Bridging the Gap Between Theory and Reality in Systematic Literature Reviews Using Artificial Intelligence

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MSR149

BACKGROUND AND OBJECTIVE

- In an ideal systematic literature review (SLR), the process begins with finalising a protocol, followed by title-abstract and full-text screenings by two independent reviewers. Any discrepancies are resolved by a third reviewer when necessary
- However, practical implementation often diverges, leading to protocol uncertainties, less alignment among reviewers, high or low inclusion rates, and potential rescreening needs. This study aims to address these challenges using artificial intelligence (AI) and cluster analysis

METHODS

- We employed an AI-driven approach to enhance the SLR process
- **NLP and Clustering**: Natural language processing (NLP) and k-means clustering algorithms grouped citations into 20 thematic clusters
- **Pilot Screening**: A representative sample of citations from each cluster was selected for initial screening. Two human reviewers independently screened the citations with a third reviewer resolving the conflicts. In parallel, these citations were also screened by AI. All screening decisions were benchmarked against the final reviewer
- **Metrics and Evaluation**: We assessed decision match rate (proportion where inclusion and exclusion decisions were identical) and recall (proportion of actual 'include' that are predicted 'include) for each reviewer
- **Conflict Analysis**: Conflicts and alignments across clusters were analysed to identify areas of improvement

INSIGHTS

- Table 1 presents a comparative analysis of citation inclusions across three reviewers (AI, Reviewer 1, and Reviewer 2) compared to final reviewer across clusters
- **Protocol refinement**: Early insights from clustered samples allows timely protocol refinement, enhancing AI efficiency in screening
- **Search strategy optimisation**: AI-driven clustering helps in refining the search strategy by spotting irrelevant thematic areas
- **Improve resource planning**: Estimating inclusion rates per cluster helps in better project planning and optimises resource allocation
- **Fill knowledge gaps**: Analysing decision match rates and recall across clusters enable reviewers to identify potential knowledge gaps in specific thematic areas
- **Reduce inter-reviewer conflicts**: It assists in early identification of thematic areas with high inter-reviewer discrepancies

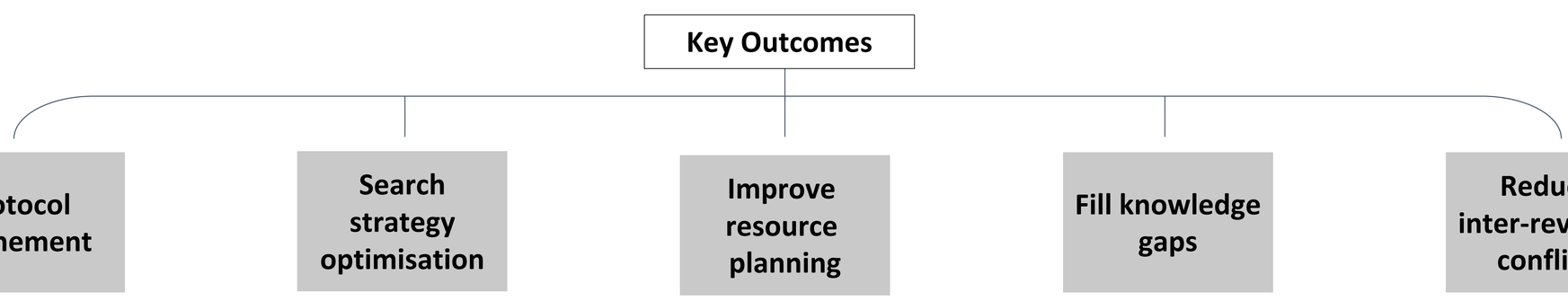

Table 1. Evaluation of AI and human reviewers compared to final reviewer across clusters

