**Author’s response to reviews**

**Title:** Governance of health research funding agencies: an integrated conceptual framework and actionable functions of governance

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**Author’s response to reviews:**

Governance of health research funding agencies: an integrated conceptual framework and actionable functions of governance

We want to thank reviewers for their careful comments. I took great care in revising the article, answering each comment point by point. We entirely rewrote the methodology and reorganized the conclusion and discussion sections.

Reviewer #1: I read with interest the manuscript "Governance of health research funding agencies: an integrated conceptual framework and actionable functions of governance" and have some suggestions to give in order to improve it. Most of them relate to restructuring the current version of the manuscript. I would clarify since the beginning what funding agencies/organizations fall within the scope of this analysis. This should be made clear since the beginning and motivated exclusion and inclusion criteria should be listed in the methods section in order to understand who are exactly the institutions the framework we want to apply to.

Answer: The clarification is now added to Section 2: About the governance of health research by funding institutions. The paragraph now starts with:

‘Health research funding institutions with a national scope encompass politics and government, advisory bodies, organizations which fund research, intermediary organizations, and institutions performing research. They can be either agencies, ministries, or institutes, which will further be named as institutions. We refer to funding institutions as institutions that are publicly run and that cover basic and applied health research. Tetroe refers to major public research funders as responsible for funding health research at a national level (21).’.

The methods should include three main sections: 1) Review of existing frameworks; 2) Development of conceptual integrated framework; 3) Application of the newly developed framework to a sample of agencies. In general a more accurate description of what the authors did is warranted in this section.

Answer: We agree. The methodology was entirely re-written. We used the suggested sections for subtitles.

1) Review of existing frameworks; 2) Theoretical development of conceptual integrated framework; 3) Practical application of the newly developed framework to a sample of agencies.
Under the first section the methods for the un-systematic review of frameworks should be better described.

Answer: The section on the review of existing frameworks now reads:

Existing frameworks were identified via a grey literature search for all hits on Google using the following keywords: frame* OR model, combined with “Health research governance” OR “governance of health research” OR (“research for health” + “governance”) anywhere in the page. We also ran Google scholar (27, 28), searching anywhere in the article, for the first 600 hits using the following keywords in the title: “Health research governance” OR “governance of health research” OR (“research for health” + “governance”).

We excluded references that were specific to one theme, such as, for instance, genomic or epidemic, as well as references which were dedicated to a specific institutional level (e.g., university), to private institutions, to advocacy-oriented institutions (e.g., think tank), to a single aspect of governance (e.g., law, ethics), or to a particular population (e.g., librarians). We included references that were specific to public organizations (e.g., agency, ministry, institute), and operated at a national level.

Note that a search strategy including the term "framework" is likely to miss many useful references in this setting (e.g. what about "model" for health research governance?). This element should at least be mentioned in the limitations section which is currently missing. The list of selected framework is actually a result of this activity and should therefore be moved down.

Answer: We agree. We ran the search on Google as well as on Google Scholar with the keyword model. We however did not find any new relevant documents.

In relation to section 3) (Application of the newly developed framework to a sample of agencies) the links and connections between some of the organisations used to develop the framework (e.g. NICE) and to test it (e.g. NIHR, both in the UK) should be explored. In this last section, it should be made clear the aim is to identify pragmatic actions theoretically identified by the agencies under the dimensions (only in terms of governance) of the framework rather than to assess the same agencies on these dimensions.

Answer: We are grateful to the reviewer for this sharp comment! The integrated framework was developed from the NICE framework, and from frameworks co-developed by the UK Health Research Authority and departments of Health UK. The pragmatic actions are derived from, among others, NIHR UK. A similar pattern is noticeable for Canada and Australia.

Step 1 intends to be conceptual, whereas step 2 is pragmatic. In that regard, step 2 should be informed by study institutions that have their framework aligned with our own integrated framework, and, additionally, informs actionable functions.

Howard published an analysis of the implementation of the centralized Research Management and Governance model from the UK and its integration by researchers (Howarth, M., Kneafsey, R., & Haigh, C. (2008). Centralization and research governance: does it work? Journal of Advanced Nursing, 61(4), 363-37). We do not intend to match such research where the focus is on the implementation of the framework as planned. Rather, we intend to illustrate conceptual functions with operational actions.

