Symposium 5: Reducing research waste; improving integrity

1. Prof Paul Glasziou - Overview of the problem & the potential for automated tools to help
2. Sir Iain Chalmers - Reducing waste from inappropriate ethics analysis and hyper-regulation of research
3. Dr Liz Wager - What can JOURNALS do to improve research reporting?
4. Dr Matt Westmore The UK NIHR's "Adding Value in Research" program: lessons from 6 years of improvement
5. Prof Patrick Bossuyt - What are academic institutions doing to reduce waste and increase value in research, and what could they do?
6. A/Prof Hans Lund. The need for research methods and processes to be evidence-based when performing research
Avoidable Waste in Research: the problem and some solutions

Paul Glasziou,
Centre for Research in Evidence-Based Practice
Bond University, Australia
www.crebp.net.au
Annual waste in research is estimated to be 85% - from avoidable design flaws (50%), non-publication (50%) and unusable reports (50%) – for a global total of over $140 Billion/year.

http://blogs.bmj.com/bmj/2016/01/14/paul-glasziou-and-iain-chalmers-is-85-of-health-research-really-wasted/
4. PUBLICATION

**Questions relevant to users of research?**
- High priority questions addressed
- Important outcomes assessed
- Clinicians and patients involved in setting research agendas

**Appropriate research design, conduct and analysis?**
- Studies designed with reference to systematic reviews of existing evidence
- Studies take adequate steps to reduce biases - e.g. concealed treatment allocation

**Efficient research regulation and delivery?**
- Appropriate regulation of research
- Efficient delivery of research
- Good re-use of data

**Accessible, full research reports?**
- Studies published in full
- Reporting of studies with disappointing results

**Unbiased and usable reports?**
- Trial interventions sufficiently described
- Reported planned study outcomes
- New research interpreted in the context of systematic assessment of relevant evidence

Adding Value in Research framework
50% of research is not published

But similar across countries, size, phase, ...

Lancet 2014;383:257–66
Non-Publication: a solution*

Around half of clinical trials have never been reported. This is the story of the campaign to find them—and to fix medicine.

Read the AllTrials story

www.alltrials.net/
Monitoring “the solution”
Automated tracking by institution

Who's not sharing their trial results?

Trials registered on ClinicalTrials.gov should share results on the site shortly after completing, or publish in a journal. But many organisations fail to report the results of clinical trials. We think this should change. Explore our data (last updated October 2016) to see the universities, government bodies and pharmaceutical companies that aren't sharing their clinical trial results.

Trial sponsors
We've ranked the major trial sponsors with the most unreported trials registered on ClinicalTrials.gov. Click on a sponsor's name to find out whether it's getting better at reporting completed trials - or worse.

<table>
<thead>
<tr>
<th>Name of sponsor</th>
<th>Trials missing results</th>
<th>Total eligible trials</th>
<th>Percent missing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sanofi</td>
<td>285</td>
<td>435</td>
<td>65.5%</td>
</tr>
<tr>
<td>Novartis Pharmaceuticals</td>
<td>201</td>
<td>534</td>
<td>37.6%</td>
</tr>
<tr>
<td>National Cancer Institute (NCI)</td>
<td>194</td>
<td>558</td>
<td>34.8%</td>
</tr>
<tr>
<td>Assistance Publique - Hôpitaux de Paris</td>
<td>186</td>
<td>292</td>
<td>63.7%</td>
</tr>
<tr>
<td>GlaxoSmithKline</td>
<td>183</td>
<td>809</td>
<td>22.6%</td>
</tr>
<tr>
<td>Mayo Clinic</td>
<td>157</td>
<td>312</td>
<td>50.3%</td>
</tr>
<tr>
<td>Yonsei University</td>
<td>139</td>
<td>194</td>
<td>71.6%</td>
</tr>
<tr>
<td>Seoul National University Hospital</td>
<td>131</td>
<td>207</td>
<td>63.3%</td>
</tr>
<tr>
<td>Alliance for Clinical Trials in Oncology</td>
<td>129</td>
<td>160</td>
<td>80.6%</td>
</tr>
</tbody>
</table>

Trials by year
Since Jan 2006, all major trial sponsors completed 25,927 eligible trials and haven't published results for 11,714 trials. That means 45.2% of their trials are missing results.

https://trialstracker.ebmdatalab.net/#/
5. REPORTING

Questions relevant to users of research?

High priority questions addressed
Important outcomes assessed
Clinicians and patients involved in setting research agendas

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Studies designed with reference to systematic reviews of existing evidence
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Adding Value in Research framework
Reports of Randomized Trials are often missing essential methods

Chen & Altman, Lancet 2005; Hopewell BMJ 2010
A peerless review? Automating methodological and statistical review

Peer review is the primary mechanism for ensuring the integrity of the published literature; however, it is a human system with all of a human's fallibilities. Here Daniel Shanahan asks whether we could use text mining to automate some aspects of the peer review process to address some of its limitations, and introduces a new pilot to evaluate the software.

