

Interactive Spreadsheet for pairwise Corrected Covered Area for assessment of Overlap of systematic reviews: A tool for Evidence-based medicine



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Abstract:

Evidence-based medicine is the main essence of clinical decision-making, particularly in the field of emergency medicine. Most important decisions in medicine are guided by aggregated data from systematic reviews and meta-analyses or guidelines. But, the number of systematic reviews has increased exponentially and to synthesize high-quality evidence with precision, umbrella reviews have merged. One critical aspect of umbrella reviews is assessing the overlap between studies included in different systematic reviews. An essential facet within umbrella reviews entails the rigorous assessment of the convergence among studies incorporated across different systematic reviews with similar objectives. Corrected covered area (CCA) is a method developed for assessing the amount of overlap between the systematic reviews that are included in an umbrella review. As assessing the CCA within multiple studies is a challenging assignment, here we have provided a free interactive tool to help researchers to calculate total CCA and pairwise CCA between the studies.

Keywords: Evidence-Based Medicine, Systematic Reviews, Overlapping Sources of Information, Corrected Covered Area.

Introduction

Evidence-based medicine is the main essence of clinical decision-making, particularly in the field of emergency medicine (1-3). Systematic reviews have become an essential tool for synthesizing the available evidence and providing actionable recommendations (4-6). However, the sheer volume of systematic reviews has increased exponentially over time, making it challenging for researchers and practitioners to navigate and extract meaningful insights (6). So as there was a need for a comprehensive approach to review and synthesize evidence from multiple systematic reviews, umbrella reviews have emerged (7). Umbrella

reviews allow for a higher level of evidence integration by analyzing and summarizing findings from multiple systematic reviews on a specific topic (7). One critical aspect of umbrella reviews is assessing the overlap between studies included in different systematic reviews. Overlap analysis provides insights into the extent of redundancy and duplication across reviews, highlighting areas where further research is needed or where evidence may be conflicting (8-10). To facilitate this analysis, we developed an interactive spreadsheet tool that enables pairwise corrected covered area overlap assessment. The tool allows users to input data from

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different systematic reviews, identify overlapping studies, and calculate corrected covered area overlap metrics. The interactive nature of the spreadsheet enhances usability and promotes efficient exploration of overlap patterns. This tool serves as a valuable resource for researchers and practitioners engaged in evidence-based medicine, particularly in the context of umbrella reviews. Facilitating overlap analysis enables a more nuanced understanding of the existing evidence landscape and assists in identifying research gaps and areas for future investigation. The spreadsheet tool enhances the transparency and reproducibility of overlap assessment, supporting evidence-based decision-making and promoting the advancement of emergency medicine practice.

Methods and Results

After gathering the systematic reviews based on a predetermined protocol that meets the proper guidelines of the systematic review and umbrella review, a master list was provided from the ID of studies included in each systematic review. Due to the possible similarities in the names of authors, the researcher should wisely select the way to record the IDs. It can be recorded as the Family name of the first author and year.

In the Master list, it is recommended to record the name or ID of the studies without any extra spaces, hyphens, or other non-alphabetic factors.

Maintaining consistent and standardized naming conventions will help ensure accurate comparisons and reduce the likelihood of errors or discrepancies when assessing overlap between studies.

When compiling the Master list, the researcher should consider the following guidelines:

Removing extra spaces: Researcher has to eliminate any unnecessary spaces within the study names or IDs. For example, if a study is listed as " Study 1" with a space before the number, it should be recorded as "study1" without the space.

Exclude hyphens or special characters: Omit any hyphens or special characters that are not part of the study's official name or ID. Stick to alphanumeric characters and standard naming conventions.

Use consistent formatting: Maintain consistent formatting throughout the Master list. This could involve capitalization rules (e.g., all uppercase or title case), abbreviations, or other formatting preferences. Make sure to apply the same formatting to all study names or IDs to facilitate accurate comparisons.

After recording the study IDs, the Master list should be provided as columns of Microsoft Office Excel. Each review should be assigned to a column and rows would be the ID of studies, s also provided in the sample file (Supplementary file 1) and shown in figure 1.

