

Living Evidence

Partnerships and technology for up to date, reliable evidence

Julian Elliott

Lead, Evidence Systems, Cochrane Senior Research Fellow, Cochrane Australia, Monash University CEO, Covidence HIV Physician, Alfred Hospital

Trusted evidence. Informed decisions.

Better health.



- Lead, Evidence Systems
- Lead, Living Evidence Network



- Senior Research Fellow
- Research Group Leader





Co-founder and CEO



• Infectious Diseases Physician





OPEN & ACCESS Freely available online

PLOS MEDICINE

Policy Forum

Seventy-Five Trials and Eleven Systematic Reviews a Day:

How Will We Ever Keep Up? 75 Trials per 30000 day Number of Clinical Trials / Year Artefactual plateau due to processing 25000 20000 → CCTR 15000 Controlled Trials --- Haynes filter MEDLARs established 10000 FDA regulations 5000 1950 1970 1990 2010 Year



Annals of Internal Medicine®

THE LITERATURE OF MEDICINE | 1 MARCH 1987

The Medical Review Article: State of the Science

CYNTHIA D. MULROW, M.D., M.Sc

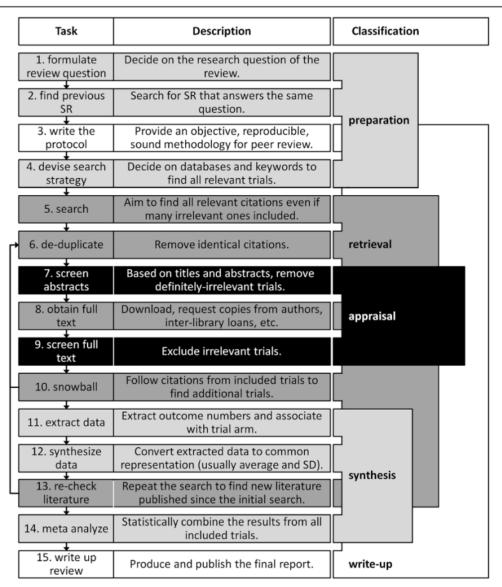


Figure 1 Existing methods for systematic reviews follow these steps with some variations. Not all systematic reviews follow all steps. This process typically takes between 12 and 24 months. Adapted from the Cochrane [10] and CREBP [11] Manuals for systematic reviews. *SR* systematic review, *SD* standard deviation.

Systematic Reviews and Clinical Practice Guidelines Improve Healthcare Decision Making

Click on any text for more information

We need better evidence and guidance to make informed healthcare choice

> Define Clinical Problem



Assemble Multidisciplinary Team





Identify, Assess, and Synthesize Evidence



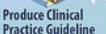


Use Guidance to Make Better Informed Decisions











Appraise Systematic Reviews and Other Evidence

Incorporate Expert Opinion and Patient Preferences and Characteristics

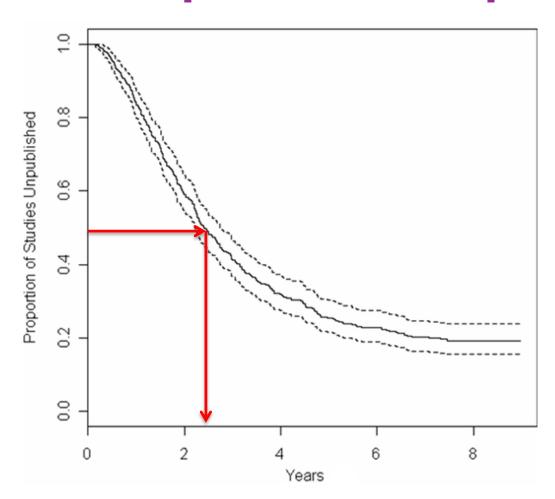


Challenges

- 1. Inefficiency
- 2. Poor quality
- 3. Lack of capacity
- 4. Lack of investment in information technology
- 5. Inaccessibility
- 6. Obsolescence