In the revised discussion, we added:

The intent of this analysis is to identify pragmatic actions under the dimensions (only in terms of governance) of the framework rather than to assess the same agencies on these dimensions.
The same three sections used to structure the methods should be used for the abstract and the results.
Answer: Results are now divided into three sections:
4.1 Brief review of existing frameworks;
4.2 Conceptual integrated framework of governance and management of health research by funding institutions
4.3 Practical application of newly developed framework in terms of governance

The abstract now reads:
‘First, we reviewed existing frameworks in the grey literature. We selected seven relevant documents. Second, we developed an integrated framework for the governance and management of health research funding institutions. Third, we extracted actionable information for governance. We selected a mix of North American, European, and Asian institutions which had documentation available in English (e.g., annual report, legal status, strategy).’

In this respect, according to authors, the proposed framework develops around three axes in Figure 1 but I am not sure which axes are these by looking at the graph.
Answer: We changed the axes for groups of functions (governance, management, transversal functions).

As regards the discussion, some of the points that are currently raised in the conclusion paragraph should move here and the conclusion should be used to briefly summarise the findings of the paper and key messages for readers and managers, policy-makers in the health research space.
Answer: We agree. We re-organized both sections.
The discussion includes: relevancy of the functions, validity of the framework, limits of the study.
The limits were added.

Discussion and conclusion sections now read:
4. ‘Discussions
We would like to discuss the validity of the framework for governance of health research funding institutions.
A few issues might arise: one could argue that the framework is not valid because it is based on a limited set of existing frames. Here, it is assumed that a sample is sufficient for the identification of elements of governance. A framework can be developed from a deductive approach, mobilizing a catalogue of theories and knowledge from scholars. It can also be developed from an inductive approach, this time mobilizing hands-on knowledge from the institutions themselves. We mainly borrowed from both approaches to develop the integrated framework, being rooted in practice, and also keeping an open door to the approaches of scholars who might have previously developed deductive frameworks. The literature refers to publications by Rani and one by Pang, both of whom used practitioners’ consultations to draw their framework.
The strength of the integrated framework will also rely upon developing it on a high variability of cases, including internal variability among institutions and external variability among the institutions’ national environments. The selected institutions of this study cover all health research topics rather than covering topics that fall under unique categories of medical research (e.g., stem cell), social sciences and humanities (e.g., management of primary care), or engineering (e.g., radiation therapy). They are quite homogeneous in that regard. However, at this stage, we applied the integrated framework to seven cases, so a wide variability of capacities exists within each research funding institution. In the United
States, the NIH was created in 1930 and cumulates almost 90 years of experience in keeping the same date of constitution, whereas the UK’s NIHR was lastly established in 2006 coming from an evolution of a previous agency. Canada’s CIHR operated on around US$800 million in 2017–2018 (equivalent to over CAN$1 billion), whereas Singapore’s NMRC mobilizes about half that budget, at US$492 million in 2016, for a population equivalent to about one seventh of the population of Canada. Having highly variable internal capacity and yet still portraying a similar set of governance dimensions reinforces the strength of the framework, especially its governance functions. Following a similar line of reasoning, all seven cases operate in diverse national environments and still demonstrate consistency through the presence of the five governance functions. Altogether, we argue that the variability of cases reinforces the validity of governance functions.

Another issue that might arise is that selected institutions might not make it possible to portray the extent of the dimensions of governance at stake. The dimensions first come from the review of frameworks in use, then they were put to the test on seven cases. Notice that we do not intend here to claim that one funding institution is doing a better job than another, or to compare across cases. The highlight is on dimensions, not cases. Any initial dimension that was irrelevant can be expected to be absent from cases, but this was not the case. All five governance functions were indeed mentioned by all seven cases. Additionally, one could argue that initially we might have missed a dimension important to governance. That is conceptually correct. Furthermore, the analysis of cases would not have made it possible to identify extra dimensions in an easy way as we did not look for a specific additional dimension, nor might such an extra dimension be easily identifiable through documentary analysis. Thus, the test of the governance functions on seven cases could invalidate a dimension if it were to be absent in one or more cases (especially for institutions outside Canada, Australia and UK that were also feeding the review of the frames), and it could temporarily validate the importance of an initial dimension that was present in all cases, but it cannot validate the extent of the governance functions.

Note that this study by no means provides an exhaustive list of HRG settings and mechanisms in selected countries, nor to compare which funding institutions perform best. Additionally, the intent of this analysis of actionable functions is to identify pragmatic actions under the dimensions (only in terms of governance) of the framework rather than to assess the same agencies on these dimensions.

