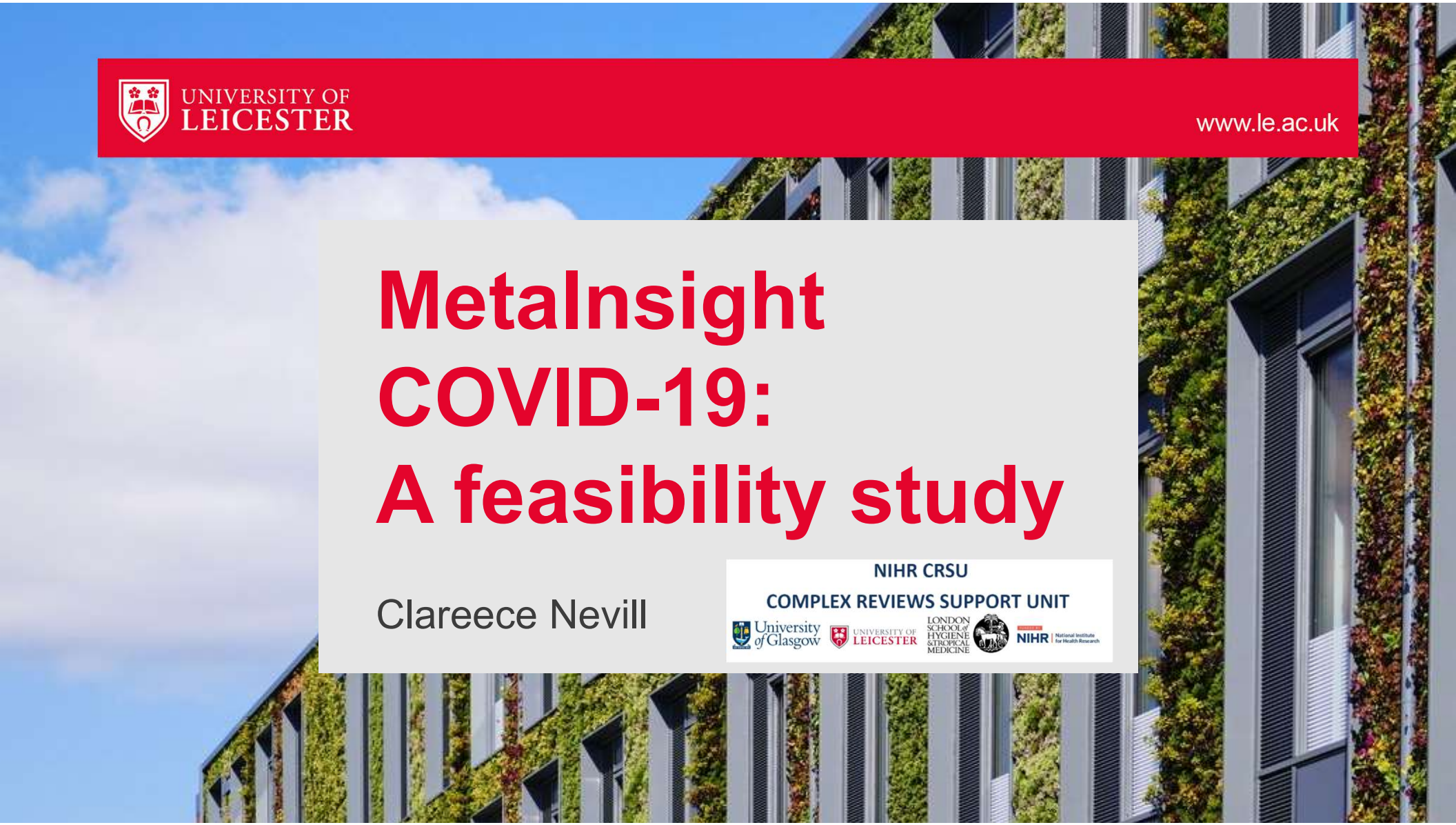

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MetaInsight COVID-19: A feasibility study