A	B	C	D	E	F	G	H	I	J
review1	review2	review3	review4	review5	review6	review7	review8	review9	review10
Arslan	Ajram	Alobaid	Alobaid	Ajram	Alagl	Clarke	Bezgin	Alagl	Annie
Brizuela	Alasqah	Bezgin	Bezgin	Alasqah	Bezgin	Martens	Chan	Alobaid	Bukhari
El-Kateb	Bezgin	Bose	Chen	Alobaid	Bukhari	Alobaid	EzEldeen	Bezgin	Estefan
Jha	Botero	Cehrelli	Dabbagh	Bezgin	Carmen	Asgary	Kahler	Bonte	Farhad
	Bukhari	Chen	Estefan	Bose	Jiang	Battepati	Li	Caleza-Jim	Jung
	Chan	Dabbagh	Jeeruphan	Cehreli	Kahler	Beslot-Ne	Lin	Casey	Lenzi
	Chen	Jadhav	Kahler	Chen	Li	Bose	Nazzal	Chen	Martin
	Estefan	Jeeruphan	Lin	Dabbagh	Lin	Brito-Junic	Peng	Chen	Nevins
	Linsuwanc	Kahler	Linsuwanc	Ding	Linsuwanc	Cao	Saoud	Cheng	Nosrat
	McCabe	Mctigue	Linsuwanc	Iwaya	Lv	Cetenovic	Shiva	Chueh	Paryani
	Moodley	Nagata	Linsuwanc	Jadhav	Meschi	Chakrabor	Silujjai	Elsheshtav	Saoud
	Narang	Nagy	Mctigue	Jeeruphan	Nagata	Dixit		Hazim	Saoud
	Nosrat	Narang	Nagy	Kahler	Nazzal	ELAshiry		Jadhav	Wang
	Peng	Saoud	Narang	Kim	Ragab	Estefan		Jayadevan	
	Rizk		Peng	Martin	Saoud	Gawthaman		Jeeruphan	
	Silujjai			McTigue	Sharma	Ghaziani		Jeeruphan	
	Timmerman			Moodley	Silujjai	Gupta		Jiang	
	Topçuoğlu			Nagata	Ulusoy	Jacobovitz		Kandemir	
				Nagy		Kahler		Kinirons	
				Narang		Karp		Lin	
				Nosrat		Kaya-Buy€ukbayram€	Lv		
				Nosrat		Khatavkar		Meschi	
				Petrino		Kumar		Mittal	
				Reynolds		Kvinnslan		Narang	
				Rizk		Law		Peng	

Figure 1. Example of sample master list in Microsoft Office Excel

To provide unique IDs of studies, researchers should eliminate any duplicate entries from the master list. This ensures that each study is represented only once. This list would be used in further steps. To facilitate this step, we also have provided a Python application that generates the unique IDs and put them in the proper cells in the spreadsheet. The application is shared on the Google

Drive application within the Colaboratory application (<https://colab.research.google.com/drive/1v8qup62GKLt6PFGOhtoBuljqE0tPVIYf?usp=sharing>). In the provided spreadsheet, the unique names of studies would be set at the first row of the second sheet, as shown in figure 2. The provided Python app would perform this task automatically.

	Ajram	Arslan	Alagl	Alasqah	Alobaid	Al-Ostwan	Alqaderi	Annie	Ashiry	Battepati	Beslot-Ne	Bezgin
evview 1	#N/A	Arslan	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
evview 2	Ajram	#N/A	#N/A	Alasqah	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Bezgin
evview 3	#N/A	#N/A	#N/A	#N/A	Alobaid	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Bezgin
evview 4	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A
evview 5	Ajram	#N/A	#N/A	Alasqah	Alobaid	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Bezgin
evview 6	#N/A	#N/A	Alagl	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Bezgin
evview 7	#N/A	#N/A	#N/A	#N/A	Alobaid	#N/A	#N/A	#N/A	#N/A	Battepati	Beslot-Ne	#N/A
evview 8	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Bezgin
evview 9	#N/A	#N/A	Alagl	#N/A	Alobaid	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Bezgin
evview 10	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Annie	#N/A	#N/A	#N/A	#N/A