Although research is ultimately undertaken by researchers in public or private organizations, universities, institutes, and centers, we do not intend to provide a framework for institutions hosting research projects—for example, organizations such as the Saskatchewan Health Research Foundation, which recently published a governance framework and policies, mainly for its board.

5. Conclusions
Two main contributions come out of this work. First, we bring a conceptual contribution for scholars in the field of governance and health research. We developed an encompassing framework for the governance of health research by national funding institutions. The framework contains 13 functions: 5 dedicated to governance, 3 dedicated to management, and 5 dedicated to transversal principles that apply to both governance and management. The framework grew out of the combination of existing governance frameworks for health research funding institutions. Second, we bring a practical contribution for high-level managers in charge of governance of health research funding institutions. The framework was broken down into operational dimensions of governance to render the governance
function of the framework more actionable. The operational dimensions are extracted from a multiple-case study of seven selected health research funding institutions from North America, Europe, and Asia and the specific actions they put in place to exercise their governance, especially regarding intelligence acquisition, strategy formulation, resourcing and instrumentation, management of relationships, and accountability and performance.

The framework is useful in several ways: to point out low-level governance and to track, measure, and forestall it. In a sense, pointing out low-level governance can help funding institutions by illuminating whenever one or more functions are given little to no attention. An institution that does not manage partnerships in a diverse and efficient way—seeking out inputs from one or two key players in the private sector, for instance—will be poor at answering the health challenges of its population. It will not perform as well as an institution with open processes that feed the debate as to which challenges must be addressed in the health sector and other sectors that determine the health of the population. Though one institution might, at its inception, choose to focus on one privileged relationship with a specific national partner, governance maturity towards more encompassing actions for improving health through research will in the long run rely on a more diverse set of partnerships.

The framework can help in tracking the maturity curve of governance for an institution. Take, for instance, an institution willing to shift gears towards stronger influence in health research: surely tightening ties with partners or focusing funding and exploring wider funding contributors would be an option. The framework could be starting material for performance measurement on the institution’s governance. It could help to develop indicators on each function so that a board can follow up changes in governance style: putting more or less emphasis on intelligence acquisition or on accountability, or else putting more or less emphasis on some more operational aspects of governance—for instance, acquiring intelligence from institutions’ top influencers, such as politicians, or else making sure citizens get a stronger voice in the governance discussion of institutions. Finally, the framework can be of use to forestall unwanted shifts in governance. Being aware of the current type of governance of the institution—leaning more or less towards one function or another, being more or less prone to the top-down or bottom-up influence of outsiders, for instance—merely implies the institution could take measures against travelling down a road it did not intend to take.

What is left to be done regarding governance of health research funding institutions? We suggest four avenues. Governance does not stand alone as a single action that high-level managers run. Governance is underpinned by principles, or, in other words, by what it means for these institutions to operate “good” governance. We suggest those principles are ethics, transparency, capacity reinforcement, monitoring and evaluation, and public engagement. These are the underlying know-how that apply to either governing or daily management. Further investigation is needed into identifying what it means in operational terms to engage the public in accountability, or to engage the public in resourcing, etc. Additionally, governance runs hand in hand with daily management. Further thought must be given to the complementarity of governance and managerial functions—what does it mean in operational terms? And, perhaps more intriguingly or more promisingly for better health research, what are the operational governance actions that are in contradiction with some of these operational management actions in place in funding institutions? Finally, in some countries, provincial research funding institutions are key players in funding research and might or might not align with national governance standards. Investigating governance functions and actionable actions for provincial funding agencies is an avenue. The same governance and management functions would likely apply to any organization across health research. The ways in which each function translates into operations in practice is more likely specific by level.
The conclusion section includes: main contribution of the study, practical contributions for high-level managers, and future steps.

Reviewer #2: Thanks for the opportunity to review this paper - "Governance of health research funding agencies: an integrated conceptual framework and actionable functions of government". The authors address an important topic that needs more attention. Below, I provide some general views on the paper, followed by specific comments ordered by section of the paper.

GENERAL COMMENTS:
Overall, this is a very important topic and the authors should be lauded for their intentions. That said, the paper is not easy to follow, with methodological gaps and unexplained interpretations that render the final results less strong than they might otherwise be.

Answer: The methodology was rewritten (please see above). The discussion and conclusion were reorganized. Some new parts were added: limits and precisions, as per requested by each reviewer.