Clareece Nevill

NIHR CRSU

COMPLEX REVIEWS SUPPORT UNIT

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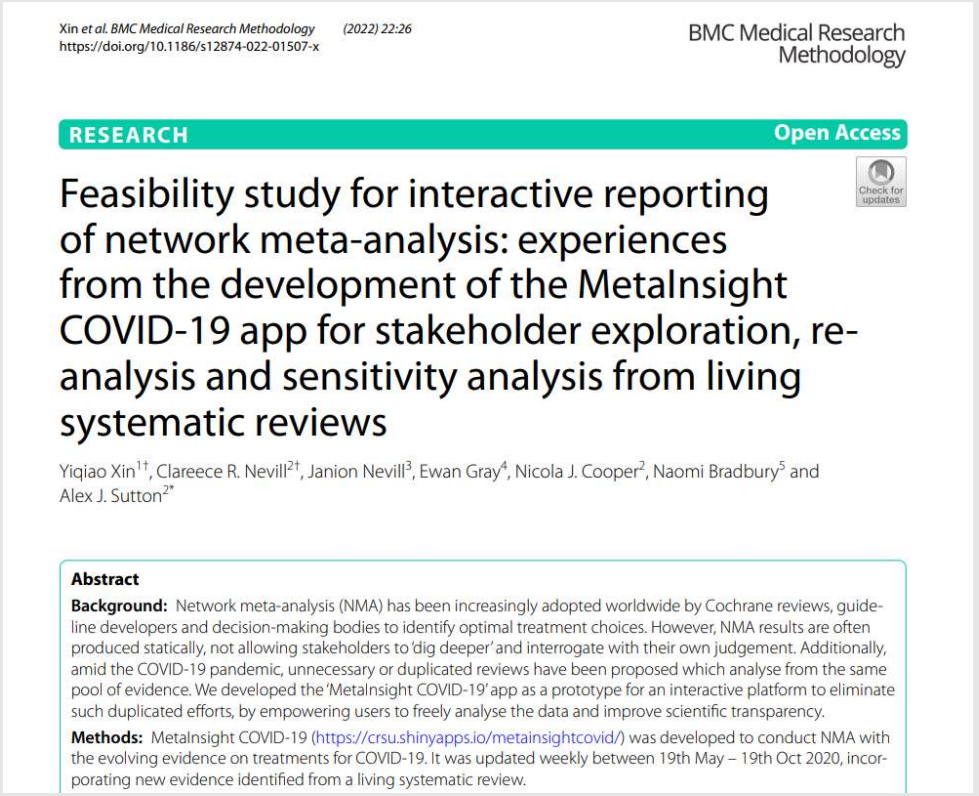
Acknowledgements

- Feasibility study team
- MetaInsight developers
- CRSU team



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https://doi.org/10.1186/s12874-022-01507-x

BMC Medical Research Methodology

RESEARCH Open Access

Feasibility study for interactive reporting of network meta-analysis: experiences from the development of the MetaInsight COVID-19 app for stakeholder exploration, re-analysis and sensitivity analysis from living systematic reviews

Yiqiao Xin[1†], Clareece R. Nevill[2†], Janion Nevill[3], Ewan Gray[4], Nicola J. Cooper[2], Naomi Bradbury[5] and Alex J. Sutton[2*]

Abstract

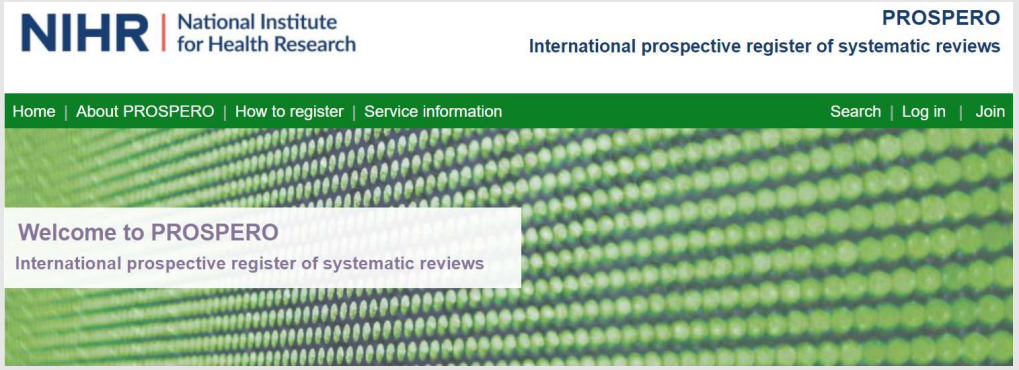
Background: Network meta-analysis (NMA) has been increasingly adopted worldwide by Cochrane reviews, guideline developers and decision-making bodies to identify optimal treatment choices. However, NMA results are often produced statically, not allowing stakeholders to 'dig deeper' and interrogate with their own judgement. Additionally, amid the COVID-19 pandemic, unnecessary or duplicated reviews have been proposed which analyse from the same pool of evidence. We developed the 'MetaInsight COVID-19' app as a prototype for an interactive platform to eliminate such duplicated efforts, by empowering users to freely analyse the data and improve scientific transparency.

