Author’s response to reviews

Title: Identifying facilitators and barriers to develop implementation strategy for an ED to Ward HAndover Tool using behaviour change theory (EDWHAT).

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Version: 1 Date: 17 Mar 2020

Author’s response to reviews:

Associate Editor Comments: I agree with the points raised by the reviewers below, and that addressing these would help strengthen the manuscript. Furthermore, the framing of the manuscript could be clarified slightly and the rationale for the study more clearly articulated and justified. In the background, this study is presented in terms of overcoming a policy-practice gap. Could you please expand on how structured clinical handover is a policy priority in this context? And expand on the evidence base for structured clinical handovers?

Reply: Structured clinical handover is a policy priority as evidenced by citations to government documents. This has been enhanced in the introduction around the ED and clinical context to include

This is especially problematic at transitions of care, such as transfer from the ED to the ward, when communication errors are more likely and there is an increased risk of information being miscommunicated or lost. Ineffective communication at clinical handover is also associated with clinicians spending extensive time attempting to retrieve relevant and correct information. This can result in inappropriate care, and the possibility of misuse or poor use of resources.

The evidence base for structured clinical handovers has been expanded to include An effective standardised and structured clinical handover process enhances the reliability of information transfer by decreasing the reliance on memory and maintaining a focus on important aspects of care. All relevant participants know the minimum information that needs to be communicated when handovers take place, the purpose of the handover, the structured format to aid communication, and how responsibility and accountability are transferred. Further, critical information is more likely to be accurately transferred and acted on. Standardised and structured clinical handover results in greater levels of patient satisfaction, better understanding of diagnosis and treatment, and reduced errors.
Reviewer #1: Thank you for submitting this interesting and relevant paper. I enjoyed reading this article and feel that it would make a valuable contribution in the clinical space of 'clinician to clinician handover' and in the application of behaviour change theory. I would suggest considering the following points during revisions, and then re-submitting.

Background:
Overall, this is a well presented section. You have justified the importance of effective handover behaviours in the wider context and used local audit information to demonstrate the implementation gap. I believe that greater use of 'behavioural language' would strengthen this section i.e., it appears that you are using behaviour change theory to develop an intervention that will enhance enablers and overcome barriers to use of a locally developed handover tool. This needs to be explicit. Likewise, a key step that should occur early in the period of inquiry is to specify the target behaviours i.e., report clearly who needs to do what differently. I think this is implicit within your paper but it would strengthen the reporting to state more explicitly how you used your local compliance data to specify a target behaviour i.e., come up with your 'behavioural diagnosis' (you might find this paper interesting: implementationscience.biomedcentral.com/articles/10.1186/s13012-019-0951-x)
Reply: Thankyou. We have refined the final sentence of the background to explicitly state we are using behaviour change theory to develop an intervention to enhance enablers and overcome barriers to use of a locally developed handover tool

Behaviour change theory will be used to design interventions to improve the target behaviour, that is, use of the clinical handover tool.

The first paragraph of the methods has been expanded to state
This exploratory convergent mixed-method study was designed using French et al.’s four-step implementation process model; (a) clarifying who needs to do what differently (nursing staff), (b) identifying barriers and enablers (electronic survey of nursing staff, informed by the Theoretical Domains Framework), (c) selecting fit-for-purpose intervention strategies and components (mapping survey results using the behaviour change wheel) (d) evaluating implementation interventions (comparing the original implementation with the findings of this study). The study process is outlined in Figure 2.