The paper needs to be tightened up with attention to consistent use of terms and concepts throughout in order to be a useful contribution.

Answer: We homogenized the terminology: whenever relevant, we changed funding agencies for funding institutions. We kept agency for the institutions that were designed as agencies, and institutions as a generic term for institutes and other forms of organizations.

The paper describes two somewhat distinct pieces of work that are somewhat clumsily combined. First piece is development of a Framework for the Governance of Health Research (FGHR) based on a brief review. Second piece is positioned as a case study of governance agencies. It is not clear if the second builds on the first or if the first and second parts contribute to a grander understanding. There is also a confusing structure that outlines governance, management and transversal functions, but then the main focus narrows to only the governance functions. Overall, the 14 functions outlined in the paper are the main deliverable. However, they are not clearly or consistently articulated, there is only unpacking of the 5 governance functions, and there is quite a bit of overlap. This may reflect the messiness of this governance area, or the intent to reduce the length of the paper, but it makes understanding the FGHR more challenging. To be useful, the descriptions of the functions need to be tighter and more consistent, and the overlap of the functions should be reduced or more clearly explained.

Answer: The primary focus of the analysis is on governance functions and actionable functions. As governance and management functions are closely entangled in practise, and widely intertwined in scholarly studies, we presented and integrated framework that includes both governance and management.

We then go on with the identification of governance related to actionable functions.

We hope that the reorganization of the methodology in 3 sections, and the reorganization of the results section into 3 distinct sections clarify our main focus.

Additionally, we clarified the distinction between funding (a governance function), and financing (a management function), and revised the sections and figure accordingly.

Methodologically, the review for part one was only of Google and Google Scholar with very limited explanation of how it was conducted and why other databases were not considered.
Answer: The methodology brings some clarifications. We also ran a snowball search on the 8 documents and did not find any additional data to integrate. One article refers to research governance (Sen, 2003) but is restricted to implications for health libraries. The other document from Alikhaldi refers to the Palestinian health research system with reference to Pang framework. The last documents from Bond (2015) refer to the Indigenous health research governance model and its application to primary care. It describes how the citizens’ jury is a procedure worth being applied to primary care governance. None of the above-mentioned articles related to a new framework on national level health research governance. Considering that we ran the search in Google and Google scholar with the additional keywords “model” and “frame”, and that the snowball search did not lead to additional frameworks, we are quite confident we did not miss any key frameworks for the analysis.

The case study only relied on a targeted review of 7 (or 8 agencies - also not clear) agencies' documents - it is unclear why other data sources (such as key informant interviews) were not included. This would have been particularly useful given the lack of data derived from public reports for some of the agencies included in the study. Answer: it was corrected for 8 cases.

This study is based on documentary analysis. Indeed, interviews would be an additional source of data. We also contacted institutions directly by mail. Considering the low response rate of institutions, it is possible that planning for interviews would have been quite a challenge.

SPECIFIC COMMENTS:

SECTIONS 1/2 (background)
The authors indicate that they will focus only on national health research funding agencies, but do not clearly address the implications of this decision. For example, in Canada, provincial research funders (represented by NAPHRO) play an important role in health research funding and have an important relationship with CIHR - but this is not directly acknowledged. Answer: A new section of the conclusion now reads:

‘In some countries, provincial research funding institutions are key players in funding research and might or might not align with national governance standards. Investigating governance functions and actionable functions for provincial funding agencies is an avenue.’

Authors indicate that an objective is to identify main functions of governance for such agencies and actionable governance functions. It is not really clear what is meant by actionable governance functions in this context, and this is something that persists throughout the paper. Answer: We added, in the introduction of section 4.3 Practical application of the newly developed framework in terms of governance, the following:

‘We further refer to actionable functions as useful actions (34) that brings clear directions (35) to enact governance.’

SECTION 3 (methods)
The methods were quite challenging to follow. My understanding is that the study was split into two parts with the first part being a review for governance frameworks for health research funding agencies (HRFAs) and the development of an integrated framework which they label as the Framework on Governance of Health Research (FGHR); and the second part was a review of existing HRFAs governance arrangements, but it was not clear if the FGHR was intended to be used to 'test' the existing HRFA governance arrangements. This was not clearly explained or maintained in the paper. Also not clear why broader review of HRFA governance arrangements did not contribute to the FGHR - perhaps
a revised/refined version of the FGHR - which would provide stronger validation of the first iteration based only on the brief review conducted.