Methods: MetaInsight COVID-19 (https://crsu.shinyapps.io/metainsightcovid/) was developed to conduct NMA with the evolving evidence on treatments for COVID-19. It was updated weekly between 19th May – 19th Oct 2020, incorporating new evidence identified from a living systematic review.

Motivation

- First trials on COVID-19 were published in April 2020.

- By the end of 2020, over 2,500 were registered worldwide[1].

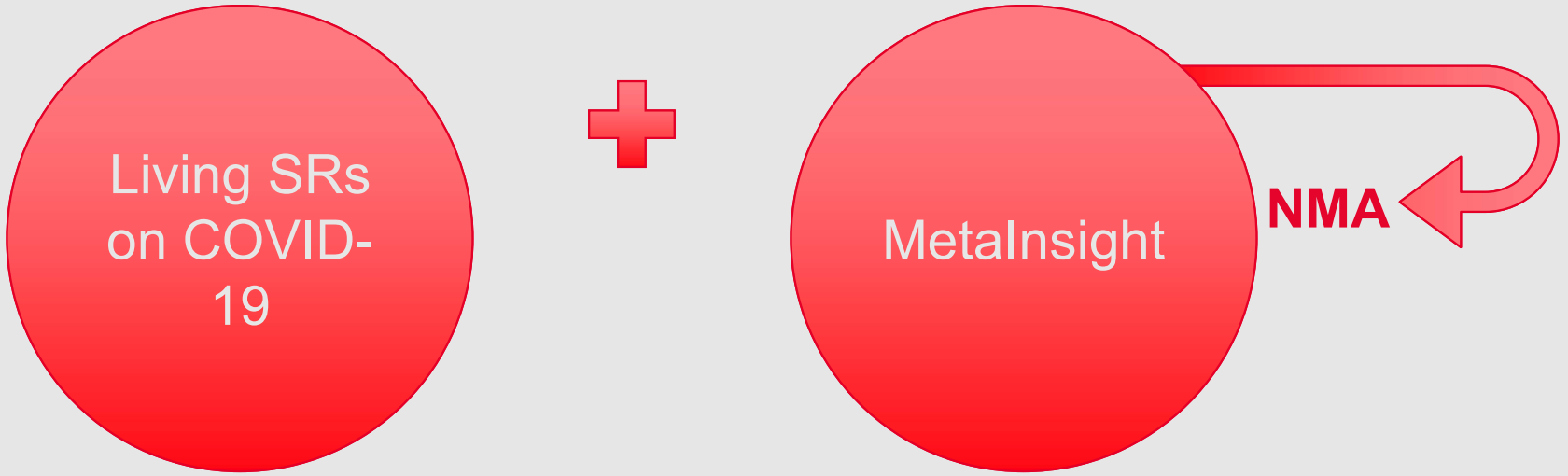


- As standard in health technology assessment, the natural next step was to conduct systematic reviews (SRs) regarding treatments for COVID-19.

- By January 2021, over 450 SRs for COVID-19 were registered in PROSPERO[2], with lots of potential overlap.

Motivation

We wanted to do ‘our bit’ for the cause.



