



The evolving science of evidence synthesis: lessons learnt from Cochrane reviews

David Tovey, Editor in Chief

Presentation to:
EBHC Conference 2017,
Taormina, Sicily



Trusted evidence
Informed decisions.
Better health.



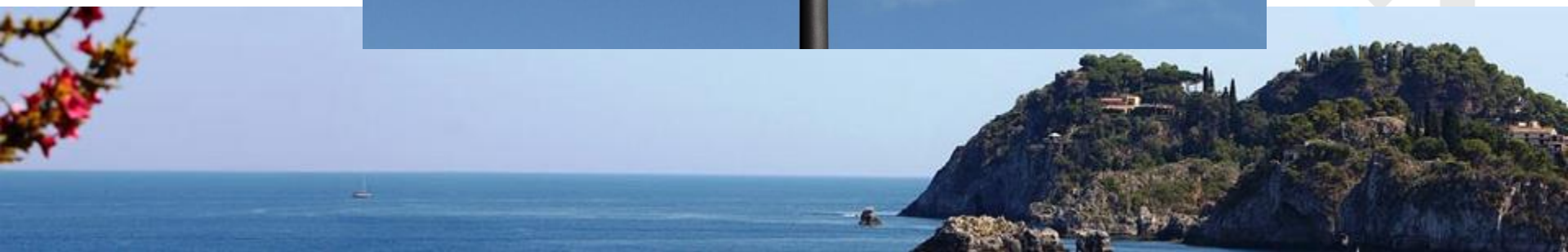
Declaration of interest

I am a full time employee of Cochrane.

Thanks to James Thomas, Chris Mavergames, Liz Bickerdicke, and Miranda Cumpston for their help in preparing the following slides.



Evidence at a crossroads..



A crisis of 'realism'