Answer: We rewrote entirely the section on methodology. It is now organized around 1) Review of existing frameworks; 2) Theoretical development of conceptual integrated framework; and 3) Practical application of newly developed framework to a sample of agencies

The search for part 1 was not comprehensively described. The authors indicate that they intended to search for grey literature and only searched Google and Google Scholar but did not explain this methodological decision nor did they explain why other databases were not considered (especially considering that two journal articles were included in their articles assessed (and more may have been found through search of traditional databases).

Answer: The section now reads:

‘Existing frameworks were identified via a grey literature search on Google using the following keywords: frame* OR model, combined with “Health research governance” OR “governance of health research” OR (“research for health” + “governance”) anywhere in the page. We found 231 hits that were all reviewed. We also ran Google scholar (27, 28), searching anywhere in the article, using the following keywords in the title: “Health research governance” OR “governance of health research” OR (“research for health” + “governance”). We found 3556 hits and reviewed the first 600 hits for each search.

We also ran a snowball search on the 8 documents and did not find any additional data to integrate. Please see above for details.

More specifically: The authors only considered the first 100 hits. It wasn't made clear if for Google that meant the first 100 for each of the search terms specified or whether the multiple search terms were combined into a single search and only 100 hits were considered in total. If this is so, the authors should note that there are limitations to Google searches when combining multiple strings of search terms that don't provide results aligned with standard Boolean operators.

Answer: We agree. We ran the search again without the strings of Booleans.

Google

Advanced search Model or frame* “Health research governance” 102
  “governance of health research” 44
  (“research for health” + “governance”) 85

Google scholar-Advanced search Model or frame* “Health research governance” 572
  “governance of health research” 344
  (“research for health” + “governance”) 2660 (reviewed of the 600 first hits)

The authors noted that they excluded results that were for only one theme (e.g., genomic), one level, one population, but did not explain the rationale for why these would not provide any insight for the study? No other information was provided on how the 100 hits for each Google database were screened. How did the authors get from 100 hits to the final included frameworks?
Answer: Framework related to the governance of research at the level of a university or an academic center are not the topic of the study and were therefore excluded. Those related to one theme or one population (i.e. Bond 2015. Aust NZ J Public Health. 2016; 2016; 40 (Suppl. 1) S89-S95;) referred the processes to comply with when undertaking research with patients. It is not the topic of the study and they were therefore excluded.

The authors identify 8 frameworks in Table 4 but refer to 7 frameworks at many places in the paper. This needs to be clarified. It was also not clear if the 7 (or 8) documents were all found through the Google/Google Scholar searches or were they result of some targeted searching (e.g., did the authors do any targeted searches of funding agencies during this part of the study?)

Answer: We rewrote entirely the section on methodology. The search was re-ran. We corrected 7 for 8 frameworks.

Why were the final results only reviewed by one author? The implications of this should be discussed.

- Data extraction was done by only one author. The limitations and implications of this should be considered in the discussion/limitations section.

Answer: The triangulation of the analysis is based on:

- Concerning the review of existing frameworks; Two searches were carried out, the search in the initial paper, and the second search for the current paper. An additional snowball step was taken to identify frames or models from the 8 documents. No additional documents were found.

- Concerning the practical application of newly developed framework to a sample of agencies: double-checking the data directly with the institutions under study.

SECTION 3.2
Rationale for selection of countries could be clarified. It currently is confusing as the authors note selection of countries based on "acknowledged leadership in English-speaking health research production, and a mix of American, European and Asian countries". This doesn't quite align with the 8 countries selected. Only four of which are English-speaking (five if you include Singapore) which doesn't leave any other (North) American countries. Were there any other criteria used to select countries (e.g., level of research funding; type of health system). Overall, the paragraph on p.10 needs some revision for clarity.

Answer: The selection relied less on English-speaking countries than on sources of information (website, annual report, strategic plan) available in English (e.g. Zon mW.).

The section on methodology was re-written for clarification purposes.

Rationale for selection of funding agencies - criteria defined by the 'research team' - not clear who is on the research team but the suggestion is that it goes beyond the two co-authors. If so, the broader team should be acknowledged to help reader assess the nature of their input.

