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AI-enhanced patient-reported outcomes in oncology:

An evidence-informed framework for multimodal monitoring and clinical implementation

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TAKE-HOME MESSAGE

Validated ePROs first. AI-supported triage, clinician-led decisions.

A conceptual framework for staged implementation, not an autonomous clinical system.

01 RATIONALE & APPROACH

ePROs capture symptoms, treatment tolerability and quality of life between visits. Survey fatigue, incomplete longitudinal data and growing information volumes limit clinical scalability. [1–3]

Aim: synthesise current evidence and develop an implementation framework for AI-enhanced multimodal PRO monitoring.

Structured narrative review with explicit search, screening and eligibility procedures. [1]

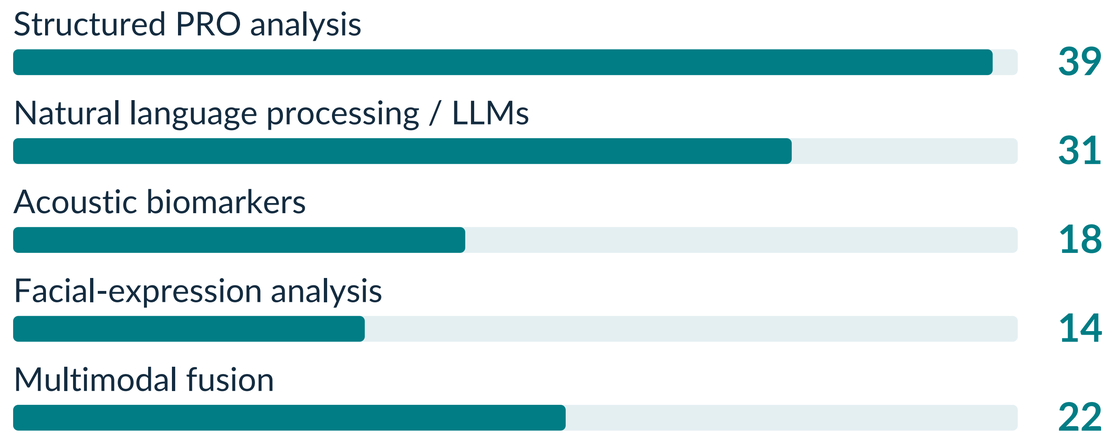
PubMed/MEDLINE · Scopus · Web of Science · IEEE Xplore

Final search: 28 March 2026

842 Records identified → **615** Titles / abstracts screened → **124** Full texts assessed

02 EVIDENCE MAP

Studies mapped to five overlapping domains



Domains are not mutually exclusive; counts must not be summed as a unique-study total.

Reported AI applications: symptom trajectories, toxicity prediction, healthcare-use risk estimation and extraction of information from text.

03 CONCEPTUAL MULTIMODAL PRO ANALYZER

Validated ePROs are the primary clinical signal; complementary data provide context. [1]

PATIENT-GENERATED DATA

- **Validated ePROs** — Primary clinical signal — Symptoms, tolerability, quality of life
- **Patient-generated text**
- **Acoustic + facial signals** — Complementary; integrate after validation

→

AI-SUPPORTED ANALYSIS

1. Longitudinal modelling
2. Multimodal fusion
3. Uncertainty estimation
4. Explainable risk stratification

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CLINICIAN-LED RESPONSE

- Prioritised alerts
- Clinician triage
- Predefined escalation

No autonomous clinical decisions

Proposed architecture derived from evidence synthesis. Prospective clinical validation is required.

04 IMPLEMENTATION PATHWAY

01 Start with structured ePROs
Collection and longitudinal risk modelling.

02 Add patient-generated text
NLP analysis for symptom context.

03 Integrate digital biomarkers
Only after validation of complementary signals.

05 TRANSLATION PRIORITIES

- Prospective multicentre validation
- Interoperability and privacy
- Model transparency
- Minimisation of alert burden

Evidence limitation: prospective validation of multimodal approaches remains limited.

SELECTED REFERENCES

1. Górecki S, Tatka A, Osmola M. Artificial intelligence for patient-reported outcomes in oncology: current applications and future directions toward multimodal monitoring. *Cancers.* 2026;18(12):1905. doi:10.3390/cancers18121905.
2. Basch E, Leahy AB, Dueck AC. Benefits of digital symptom monitoring with patient-reported outcomes during adjuvant cancer treatment. *J Clin Oncol.* 2021;39:701–703. doi:10.1200/JCO.20.03375.
3. Krepper D, et al. Machine learning models including patient-reported outcome data in oncology: a systematic literature review and analysis of their reporting quality. *J Patient Rep Outcomes.* 2024;8:126. doi:10.1186/s41687-024-00808-7.

ePRO: electronic patient-reported outcome • NLP: natural language processing • LLM: large language model

READ THE REVIEW

Full article & framework

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