Author’s response to reviews

Title: Hospital-based interventions: a systematic review of staff-reported barriers and facilitators to implementation processes.

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Response to reviewers

We thank the reviewers for their thoughtful and considered comments on our manuscript. Below, we detail the changes we have made in response, which we believe have significantly improved our paper. All changes are highlighted in yellow within the revised manuscript.

Editor's comment: Authors are requested to consider reanalyzing the data using an established implementation framework of determinants. Please pay close attention to Reviewer 2 comments regarding this.

Response: We have given careful consideration to Reviewer 2’s comments, and have discussed as a team our views regarding re-analysis of data. Due to the unique context chosen for our systematic review (hospitals), we elected to use emergent (inductive) analysis rather than a deductive approach, and we consider that this was the best method to answer our original research hypothesis.

We agree that existing frameworks such as the CFIR contribute greatly to our understanding of process and mechanisms of change, and for this reason, we have included in our revised manuscript a comparison of our domains with the CFIR in relation to the studies reviewed. We provide detail on how the data extracted fits the CFIR framework as well as our own framework, and highlight informative similarities and differences that may indicate factors most significant to the hospital system.
Reviewer #1: This article discusses how best to implement interventions in hospital settings. The topic of how to ensure that interventions are effectively implemented is one likely to be of interest to a wide audience. I found it generally clearly written, well-conducted, interesting to read and providing a clear outline of existing evidence in this area. My most serious comment on the paper is (4) below regarding the inclusion criteria which I did not find clear in the current draft. I have the following suggestions which I feel would improve the clarity of the paper:

1) More information on how framework analysis was conducted should be provided. For example, who undertook the initial coding, how were codes refined etc

Response: More detail has been provided regarding analysis on p7, in line with the PRISMA checklist, to ensure greater clarity regarding the analysis process. We have added the sentence below added to the data extraction section of the methodology:

“Initial codes were generated by the first author, and were refined together by the team in a series of iterative reviews, to ensure clarity and synthesis of data.”

2) Quality ratings - was a formal analysis of agreement between reviewers undertaken, how many people evaluated each article?

Response: More detail has been provided regarding analysis on p8 with the section quality assessment section now reading as follows:

“Quality assessment was based on the implementation data provided, rather than the overall study data. All papers were reviewed against these checklists (LG), and a subset of papers (6) were reviewed by a second author (NR) to assess for agreement. We defined agreement as the proportion of items where both raters gave a positive (Yes) or a negative (Can’t tell, No) score. A formal analysis of agreement was carried out based on Cohen’s Kappa for inter-rater reliability, and scores varied from 0.45 to 0.61 between raters, indicating moderate to substantial agreement according to Landis and Koch’s standards [1]. Discrepancies were resolved through iterative discussions.”

3) Screening of abstracts etc how many people performed this? Was it cross-checked, what was the agreement between reviewers?

Response: More detail has been provided regarding analysis on p6-7 with the section on study selection now reading as follows:
“Decisions regarding eligibility were made by LG and verified by co-authors. Studies were initially screened by title and abstract; the remaining articles underwent a full text analysis. All studies were initially reviewed by the first author (LG), with a subset of articles (10%) also subject to team review to assure consistency. No formal analysis of agreement was carried out for this stage of study selection, as any disagreements were resolved by iterative discussion until consensus was reached.”

4) Inclusion criteria of patient-focused intervention- this criteria seems very vague to me, even looking at the table with further details I'm not sure how the authors operationalised this when searching. I'm particularly confused about this given that there were a relatively small number of studies for such a broad criteria e.g. on decision aids only 2 studies were identified.

Response: We have provided further detail in text on p6 regarding the process of operationalising this criteria, as well as specifying in text that a study needed to meet all inclusion criteria in order to be eligible for inclusion. This is the reason why a relatively small number of studies were identified. In fact, many patient-focused interventions were identified in the initial search, but only a small number addressed the other inclusion criteria. Most commonly, papers did not collect formal implementation data, and this was the second most common reason for exclusion (as shown in the PRISMA Flow Diagram in Figure 1, which indicates n=47/164 excluded abstracts due to lack of formal implementation data).

5) I wonder if a summary table highlighting how many studies identified each barrier/facilitator would also be helpful- at the moment this information can be gauged by looking at the study table however it is slightly difficult to identify. Were there any barriers which were explored in the studies but were found not to be important (e.g. in the small number of quantitative studies)? Perhaps these null results could also be included.