Answer: We added: ‘A team composed of professors, researchers, consultants, and managers from funding institutions and research centers (total 6 individuals: 2 from the field of governance, 1 finance, 1 academic training, 2 international management; equally coming from academic and practical background; 4 directly worked with funding institutions) selected cases.’
Also, do all of the funding agencies have similar scope of health research funding (from biomedical to clinical to health services to public health)?
Answer: The description of the funding institutions selected for practical application of the integrated framework is provided in table 5 Brief description of features of funding institutions. For instance, some institutions manage a yearly budget of 207 million pounds (265 millions USD); others 800 million Australian dollars (545 million USD), almost double.

It appears that a document review was conducted, but it is not presented this way. The authors note that reports (annual report, strategic plan) were collected - are these examples or targeted documents for all 8 agencies?
Answer: We hope the new methodology section clarifies the point.

The appendix of data includes 'web site' for the agencies but not specific URLs searched - they should be.
Answer: We added the URL.

Line 146 refers to sending the data for review to 7 institutions. Why not all 8?
Answer: For the development of the framework we used 8 frameworks. For the practical application and identification of actionable actions, we used 7 cases. All institutions were contacted.
We corrected the text wherever needed.

Line 150-154 would likely be better positioned in the discussion as a limitation.
Answer: We agree. It was moved as suggested.

SECTION 4 (results)
Section 4.1. The purpose of the first paragraph is unclear. It seems to present a normative understanding of what a national framework for HRG is rather than what the heading suggests as a 'brief summary of existing frameworks'. Examples of phrasing such as 'It should give clear direction...' or 'Such frameworks eventually include people...' contribute to this confusion.
Answer: Results are now divided into three sections:

4.1 Brief review of existing frameworks;
4.2 Conceptual integrated framework of governance and management of health research by funding institutions
4.3 Practical application of newly developed framework in terms of governance

We removed the term ‘should’.

Line 189 - how are you distinguishing 'overarching' from 'broad'? Are you referring to breadth and depth?
Answer: We changed for ‘the most broad framework’, and removed the term ‘overarching’
Section 4.2
On p.9 you refer to know-how as principles. On p.21 you refer to know-how as transversal encompassing functions. Reference to transversal functions is not consistent or clear in the paper.
Answer: We kept p. 21 unchanged.
We changed p. 9.
From
‘Governance refers to broad functions or ‘know-why’, management refers to “know-what”, and principles refer to ‘know-how’.

To

‘Governance refers to broad functions or ‘know-why’, management refers to “know-what”, and transversal functions refer to know-how. These transversal functions are, in essence, principles that apply to governance and management functions.’

It's not clear how much of the FGHR model reflects the 8 frameworks assessed vs. the authors' own views on the framework. The functions in the FGHR model don't always align and some cases contrast with what was found in the other 8 frameworks.
Answer: We made a few changes. The methodology was clarified. And we changed table 4 to make those relationships between the 8 frameworks and our framework more obvious. We added column C1 to column C9.

We also agree on the existence of contrasts between all 8 frameworks identified from the literature. That is one reason supporting the utility of an integrated framework.

It's also not clear why some functions are positioned as transversal functions and others not. More explanation/rationale for this would strengthen the utility of the FGHR model.

Answer: For clarity purposes we modified p.9.
From
‘Governance refers to broad functions or ‘know-why’, management refers to “know-what”, and principles refer to know-how.’

To

“Governance refers to broad functions or ‘know-why’, the vision and relationships to the external environment, management refers to “know-what” and operational daily tasks carried out within the environment of the institution, and transversal functions refer to know-how. These transversal functions are, in essence, principles that apply to governance and management functions.’

For example, might not funding/financing be transversal?
Answer: In that regard, funding (others) # financing (oneself) were reclassified.
The outward flow of monetary funds to research centers, academics, etc. refers to the function funding, and is a daily task within management.
The inward flow of monetary resources to support the funding agency might come from partners, national budget, philanthropists, etc. A funding institution needs to manage the risk of diminishing public funds etc. Therefore, financing is a governance task.
The figure of the integrated framework was adjusted. Text in sections 4.2 and framework; and section 4.3. Practical application –resourcing and instrumentation were changed accordingly.

(http://www.differencebetween.net/business/difference-between-funding-and-financing/)

The explanation of the exclusion of the Saskatchewan Health Research Foundation on p.25 seems mispositioned (should be earlier when noting eligibility criteria for document review.
Answer: We agree and moved the section to Conclusion- limits.