Influence of
Pharma

Wrong
questions

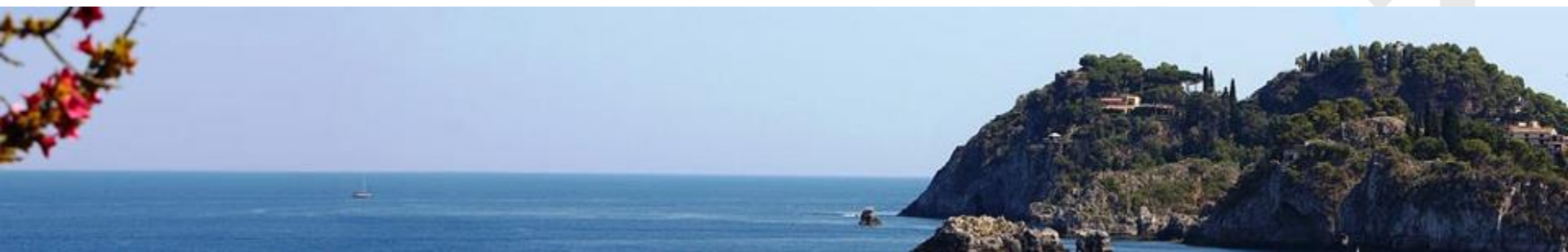
Conflict of
Interest

Don't involve end
users enough

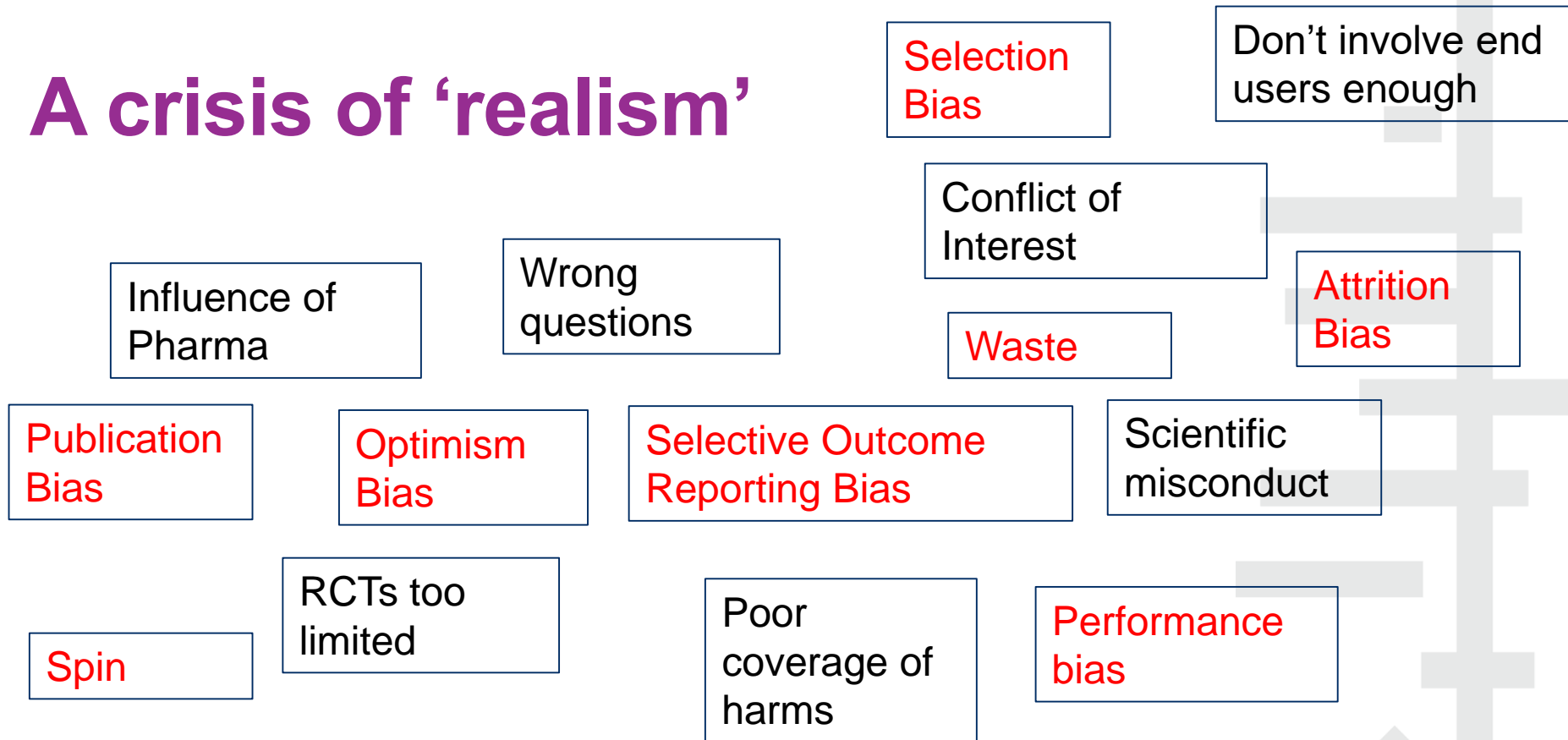
Scientific
misconduct

Poor
coverage of
harms

RCTs too
limited



A crisis of 'realism'



EBM Manifesto

- 1) Expand the role of **patients, health professionals and policy makers** in research
- 2) Increase the **systematic use of existing evidence**
- 3) Make research evidence **relevant, replicable and accessible** to end users.
- 4) **Reduce questionable research practices, bias, and conflicts of interests**
- 5) **Ensure drug and device regulation is robust, transparent and independent**
- 6) Produce better usable clinical guidelines.
- 7) Support innovation, quality improvement, and safety through the better use of real world data.
- 8) **Educate professionals, policy makers and the public in evidence-based healthcare to make informed choices.**
- 9) Encourage the next generation of leaders in evidence-based medicine

Evidence based medicine manifesto for better healthcare

A response to systematic bias, wastage, error, and fraud in research underpinning patient care

BMJ 2017; 357 doi: <https://doi.org/10.1136/bmj.i2973>



And meanwhile, the world moves on..

- Need answers much more quickly
- Growing interest in 'real world data'
- More complex / versatile evidence
- Moves towards individualised health care: 'personalised' or 'precision' medicine





How is Cochrane responding?



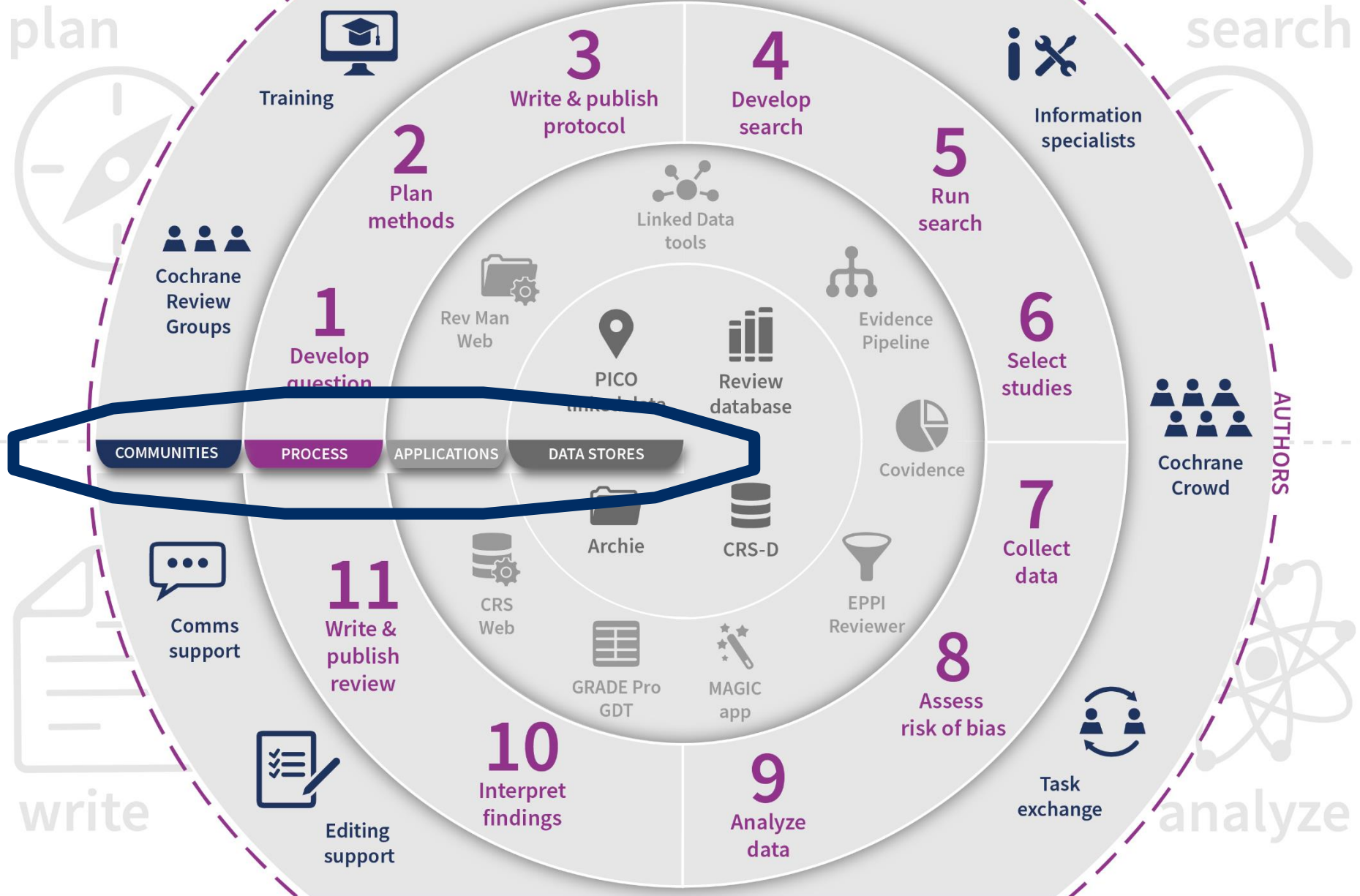
The (Cochrane) Ecosystem of Evidence: connecting generation, synthesis & translation