Methods/Results:
Broadly, there are elements of your methods that are quite superficial and where it is difficult to interpret how the different activities you described linked together coherently. Strengthening some of your reporting of methods would improve the quality of the paper overall. Specifically:
1. I would like some rationale regarding why you selected the TDF - you can use the BCW without the TDF i.e., identify barriers/enablers at the level of COM-B and then move out to intervention functions from there - what added value did the TDF bring?
Reply: The author’s preference is to use the TDF to obtain information through surveys in the acute clinical environment because we find it is easier to ask targeted questions relating to organisational practice. Further, we find it is more easily applied, interpreted and linked. We then like to use COM-B to map and present the data, especially because it consolidates the information.
We have enhanced the Phase 1: staff survey paragraph to state
This was followed by 11 questions focussed on known barriers and enablers to uptake of new tools in the clinical environment generally and specific to the study site that were then mapped to the domains of the Theoretical Domains Framework (TDF). The Theoretical Domains Framework is a synthesis of behavioural change theories presented as a framework to explore the science of intervention implementation in health care17. The TDF was selected to inform the survey to enable targeted questions related to practice within the clinical environment, classification of enablers and barriers using a broad range behavioural influences, and, as the investigators had previously successfully used the TDF to identify and design interventions in the ED / acute care context.

2. It appears that you are conflating the 2 versions of the TDF. To elaborate, in the body of the work you suggest that you developed a questionnaire with 11 questions mapped to the TDF domains. Presumably, you included 1 question from each of the 11 domains from the first iteration of the TDF (published 2005)? If so, please report this explicitly. In table 1, you contradict this in the title of your table which is labelled as displaying "the 14 behavioural influences of the TDF" (despite only having 11 domains listed). The TDF2 has 14 domains (published 2012). Likewise, you state that you mapped into 8 of 14 domains in line 221. I would suggest ensuring that you are clear and consistent about which version you selected and applied.
Reply: Thank you for raising these points for clarification. We have revised these sections for clarity.

The authors asked 11 questions related to enablers and barriers. These questions were designed based on the known evidence, and were mapped to the relevant TDF domain. All 14 domains are listed in Table 1. To clarify this we have enhanced the Phase 1: staff survey paragraph to state
This was followed by 11 questions focussed on known barriers and enablers to uptake of new tools in the clinical environment generally and specific to the study site that were then mapped to the domains of the Theoretical Domains Framework (TDF).

The mapping to the 8 domains is what the results demonstrated – only 8 domains were identified in the analysis.

These mapped to eight of the 14 TDF domains

3. I would value a little more detail regarding the development of your questionnaire - did you base the content on any existing validated TDF questionnaires? If so, this should be stated.
Reply: Further details on the development of the survey has been added including relevant citations
The survey was developed using known barriers and enablers to uptake of new tools in the clinical environment generally and specific to the study site that were then mapped to the domains of the Theoretical Domains Framework (TDF).
4. You state that you integrated the data during the analysis to identify TDF domains - how was this achieved? In your subsequent results section, the qualitative and quantitative data are presented quite separately which makes it even less clear how these data were used together to inform the picture. It might be helpful to re-structure your results and present these data under TDF domain headings rather than the current structure (there is precedent for reporting under domain headings within the wider body of TDF literature). This would allow you to present the descriptive stats within the relevant domains; describe the themes/sub-themes that you synthesised; present utterances that reflects barriers and enablers to the target behaviour.

Reply: We apologise for this confusion. True to mixed methods design, the quantitative and qualitative data were analysed separately. The data were then mapped to the TDF separately. The TDF domain was the “linkage” or integration key. The heading for phase 2 has been revised to better reflect the process and the sequence of the text revised.

Phase 2: Identification of facilitators and barriers and Data integration

5. Line 138 you use the word "item" to describe a unit that was interrogated by 2 members of your research team to reach a level of agreement. What do you mean by an item? Were you reviewing at theme-level or free-text level from participants responses? Can you make this explicit.

Reply: We have changed the sentence to state If it was unclear if an item (survey response or theme) was a facilitator or barrier for the implementation

6. Linking to point 5, you state that your thematic analysis was completed by 2 authors, and you appear to have a process in place, within your methods, to agree whether "an item" was a barrier or enabler. However, you have not stated if the mapping to TDF domains was carried out/agreed by 2 members of your team. Given that the domains are key to the subsequent stages, it is important to have a robust and defensible process for coding at the domain level.

