

Screening tools for streamlining systematic literature review process: reviewers' perspective

Paulina Bajko¹, Jon A. Briggs¹, Kathleen Bowes¹, Audrey E. Brown¹ and Angaja Phalguni¹

¹Genesis Research, Newcastle Upon Tyne, UK

Background

The robust and well-defined methodology of systematic literature reviews (SLRs) helps to generate high quality evidence. As SLRs have become a vital part of evidence-based healthcare, a growing number of tools have emerged to support the screening of records identified through literature search.

Objective

The aim of this study was to compare practical use of three screening tools based on user experience.

Methods

Rayyan, Covidence and PICO Portal were compared by reviewers with a minimum of 30 hours of experience of using these tools, including at least one systematic review with double-blinded screening. A total of 40 features were evaluated, covering six major themes:

- Ease-of-use
- SLR stages supported
- Team and review settings
- Record management
- Screening features
- Review management

Rayyan has both free and subscription offers available, however only the free version was evaluated.

Results

Each tool fully supports reference screening for SLRs (Table 1).

The free version of Rayyan offers key features (importing/ exporting records; searching and filtering records; conducting single and double independent screening; adding tags and notes, highlights for keywords; inclusion/ exclusion reasons; and conflict resolution) required for a well-organized screening. This version of the tool offers limited or no functionality for more advanced capabilities such as detailed user statistics, artificial intelligence (AI) support, and automatic transition to the full text review stage of the project (Table 1).

PICO portal and Covidence offer all key functionalities, and enable screening supported by machine learning (AI), automatic duplicate detection, full text upload, automatic progress of relevant references from title/ abstract to full text screening, and generation of a PRISMA 2020 compliant diagram. These two tools also provide detailed user and project analytics (Table 1).

These features may help streamline tasks, improve productivity, and support project management. In addition, PICO portal provides an automatic open-access full text acquisition. Whereas Covidence offers bulk pdf upload for full text review, the ability to link records from the same study, data extraction and quality assessment support (Table 1).

Conclusions

While all three tools can be used in a robust SLR, additional features offered by PICO portal and Covidence might be valuable in larger reviews involving multiple reviewers. The free version of Rayyan is a cost-effective tool and might be more suitable for a student project or small reviews.

