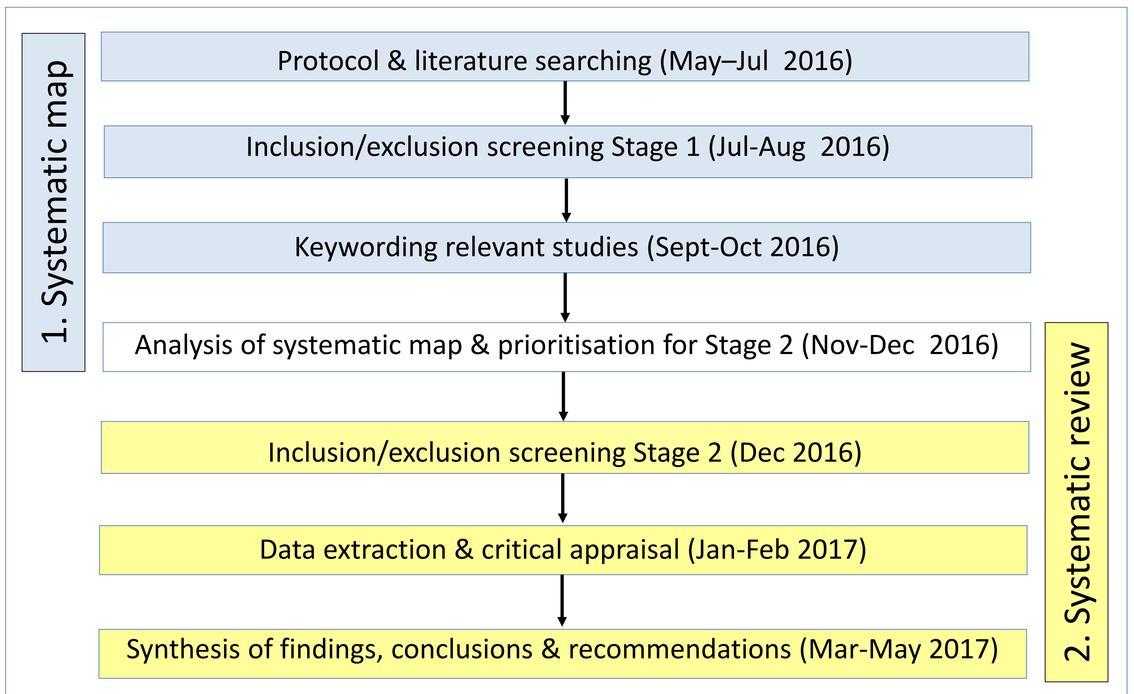
Peer review innovations for grant applications: efficient and effective?

Geoff Frampton, Jonathan Shepherd, Karen Pickett and Jeremy C Wyatt
Wessex Institute, Faculty of Medicine, University of Southampton, UK

NHS National Institute for Health Research

Background and methods

- Peer review (PR) is a standard approach for selecting health research proposals for funding, but has been criticised for being inefficient and ineffective.
- There is a need to map the novel approaches to peer review that have been investigated and assess their impact in relation to some of the criticisms made.
- Our research question was: What is the research evidence on methods and processes for timely, efficient and good quality peer review of research funding proposals in health?
- We conducted a two-stage evidence synthesis: (1) systematic mapping to ascertain the key characteristics of the evidence base, followed by (2) a systematic review of a sub-set of studies from the map as prioritised in consultation with National Institute for Health Research (NIHR) stakeholders.
- The stakeholder-agreed inclusion criteria for the systematic review focused on primary research studies of peer review innovations that may result in a more efficient and effective peer review system and which reported efficiency or effectiveness outcomes to enable this to be assessed.



Results of the systematic map

- A total of 1824 references were screened, and **83** studies were included in the systematic map. Most were published since 2005; 50% were from the USA. Others: Australia, Europe.
- Study types: 61% were observational; 31% were based on surveys, interviews or focus groups; and 7% were experimental (of which 3 studies [4%] were randomised).
- A variety of PR innovations has been studied e.g. methods to identify, recruit and train peer reviewers, methods of scoring and ranking applications, & strategies for improving reliability between peer reviewers.
- A total of **8** studies from the systematic map met the inclusion criteria for the systematic review, evaluating a broad range of innovations. These were single- and two-group observational and experimental studies of peer review innovations, including one randomised controlled trial (RCT)