Cochrane Strategy to 2020

1. Producing high quality systematic reviews that address the priorities of decision makers
- **generation and synthesis**
2. Ensuring that our evidence is accessible and used
- **translation**
3. Advocating for Evidence
- **generation, synthesis and translation**
4. Building an effective and sustainable organisation
- **generation, synthesis and translation**





The (Cochrane) Ecosystem of Evidence: generation and synthesis



Improved engagement with key stakeholders

Knowledge Translation strategy



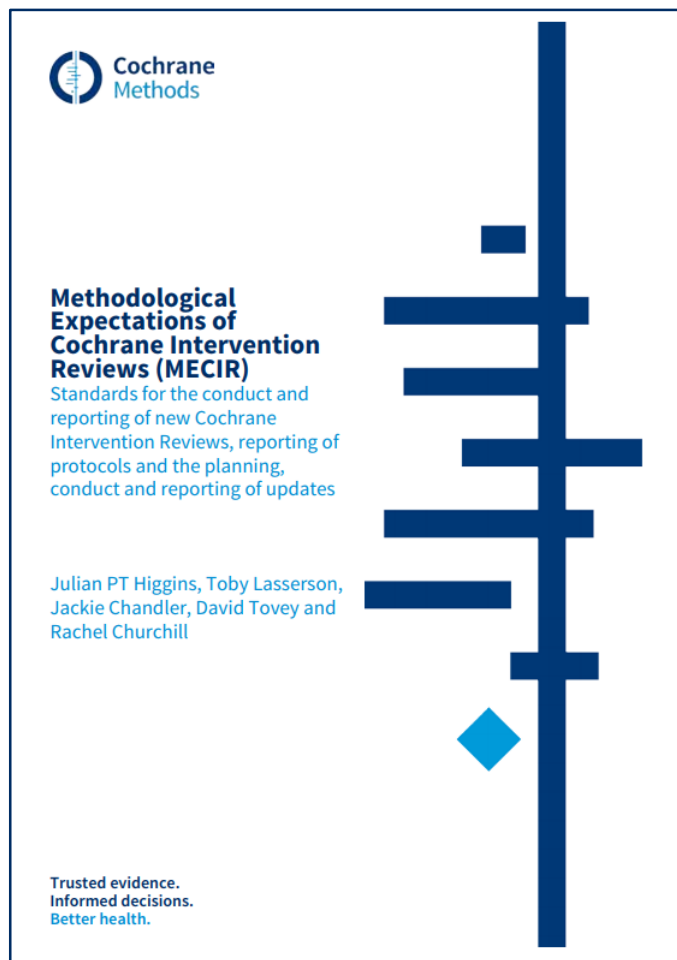


GRADE: at the heart of every review

- Outcomes not study based
- Intuitive and flexible
- Aids understanding & communication
 - Harms
 - Relative and absolute effects
 - Certainty of effect estimates
 - Improvements to the narrative
- Provides an alternative to reliance on 'statistical significance'



Adherence to quality standards



<http://methods.cochrane.org/mecir>



Cochrane Editorial Unit (CEU) Screening

- CEU has been screening new reviews against **key MECIR standards** since September 2013.
- Evolved to consider 3 core components of reviews as major determinants of overall review quality:
 1. implementation of protocol methods
 2. interpretation of findings
 3. consistency of reporting
- Development of a triage tool



The triage tool encourages...

- Spotting outliers and avoiding possible data errors: e.g. transposition, transcription and transformation errors
- Appropriate analysis of non-standard study designs: cluster RCTs, within-patient designs (e.g. X-over)
- Clear and consistent downgrading decisions in SoF tables
- Consistent interpretation
- Emphasising effect estimation over statistical significance
- Consistent reporting of data
- Complete reporting of important outcomes in summary versions

Consistent interpretation

Plain language summary: *“The effects of the intervention compared with control are uncertain”*

Main results: *“The intervention was also associated with statistically significantly greater improvements than control; however, the risk of bias in this RCT was high”.*

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
Outcome X	The mean measure of Outcome X in the control group was 6 points	The mean measure of Outcome X in the intervention groups was 0.47 points lower (0.86 lower to 0.08 lower)		30 (1 study)	⊕⊕⊕⊕ very low ¹	