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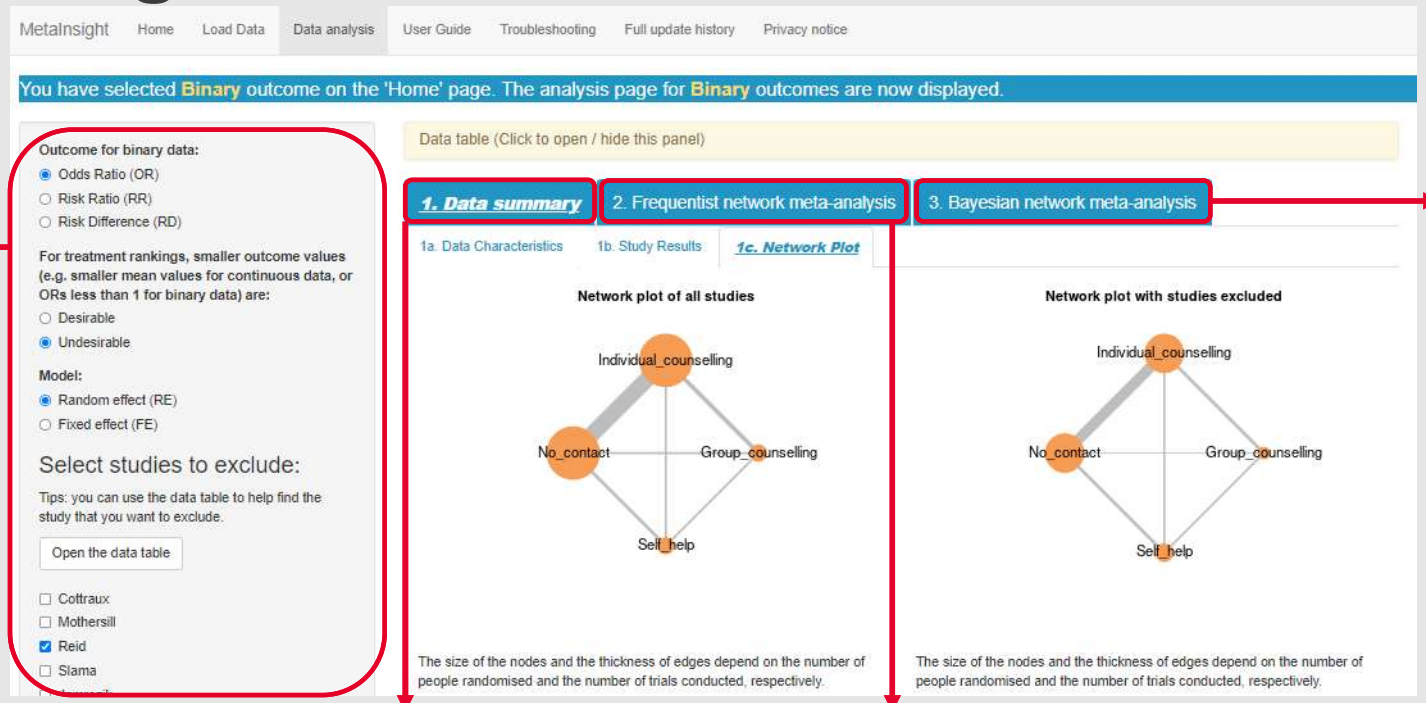
MetaInsight

https://crsu.shinyapps.io/MetaInsight



Options

Bayesian
- Forest plot
- Comparison of all treatment pairs
- Ranking table
- Nodesplit model
- Bayesian result details
- Deviance report
- Model details

Data Summary
- Data characteristics
- Study Results
- Network plot

Frequentist
- Comparison of all treatment pairs
- Forest plot
- Inconsistency

Key benefits of MetaInsight to transfer

- Network meta-analysis Living?!
- Exploration, re-analysis, sensitivity analysis

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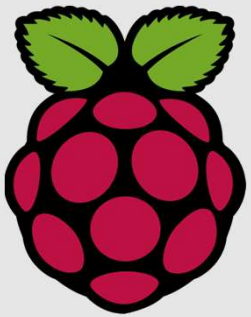
A living MetaInsight tailored to COVID-19