Table 1. Summary of features of screening tools

<div><div>rayyan</div><div>FREE VERSION</div><div>[1]</div></div> <div><div>PICO Portal</div><div>[2]</div></div> <div><div>covidence</div><div>[3]</div></div>			
Theme 1: Ease of use			
A) Availability and access	Free version (assessed here) and paid subscription (not assessed)	Paid subscription only	Paid subscription only
B) Account set up	Simple and well described set up guide	Simple and well described set up guide	Simple and well described set up guide
C) Does it require user to code	No	No	No
D) Tutorial/help information	Tutorials videos and guides available	PICO portal user guide, responsive customer service	Tutorial videos and resources available on the Covidence Knowledge Base.
E) Support desk experience	Additional support was not needed	Good support desk experience (US based)	Good support desk experience
F) Mobile app available	Available: decision making limited up to 100	Not available	A mobile-optimized version of ti/ab screening only
G) Keyboard shortcuts	Yes, for inclusion and exclusion decisions during screening	Yes, for inclusion and exclusion decisions during screening	No
Theme 2: Stages of systematic literature review supported			
A) Ti/ab screening (yes/no)	Yes, single, double blinded, double not blinded	Yes, single, double blinded, or final decision from principal reviewer	Yes, single, double blinded, or final decision from principal reviewer
B) Full text review (yes/ no)	Yes, requires additional tools.	Yes, single, double blinded, or final decision from principal reviewer	Yes, single, double blinded, or final decision from principal reviewer
C) Conflict resolution	Post screening, independent or between reviewers	Yes. An adjudicator can be appointed to make a final decision	Yes. An adjudicator can be appointed to make a final decision
D) Ability to link associated articles of the same study	No	Yes, features automatic detection of associated articles with user oversight	Yes, references of the same study can be merged
E) Automatic PRISMA	No	Yes, PRISMA 2020 compliant diagram is automatically generated	Yes, PRISMA 2020 compliant diagram is automatically generated
F) Data extraction	No	Yes, currently in beta	Yes, dual and single reviewer data extraction and quality assessment.
Theme 3: Team and review settings			
A) Team members per project and overall [limited/unlimited]]	Up to 3 active reviewers per project Unlimited reviewers invite (overall)	Unlimited reviewers	Unlimited reviewers
B) Ability to assign a lead/ principal reviewer	No	Yes, lead reviewers can be assigned	Yes, lead reviewers can be assigned
C) Ability to assign a specific person to resolve conflicts	No	Yes, lead reviewers and library co-owners/ owners can act as adjudicators.	Yes, review creator can assign a specific person to resolve conflict
D) Options for single or double screening	Yes	Yes	Yes
E) Option for reviewers to be blinded to other reviewer's screening decisions and/or notes	Yes	Yes	Yes, for decision, no for notes
Theme 4: Record management			
A) Citation upload	Mendeley (direct), supports all common file formats	Supports all common file formats	EndNote, XML, PubMed, RIS
B) File size that can be imported	10 files at a time 100 MB each allowing 1 GB to be added simultaneously	Information unavailable	Files up to 50 MB/ 15,000 references in size
C) Automatic deduplication (manual review availability)	Available; limited capacity	Yes, with option to review the duplicates manually	Yes, with option to review the duplicates manually
D) Ability to see import/ export history	No	Yes	Yes
E) Inbuilt function to search internet for full texts	No	Yes, automatically adds pdfs of open access references included for full text review	No
F) Full text upload (single/ bulk upload)	Up to 10 at a time, full text needs to be matched with reference	Single upload for anything not found with automated searches	Supports single and bulk upload of pdfs
G) What can be exported, and how?	Email with a link to download. Export by review decision and/ or labels (tags)	Email with a link to download. Export can be filtered and done in a range of file types	Export can be filtered and can be done in a range of file types.
H) Search in reference library	Yes, simple search, advanced in development	Yes, simple, and advanced search options are available.	Yes, simple, and advanced search options are available.
I) Filter records using assigned tags	Yes	Yes	Yes
J) Filter records according to availability of full texts	No	Yes	Yes
Theme 5: Screening features			
A) Screening supported by machine learning or AI	Yes, reference relevance predicted after the first 50 references screened	Machine learning pushes likely includes to reviewers following unaided initial screening	Relevant references predicted based on previous decisions.
B) Include/exclude/ maybe option	Yes	Yes	Yes
C) Keywords/ highlight (add/edit)	Custom inclusion/ exclusion terms can be added during a review by any reviewer	Keywords can be added individually or as a list. Additional key phrases are highlighted as keywords by machine learning	Keywords for inclusion and exclusion can be added individually or as a list by any reviewer and highlighted.
D) Exclusion reason (add/edit)	PICO exclusion reasons, additional can be added, bulk decision making possible	Additional exclusion reasons can be added	Inclusion and exclusion reasons can be added or edited by any reviewer
E) Labels (tags)/ notes	Yes: for all reviewers	Yes, for all reviewers	Yes, for all reviewers
F) Reference sorting	Yes, by year, title, author, and relevance	Not during screening	Yes, by author, year, and relevance.
G) History of screening for each record	Limited: decision and decision maker details available	Yes, displays detailed screening history for each record	Yes, displays detailed screening history for each record
H) Ability to move a record from full text screening to ti/ab screening	No	Yes	Yes
Theme 6: Review management			
A) Ability to assign a project administrator	No	Yes	Yes
B) Screening statistics	Progress and number of excluded/ included. Detailed statistics not available	Yes, several project and user performance metrics are presented	Progress and number of excluded/ included. Detailed statistics not available
C) Transition between review stages (ti/ab to FTR) manual or automatic	Manual, new library required	Automatic (requires upload of full texts)	Automatic (requires upload of full texts)
D) Work allocation (manual or automatic)	Manual	Automatic	Automatic
ABBREVIATIONS: AI, artificial intelligence; FTR, full text review; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; ti/ab, title/abstract; UI, user interface.			

REFERENCES

1) Mourad Ouzzani, Hossam Hammady, Zbys Fedorowicz, and Ahmed Elmagarmid. Rayyan — a web and mobile app for systematic reviews. Systematic Reviews (2016) 5:210, DOI: 10.1186/s13643-016-0384-4.

2) PICO Portal, New York, NY United States. Available at www.picoportal.org

3) Covidence systematic review software, Veritas Health Innovation, Melbourne, Australia. Available at www.covidence.org.