Footnotes

1 Imprecision due to sparse data; risk of bias due to lack of blinding, high rate of attrition, reporting and other bias

Emphasising effect estimation over statistical significance

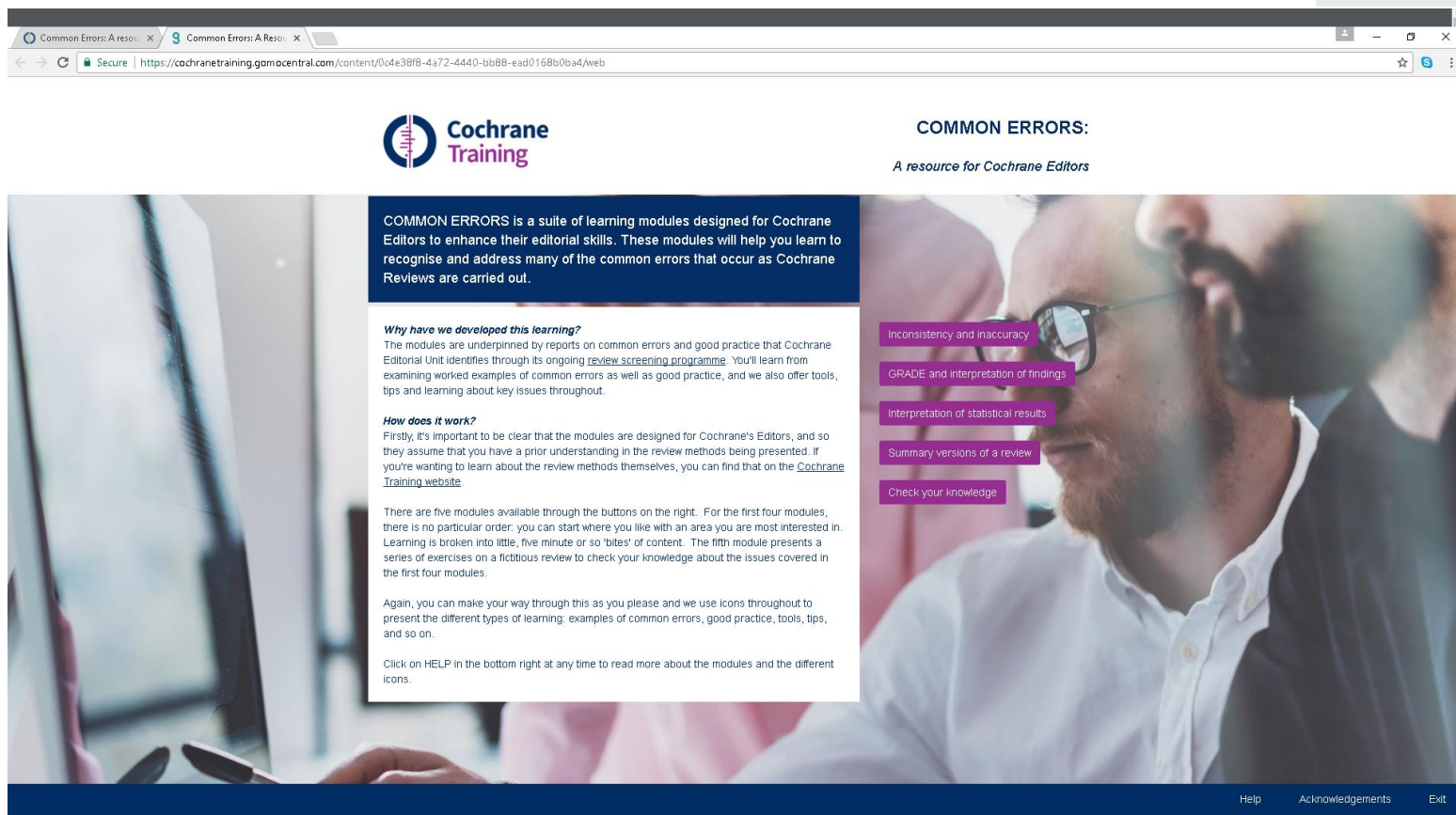
Main results: *For the outcome of mortality at the end of the follow-up period, we found no statistical difference between the intervention and control groups (RR 1.46, 95% CI 0.99 to 2.13; $I^2 = 10%$; $P = 0.05$; low quality).*

Authors' conclusions: *The current evidence does not show a difference in the risk of mortality.*

Outcomes	Illustrative comparative risks* (95% CI)		Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)	Comments
	Assumed risk	Corresponding risk				
Mortality	91 per 1000	131 per 1000 (90 to 193)	RR 1.46 (0.99 to 2.13)	816 (6 RCTs)	⊕⊕⊕⊕ low	

Intervention Y may increase mortality by about 4% (low quality evidence).

<http://training.cochrane.org/common-errors>



Cochrane Training

COMMON ERRORS:
A resource for Cochrane Editors

COMMON ERRORS is a suite of learning modules designed for Cochrane Editors to enhance their editorial skills. These modules will help you learn to recognise and address many of the common errors that occur as Cochrane Reviews are carried out.

Why have we developed this learning?
The modules are underpinned by reports on common errors and good practice that Cochrane Editorial Unit identifies through its ongoing [review screening programme](#). You'll learn from examining worked examples of common errors as well as good practice, and we also offer tools, tips and learning about key issues throughout.

How does it work?
Firstly, it's important to be clear that the modules are designed for Cochrane's Editors, and so they assume that you have a prior understanding in the review methods being presented. If you're wanting to learn about the review methods themselves, you can find that on the [Cochrane Training website](#).

There are five modules available through the buttons on the right. For the first four modules, there is no particular order: you can start where you like with an area you are most interested in. Learning is broken into little, five minute or so 'bites' of content. The fifth module presents a series of exercises on a fictitious review to check your knowledge about the issues covered in the first four modules.

Again, you can make your way through this as you please and we use icons throughout to present the different types of learning: examples of common errors, good practice, tools, tips, and so on.

Click on **HELP** in the bottom right at any time to read more about the modules and the different icons.

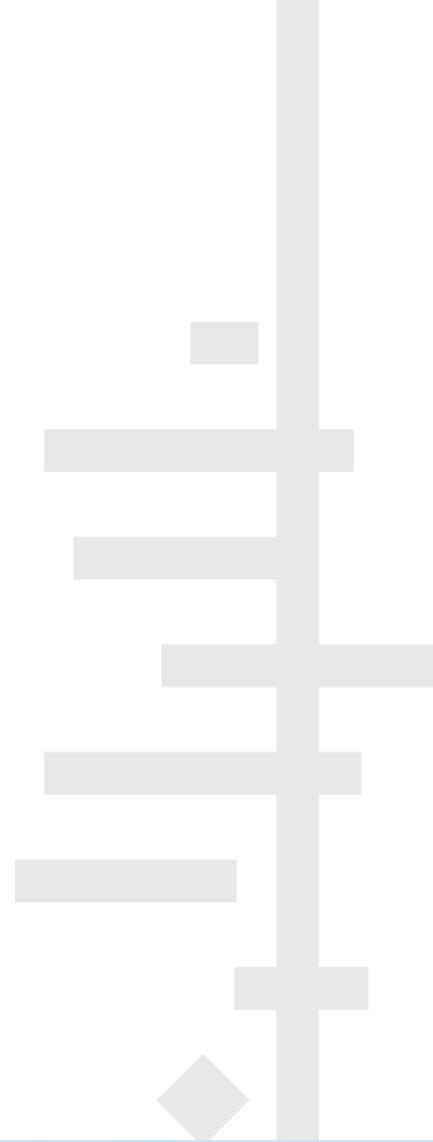
- Inconsistency and inaccuracy
- GRADE and interpretation of findings
- Interpretation of statistical results
- Summary versions of a review
- Check your knowledge