COVID-NMA
COVID-19 OPEN LIVING EVIDENCE SYNTHESIS TO INFORM DECISION

Six month trial period, 19th May – 19th October 2020, updated weekly



Raspberry Pi used to help automate weekly extraction of data

```
# Read in and store data once when radio button chosen (if an optic
CachedData <- reactiveValues()
observe(CachedData$mortality_data <- read_sheet(url(), sheet = "COVIDMortalitydata", col_names = FALSE))
```

* auto-connect function

MetaInsight linked with Google spreadsheet

COVIDALL3.1_latest

File Edit View Insert Format Data Tools Extensions He

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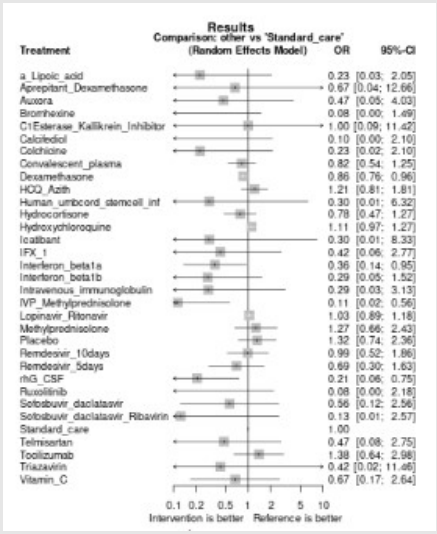
G29 fx /

	A	B	C	D	E	F
1	StudyID	Study	T	R	N	Follow_up_days
2	1	CaoB	1	25	100	28
3	1	CaoB	2	19	99	28
4	2	Yueping	1	0	17	21
5	2	Yueping	2	0	34	21
6	2	Yueping	4	0	35	21
7	3	ChenJ_Zhejiang	1	0	15	14
8	3	ChenJ_Zhejiang	3	0	15	14
9	4	ChenC	4	0	120	7
10	4	ChenC	5	0	120	7

