRs using role-play-based reflection methods.

Paes, P., et al. (2019). **Complex decision making in medical training: key internal and external influences in developing practical wisdom.** *Medical education, 53(2)*, 165–174. [Click for full-text.](#)

The importance of training doctors to be self-regulated learners in learning environments that support their development is highlighted. Aspects of the clinical learning environment (structure) such as rotation structures, the culture, supervision and feedback can all be enhanced. Self-efficacy and relational agency, alongside other internal influences, are key factors in accelerating development of practical wisdom. Other studies have shown that these factors can be improved with targeted interventions.

Sasazuki, M., et al. (2019). **Decision-making dilemmas of paediatricians: a qualitative study in Japan.** *BMJ open, 9(8)*, e026579. [Click for full-text.](#)

Our data indicate the necessity of establishing and implementing an effective support system for paediatricians, such as structured professional education and arguments for creating social consensus that assist them to reach the best plan for the management of severely ill children.

BARRIERS & ENABLERS

BIAS

Almujarkesh, M. K., et al. (2023). **Social Determinants in Clinical Decision Making: A Case of Mistaken Hepatic Encephalopathy.** *Cureus, 15(6)*, e40405. [Click for full-text.](#)

The patient's clinical diagnosis was compromised by incomplete information related to a language barrier, and anchoring biases prevented a thorough history taking from the patient family and later on from the patient. Physician's anchoring bias, a form of implicit bias, can negatively impact outcomes in patients, especially those with limited language proficiency, due to communication barriers leading to misunderstanding of the patient's clinical presentation and overreliance on clinical heuristics.

Carmichael, S. P., et al. (2023). **Categories of Evidence and Methods in Surgical Decision-Making.** *The Surgical clinics of North America*, 103(2), 233–245. [Click for full-text.](#)

Although surgeons may seek evidenced-based practices to support their decision-making, threats to the validity of evidence and appropriate application of evidence may influence implementation. Furthermore, a surgeon's conscious and unconscious biases may additionally determine individual practice.

UNCERTAINTY

Gamborg, M. L., et al. (2023). **Clinical decision-making and adaptive expertise in residency: a think-aloud study.** *BMC medical education*, 23(1), 22. [Click for full-text.](#)

Residents who too quickly moved on to hypothesis testing tended to have to redirect their hypothesis more often, and thus be more laborious in their CDM. Uncertainty affected physicians' CDM when they did not reconcile their professional role with being allowed to be uncertain. This allowance is an important feature of orientation to new knowledge as it facilitates the evaluation of what the physician does not know. This supports current literature, which argues that role clarification helps decisional competency. This study adds that promoting professional development by tolerating uncertainty may improve adaptive decisional competency.

Martínez-Sanz, J., et al. (2020). **Understanding clinical decision-making during the COVID-19 pandemic: A cross-sectional worldwide survey.** *EClinicalMedicine*, 27, 100539. [Click for full-text.](#)

This study provides insight into the drivers of the decision-making process during a new and extreme health emergency. Different factors including the perceived expertise and quality of publications, gender, geographic origin, medical specialty and implication in medical research influenced this process. The clinical severity attenuated the physician's tolerance for uncertainty.

INFORMATION OVERLOAD

Schurmans, L., et al. (2022). **Both Medical and Context Elements Influence the Decision-Making Processes of Pediatricians.** *Children*, 9(3), 403. [Click for full-text.](#)

Additional information of an alarming nature induces the physician to become more worried, whereas reassuring information decreases this worry. In some cases, with the medical factors, the gender and the age of the pediatrician does have some effect on the clinical decision-making. We conclude that medical decision-making is affected by multiple intrinsic and extrinsic factors that differ between physicians.

ORGANISATIONAL BARRIERS

Hugelius, K., et al. (2021). **Decision-making by medical officer in charge during major incidents: a qualitative study.** *Scandinavian journal of trauma, resuscitation and emergency medicine*, 29(1), 120. [Click for full-text.](#)

Reliable and timely information management structure enabling the gathering and analysis of essential information, a clear command structure and appropriate personal qualities were essential and contributed to successful MOCs decision making in major incidents.