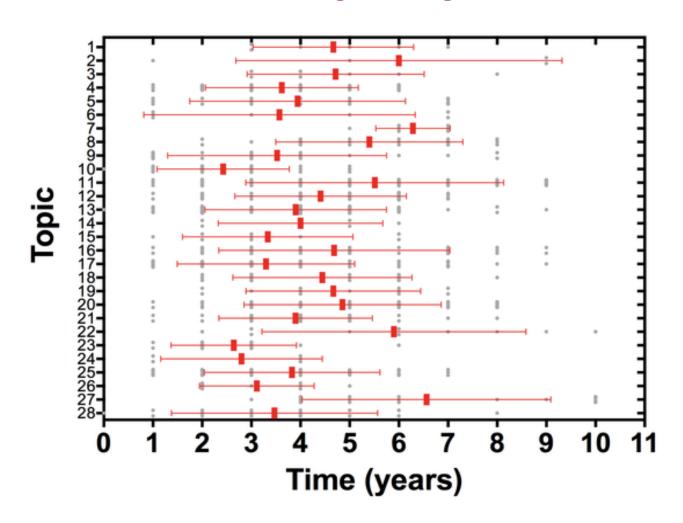


Time from protocol to SR publication



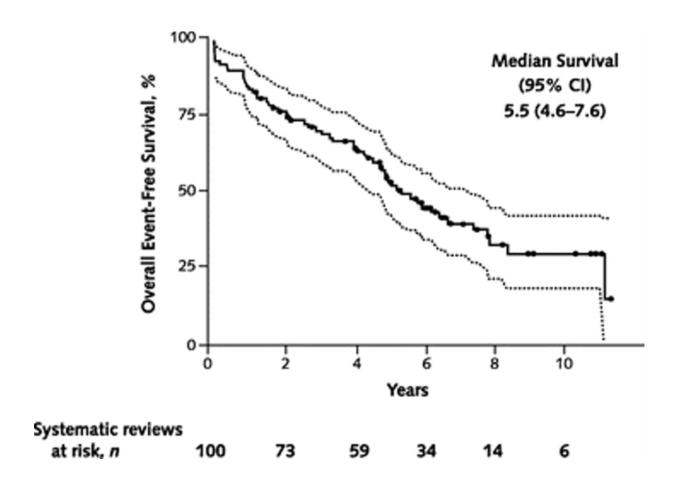


Time from study to systematic review



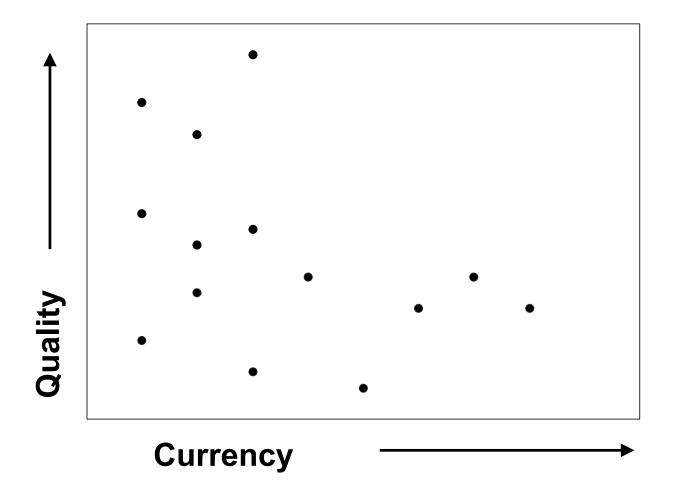


Survival of systematic review accuracy





Health evidence trade-off





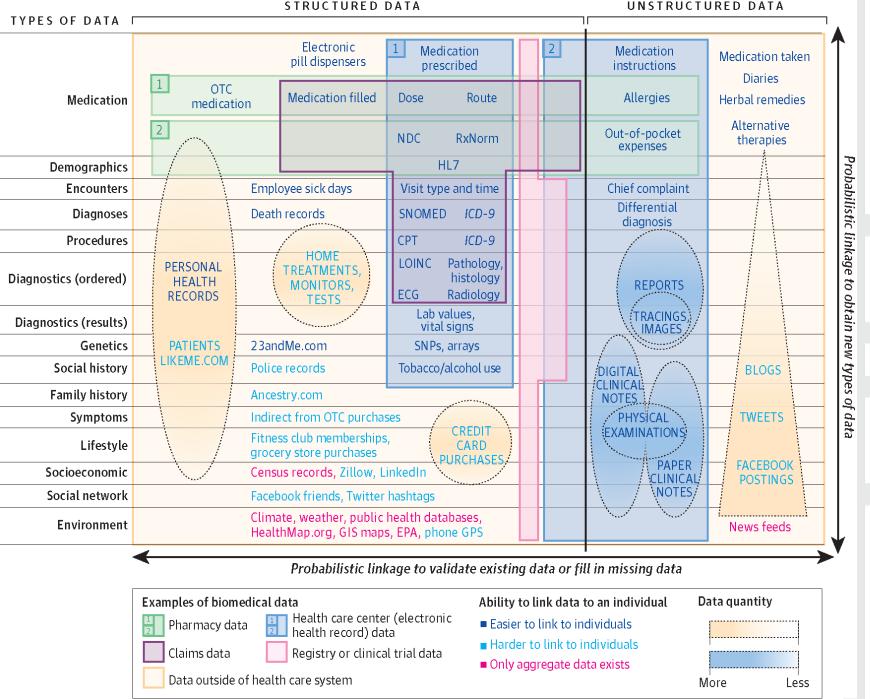


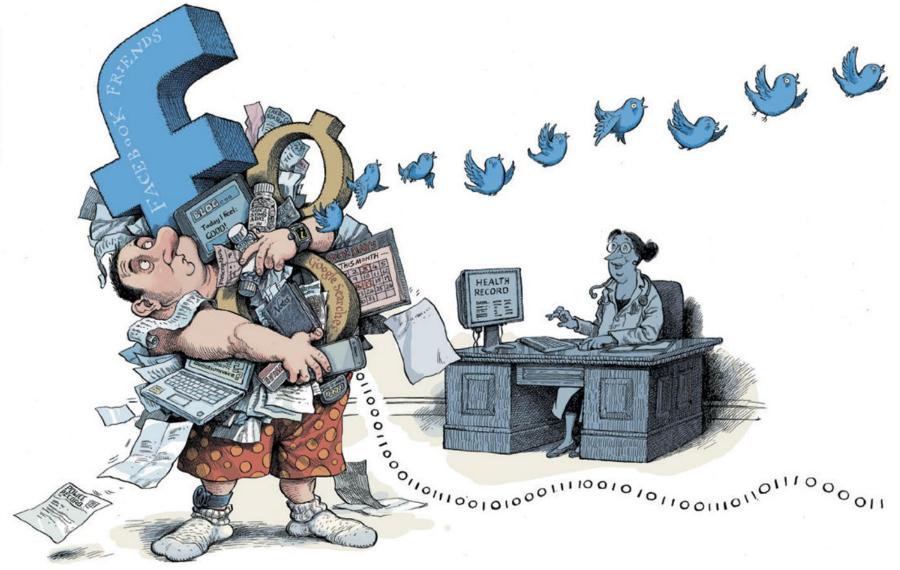
Opening up clinical data on new medicines

As a first step, EMA is publishing today data for two medicines, representing approximately 260,000 pages of information for over 100 clinical reports. Data will be progressively added online for all applications concerned since the policy entered into force. This will be a learning curve for the Agency and all its stakeholders, as they start

As a first step, EMA is publishing today data for two medicines, representing approximately 260,000 pages of information for over 100 clinical reports.

