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Do traditional SLR methods meet the standards of transparency and increasing AI-assisted screening?

A case study comparing individual vs. hierarchical PICOS annotation

BACKGROUND

SLR guidelines recommend hierarchical assessment of PICOS criteria. In practice, reviewers frequently exclude records based on a single criterion despite multiple PICOS criteria being unmet. This approach may reduce transparency, complicate scope changes, and limit efficient AI-assisted evidence synthesis.

OBJECTIVES

We evaluated whether independent PICOS-level annotation improves adaptability, reviewer consistency, and AI training efficiency.

METHODS

Traditional hierarchical screening workflows were compared with a Real-Time AI-assisted systematic literature review (REAL-SLR) framework that independently annotate decisions for each PICOS criterion. A prostate cancer (PC) scope change re-introducing active surveillance served as a case study. Outcomes included inter-reviewer discordance, re-review effort following scope change, and AI training requirements.

Table1. **PICOS criteria for the prostate cancer REAL-SLR**

PICOS	REAL-SLR PICOS	Added as a protocol update
Patient population	Patients diagnosed with prostate cancer at any stage	
Interventions and Comparators	Any intervention used for the treatment of prostate cancer (surgery, radiotherapy, drugs, biologics, cell treatments, vaccines, etc.)	**Active surveillance**
Outcomes measures	Efficacy (OS, PFS, other progression, response), PROs, safety	
Study design	RCTs, non-RCTs, single arm, Phase 1, Phase 1/2, Phase 2, Phase 2/3, Phase 3, Phase 4; Pooled analyses of RCTs; ECTs	

KEY TAKEAWAYS

Preserving independent PICOS-level decisions improves transparency, reproducibility, and adaptability while substantially reducing scope-change burden.

With the increasing use of AI in PICO review, the current hierarchical screening process may not be sufficient to ensure that accuracy and transparency are maintained, suggesting current SLR guidelines should consider individual PICOS annotation to support living evidence generation, AI-assisted review, and evolving HTA evidence requirements.

RESULTS

- Among **9,302** prostate cancer records, 10–70% were assigned different exclusion reasons by reviewers despite reaching the same exclusion decision.
- This discordance was substantially reduced with independent PICOS annotation, with discordance rates of 0.4%, 1.25%, 4.5%, and 1.7% for population, intervention/comparator, outcomes, and study design, respectively.
- Individual PICOS annotation also reduced AI training effort.
- Initial AI training achieved accuracies of 99.64%, 92.34%, 86.86%, and 94.53% for each PICOS criterion, respectively.
- Preserving individual PICOS annotations allowed subsequent training iterations to focus only on lower-performing criteria, requiring 3, 3, and 2 iterations, respectively, to achieve accuracies >95%.
- When active surveillance was added as an intervention, independent PICOS annotation reduced re-review effort by 98.75% compared with traditional hierarchical screening, as only 0.7% of records were excluded by intervention while meeting all remaining PICOS criteria.