New data added to 'live' Google spreadsheet



NMA output automatically updated

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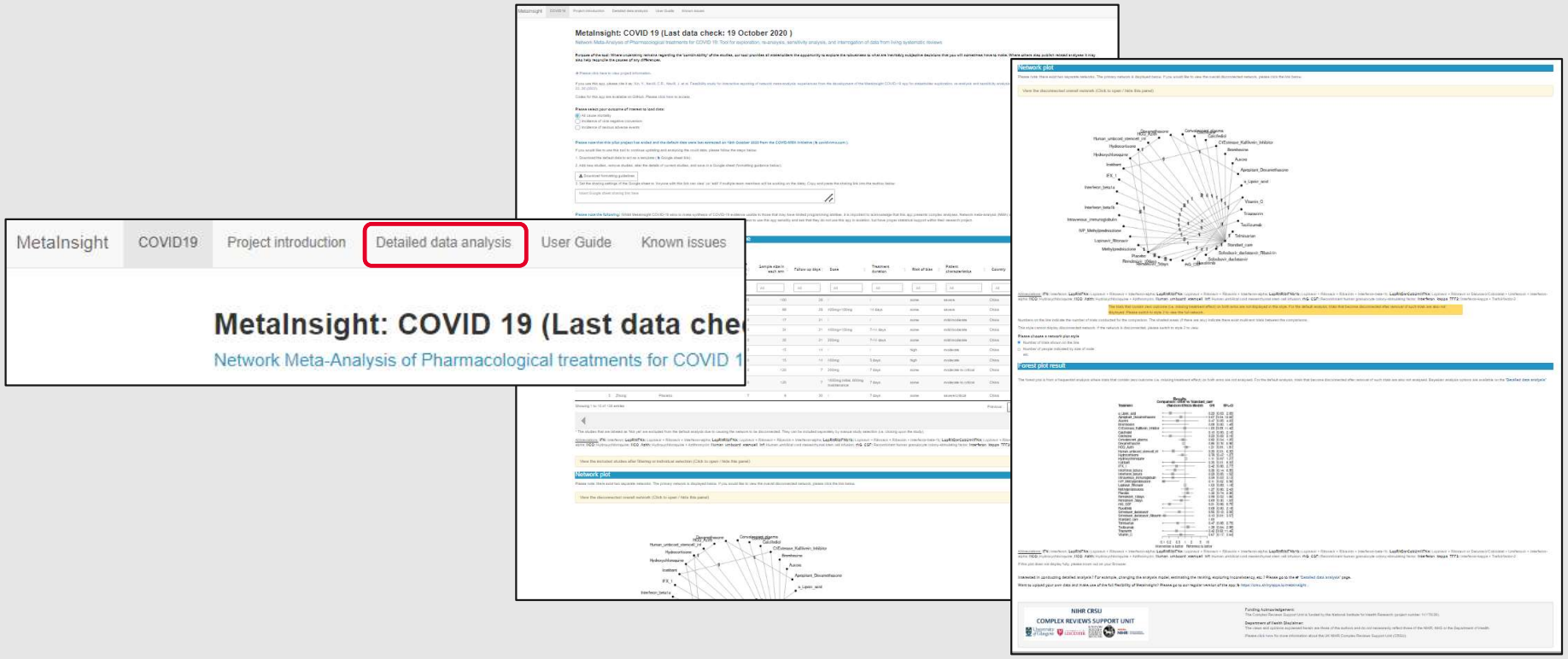
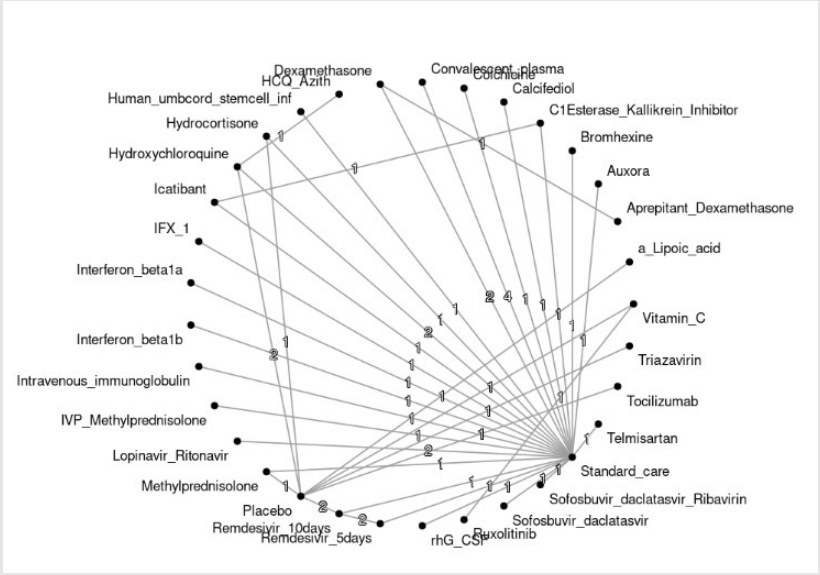
Exploration, re-analysis, and sensitivity analysis



Exploration



Network plot

Characteristics of the included studies for the selected outcome

Show 10 entries Search:

StudyID	Author	Treatment	Number of people who had outcome in each arm	Sample size in each arm	Follow up days	Dose	Treatment duration	Risk of bias	Patient characteristics	Country	Time of outcome measure (days)
All	All	All	All	All	All	All	All		All	All	All
1	CaoB	Standard_care	25	100	28	/	/	some	severe	China	14-28
1	CaoB	Lopinavir_Ritonavir	19	99	28	400mg+100mg	14 days	some	severe	China	14-28
2	Yueping	Standard_care	0	17	21	/	/	some	mild/moderate	China	14-28
2	Yueping	Lopinavir_Ritonavir	0	34	21	400mg+100mg	7-14 days	some	mild/moderate	China	14-28
2	Yueping	Umifenovir	0	35	21	200mg	7-14 days	some	mild/moderate	China	14-28
3	ChenJ_Zhejiang	Standard_care	0	15	14	/	/	high	moderate	China	14-28
3	ChenJ_Zhejiang	Hydroxychloroquine	0	15	14	400mg	5 days	high	moderate	China	14-28
4	ChenC	Umifenovir	0	120	7	200mg	7 days	some	moderate to critical	China	7
4	ChenC	Favipiravir	0	120	7	1600mg initial, 600mg maintenance	7 days	some	moderate to critical	China	7
5	Zhong	Placebo	7	9	30	/	7 days	some	severe/critical	China	14-28