Cluster title	No. of citations	Final reviewer inclusion	AI reviewer inclusion	AI decision match rate	AI reviewer Recall	R1 reviewer inclusion	R1 decision match rate	R1 reviewer Recall	R2 reviewer inclusion	R2 decision match rate	R2 reviewer Recall	Conflict %: R1 and R2
ALK-Positive Lung Cancer: Prognosis, Resistance Profiles, and Treatment Response	76	28	67	43%	93%	27	96%	93%	29	96%	96%	8%
Anlotinib in Lung Cancer Treatment	6	0	3	50%	NA	0	100%	NA	0	100%	NA	0%
Cost-Effectiveness Analysis of Treatments for Non-Small Cell Lung Cancer	36	0	10	72%	NA	0	100%	NA	0	100%	NA	0%
Crizotinib Treatment and Resistance in ROS1 Fusion-Positive Non-Small Cell Lung Cancer	37	2	19	54%	100%	3	97%	100%	3	97%	100%	5%
Efficacy and Safety of Pemetrexed and Gefitinib in Non-Small-Cell Lung Cancer Treatment	10	0	0	100%	NA	0	100%	NA	1	90%	NA	10%
Immunotherapy in Lung Cancer	78	11	19	74%	45%	13	90%	73%	8	96%	73%	12%
Immunotherapy in Non-Small Cell Lung Cancer	41	5	6	93%	80%	7	95%	100%	8	93%	100%	12%
Inflammatory Indexes and Survival in Lung Cancer Patients	16	8	7	69%	63%	9	94%	100%	5	69%	50%	38%
Innovative Approaches for Monitoring and Treating Non-Small Cell Lung Cancer	21	2	8	62%	50%	2	100%	100%	1	95%	50%	5%
Innovative Therapies for Advanced Non-Small Cell Lung Cancer	18	2	4	78%	50%	2	100%	100%	2	100%	100%	0%
Innovative Treatments for Non-Small Cell Lung Cancer	88	26	23	67%	38%	25	92%	85%	26	91%	85%	15%
MET Alterations in Non-Small-Cell Lung Cancer	30	2	7	83%	100%	3	97%	100%	3	90%	50%	7%
Neoadjuvant Treatments in Non-Small Cell Lung Cancer	37	1	5	84%	0%	1	100%	100%	2	97%	100%	3%
Osimertinib Treatment Outcomes in EGFR-Mutant Lung Cancer Patients	67	3	4	93%	33%	4	99%	100%	4	99%	100%	3%
Patient-Reported Outcomes in Lung Cancer Trials	11	6	7	73%	83%	6	100%	100%	5	91%	83%	9%
Pneumonitis Risk and Toxicity in Lung Cancer Patients	17	2	4	88%	100%	3	94%	100%	3	82%	50%	12%
Prognostic Factors in Advanced Non-Small Cell Lung Cancer	255	42	100	66%	67%	49	94%	90%	42	95%	86%	11%
Treatment Outcomes in Non-small Cell Lung Cancer Patients	34	5	6	91%	80%	4	97%	80%	5	100%	100%	3%
Treatment Strategies and Outcomes in Non-Small Cell Lung Cancer	67	28	29	69%	64%	20	88%	71%	27	99%	96%	10%
Treatment Strategies for ALK-Positive Advanced Non-Small Cell Lung Cancer	55	39	43	89%	97%	38	98%	97%	36	91%	90%	11%
Total	**1000**	**212**	**371**	**72%**	**72%**	**216**	**95%**	**89%**	**210**	**95%**	**87%**	**9%**

Abbreviations: ALK, anaplastic lymphoma kinase; EGFR, epidermal growth factor receptor; MET, mesenchymal-epithelial transition; No., number; R1, reviewer 1; R2, reviewer 2; ROS1, ROS proto-oncogene 1.

CONCLUSIONS

- These improvements contribute to more efficient, consistent, and reliable SLRs, bridging the gap between theoretical best practices and practical implementation
- Future research should focus on validating these findings across diverse fields and quantifying the impact on SLR quality and efficiency

FUNDING: This study did not receive any funding, and the authors declare no conflict-of-interest.

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Fly Through Reviews

Poster presented at ISPOR EUROPE 2024, Barcelona, Spain (17-20 Nov 2024)