Figure 1. **Hierarchical review vs. independent annotation in PICOS screening**

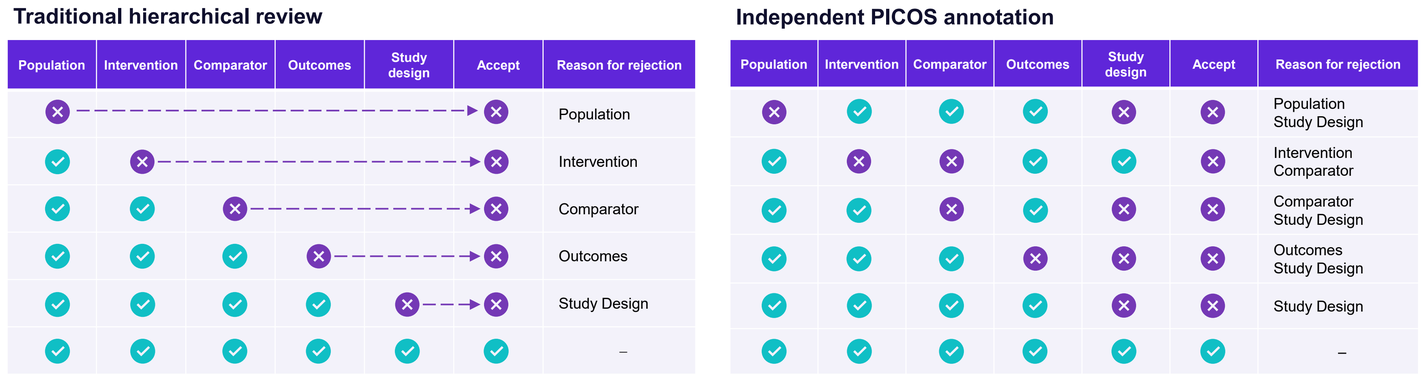


Figure 2. **Accuracy of AI abstract review**

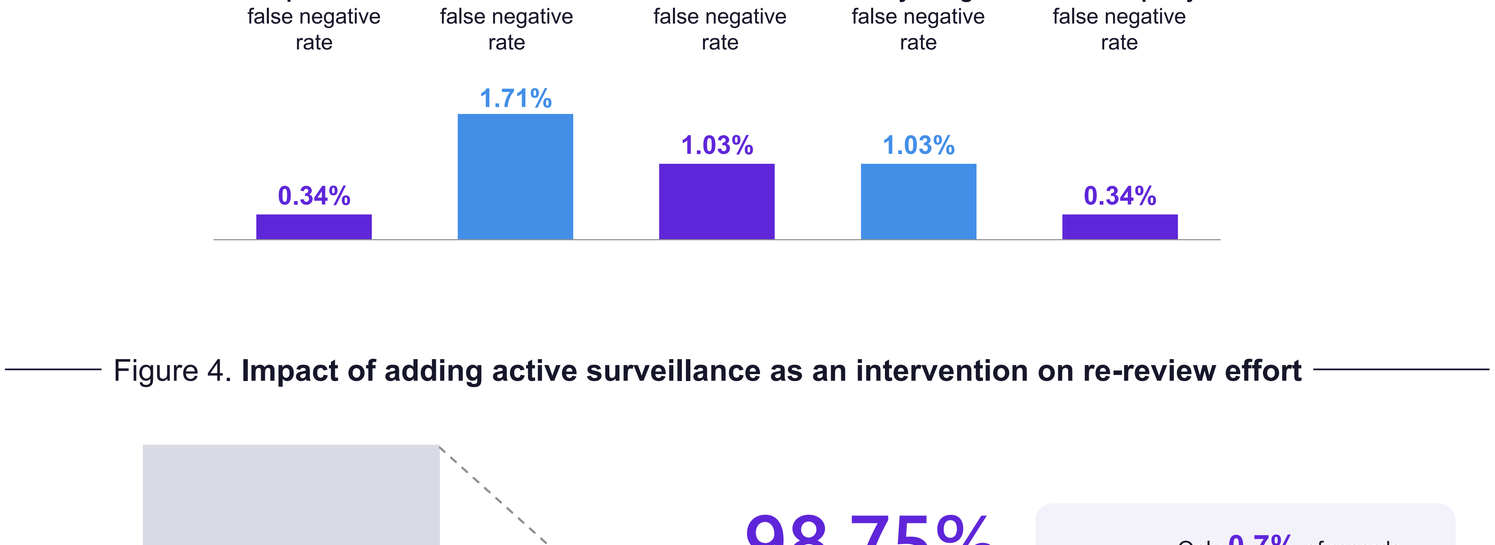


Figure 3. **False negative rates by PICO element**

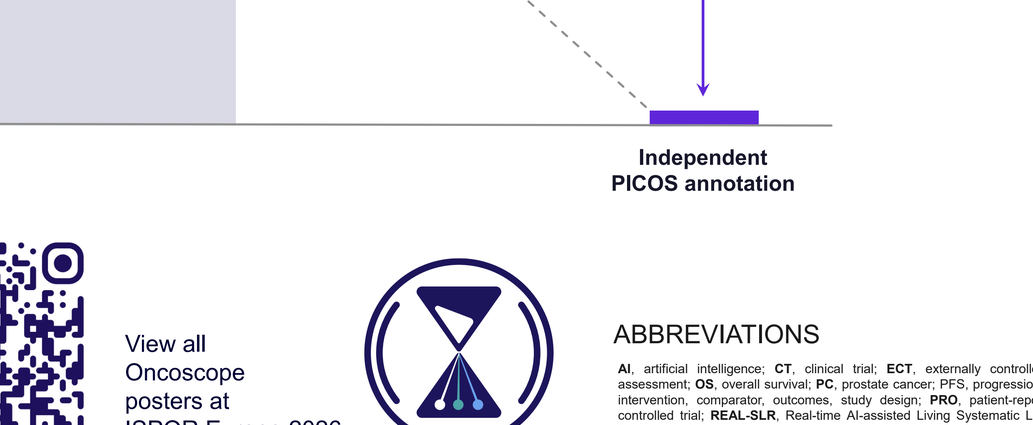
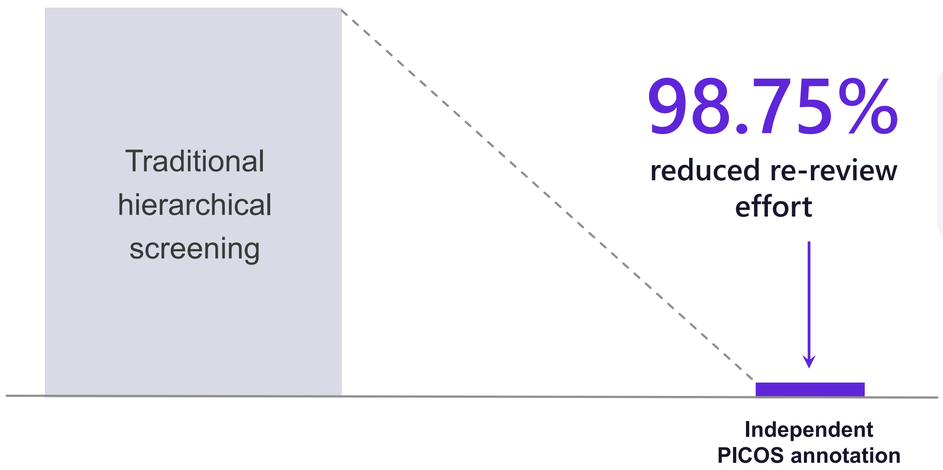


Figure 4. **Impact of adding active surveillance as an intervention on re-review effort**



Only **0.7%** of records were excluded by intervention while meeting all other PICOS criteria.

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ABBREVIATIONS

AI, artificial intelligence; **CT**, clinical trial; **ECT**, externally controlled trial; **HTA**, health technology assessment; **OS**, overall survival; **PC**, prostate cancer; PFS, progression-free survival; **PICOS**, population, intervention, comparator, outcomes, study design; **PRO**, patient-reported outcome; RCT, randomized controlled trial; **REAL-SLR**, Real-time AI-assisted Living Systematic Literature Review; **SLR**, systematic literature review.