Daniel Shanahan  23 May 2016

Automated **Statistical Support** for Journals and Authors

“...the majority of statistical analyses are performed by people with an inadequate understanding of statistical methods. They are then peer reviewed by people who are generally no more knowledgeable”

— Douglas Altman
2. DESIGN

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Appropriate research design, conduct and analysis?

Studies designed with reference to systematic reviews of existing evidence
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Efficient delivery of research
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Adding Value in Research framework
Automation systematic reviews

RobotReviewer report
Risk of bias table

Drop in pdf file
Make a coffee

Characteristics of studies
Légaré F, 2012

1. Despite recent efforts to decrease the use of antibiotics for acute respiratory infections, their prescription is still too frequent (1.2 and may be contributing to antibiotic resistance. Only 6%–18% of children with acute respiratory infections, 5%–15% of adults with pharyngitis and 38% of adults with acute rhinosinusitis have bacterial infections.

Population

1. Participants Randomization: A biostatistician used Internet-based software to simultaneously randomize all...
### Automated systematic review software

#### Table 1 Examples of tools used for the automation of evidence synthesis tasks

<table>
<thead>
<tr>
<th>Step</th>
<th>Example application</th>
<th>Description</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Search</td>
<td>Quick Clinical</td>
<td>Federated meta-search engine</td>
<td>Limited source databases not optimized for systematic reviews</td>
</tr>
<tr>
<td>Search</td>
<td>Sherlock</td>
<td>Search engine for trial registries</td>
<td>Limited to clinicaltrials.gov</td>
</tr>
<tr>
<td>Search</td>
<td>Metta</td>
<td>Federated meta-search engine for SR</td>
<td>Not available publicly</td>
</tr>
<tr>
<td>Snowballing</td>
<td>ParsCit</td>
<td>Reference string extraction from published papers</td>
<td>Does not fetch nor recursively pursue citations</td>
</tr>
<tr>
<td>Screen titles and abstracts</td>
<td>Abstrackr</td>
<td>Machine learning-based abstract screening tool</td>
<td>May reduce review recall by up to 5%</td>
</tr>
<tr>
<td>Extract data</td>
<td>ExaCT</td>
<td>PICO and other information element extraction from abstracts</td>
<td>No association (e.g. of outcome with trial arm), results only available in HTML</td>
</tr>
<tr>
<td>Extract data</td>
<td>WebPlotDigitizer</td>
<td>Re-digitization of data from graphs and plots.</td>
<td>No support for survival curves, no optical character recognition</td>
</tr>
<tr>
<td>Meta-analyze</td>
<td>Meta-analyst</td>
<td>Create a meta-analysis from extracted data</td>
<td>Limited integration with data-extraction and conversion programs</td>
</tr>
<tr>
<td>Write-up</td>
<td>RevMan-HAL</td>
<td>Automatic summary write-up from extracted data.</td>
<td>Only works with RevMan files</td>
</tr>
<tr>
<td>Write-up</td>
<td>PRISMA Flow Diagram Generator</td>
<td>Automatic generation of PRISMA diagrams</td>
<td>Does not support some complex diagrams</td>
</tr>
</tbody>
</table>

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Tsafnat *et al.* *Systematic Reviews* 2014, 3:74

International Collaboration for Automated Systematic Reviews (ICASR)
http://ebrnetwork.org/the-vienna-principles/
Some Conclusions

- 85% of research wasted
- Much waste is avoidable
- Automation tools can help at several stages
The Vienna Principles

By hnykvist | 21 March, 2016 | No Comments |

Principles of collaboration on development of automation in systematic reviews released.

**The Vienna Principles**

1. Systematic reviews involve multiple tasks, each with different issues, but all must be improved.
2. Automation may assist with all tasks, from scoping reviews to identifying research gaps as well protocol development to writing and dissemination of the review.
3. The processes for each task can and should be continuously improved, to be more efficient and more accurate.
4. Automation can and should facilitate the production of systematic reviews that adhere to high standards for the reporting, conduct and updating of rigorous reviews.
5. Developments should also provide for flexibility in combining and using, e.g. subdividing or merging steps and allowances for different users to use different interfaces.
6. Different groups with different expertise are working on different parts of the problem; to improve reviews as a whole will require collaboration between these groups.
7. Every automation technique should be shared, preferably by making code, evaluation data and corpora available for free.
8. All automation techniques and tools should be evaluated using a recommended and replicable method with results and data reported.

Drafted by members of International Collaboration for the Automation of System Reviews (ICASR) at their first meeting, 2 October 2015, Vienna, Austria.

http://ebrnetwork.org/