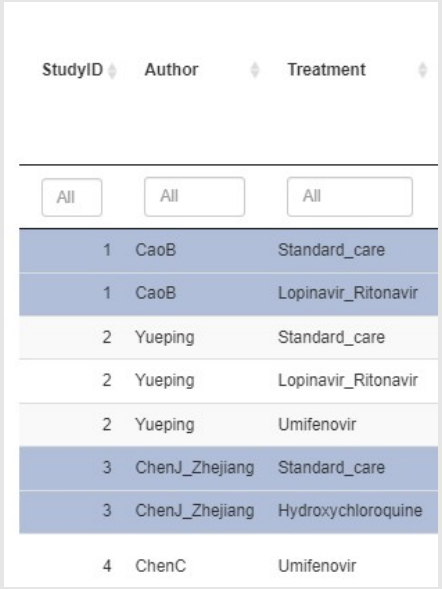
Showing 1 to 10 of 138 entries Previous 1 2 3 4 5 … 14 Next

* The studies that are labeled as 'Not yet' are excluded from the default analysis due to causing the network to be disconnected. They can be included separately by manual study selection (i.e. clicking upon the study).

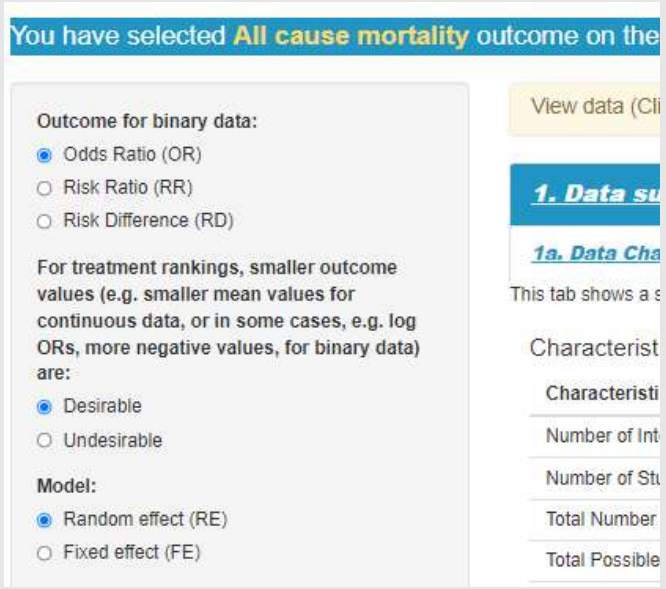
Characteristics table

Re-analysis

Filter function



Select function



Detailed analysis options

Sensitivity analysis

ORs, more negative values, for binary data) are:

- (•) Desirable
- ( ) Undesirable

Model:

- (•) Random effect (RE)
- ( ) Fixed effect (FE)

Select studies to exclude:

Tips: You can use the study characterstics table to find the study that you want to exclude.

» Open the data table

- [ ] CaoB
- [ ] Yueping
- [x] ChenJ_Zhejiang
- [ ] ChenC
- [ ] Zhong
- [ ] WangY
- [ ] Hung
- [ ] LouY
- [ ] BeigelJH
- [x] Goldman
- [ ] CaoY
- [ ] Davoudi-Monfared

Characteristics

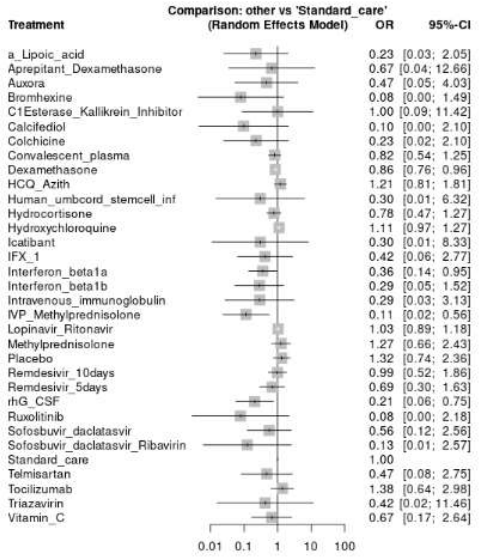
Characteristic
Number of Interv
Number of Studi
Total Number of
Total Possible P
Total Number of
Is the network c
Number of Two-
Number of Multi-
Total Number of
Number of Studi
Number of Studi
Number of Studi