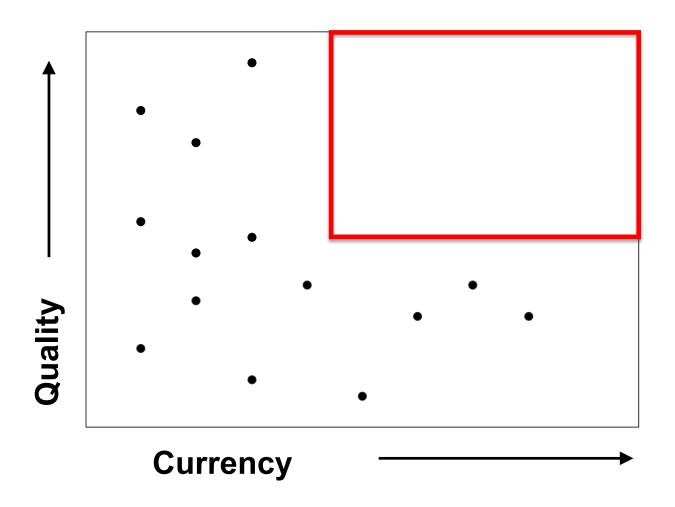
Once the process is fully implemented and the backlog has been dealt with, EMA aims to publish the reports 60 days after a decision on an application has been taken, or within 150 days after the receipt of the withdrawal letter. EMA is committed to these timelines. However, given the volume of work in publishing these reports, which will have to be undertaken with existing resources, EMA may need to re-assess their feasibility. According to current forecasts, EMA expects to offer access to approximately 4,500 clinical reports per year.





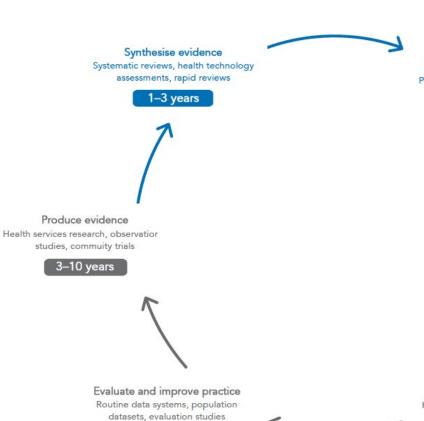


Breaking the health evidence trade-off





Living Evidence



Disseminate evidence to decision makers

Public health and clinical guidelines, policy briefs, standards, decision support systems

2-6 years



Disseminate evidence to consumers and patients

Consumer health information, patient decision aids, advocacy and policy briefs

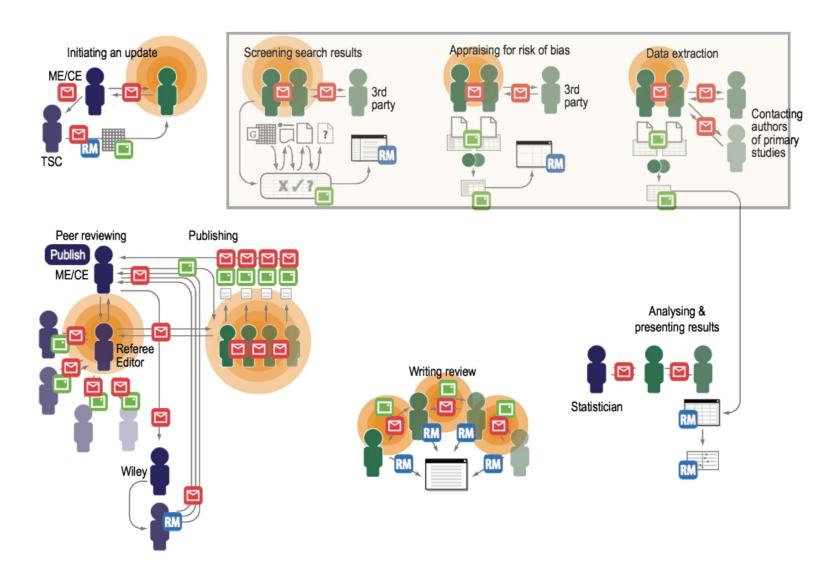
Implement evidence

Knowledge translation activities, policy and practice change





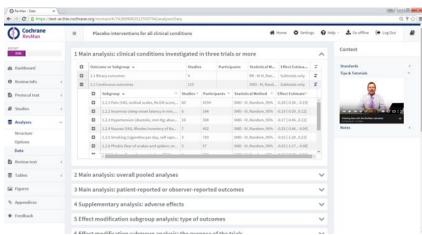
Excel, Word, Paper, Email...

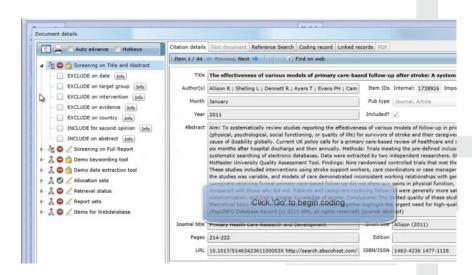




A new software ecosystem



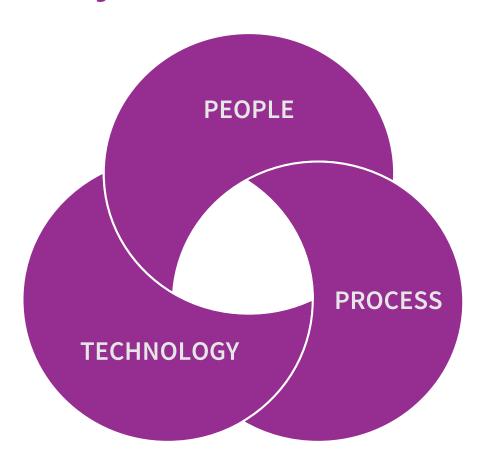








Project Transform



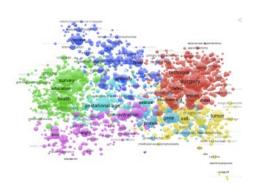


Text mining

Deriving high-quality information from **text**

Machine learning

Models that **learn from data** to make predictions or decisions

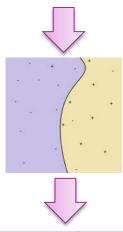






Study 1 Effectiveness of asthma self-care interventions: a systematic review Study 2 Effectiveness of a self-monitoring asthma intervention: an RCT