But more directly, its exclusion raises questions about the criteria for inclusion and what else might have been excluded. Although the SHRF might host research projects, it also is a funder of research, so considering some of the other frameworks considered, this particular rationale is somewhat peculiar.
Answer: The exclusion criteria was clarified. It now reads, section 3.1:
‘We excluded references that were specific to one theme—for example, genomic or epidemic—as well as those dedicated to one institutional level (e.g., university), private institutions, advocacy oriented institutions (e.g., think tank) or a single aspect of governance (e.g., law, ethics), or a population (e.g., librarians). We included references that were specific to public organizations (e.g., agency, ministry, institute), and national levels.’

A new section in the conclusion now reads:
‘In some countries, provincial research funding institutions are key players in funding research and might or might not align with national governance standards. Investigating governance functions and actionable functions for provincial funding agencies is an avenue.’

Section 4.3. The paper is somewhat clumsy in reframing each section somewhat differently. You shouldn't need to reiterate why you are doing the study in each subsection. This should be set out clearly in the beginning of the paper and then addressed in the discussion.
Answer: We agree and removed the following sentences:
‘In this section, we apply the governance function to a few cases. We want to extract conclusions for the practice of governance of health research.’

Table 5. It would be helpful if the yearly budget would be put in both the agencies' home country currency as well as converted to a standard currency.
Answer: We added the conversion in euros ((equivalent in euros)).

Section 4.3.2
Each sub section reiterates the definition of the function focused on pp.23-25. This is inefficient use of space. Some restructuring to avoid this unnecessary duplication would be helpful.
Answer: Section 4.3.2 briefly introduces each sub section. While the presentation of the integrated framework in section 4.2 describes each function at length, the apparent redundancy brings a lay-out formulation to facilitate reading flow within the maximum number of words allowed for the article.
The 'resourcing and instrumentation' function, as described on p.10 is essentially a financing and funding function. Yet this doesn't come out clearly at all in the FGHR diagram, where financing and funding are positioned as management functions.

Answer: Please see above about the adjustments made regarding funding (a governance function) and financing (a management function).

We also added details about what we consider governance and management in section 3.2 methodology –theoretical framework, see above.

P. 38 line 453. The authors note that CIHR organized a pilot project with parliamentarians and repeats it 3 times per year since 2012, but the cited source only seems to indicate that CIHR produces a newsletter directed to parliamentarians three times per year. This should be clarified.

Answer: We reformulated. It now reads:

In 2005, CIHR in Canada organized a pilot project with parliamentarians named ‘Health Researcher's Day on the Hill’, and planned to send newsletters to members of Parliament three times a year since 2012 (41)

P. 43 line 490. The authors conclude a long presentation of functions with one sentence note that they have 'extracted a few specific operational dimensions salient to governance of health research by funding agencies' and list them in Table 11. It is not clear how this list was determined - this should be clarified.

Were there specific criteria to extract salient dimensions? Are these, as noted in the conclusions (p. 46 line 537-539 the operational dimensions that make the framework more actionable? if so, this needs to be explained.

Answer: We added a definition of actionable functions of governance. See above. We hope the new methodology clarifies the point.

Tables 6/7/8/9/10. Are the tables mis-titled? They refer to country cases, but they really are specific to an organization and do not capture broader considerations that would be needed to encompass the country.

Answer: We agree. We changed the titles of each table (for instance Table 6: About intelligence acquisition across funding institutions by case). We also changed the sub-titles of the columns (country, institution).

It's also not clear how the data in these tables were obtained and whether it represents random highlights or systematically derived information. As the information is presented in a vertical column and not compared across countries/agencies, it is very difficult to consider any of this information comparative, but rather to consider it as isolated highlights for each agency. If the desire is to have more comparative value, the authors should look to provide some basic categorization of the actions noted in the table to allow comparison across the agencies/countries.

Answer: The revised methodology clarifies the selection of data, section 3.3 Practical application now reads:

‘The information from this study has been extracted from documentary sources: reports of the selected
funding institutions available as of November 2018 (annual report, strategic plan); related strategic information whenever available from the website of the selected funding institutions as consulted in November 2018 (e.g., organizational chart, procedures, mission); and the legal status of the selected funding institutions (i.e., the constitutive act in force) (See Appendix – data sources for further details). Some institutions documented their strategy and actions at much more detailed levels than others; we considered what was mentioned independently of the level of details.