1. Data summary | **2. Frequentist network meta-analysis** | 3. Bayesian network meta-analysis

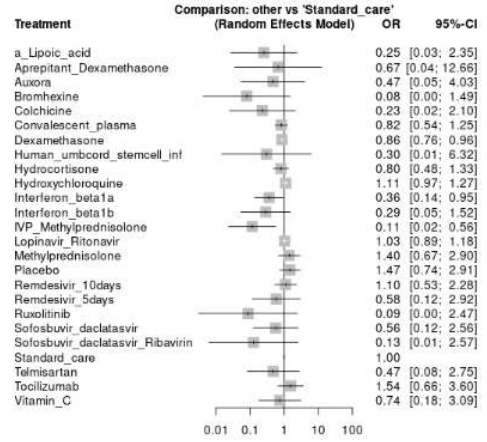
2a. Forest Plot | 2b. Comparison of all treatment pairs | 2c. Inconsistency

The trials that contain zero outcome (i.e. missing treatment effect) on both arms are not analysed in the frequentist analysis. For the default analysis, trials that become disconnected after removal of such trials are also not analysed.

Results for all studies



Results with studies excluded



In summary…

- The six-month feasibility study taught us what difficulties exist for setting up a living NMA platform, which steps can be automated, and useful tips such as the google spreadsheet set-up.

- Further useful features include node lumping/splitting options.

- MetaInsight COVID-19 is an example of how such a platform can meet the need of performing rapid evidence synthesis under different scenarios through exploration, re-analysis, and sensitivity analysis.

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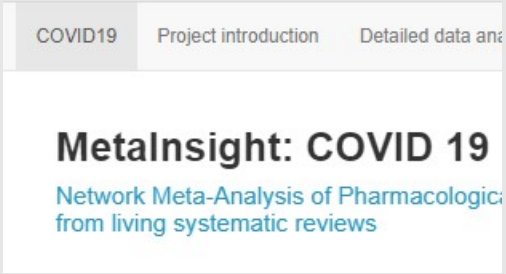
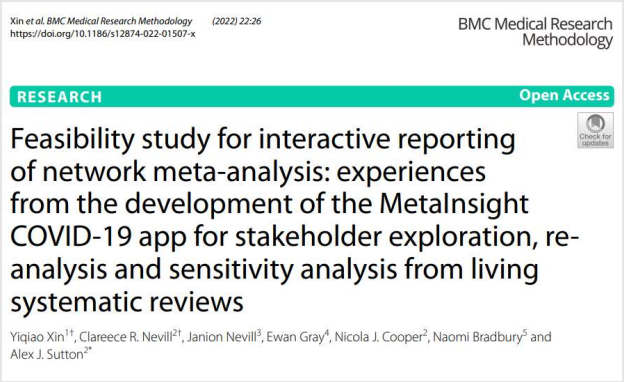
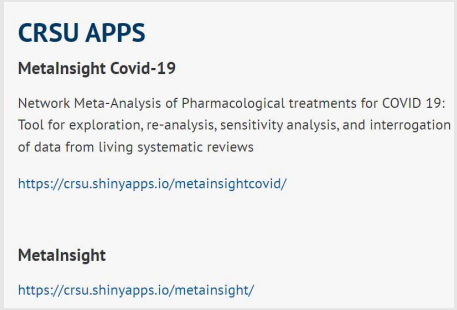
Thank You



https://www.crsu.shinyapps.io/MetaInsightCOVID



https://bmcmedresmethodol.biomedcentral.com/articles/10.1186/s12874-022-01507-x



http://www.nihrcrsu.org/guidance/apps/

https://github.com/CRSU-Apps

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[1] Thorlund K, Dron L, Park J, et al. **A real-time dashboard of clinical trials for COVID-19.** *Lancet Digit Health* 2020;2(6):e286-e87

[2] Research NIfH. **International prospective register of systematic reviews** [Available from: https://www.crd.york.ac.uk/prospero/ accessed 18 January 2021].