RCT?										
0	1	1	1	1	1	1	1	0	0	0
1	1	1	1	0	0	0	0	1	1	1

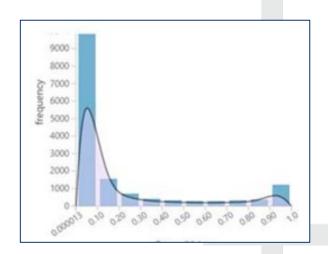


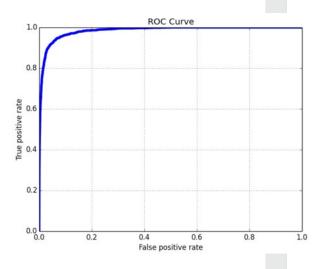
Effectiveness	asthma	self	care	interventions	systematic	review	monitoring	intervention	RCT
1	1	0	0	0	0	0	0	0	1



Study type classification: RCT classifier

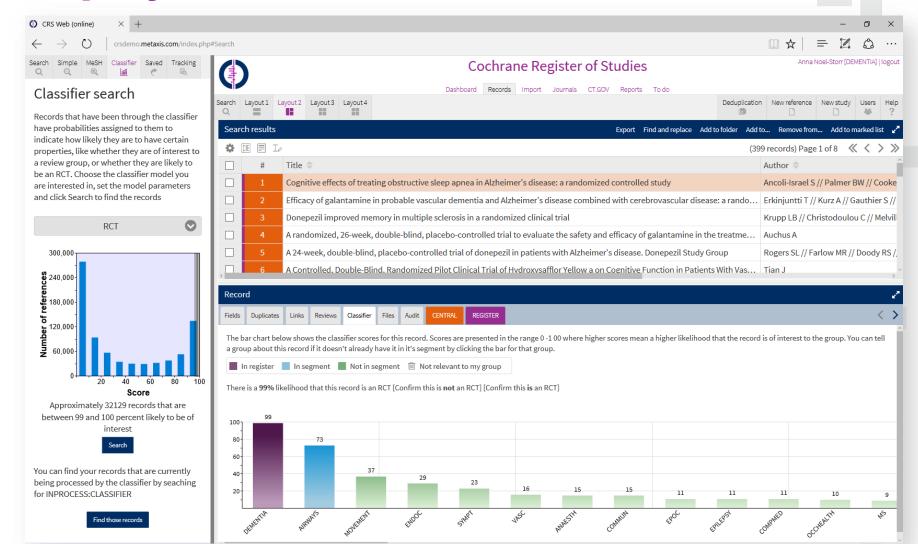
- Trained on 400,000 classifications by the Crowd; calibrated on 49,000 studies in McMaster 'Hedges' dataset; tested against all included studies in Cochrane reviews (94,000)
- Provides a score for each citation (0-100)
- Recall of 99.8%
- Generalises across reviews





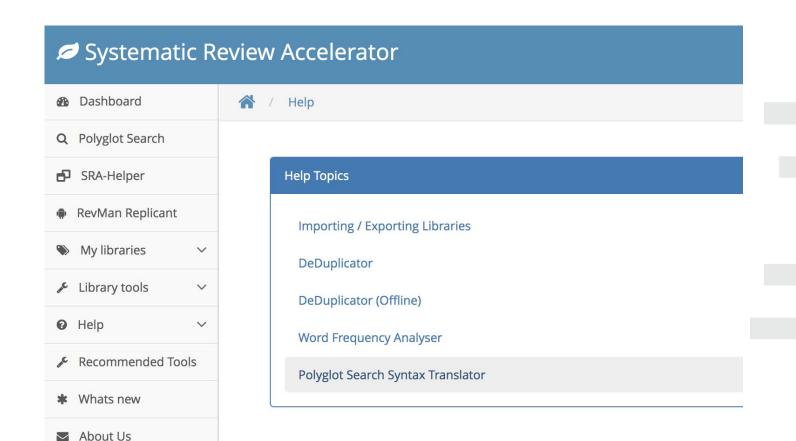


Deployed





Contact Us









You can make a difference

Become a Cochrane citizen scientist. Anyone can join our collaborative volunteer effort to help categorise and summarise healthcare evidence so that we can make better healthcare decisions.

Give it a try

crowd.cochrane.org



Micro-training modules



Treatments can harm



Anecdotes are unreliable



Expert opinion alone is not enough



The role of comparison



Comparing like with like



The role of blinding



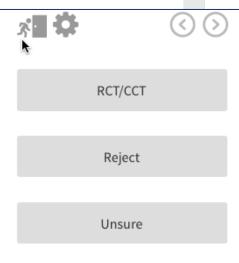
Size matters



Is this 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



Help me decide

Add a note





13,757 contributors

3,270,774 classifications

80,000+ RCTs/q-RCTs



Accuracy

	Info specialist and methodologist		
Cochrane citizen	True positives 457	False positives 58	
scientists	False negatives 4	True negatives 5522	