One member of the study team read through all documentation, and then extracted and classified information relevant to the stated dimensions of the framework (see Table 6 to Table 10). A round of verification and collection of complementary data took place by sending a request to each institution for comments from the direction of communication, cc’d to the contact of the head manager of each funding institution. Out of seven institutions contacted, we received three answers. The institutions were asked for the following information: (1) to complete information about their institution, and (2) to comment on the validity of the five governance-related dimensions (e.g., Do they make sense to you? Are they clear? Anything missing?).

SECTIONS 5/6 (discussion/conclusions)

P. 46 line 534 - there is a conflict throughout the paper that 8 agencies are identified but only 7 are compared. This discrepancy is not explained.
Answer: We corrected. 8 documents help to develop the integrated framework. 7 funding institutions helped to extract actionable functions.

The distinction between the discussion and conclusion sections is unclear. There are paragraphs in the conclusion that are seemingly more appropriate for a discussion section (e.g., line 543 - ‘We would like to discuss the validity…’). The authors should either combine the two sections, or restructure the conclusions into a much briefer summary of the findings of the paper.
Answer: Changes were made. Please see above.

P. 47 line 552. How was this work more inductive than deductive?
Answer: We rephrased the sentence to make it clearer. It now reads: ‘We mainly borrowed from both approaches to develop the integrated framework, being rooted in practice, and also with an open door to the approaches of scholars who might have previously developed deductive frameworks. The literature refers to publications by Rani and one by Pang, both of whom used practitioners’ consultations to draw their framework.’

A lot of weight is given to the document review, but were any individuals spoken to? This seems to be a significant methodological limitation of this study. It is difficult to actually see this as a case study in that sense, as it does not rely on multiple data sources.
Answer: Please see above for the new section on methodology, and for the explanation of triangulation.

P. 48 lines 573-575. Why aren't these figures (comparative currency values and per capita breakdown) provided in the earlier table in the paper?
Answer: These figures are indeed presented in table 5, which appears earlier in the paper, in section 4.3
rather than at the end of the paper. We use them at the end of the paper as they relate to the discussion on the high variability of cases employed for the practical application of the framework.

P. 48. The notes about accumulation of experience is somewhat misleading. The authors suggest that NIH has 90 years of experience while NIHR was established in 2006. But like many of these agencies, they represent evolutions of previous agencies (NIHR evolved from MRC in UK as did CIHR from MRC in Canada). Do the authors view this previous experience as being lost? Answer: We reformulated. It now reads: ‘In the United States, NIH was created in 1930 and cumulates almost 90 years of experience in keeping the same date of constitution, whereas the UK’s NIHR was lastly established in 2006 coming from an evolution of previous agency.’

OTHER COMMENTS:
P.5 I don't understand the first sentence of the last paragraph on page 5. The purpose or relevance for why these four regions were identified is unclear. Answer: It now reads: ‘Few frameworks on health research systems are available. Two characteristics can be distinguished: governance and/or management functions.

P. 7. The last paragraph of Section 2 needs some refinement. Especially the last three sentences. Answer: The paragraph now reads: ‘We will first provide a framework of research governance and management applied to the health domain for funding institutions. We will then present international cases of funding institutions and how they enact functions. Then, we build upon case descriptions to draw some practical applications of the HRG functions for funding institutions. We finally discuss the applications for funding institutions.’

Two sentences are moved to the discussion:’
The same governance and management functions would likely apply to any organization across health research. The ways in which each function translates into operations in practice is more likely specific by level. ‘.

P.10 line 118. "This paper is based on…". Consider changing to "We sought research funding agencies from a diversity of countries." Answer: The change was made.

P.10 line 120. Add 'North' American. Answer: The change was made.

In several places in Section 3.2, the authors refer to 'the paper' when they really should be referring to 'the study' or 'the analysis'. See line 118, line 124, 129, line 136. Answer: line 118 was changed. Line 124 was deleted.
Line 119 was deleted.
Line 136 was changed. It now reads: ‘The information of this study has been extracted from documentary sources”

P.13 line 178. Should HMRC be replaced with NHMRC?
Answer: The change was made.

Referencing of tables is out of order - Tables 6-10 referred to before table 4 for example.
Answer: We deleted the early referral.

P. 31 line 391. typo - 'itis' to 'it is'
Answer: The change was made.

Table 11 - can you clarify 'punctual' versus 'recurrent' partnerships?
Answer: We changed the formulation in the table to match the text. It now reads: ‘customary versus recurrent partnerships.

We hope the changes made clarify the purpose and interest of this paper. Thanks again for the careful review.