Response: We appreciate this suggestion and have included a new column in Table 6 that indicates how many of the included studies identified each barrier/facilitator, as well as an in-text discussion of the most common barriers for each domain on p18. There were some barriers that were reported only at the lower level of in-text reference, that emerged from the quantitative studies (e.g. barriers endorsed on a questionnaire by only one staff member). However these barriers had commonalities with other barriers, and where therefore still addressed by implementation strategies within the current studies. Given this, we feel that it is not feasible at this stage to specifically classify any null results or unimportant barriers, particularly given the lack of detail and low quality ratings of some included studies. We do note that this is an important issue to be pursued within the field, and one that will be considered in our own ongoing research.
6) The authors refer to existing implementation frameworks e.g. PARiHS and theories in their introduction and discussion- personally I would welcome further discussion of how their findings fit with these existing frameworks.

Response: We have added additional information to our discussion on p23-24 comparing our own findings with both the PARiHS and the CFIR. This new text is provided below in response to Reviewer 2’s comment 7.

Reviewer #2:

This paper is a systematic review of studies that have explored barriers and facilitators to implementation of health care interventions in hospital. First, let me say that I do appreciate the effort that goes into a systematic review. That said, the review does not offer novel information for the field. The conclusions drawn are already quite readily found in the published literature, and indeed, comprise well established frameworks related to barriers and facilitators; what we would now more appropriately refer to as 'factors' associated with implementation success. The paper is useful insofar as identifying weaknesses in reporting for implementation research, which are now addressed with the launch of the StaRI standards (BMJ, Equator). I have made several specific comments below.

Response: We believe there are several key aspects of our review that contribute new information to the continually evolving literature on implementation success, and feel that by engaging with the feedback from both reviewers, we have been able to more clearly highlight these findings so that they can be of best use to the readership of Implementation Science. We first address the specific comments of Reviewer 2 below, and close by summarizing the novel findings of our research overall.

Introduction:

1. The authors assert that 'despite careful planning', interventions fail to be successfully implemented or sustained. I think there is an assumption here, namely that failed interventions began with careful planning; often this is one aspect of process that is sorely missing.

Response: Thank you for raising this point, we have revised our wording to acknowledge this on p3, with the sentence now reading:
“However, despite sound theoretical basis and empirical support, many interventions do not produce real-world change, as few are successfully implemented [2, 3], and fewer still are sustained long-term”

2. The ramifications of ‘failed interventions' should likely read 'failed implementation efforts', and it is critical to distinguish where failures are due to implementation outcome or intervention outcomes.

Response: We have revised our wording to reflect this, the sentence on p3 now reads: “The ramifications of failed implementation efforts can be serious and far-reaching; the additional workload required by implementation efforts can add significant staff burden[2], which can reduce the quality of patient care and may even impact treatment efficacy if interventions disrupt workflow [3]”

3. The statement - staff who bear the burden of implementing new interventions may be reluctant to try alternatives if their first experience was unsuccessful" requires a citation.

Response: We have added a citation (Rankin et al., 2015) to this point on p3.

4. Given the evolution of evidence in implementation science (IS), it seems a limited view to characterize implementation failures on the basis of barriers and facilitators alone, which the field now mostly refers to as factors associated with implementation success. What about process?

Response: We are in agreement with the point that process is very important to implementation success, and believe that this issue relates more to differences in terminology which mark the field of implementation science as it develops. Many of the factors which we termed ‘barriers and facilitators’ occur during the process of implementation, and we have altered our terminology to clarify this on p3 as below: “A thorough understanding of the barriers and facilitators to implementation, as well as an ongoing assessment of implementation processes, are therefore crucial to increase the likelihood that the process of change is smooth, sustainable and cost-effective.”

5. The CFIR addresses more than implementation process and characteristics of the intervention; these are only two of five domains. Moreover, it is more comprehensive in its capture of these factors.
Response: In highlighting these two aspects of the CFIR in particular, we were seeking to demonstrate areas of difference and additional contribution to other models like the PARiHS framework, rather than to suggest that they are the only two aspects addressed by the framework. We have added more detail to the introduction, on both the CFIR and the different types of implementation frameworks as suggested in comment 6, with the new paragraph on p3-4 reading as below:

“Implementation science focuses on factors that promote the systematic uptake of research findings and evidence-based practices into routine care [4]. A number of frameworks have been developed to describe and facilitate this process, and can be classified into three main groups with the following aims: describing or guiding the process of translating research into practice (process models); understanding and/or explaining what influences implementation outcomes (determinant frameworks, classic theories and implementation theories); and evaluating implementation (evaluation frameworks)[5]. As our review seeks to recognize the specific types of determinants that act as barriers and facilitators, we drew most from determinant frameworks such as the Promoting Action Research in Health Services framework (PARiHS) [6] and the Consolidated Framework for Implementing Research (CFIR) [7]. The PARiHS highlights the importance of evidence, context and facilitation [6], while the CFIR proposes 5 key domains of influence: inner and outer setting, individual characteristics, intervention characteristics and processes [7]. The focus of such frameworks is on understanding and/or explaining influences on implementation outcomes, and they are therefore often used by researchers and clinicians to plan their implementation, develop strategies to overcome barriers and support successful delivery.”

6. The introduction jumps around without good coherence. There is no recognition of the different TYPES of implementation frameworks (see Nilsen, this journal), and no segway to the role of IS strategies. Relatedly, more up to date, recent work on IS strategies that is not referenced (see ERIC paper, this journal).

Response: We have made several changes to the structure of the introduction so as to enhance a greater sense of coherence and flow on p3-4. We appreciate the suggestion of these additional articles, and have referenced these, with their specific relevance to our review, on p3-4.

METHODS

7. It is curious that the authors chose to start from scratch in the analytic frame (inductive analysis) rather than utilize the well established determinant frameworks that have already characterized the factors associated with implementation success, such as CFIR. Page 17 of results is the first time the authors refer to their findings as ‘domains’ and yet they don’t align them with the domain language of existing frameworks, like CFIR.
Response: In keeping with the PRISMA statement for the conduct of systematic reviews (Moher et al., 2009), which recognizes that conducting a systematic review is an iterative process, we believe we have appropriately used an inductive approach to analysis in order to remain open to the factors that may emerge from real-world studies within a specific context, that had not been addressed by a previous systematic review. Given the hospital context being explored, we decided to undertake this emergent analysis rather than using an existing theoretical framework initially, as this allowed us to see what factors arose in real world studies, rather than imposing a specific framework initially.

We agree that existing frameworks such as the CFIR contribute greatly to our understanding of process and mechanisms of change, and for this reason, we have included in the discussion section of our revised manuscript, a comparison of our own framework and the CFIR in relation to the studies reviewed. We provide discussion on how the data extracted fits the CFIR framework as well as our own framework, and highlight informative similarities and differences and discussing the relative benefits and detriments of the indicative versus deductive approach. In making this comparison, we have clarified our language regarding the domains of our framework, and have identified where our domains align with and differ from the CFIR, as well as areas of novel information, such as the associations between domains (which has been revised and is discussed in point 3 of the results section).

New added text in the manuscript on p23 as follows:“In undertaking this systematic review, we gave consideration to the relative benefits and detriments of inductive versus deductive analysis. Given the hospital context, and recognition of the systematic review as an iterative process [8], we elected to use an exploratory approach to remain open to the factors that may emerge from real-world studies within hospital settings. In line with our secondary aims, we recognized the breadth of determinant frameworks already exist and it was very useful to compare our findings within these frameworks, in order to explore similarities and differences. The three key domains identified in this review reinforce the use of theory-based frameworks to guide and support hospital-based implementation, as the factors outlined by such frameworks were clearly borne out in this real-world data. Our findings also contribute to the usefulness of existing frameworks, adding to the PARiHS framework by highlighting the important role of intervention factors, and to the CFIR by casting light on the associations between domains. Our domains showed significant overlap across the five domains of CFIR. However, it was challenging to decide where specific barriers from the first studies we reviewed would best fit with pre-defined framework domains. For example, due to the limited information provided in some studies, it was unclear at times where a barrier would fit within the CFIR sub-domains; this applied in trying to determine the role of an individual involved in engagement, as studies did not always provide sufficient detail to code this barrier into an ‘opinion leader’ versus a formally appointed ‘champion’. This type of fine grained differentiation may be of most relevance in situations
where nuanced distinctions influence the selection of implementation strategies at the development stage.

With five domains and 39 constructs, the CFIR provides a more nuanced conceptualization of factors impacting implementation success, and therefore provides a means of expanding and exploring in more depth the domains identified in our analysis. In contrast, our review generated a simplified view of factors, which may be more pragmatic for busy hospital environments. In real world research, it is clear that at some points pragmatism is required, while at other times, a more detailed understanding is needed, and this is a constant balance for implementation scientists.”

8. Assessment of quality might (better) have been done using the StaRI standards (see BMJ, 2017), however I realize that not all the studies were implementation related as they looked at barriers/facilitators rather than process.