Sensitivity: 99.1% Specificity: 99.0%



Efficiency



N = 3635RCT = 872



54



76% reduction



N = 4913RCT = 831



64



3 days

83% reduction



N = 1200RCT = 370



29



4.5 hrs

69% reduction



N = 3424 RCT = 1446



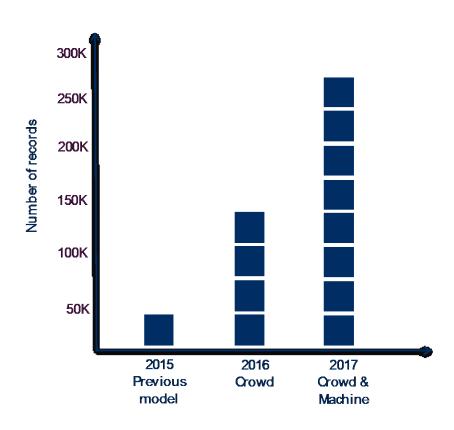
47



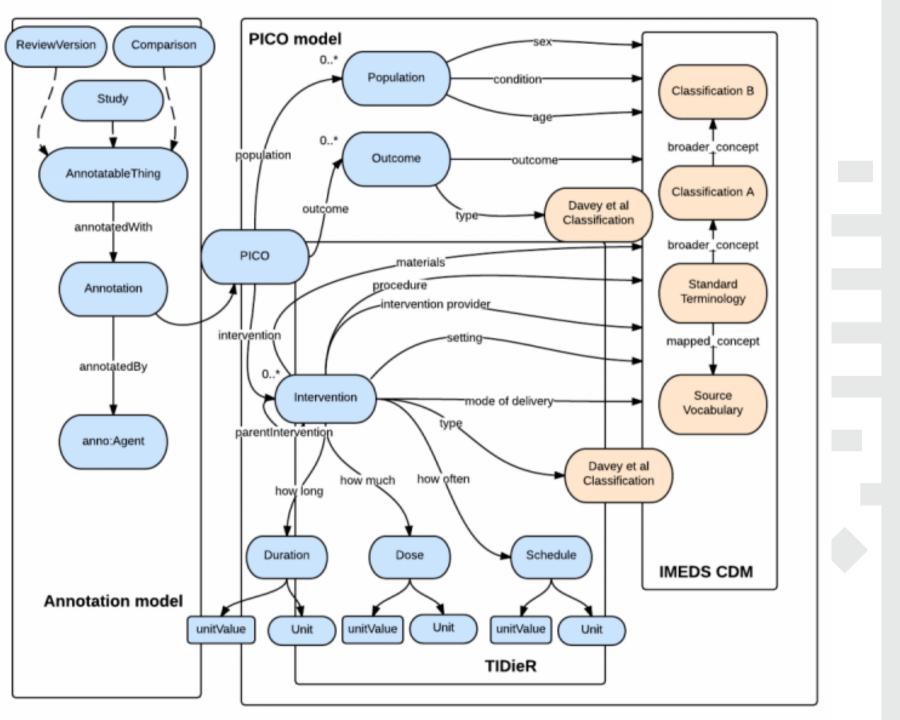
58% reduction



Throughput











Home

IHTSI

SNOMED CT

The Global Language of Healthcare

SNOMED CT is the most comprehensive and precise clinical health terminology product in the International Health Terminology Standards Development Organisation (IHTSDO).

SNOMED CT has been developed collaboratively to ensure it meets the diverse needs and exp now accepted as a common global language for health terms.

Patients and healthcare professionals benefit from improved health records, clinical decisions and sofety in healthcare delivery



RxNorm

RxNorm provides normalized names for clinical drugs and links its names to mi including those of First Databank, Micromedex, MediSpan, Gold Standard Drug between systems not using the same software and vocabulary.

RxNorm now includes the National Drug File - Reference Terminology (NDF-RT including mechanism of action, physiologic effect, and therapeutic category.

Documentation



Discover MedDRA



Purpose/Definition

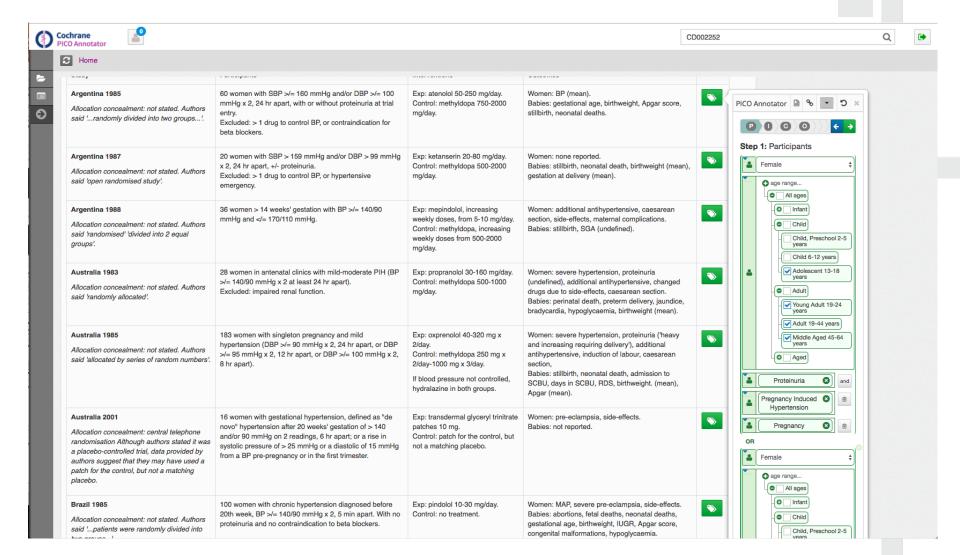
The ATC/DDD system classifies therapeutic drugs. The purpose of the ATC/DDD system is to serve as a tool for drug utilization research in order to improve quality of drug use.

Classification structure

In the ATC classification system, the drugs are divided into different groups according to the organ or system on which they act and their chemical, pharmacological and therapeutic properties. Drugs are classified into five different levels. Drug consumption statistics (international and other levels) can be presented for each of these five levels.