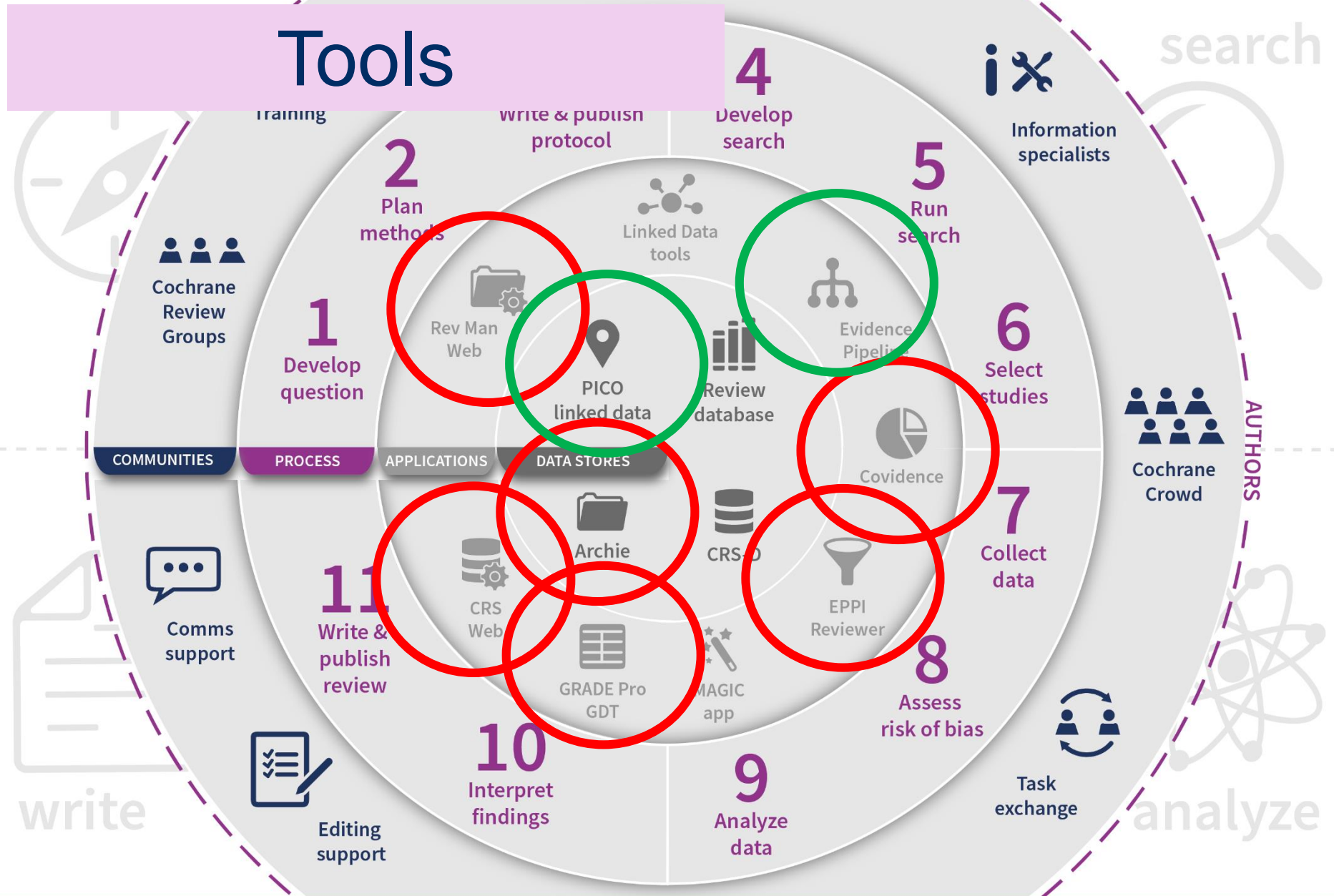
Help Acknowledgements Exit



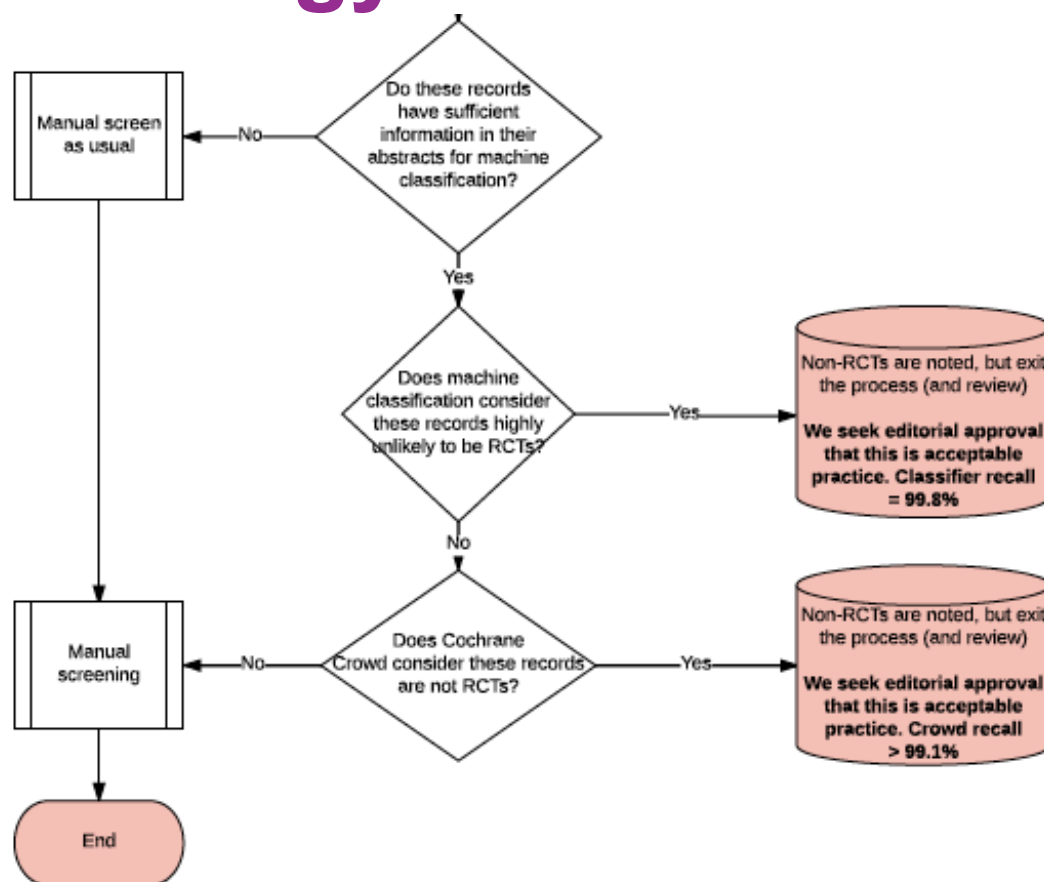
Improving the efficiency of production

- Removing roadblocks
- Increased use of professional teams
- Technology and ‘the crowd’





Technology and ‘the crowd’



Plans for change: Technology and the changing patterns of contribution

A bigger team than you think

Connect with the global health evidence community to get your work done more quickly

Post a task

Contribute skills



6882

Contributors

118

Countries

1480071

Classifications



The microtask: is it an RCT?

The efficacy of internet-based cognitive behavioral therapy for insomnia. [Chinese]
[609918800]

Objective To evaluate the effectiveness of internet-based cognitive behavioral therapy (ICBT) for the treatment of insomnia by comparison of sleep parameters, degrees of anxiety and depression of the ICBT, with traditional face-to-face cognitive behavioral therapy (CBT) and pharmacotherapy for insomnia. **Methods** Seventy-nine cases meeting proposed DSM-5 criteria for insomnia disorder were randomly assigned to ICBT (n=27), CBT (n=26), and pharmacotherapy (n=26) group, and treated accordingly for 8 consecutive weeks. The sleep parameters, the levels of anxiety and depression in the 3 groups were compared and analyzed before, 4 weeks after and the termination of treatment. **Results** Comparing to that of pre-treatment, the sleep parameters were significantly improved, anxiety and depression levels obviously decreased after treatment for 4 and 8 consecutive weeks, the differences were statistically significant ($P<0.05$). After treatment for 4 consecutive weeks, the sleep latency, total asleep time and wake time after sleep were significantly different ($P<0.05$) when compared with pharmacotherapy group with ICBT and CBT groups. After the treatment, the sleep latency, anxiety and depression levels were lower in ICBT and CBT groups than those in