Results of the systematic review

Innovations studied	Key findings	Comments on methodology
Short proposal with simplified scoring & accelerated PR (single-group study) *(Barnett et al. BMC Health Serv Res 2015; 15: 55)*	Time from submission to outcome was reduced to 8 weeks and applicants' time to prepare a proposal reduced to approximately 7 days (times prior to implementing the innovation not reported).	Key strengths: Tested in 4 'live' funding rounds; prospective Key limitations: No comparator Generalisability: Regional (state) funder, broad topic range
Shorter application & smaller PR panel ± face-to-face meeting compared vs standard process (2 parallel groups) *(Herbert et al. BMJ Open 2015; 5: e008380)*	Estimated overall PR time and cost savings equivalent to ca £1.2-2.8 million per year; near-satisfactory agreement in funding decisions (72-74%) between simplified vs standard.	Key strengths: Tested alongside a 'live' funding round; prospective Key limitations: Unclear whether admin costs included Generalisability: National funder, broad topic range
Larger panel (11 members) with short proposal (5 pages) compared vs standard 2-reviewer critique (2 parallel groups) (Mayo et al. J Clin Epidemiol 2006; 59: 842-848)	Poor agreement in funding decision between the two PR approaches (kappa=0.36); concluded that at least 10 reviewers would be needed for optimal agreement.	Key strengths: Tested in a 'live' funding round; prospective Key limitations: Ranking criteria differed between groups Generalisability: University pilot project; broad topic range
5-member Delphi process for ranking 10 proposals (single-group study) *(Holliday et al. Int J Gen Med 2010; 3: 225-230)*	A three-round modified online Delphi process completed within 16 days was efficient and transparent for selection of innovative proposals, using a small set of non-conflicted reviewers.	Key strengths: Tested in a 'live' funding round; prospective Key limitations: No comparator; small sample size Generalisability: Focused on cancer innovations grants
Teleconference & video-conference PR panels compared vs face-to-face PR (2 groups, case-control type design) *(2 studies: Gallo et al. PLoS One 2013; 8(8): e71693; Carpenter et al. BMJ Open 2015; 5: e009138)*	The two approaches were generally similar in terms of overall reviewer scores and PR discussion times , although discussion times varied between funding rounds (years).	Key strengths: Each method tested in 2 'live' funding rounds Key limitations: Retrospective case-control analysis Generalisability: National funder, broad topic range
Virtual PR using WebEx software compared vs face-to-face PR (2 groups, case-control type design) *(Vo et al. Southern Med J 2015; 108(10): 622-626)*	The two approaches had similar time per discussed proposal but virtual PR had lower cost per reviewer. Reviewers' receptiveness to virtual PR varied with their PR panel role.	Key strengths: Each method tested in 5-6 'live' funding rounds Key limitations: Unplanned PR sessions; retrospective analysis Generalisability: National funder, broad topic range
PR training video to improve reviewer scoring reliability compared vs no training (2-group RCT) *(Sattler et al. PLoS One 2015; 10(6): e0130450)*	The training video improved the accuracy of both experienced and novice reviewers' scores, as judged against a reference rating scale specific to the US National Institutes of Health.	Key strengths: Randomised controlled trial Key limitations: 'Artificial' data; covered only part of PR process Generalisability: Specific experimental setting, unlike 'real world'
Inclusion of patients & care-giving stakeholders in PR (single-group study) *(Fleurence et al. Ann Int Med 2014; 161: 122-130)*	Patient and stakeholder reviewers added different perspectives to PR; patients more frequently changed their score decision than scientists or stakeholders; discussion improved agreement.	Key strengths: Tested in a 'live' (inaugural) funding round Key limitations: No comparator; retrospective analysis Generalisability: National funder, comparative effectiveness topics

Discussion

Our systematic map suggests that there is considerable research examining different strategies for peer review of grant proposals. However, our systematic review shows that relatively few studies have tested the impacts of innovative peer review approaches on the efficiency and effectiveness of proposal selection. The studies which met our inclusion criteria are heterogeneous and subject to methodological shortcomings, but they appear to show promise that efficiency and/or effectiveness of peer review might be improved in various ways.

Footnote: The use of 'sandpits' is a peer review innovation in which applicants pitch their research ideas to research sponsors at a face-to-face meeting, typically lasting several days. This approach has been used by several UK research councils for funding innovative research proposals since 2004. However, we did not find any studies that have empirically tested the efficiency and/or effectiveness of the sandpit approach.

Conclusions and recommendations

Although the use of shorter proposals and remote peer review meetings appears to offer promise in speeding up peer review and reducing costs, there is considerable uncertainty whether this would impact on the quality and effectiveness of peer review. More robust studies of efficiency and effectiveness outcomes are needed, comparing a wider range of innovations.

A limitation of all eight studies is that methods and settings were poorly reported, hindering assessment of their generalisability. We recommend that peer review innovations should be described more comprehensively.

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Correspondence: Dr Geoff Frampton email: gkf1@southampton.ac.uk