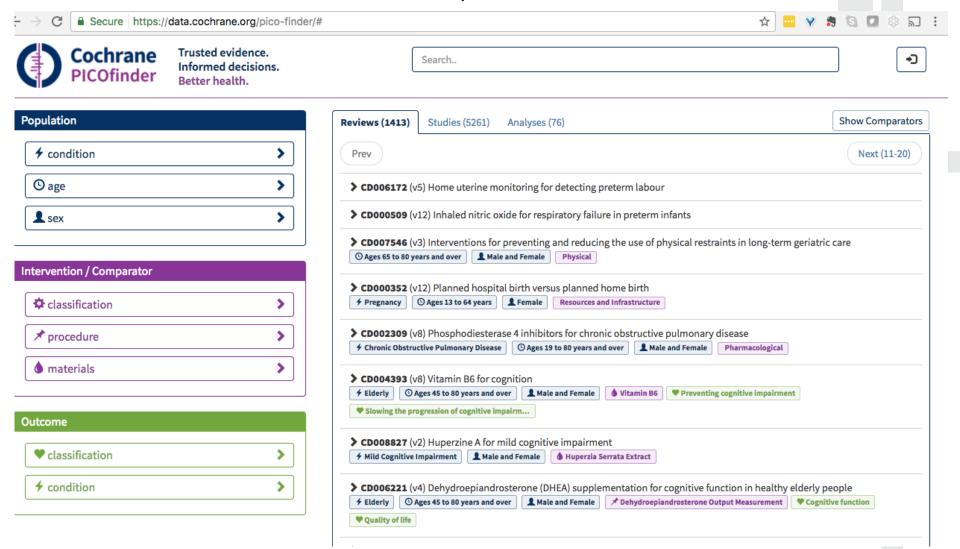


PICO Annotator



() Cochrane Exploring content

Flexible search for combinations of Population, Intervention, Outcome





		Home Settinas Feed	Home	Settings
Add PICO				
Short names are used for the table and mobile to keep layout less cluttered	(i) Codes are used	for user search, finding Systematic revi	ews and for dec	ision support
opulation 🗷				
People with dementia	ICD-10 💌	Add start of term to search	code	Add
ihort name	ICD-10	Dementia in Alzheimer's disease	F00	1 ×
Dementia	SNOMED-CT	Dementia	52448006	6 ×
	MeSH	Dementia	D003704	1 ×
ntervention 🗷				
Memantin	MeSH 💌	Add start of term to search	code	Addı
Short name	MeSH	Memantine	D008559	∂ ×
Memantin	ATC	Memantin	N06D X01	1 ×
Comparator ∠				
No extra treatment, usual care except memantin	MeSH 💌	Add start of term to search	code	Add
			D010919	
Short name	MeSH	Placebos	D010313	

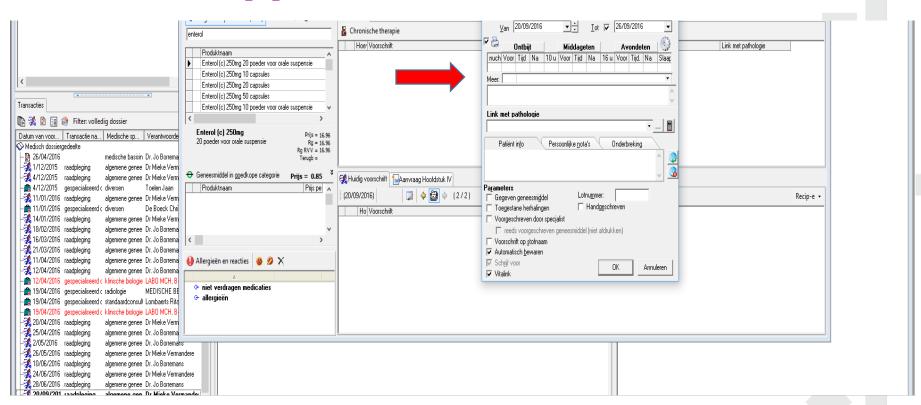


Develop recommendations

Children 1 month to 2 years old receiving antibiotics for an infection. Strong recommendation Benefits clearly outweigh the drawbacks/harms. We recommend adjunctive probiotics rather than no probiotics. VIEW LESS DETAILS ^ Research evidence Key info Rationale Practical info Adaptation **Decision Aids** Feedback (0) Population Intervention Comparator Children 1 month to 2 years old Adjunctive probiotic therapy No probiotic therapy Evidence profile Summary References Absolute effect estimates Outcome Certainty in effect estimates Study results and measurements Summary Timeframe No probiotics Probiotics (Quality of evidence) 0 0 Relative risk 0.46 180 83 (CI 95% 0.35 - 0.61) per 1000 per 1000 AAD < 2 years Moderate Probiotics appear to decrease Based on data from 3898 patients in 22 Due to serious inconsistency. the incidence of AAD. studies Difference: 97 fewer per 1000 Follow up: 1-12 weeks. (CI 95% 117 fewer - 70 fewer)

() Cochrane

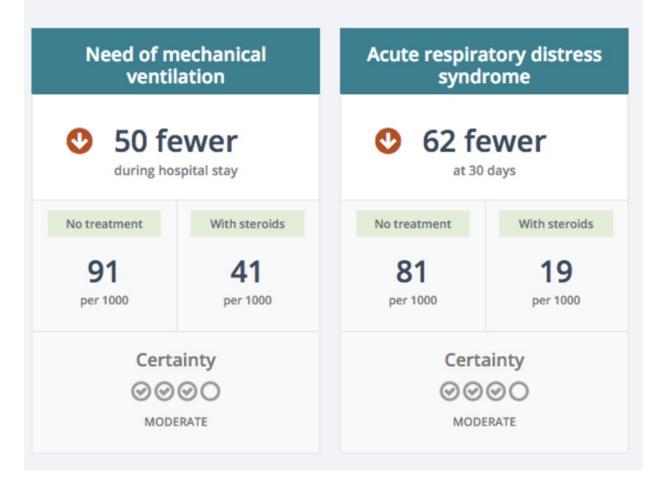
Decision support





Decision aids

Among a 1000 patients like you, with steroids







ABOUT

THE PLATFORM

NEWS

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CENTER FOR GLOBAL CLINICAL RESEARCH DATA