pharmacotherapy group, and the difference was statistically significant ($P<0.05$). In addition, no significant difference ($P>0.05$) was found in sleep parameters and anxiety level between ICBT group and CBT group. **Conclusion** ICBT may display a slower effect on improving speed in falling asleep than the pharmacotherapy does, but the efficacy of ICBT is better than that of pharmacotherapy after



RCT/CCT

Reject

Unsure

[Help me decide](#)

[Add a note](#)

Is it an RCT?

The (Cochrane) Ecosystem of Evidence: translation



More diversity in production and delivery of content

Knowledge Translation strategy



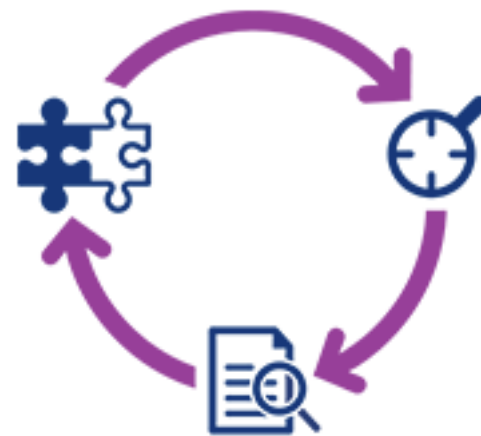
Presentation and delivery

- More diverse and bespoke summaries that meet the needs of end users e.g. policy briefs, evidence to decision summaries
- Multi-lingual presentation and search
- Exploitation of PICO annotation and Linked Data to communicate with other systems / products
 - MAGIC app
 - Decision support tools



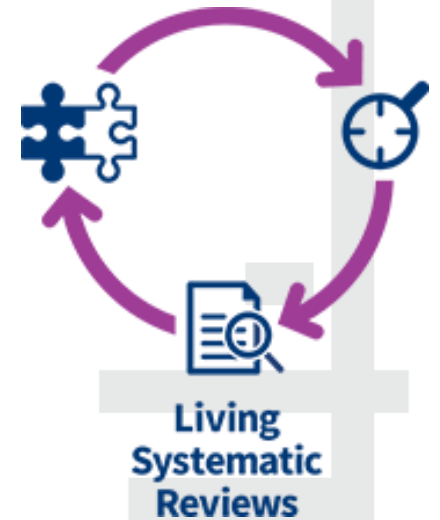
‘Living’ Systematic Reviews

‘a systematic review which is continually updated, incorporating relevant new evidence as it becomes available.’



**Living
Systematic
Reviews**

First two Living SRs published



Cochrane Library Trusted evidence. Informed decisions. Better health.

Search title, abstract, keyword

Cochrane Reviews ▾ Trials ▾ More Resources ▾ About ▾

Go to old article view

Cochrane Database of Systematic Reviews

Delayed antibiotic prescriptions for respiratory infections

New search | Conclusions changed | Review | Intervention

Geoffrey KP Spurling, Chris B Del Mar, Liz Dooley, Ruth Foxlee, Rebecca Farley

First published: 7 September 2017

Editorial Group: Cochrane Acute Respiratory Infections Group

DOI: 10.1002/14651858.CD004417.pub5 View/save citation

Cited by (CrossRef): 0 articles Check for updates

Am score 3

Abstract



Cochrane Library Trusted evidence. Informed decisions. Better health.