Jansen, I., et al. (2021). **An act of performance: Exploring residents' decision-making processes to seek help.** *Medical education*, 55(6), 758–767. [Click for full-text.](#)

This study suggests that sociocultural forces influence residents to experience help-seeking as an act of performance. Especially, a safe learning environment resulting from constructive relationships with supervisors and the approachability of other health care team members lowered the barriers to seek help. Supervisors could address these barriers by having regular conversations with residents about when to seek help.

EVALUATIONS OF DECISION MAKING

McNamara, L. M., et al. (2023). **Constructing validity evidence from a pilot key-features assessment of clinical decision-making in cerebral palsy diagnosis: application of Kane's validity framework to implementation evaluations.** *BMC medical education*, 23(1), 668. [Click for full-text.](#)

Kane's approach is beneficial for prioritising sources of validity evidence alongside the iterative development of a key-features examination in the CP field. The validity argument supports scoring assumptions and use of scores as an outcome measure of physician decision-making for CP guideline education implementation interventions. Scoring evidence provides the foundation to direct future studies exploring association of key-feature scores with real-world performance.

Nomura, O., et al. (2021). **Creating Clinical Reasoning Assessment Tools in Different Languages: Adaptation of the Pediatric Emergency Medicine Script Concordance Test to Japanese.** *Frontiers in medicine*, 8, 765489. [Click for full-text.](#)

This pediatric emergency medicine Script Concordance Test was reliable and valid for assessing the development of clinical reasoning by trainee doctors during residency training.

Davis, S. S., et al. (2019). **Fatal flaws in clinical decision making.** *ANZ journal of surgery*, 89(6), 764–768. [Click for full-text.](#)

This paper demonstrates thought-provoking examples of clinical decision-making failure implicated in patient death. Clinical decision-making failures most commonly occur around the decision to operate with increased discussion of complex cases possibly required. Further CDMI evaluation should be considered to complement more traditional methods of surgical mortality evaluation.

APPENDIX

SEARCH METHODOLOGY

A systematic search was conducted for literature. The results were screened by librarians using [Covidence](#).

SEARCH LIMITS

- English-language
- Published within the last 5 years

DATABASES SEARCHED

- Medline – index of peer reviewed articles across health sciences and medicine.
- Embase – index of biomed and pharmacological peer reviewed journal articles.
- Emcare – index of nursing, allied health, critical-care medicine and more.
- Cochrane Library – collection of databases containing high-quality independent evidence.
- Grey literature – Google, Google Scholar, Trip database, Biomed Central Proceedings.

HAND SEARCHING

Additional citation searching was undertaken from the following articles:

- Yazdani, S., et al. (2017). **Models of clinical reasoning with a focus on general practice: A critical review.** *Journal of advances in medical education & professionalism*, 5(4), 177–184. [Click for full-text.](#)

SEARCH TERMS

Concept	MeSH headings	Keywords
Clinical Decision Making	Clinical Reasoning; Clinical Decision-Making; Decision Making	Clinical [within 1 word of] Reasoning or Decision(s)(-making)(making)
Frameworks	Practice Guideline; Guideline	Decision(s)(-making)(making) [within 3 words of] Process(es)(ing)(ed) or Procedure(s) or Aid(s) or Model(s)(ling) or Technique(s) or Framework(s) or Support(s)(ing)(ed) or Assist(s)(ing)(ed) or Guideline(s)