Response: We carried out extensive review of existing quality measures, and had commenced our quality review before the StaRI guidelines were released. However, in considering now whether they would provide a better assessment of quality in this case, we decided against this change for two reasons. Firstly, as we note in our methods, a significant proportion of the included studies provided only very limited information implementation processes, and therefore did not address many of the points within the StaRI guidelines. Secondly, the majority of studies did not clearly distinguish between the implementation strategies and the intervention, meaning that these dual strands could not be assessed for quality of reporting. We do however, appreciate the value added by the StaRI guidelines to all areas of implementation reporting, and have added additional reference to this approach to help clarify our methods on p6, as well as recommending ongoing use of these guidelines in our discussion p25 as below:

Addition to Methods: “We included studies that provided any formal data, quantitative or qualitative, regarding implementation barriers and facilitators either anticipated pre-implementation or encountered during implementation. In assessing eligibility, we focused on data related to implementation strategies specifically, rather than the intervention itself [9]. The recently published StaRI guidelines highlight the importance of recognizing these dual strands that exist in all implementation studies, wherein the strategies used to implement the intervention are separate from the intervention itself [16]. Our analysis therefore focuses on the barriers and facilitators affecting the process of testing implementation strategies, rather than the intervention.”
Addition to Discussion: “The recently developed Standards for Reporting Implementation Studies (StaRI) have suggested that this issue can be explored by differentiating between the core components of the intervention, to which fidelity is required, versus components or strategies that may be adapted by local sites to support effective implementation [64]. Adhering to the recommendations of these recent guidelines when reporting results will help to further ensure clarity of reporting, generating results that can be more clearly understood, generalized and drawn upon by others in the field.”

RESULTS

1. Presume the authors are referring to implementation intervention, but this is unclear - "There was great variation in the interventions and the health states targeted, as shown in Tables…”

Response: We have clarified this language with the sentence on p9 now reading:

“There was great variation in the implementation of interventions and the health states targeted, as shown in Tables 3 and 4.”

2. "Ensuring completion of the intervention" is referred to as fidelity in the IS literature.

Response: We have altered this language as suggested on p18, with the sentence now reading:

“The importance of regular audit, such as real-time monitoring of admissions to ensure intervention fidelity, was also reported as helpful to implementation success”

3. Regarding relationship of domains to one another it is not clear whether/how the individual studies could/did account for causality rather than association. Rather, I think what individual studies are reporting are the strategies they used to mitigate barriers.

Response: We appreciate this point, and have taken care to alter our language so that it describes association rather than causation. We note that this section of analysis is not just about intervention strategies, as associations also occurred at the staff and system domains organically during the implementation process, rather than as a result of consciously selected strategies. These associations were detailed in the individual studies, where staff surveyed reported factors that unexpectedly influenced the implementation process. We have added additional information on p19 that further clarifies this issue, and also highlights the utility of such a finding.
Final Reviewer 2 comment: In the end, I don't see how this paper moves us ahead in our understanding of how best to implement in hospital settings, or other contexts. I don't disagree with their conclusions at all; these are good - but they are already in the literature.

Response: We believe there are several aspects of our results that contribute new information to the continually evolving literature on implementation success. Firstly, our paper demonstrates through extensive review that the key factors known to generally influence implementation success are directly encountered within the hospital environment, rather than making assumptions that this would be the case. We argue that this finding is still meaningful, because hospital environments present a unique context for exploration that have not been previously examined. Our findings are grounded in real-world studies, and can therefore provide a basis for future researchers in the hospital-based environment to draw from in their analysis. Second, in quantifying the most commonly cited barriers (which has been added to Table 6 as suggested by Reviewer 1) we highlight the areas of our own framework, and of the CFIR that appear to carry most weight for this context, providing areas of focus and direction for future researchers and for practical use. Third, by exploring the bidirectional associations between domains, we have highlighted an area of potential leverage that may provide greater insight into the mechanisms of change that occur during the implementation process, and the associations between the different domains of key frameworks.

We believe that our findings will appeal to a wide clinical audience, as there are many examples of unsuccessful attempts to implement interventions in hospital settings, often due to a lack of appreciation of the range of factors that influence the process. We anticipate that our synthesis of these factors into a simplified framework for practical use, alongside comparisons with established frameworks that provide greater depth and comprehensiveness, will increase awareness and could potentially assist in reducing unnecessary costs and enhance practice and policy implementation strategies, as well as assist in streamlining processes for hospital staff.