Search title, abstract, keyword

Cochrane Reviews ▾ Trials ▾ More Resources ▾ About ▾

Go to old article view

Cochrane Database of Systematic Reviews

Parenteral anticoagulation in ambulatory patients with cancer

Review | Intervention

Elie A Akl, Lara A Kahale, Rami A Ballout, Maddalena Barba, Victor E D Yosuico, Frederiek F van Doormaal, Saskia Middeldorp, Andrew Bryant, Holger Schünemann

First published: 10 December 2014

Editorial Group: Cochrane Gynaecological, Neuro-oncology and Orphan Cancer Group

DOI: 10.1002/14651858.CD006652.pub4 View/save citation

Cited by (CrossRef): 1 article Citation tools ▾

Am score 15

See clinical summaries based on this review



Looking forward: a new content strategy



Different ways to address conventional questions: evidence sources



**Cochrane
Library**

Cochrane Database of Systematic Reviews

Neuraminidase inhibitors for preventing and treating influenza in adults and children (Review)

Jefferson T, Jones MA, Doshi P, Del Mar CB, Hama R, Thompson MJ, Spencer EA, Onakpoya IJ, Mahtani KR, Nunan D, Howick J, Heneghan CJ



**Cochrane
Library**

Cochrane Database of Systematic Reviews

Optimisation of chemotherapy and radiotherapy for untreated Hodgkin lymphoma patients with respect to second malignant neoplasms, overall and progression-free survival: individual participant data analysis (Review)

Franklin J, Eichenauer DA, Becker I, Monsef I, Engert A



Different ways to address conventional questions: evidence methods



Cochrane Database of Systematic Reviews

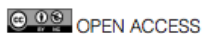


Interventions for the management of malignant pleural effusions: a network meta-analysis (Review)

Clive AO, Jones HE, Bhatnagar R, Preston NJ, I

**Guidance for using the
iCAT_SR:
Intervention Complexity**

RESEARCH METHODS AND REPORTING



ROBINS-I: a tool for assessing risk of bias in non-randomised studies of interventions

Jonathan AC Sterne,¹ Miguel A Hernán,² Barnaby C Reeves,³ Jelena Savović,^{1,4} Nancy D Berkman,⁵ Meera Viswanathan,⁶ David Henry,⁷ Douglas G Altman,⁸ Mohammed T Ansari,⁹ Isabelle Boutron,¹⁰ James R Carpenter,¹¹ An-Wen Chan,¹² Rachel Churchill,¹³ Jonathan J Deeks,¹⁴ Asbjørn Hróbjartsson,¹⁵ Jamie Kirkham,¹⁶ Peter Jüni,¹⁷ Yoon K Loke,¹⁸ Theresa D Pigott,¹⁹ Craig R Ramsay,²⁰ Deborah Regidor,²¹ Hannah R Rothstein,²² Lakhbir Sandhu,²³ Pasqualina L Santaguída,²⁴ Holger J Schünemann,²⁵ Beverly Shea,²⁶ Ian Shrier,²⁷ Peter Tugwell,²⁸ Lucy Turner,²⁹ Jeffrey C Valentine,³⁰ Hugh Waddington,³¹ Elizabeth Waters,³² George A Wells,³³ Penny F Whiting,³⁴ Julian PT Higgins³⁵

New question types



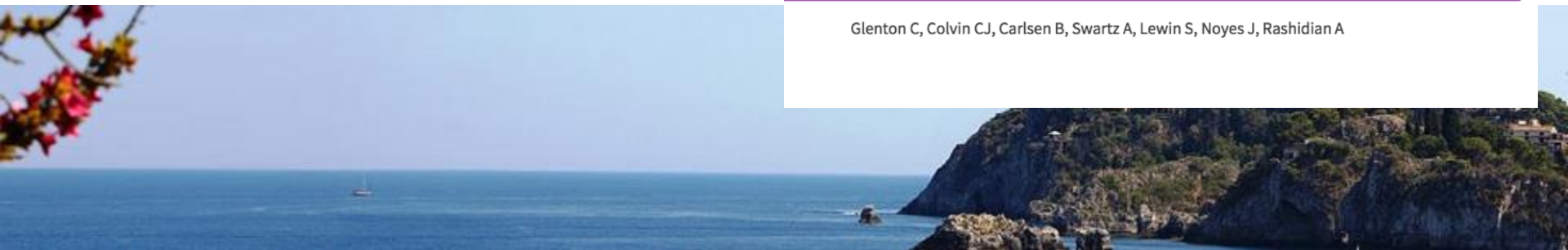
Lay health workers in primary and community health care for maternal and child health and the management of infectious diseases (Review)

Lewin S, Munabi-Babigumira S, Glenton C, Daniels K, Bosch-Capblanch X, van Wyk BE, Odgaard-Jensen J, Johansen M, Aja GN, Zwarenstein M, Scheel IB



Barriers and facilitators to the implementation of lay health worker programmes to improve access to maternal and child health: qualitative evidence synthesis (Review)

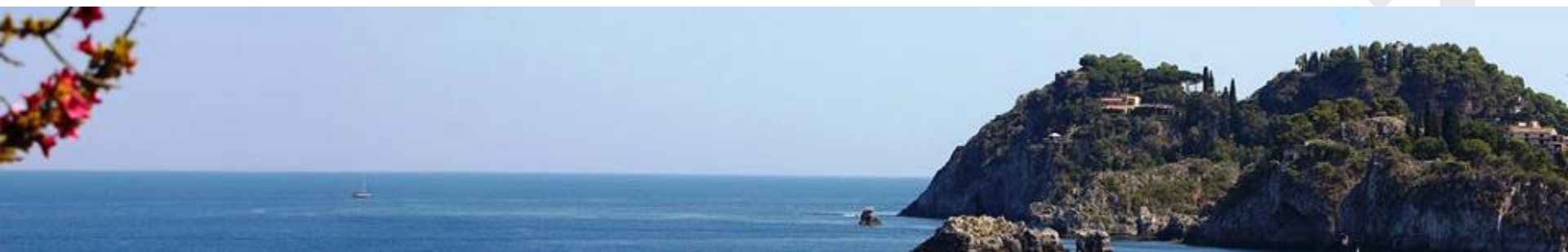
Glenton C, Colvin CJ, Carlsen B, Swartz A, Lewin S, Noyes J, Rashidian A





