

PRISMA-ScR Checklist

Checklist mapping to manuscript sections

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PRISMA-ScR item number	Item name	Checklist requirement	Manuscript location	Status	Notes for authors
1	Title	Identify the report as a scoping review.	Title (p. 1)	Completed	Title explicitly identifies the manuscript as a scoping review.
2	Abstract	Provide a structured summary including objectives, eligibility criteria, sources, charting methods, results, and conclusions.	Abstract (p. 2)	Completed	The abstract summarizes the rationale, objective, information sources, eligibility/selection process, number of included studies, main findings, and conclusions.
3	Rationale	Describe the rationale for the review in the context of what is already known.	Introduction (pp. 2-4)	Completed	Rationale addresses diagnostic uncertainty, diatom-test controversy, emerging methods, and the medico-legal validation gap.
4	Objectives	Provide an explicit statement of questions and objectives with reference to participants, concepts, and context.	Introduction (p. 4); Materials and Methods 2.2 (p. 4)	Completed	The aim is stated in the Introduction and the review questions are provided in Materials and Methods 2.2.
5	Protocol and registration	Indicate whether a review protocol exists and where it can be accessed, if available.	Materials and Methods 2.1 (p. 4)	Completed	The manuscript states that no protocol was registered and that the review questions, eligibility criteria, and charting framework were defined before full-text eligibility assessment.
6	Eligibility criteria	Specify characteristics of sources used as eligibility criteria and give rationale.	Materials and Methods 2.4 (p. 5)	Completed	Eligibility and exclusion criteria are described.
7	Information sources	Describe all information sources and dates of coverage/contact.	Materials and Methods 2.3 (pp. 4-5); Supplementary Table S1 (Supplementary Materials, p. 1)	Completed	Databases, date range, language/document-type filters, records exported, and final search date are reported in Supplementary Table S1.
8	Search	Present the full electronic search strategy for at least one database, including limits, so it could be repeated.	Supplementary Table S1 (Supplementary Materials, p. 1)	Completed	Complete database-specific search strings, limits, and final search date are reported in Supplementary Table S1.
9	Selection of sources of evidence	State the process for selecting sources of evidence.	Materials and Methods 2.5 (pp. 5-6); Figure 1 (p. 7)	Completed	Deduplication, title/abstract screening, full-text retrieval, and eligibility are described.
10	Data charting process	Describe the method of charting data and any calibration or update process.	Materials and Methods 2.6 (p. 6); Supplementary Table S2 (Supplementary Materials, pp. 2-16)	Completed	Structured data-charting form is described; Supplementary Table S2 is aligned with the revised main manuscript citation numbering.
11	Data items	List and define all variables for which data were sought.	Materials and Methods 2.6 (p. 6); Supplementary Table S2 (Supplementary Materials, pp. 2-16)	Completed	Charted fields are listed and presented in Supplementary Table S2.
12	Critical appraisal of individual sources of evidence	If done, describe methods used for critical appraisal and how this was used in synthesis.	Materials and Methods 2.6 (p. 6); Discussion 4.5 (pp. 21-22)	Not applicable	Formal risk-of-bias/critical appraisal was not performed because the review was designed to map evidence rather than estimate pooled effects or diagnostic accuracy.

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13	Synthesis of results	Describe methods of handling and summarizing charted data.	Materials and Methods 2.7 (p. 6)	Completed	Descriptive thematic synthesis across four domains is described.
14	Selection of sources of evidence	Give numbers of sources screened, assessed, and included, with reasons for exclusions at each stage.	Results 3.1 (pp. 6-7); Figure 1 (p. 7)	Completed	PRISMA-ScR flow numbers, retrieval failures, and full-text exclusion reasons are reported in the main manuscript and Figure 1.
15	Characteristics of sources of evidence	Present characteristics of each included source.	Results 3.2 (pp. 7-8); Supplementary Table S2 (Supplementary Materials, pp. 2-16)	Completed	Study characteristics are summarized and fully charted.
16	Critical appraisal within sources of evidence	If done, present critical appraisal data.	Discussion 4.5 (pp. 21-22)	Not applicable	Formal critical appraisal was not performed.
17	Results of individual sources of evidence	For each included source, present relevant charted data.	Supplementary Table S2 (Supplementary Materials, pp. 2-16)	Completed	Complete charting table includes each of the 165 included studies and is aligned with the revised main manuscript reference list.
18	Synthesis of results	Summarize and/or present charting results related to review questions.	Results 3.3-3.8 (pp. 8-14); Tables 1-3 (pp. 8-14); Supplementary Table S3 (Supplementary Materials, p. 17)	Completed	Results synthesize thematic domains, methodological families, forensic applications, and validation levels; Supplementary Table S3 provides the complete domain-combination table.
19	Summary of evidence	Summarize main results, including relevance to review questions and objectives.	Discussion 4.1-4.4 (pp. 14-21)	Completed	Discussion summarizes principal findings, methodological advances, medico-legal interpretation, implications, and research gaps.
20	Limitations	Discuss limitations of the scoping review process.	Discussion 4.5 (pp. 21-22)	Completed	Limitations include unavailable reports, regional database limitations, heterogeneity, and absence of meta-analysis/risk-of-bias grading.
21	Conclusions	Provide general interpretation of results and implications for future research and practice.	Conclusions (p. 22)	Completed	Conclusions emphasize integration, validation, and standardization.
22	Funding	Describe sources of funding and role of funders.	Final manuscript metadata (p. 23)	Completed	The manuscript states that this research received no external funding.