A global clinical trial data sharing platform

Purpose-driven data sharing to enhance scientific discovery & public trust

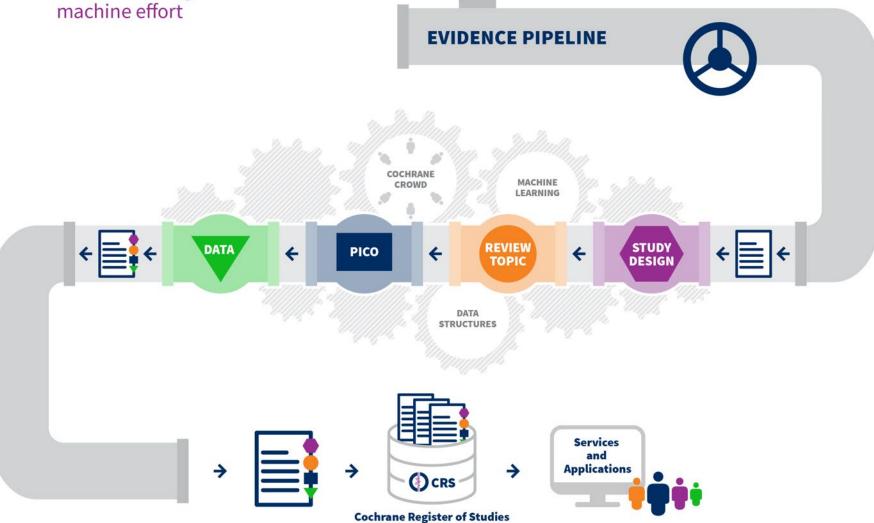


Evidence Pipeline

Finding and classifying relevant research through human and machine effort



Centralised search service Routine searches for specialised registers Individual searches for reviews



PLOS MEDICINE

Policy Forum

Living Systematic Reviews: An Emerging Opportunity to Narrow the Evidence-Practice Gap

Julian H. Elliott^{1,2*}, Tari Turner^{2,3}, Ornella Clavisi⁴, James Thomas⁵, Julian P. T. Higgins^{6,7}, Chris Mavergames⁸, Russell L. Gruen^{4,9}

1 Department of Infectious Diseases, Alfred Hospital and Monash University, Melbourne, Australia, 2 School of Public Health and Preventive Medicine, Monash University, Melbourne, Australia, 3 World Vision Australia, Melbourne, Australia, 4 National Trauma Research Institute, Alfred Hospital, Melbourne, Australia, 5 EPPI-Centre, Institute of Education, University of London, London, England, 6 School of Social and Community Medicine, University of Bristol, Bristol, England, 7 Centre for Reviews and Dissemination, University of York, York, England, 8 Informatics and Knowledge Management Department, The Cochrane Collaboration, Freiburg, Germany, 9 Department of Surgery, Monash University, Melbourne, Australia

The Bridge from Evidence to Practice

Health research promises societal benefit by making better health possible. However, there has always been a gap between research findings (what is known) and health care practice (what is done), described as the "evidence-practice" or "know-do" gap [1]. The reasons for this gap are complex [2], but it is clear that synthesising the complex, incomplete, and at times conflicting findings of biomedical research into forms that can readily inform health decision making is an essential component of the bridge from "knowing" to "doing."

Systematic reviews (SRs) and metaanalyses have provided incalculable benefit for human health by contributing to the

Summary

- The current difficulties in keeping systematic reviews up to date leads to considerable inaccuracy, hampering the translation of knowledge into action.
- Incremental advances in conventional review updating are unlikely to lead to substantial improvements in review currency. A new approach is needed.
- We propose living systematic review as a contribution to evidence synthesis that combines currency with rigour to enhance the accuracy and utility of health evidence.
- Living systematic reviews are high quality, up-to-date online summaries of health research, updated as new research becomes available, and enabled by improved production efficiency and adherence to the norms of scholarly communication.
- Together with innovations in primary research reporting and the creation and use of evidence in health systems, living systematic review contributes to an emerging evidence ecosystem.



Trials³ will be published by Oxford University Press in electronic form. Besides registers of published⁴ and unpublished trials and trials in progress or planned, the data base will include a library of trial overviews which will be updated when new data become available.

Oxford Database of Perinatal Trials, National Perinatal Epidemiology Unit, Radcliffe Infirmary, Oxford OX2 6HE

IAIN CHALMERS



Living Systematic Review

"A systematic review that is continually updated, incorporating new evidence as it becomes available."



Key elements:

- "Systematic review"
- "Continually"
- "Updated"
- "Incorporating new evidence"



Key implications

Category	Item	Description
Production	Work processes	Search strategy maintained and fed continually into workflow
	Team management	Coordinated and ongoing effort
	Methods	Pre-specified approach to search, meta-analysis and updating
Publication	Publication format	Persistent, dynamic, online-only publication

Interventions for increasing fruit and vegetable consumption in children aged five years and under





Rebecca K Hodder ☑, Fiona G Stacey, Kate M O'Brien, Rebecca J Wyse, Tara Clinton-McHarg, Flora Tzelepis, Erica L James, Kate M Bartlem, Nicole K Nathan, Rachel Sutherland, Emma Robson, Sze Lin Yoong,

Luke Wolfenden

First published: 24 January 2018

Editorial Group: Cochrane Heart Group

DOI: 10.1002/14651858.CD008552.pub4 View/save citation







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RESEARCH ARTICLE III metrics

AWAITING PEER REVIEW

Towards a new model for producing evidence-based guidelines: a qualitative study of current approaches and opportunities for innovation among Australian guideline developers [version 1; peer review: awaiting peer review]

Steve McDonald, Julian H. Elliott, Sally Green, Tari Turner



** PEER REVIEWERS Invited

FUNDERS Cochrane | National Health and Medical Research Council



Living Guideline

"A guideline in which individual recommendations are updated as soon as relevant new evidence becomes available."



Key elements:

- "Guideline"
- "Individual recommendations"
- "Updated"
- "Relevant new evidence"



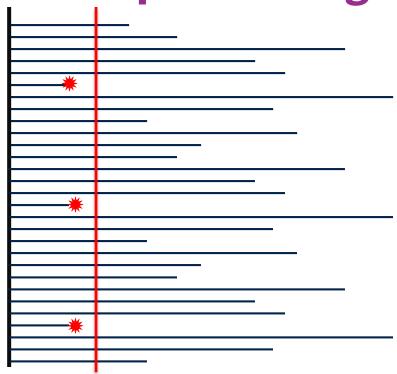
When to update the guidelines?