Teaching and learning developments

Cornerstone of our approach to Goal 4 of Strategy to 2020





Cochrane Interactive Learning

- 9 modules of self-directed, interactive & engaging learning
- Written by world-leading experts in systematic review methods
- Learn at your own pace on laptop, tablet and mobile
- Assessment & certification

W: interactivelearning.cochrane.org

E: interactivelearning@cochrane.org



Module 1: Introduction to conducting systematic reviews

🕒 30 min

What systematic reviews are, why they are useful, framing a review question, process for reviews. [Read more](#)

🔒 Free module, login required

[Log in and start module](#)



Module 2: Writing the review protocol

🕒 30 min

Why protocols are a crucial step, components of a protocol, framing eligibility criteria. [Read more](#)

🔒 Restricted

[Log in and start module](#)



Module 4: Selecting studies and collecting data

🕒 60 min

How to select studies for inclusion, systematically collecting different data types that meet criteria. [Read more](#)

🔒 Restricted

[Log in and start module](#)



Module 5: Introduction to study quality and risk of bias

🕒 90 min

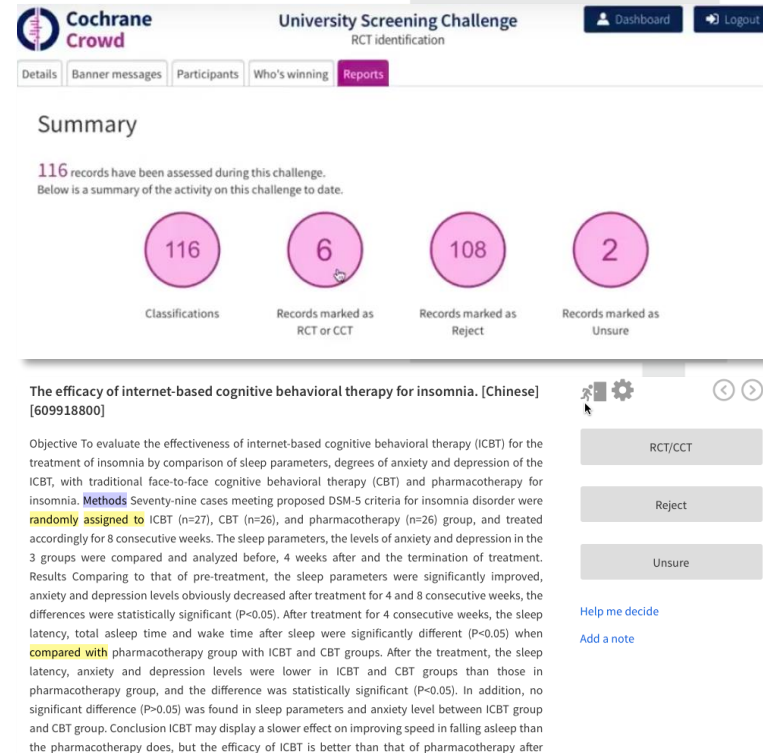
What bias is, how to assess the risk of bias in randomized trials in different sources. [Read more](#)

🔒 Restricted

[Log in and start module](#)

Cochrane Classmate

- Innovative online teaching tool – demonstrate, challenge and compete!
- Identify study designs & screen abstracts
- Contribute to live Cochrane Crowd citizen science microtasks
- For teachers of research methods & evidence synthesis



Cochrane Crowd University Screening Challenge RCT identification

Dashboard Logout

Details Banner messages Participants Who's winning **Reports**

Summary

116 records have been assessed during this challenge. Below is a summary of the activity on this challenge to date.

Classification	Count
Classifications	116
Records marked as RCT or CCT	6
Records marked as Reject	108
Records marked as Unsure	2

The efficacy of internet-based cognitive behavioral therapy for insomnia. [Chinese] [609918800]

Objective To evaluate the effectiveness of internet-based cognitive behavioral therapy (ICBT) for the treatment of insomnia by comparison of sleep parameters, degrees of anxiety and depression of the ICBT, with traditional face-to-face cognitive behavioral therapy (CBT) and pharmacotherapy for insomnia. **Methods** Seventy-nine cases meeting proposed DSM-5 criteria for insomnia disorder were **randomly assigned to** ICBT (n=27), CBT (n=26), and pharmacotherapy (n=26) group, and treated accordingly for 8 consecutive weeks. The sleep parameters, the levels of anxiety and depression in the 3 groups were compared and analyzed before, 4 weeks after and the termination of treatment. Results Comparing to that of pre-treatment, the sleep parameters were significantly improved, anxiety and depression levels obviously decreased after treatment for 4 and 8 consecutive weeks, the differences were statistically significant (P<0.05). After treatment for 4 consecutive weeks, the sleep latency, total asleep time and wake time after sleep were significantly different (P<0.05) when **compared with** pharmacotherapy group with ICBT and CBT groups. After the treatment, the sleep latency, anxiety and depression levels were lower in ICBT and CBT groups than those in pharmacotherapy group, and the difference was statistically significant (P<0.05). In addition, no significant difference (P>0.05) was found in sleep parameters and anxiety level between ICBT group and CBT group. Conclusion ICBT may display a slower effect on improving speed in falling asleep than the pharmacotherapy does, but the efficacy of ICBT is better than that of pharmacotherapy after

RCT/CCT
Reject
Unsure

[Help me decide](#)
[Add a note](#)

Conclusion

Interesting, challenging times!

- There is still a need for high quality, relevant evidence, efficiently produced, but..
- The Eco-system model provides a useful framework, built on..
 - People and communities
 - Technology
 - Process
 - Networks that build on inclusiveness and diverse skills