Figure 2. Example of sample unique IDs list in Microsoft Office Excel

	Ajram	Arslan	Alagl	Alasqah	Alobaid	Al-Ostwan	Alqaderi	Annie	Ashiry	Battepati	Beslot-Nei	Bezgin	Bonte	Bose	Botero	Brizuela	Bukhari
review 1		✓	1														
review 2	✓	1		✓	1							✓	1		✓	1	✓
review 3					✓	1						✓	1	✓	1		
review 4							✓	1		✓	1			✓	1		
review 5	✓	1		✓	1	✓	1			✓	1		✓	1			
review 6			✓	1							✓	1		✓	1		
review 7					✓	1				✓	1	✓	1	✓	1		✓
review 8												✓	1				
review 9			✓	1	✓	1						✓	1	✓	1		
review 10								✓	1								✓
times a stu	2	1	2	2	4	0	1	1	0	2	1	6	1	3	1	1	3

Generate total results	number of studies mentioned in all reviews (includes overlaps)	260
	number of reviews [C]	10
	number of unique studies cited in reviews [r]	157
	total CCA, %	7,28945%

Figure 3. Example of final total results

Then using the Macros of Microsoft Office Excel in the next sheet, the presence of IDs in reviews would be assigned as number “1” after pressing the button, as shown in Figure 3. This would generate total CCA between all studies based on the formula provided by Pieper et al. (11).

In the sheet entitled “one by one CCA”, pairwise CCA between two studies would be provided automatically, as shown in Figure 4.

Discussion and conclusion

The CCA is a method used to assess the overlap between studies included in different systematic reviews, particularly in the context of umbrella reviews. It provides a quantitative measure of the degree to which reviews address the same or different primary research pieces of literature (8-11). To calculate the CCA, researchers can utilize this interactive spreadsheet tool. This tool allows researchers to input the relevant data and calculate both total CCA and pairwise CCA between the studies. The CCA provides a simple percentage value representing the overlap between systematic reviews (11). Based on the Pieper et al. study, an overlap of more than 15% is high.

The availability of an easy-to-use Corrected Covered Area tool provides researchers with a valuable

resource for evaluating overlap between studies in systematic reviews. By utilizing this tool, researchers can calculate total CCA and pairwise CCA, gaining insights into the convergence and relationships between studies included in different systematic reviews. This contributes to the advancement of evidence-based medicine by promoting a more thorough assessment of the existing literature.

Supplementary file 1: [CCA calculation spreadsheet](#)

Note: The file should be redownloaded for new projects. Sample data is available in the file. The researcher should replace their own data in the file.

Declarations:

Funding: None.

Data availability: Spreadsheet and online Python app are available at UiEM.

Conflicts of interest: None.

Author contributions: PK contributed to all stages of the work.

Acknowledgments: The AI tool of ChatGPT was used for grammatical revisions and all AI written text is supervised by the human author.

Ethical considerations: Not applicable.

CCA	review 1	review 2	review 3	review 4	review 5	review 6	review 7	review 8	review 9	review 10
review 1		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
review 2	0.00		14.06	0.00	34.72	6.67	4.11	22.64	34.85	10.91
review 3	0.00	14.06		0.00	50.94	20.51	5.36	14.29	20.00	10.00
review 4	0.00	0.00	0.00		0.00	0.00	3.13	0.00	0.00	0.00
review 5	0.00	34.72	50.94	0.00		14.52	3.75	9.09	21.52	13.33
review 6	0.00	6.67	20.51	0.00	14.52		11.11	21.88	10.53	16.67
review 7	0.00	4.11	5.36	3.13	3.75	11.11		2.00	4.17	4.44
review 8	0.00	22.64	14.29	0.00	9.09	21.88	2.00		20.75	12.50
review 9	0.00	34.85	20.00	0.00	21.52	10.53	4.17	20.75		0.00
review 10	0.00	10.91	10.00	0.00	13.33	16.67	4.44	12.50	0.00	

Figure 4. Example of pairwise CCAs between 2 reviews

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