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Publication of the guidelines



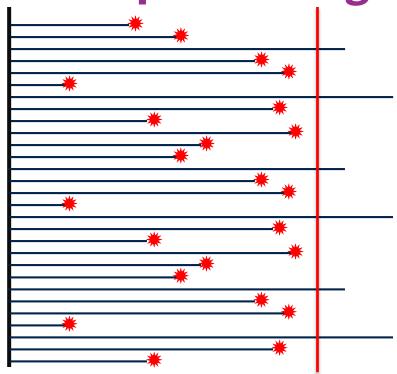
When to update the guidelines?



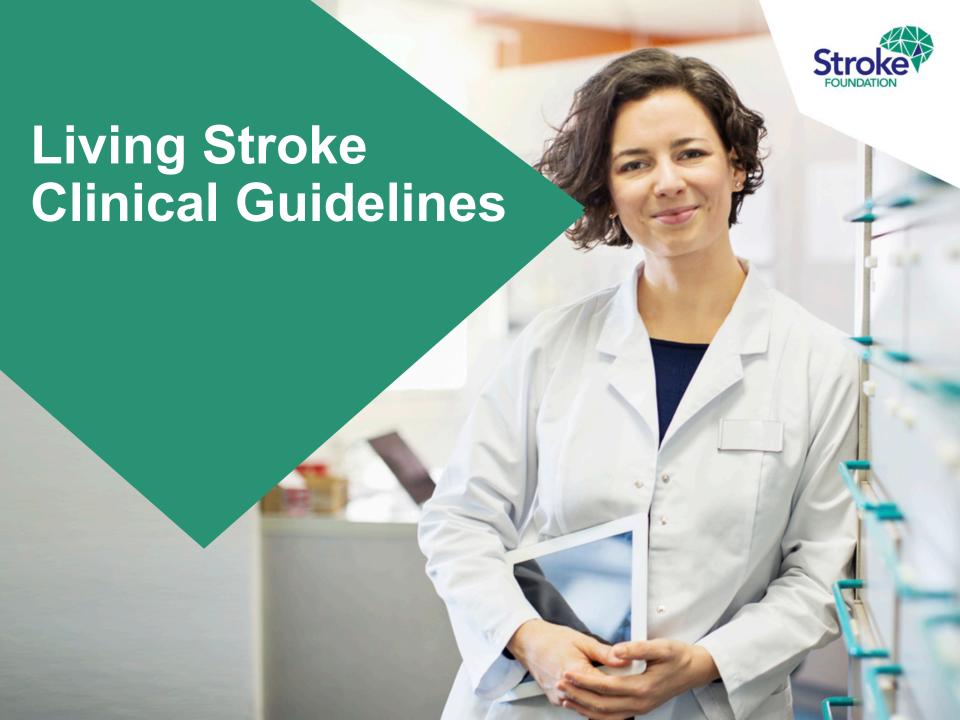
Publication of the guidelines



When to update the guidelines?



Publication of the guidelines



ABOUT LIVING EVIDENCE

FRONTIER PROJECTS

PUBLICATIONS

Delivering reliable, accessible, up-to-date evidence in health.

ABOUT OUR PROJECTS





1. Products and Processes

- adopts a continuous workflow for near real-time updating whenever new research warrants a change in practice or policy
- enables living evidence 'products', including living guidelines, living policy briefs and living health technology assessments



ABOUT US

Platforms and Precision

- harnesses software platforms, machine learning and crowd-sourcing to reduce unit costs of evidence production

develops methods for using individuallevel data to deliver and monitor personalised guidance in learning healthcare systems







Partnerships and People

HOME

- engages consumers, clinicians, policymakers and international partners in evidence co-production
- builds a critical mass of organisational and professional capability to deliver reliable, accessible, up-to-date evidence



The Living Evidence Network

- 200+ members
- Researchers, guideline developers, professional medical associations, HTA developers
- Cochrane and non-Cochrane
- Considerable expertise and interest within the Network
- Resources, meetings, webinars, pilots
- cochrane.org/lsr



Research must be actively pursued and developed and as fast as new knowledge is acquired it must be applied

Commonwealth Minister for Health William (Billy) Hughes, 1936



Living Evidence Network interest group leads

Elie Akl, John Hilton, Harriet Maclehose, Steve McDonald, Joerg Meerpohl, Georgia Salanti, Ian Shemilt, Mark Simmonds, Anneliese Synnot, James Thomas, Tari Turner

Living Evidence Network members

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Project Transform

Project Executive

Chris Champion, Julian Elliott (Co-Lead), James Thomas (Co-Lead), Sally Green, Chris Mavergames, Steve McDonald, Anna Noel-Storr, David Tovey, Tari Turner

Research Committee

Mike Clarke, Julian Elliott, Paul Glasziou, Sally Green, Chris Mavergames, Steve McDonald, Anna Noel-Storr, James Thomas, David Tovey, Tari Turner

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Clive Adams, Lorne Becker, Linn Brandt, Rachel Churchill, Agustin Ciapponi, Gordon Dooley, Ruth Foxlee, Demian Glujovsky, Toby Lasserson, Geraldine Macdonald, Sue Marcus, Rupert McShane, Melissa Murano, Charlotte Pestridge, Daniel Perez Rada, Gabriel Rada, Jacob Riis, Ian Shemilt, Emily Steele, Anneliese Synnot, Chris Watts, Karla Soares-Weiser, and IKMD developers.

Project Component Co-Leads

Evidence Pipeline: James Thomas, Steve McDonald Cochrane Crowd: Anna Noel-Storr, Chris Mavergames Task Exchange: Chris Mavergames, Julian Elliott, Tari Turner

Production Models: David Tovey, Julian Elliott, Tari Turner

Australian Guidelines: Tari Turner, Steve McDonald

Machine Reading: Paul Glasziou, Elaine Beller













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