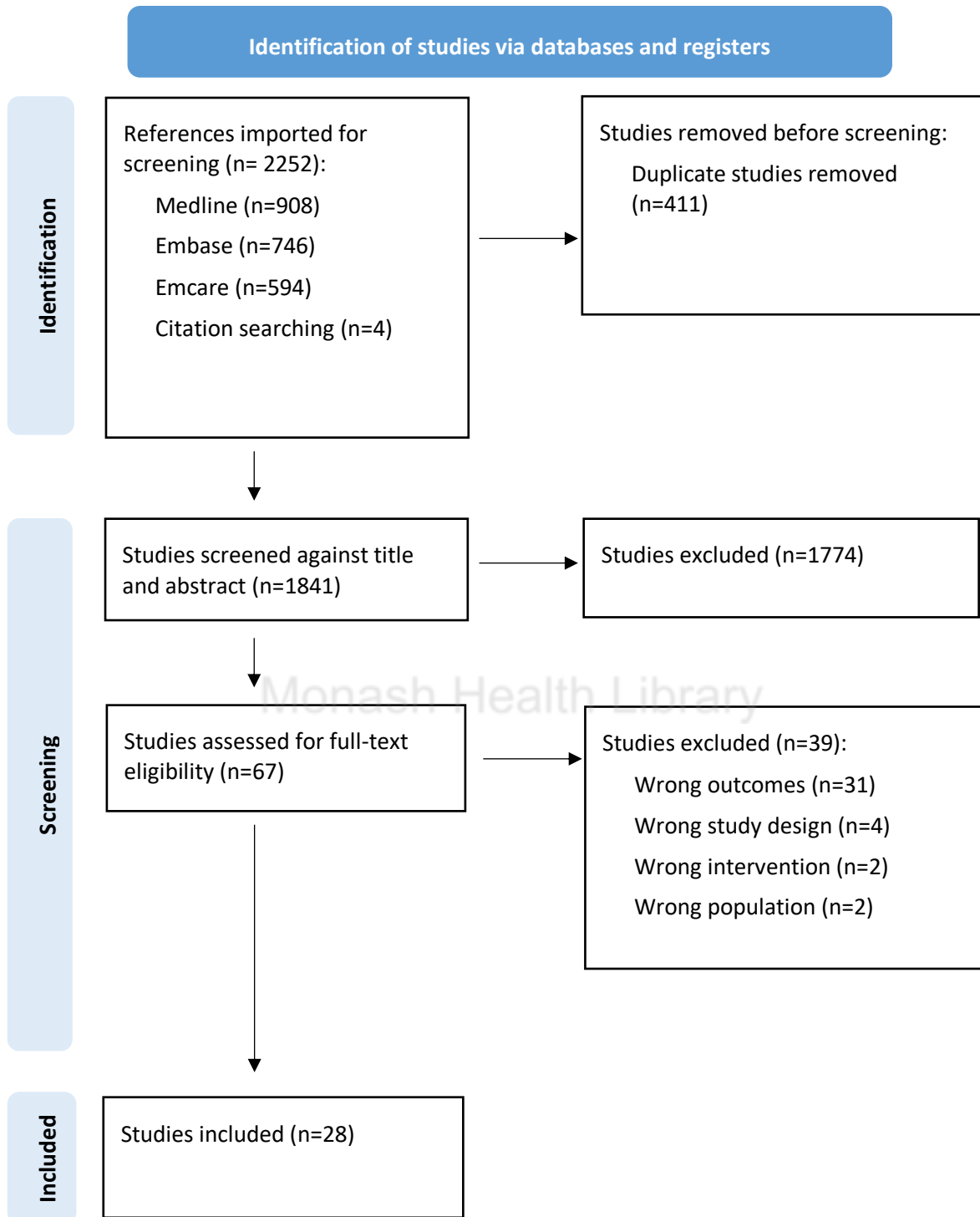
Hospital Medical Staff	exp Physicians; Medical Staff, Hospital	Physician(s); Doctor(s); Resident(s); Consultant(s); Allergist(s); An(a)esthesiologist(s); An(a)esthetist(s); Cardiologist(s); Dermatologist(s); Endocrinologist(s); Gastroenterologist(s); Geriatrician(s); Gyn(a)ecologist; Hospitalist(s); Nephrologist(s); Neurologist(s); Obstetrician(s); Oncologist(s); Ophthalmologist(s); Otolaryngologist(s); P(a)ediatrician(s); Pulmonologist(s); Rheumatologist(s); Surgeon(s); Urologist(s)
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MEDLINE SEARCH STRATEGY

Ovid MEDLINE(R) ALL <1946 to May 13, 2024>

- 1 *Clinical Reasoning/ or *Clinical Decision-Making/ or *Decision Making/ 52235
- 2 (clinical adj (reasoning or decision*)).ti. 9301
- 3 1 or 2 59596
- 4 (decision* adj3 (process* or procedure* or aid* or model* or technique* or framework* or
support* or assist* or guideline*)).tw,kw. 106820
- 5 Practice Guideline/ or Guideline/ 38433
- 6 4 or 5 144773
- 7 (physician* or doctor* or resident* or consultant* or allergist* or an?esthesiologist* or
an?esthetist* or cardiologist* or dermatologist* or endocrinologist* or gastroenterologist* or
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