Reply: Apologies for this omission. Same as with the thematic analysis, we sat and did this together.

The sentence has been revised to state The quantitative and qualitative results were then mapped to each of the TDF domains by two authors (KR and KC).

7. It is possible to code participants' responses into more than 1 TDF domain. You selected not to do this. Can you add a sentence of rationale for this decision?

Reply: Thank you for this excellent point. We did code items to more than one domain (an image could not be attached to this reply however, if the reviewers request it, we can send it separately), however for ease of presentation, we selected the domain we felt most represented the item. However, if the secondary domain had not already been identified in any other items, we kept that domain so as not to omit any relevant domains. This section has been rewritten to state For any items that crossed multiple domains, for ease of presentation, we selected the domain we felt most represented the item. However, if the secondary domain was not identified in any other items, we allocated that domain to prevent omission of any relevant domains.
8. You have presented COM-B (and the associated TDF domains) in your logic map (fig 5) but have not referred to this at all in the body of your work. Given that COM-B is the central 'hub' of the BCW, and that you can work through COM-B when mapping domains to intervention functions, I would suggest incorporating this into your methods.
   Reply: The TDF domains were grouped using COM-B primarily for simplicity of presentation in the logic map. We understand that there are two ways to map to the intervention functions, and we have outlined our processes in phase 3 of the methods. We have also moved Figure 3 to the results section as it is a result of the integration, rather than a methods diagram. Apologies for this oversight.

9. Line 154 - who were these stakeholders? Can you summarise in the body of the paper and/or specify in an appendix?
   Reply: The following addition has been made
   Stakeholders (front line nurses, nurse managers, nurse educators)

10. Whilst I can appreciate how you mapped from broader intervention functions to more granular BCTs, I believe that the methods needs to be expanded between lines 162 and 165. From a stylistic perspective, BCTs are not typically used to develop an implementation strategy, as the BCT is the smallest replicable unit of an implementation intervention. Instead, a mode of delivery or mode of action is required to operationalise the BCT i.e., deliver it in the real world context. The wording here needs some attention. Also, you mention using the survey data to inform the modes of delivery - can you elaborate a little on how this was achieved?
   Reply: We have refined the wording to better reflect that a BCT supports the mode of delivery and, how the survey data were used to inform the mode of delivery selection.
   For example, should the barriers and facilitators differ between ward and emergency nurses, the intervention function and supporting BCTs were refined to that context. Each BCT was also assessed using the APEASE criteria for inclusion. The resulting BCTs were collated and used as suggested techniques to support the selected modes of delivery specific to the context of the sites (wards vs EDs, or particular sites). The TDF domains were grouped using COM-B then developed to a logic map
   A sentence has been added to Phase 2 of the methods to explain how we determined if there were enablers or barriers to specific contexts.
   Sub analyses (cross tabulation) of enablers and barriers were conducted to determine if there were any findings specific to the type of nurse (ED or ward) or hospital site.

   An additional sentence has also been added to Phase 3 methods
   For example, if the barriers and facilitators differed between ward and emergency nurses, the intervention function and supporting BCTs were refined to that context.

11. From your paper/images I cannot clearly see which specific BCTs were mapped from the domains/intervention functions as per their labels within the BCT taxonomy.
   Reply: The recommendations column contains the mode of delivery and selected BCT. They are colour coded to the corresponding barrier and TDF domain (which are grouped by COM). Figure 3 heading has been changed to Logic map demonstrating mapping process and selected modes of delivery/BCTs to implement the intervention functions.
Discussion:
You touch on an important point about the use of theory to develop interventions (as opposed to pragmatic alternatives). It would be good to expand this discussion here, with use of literature to build an argument for theory-based interventions.
Reply: The discussion has been expanded to discuss the use of theory to develop interventions
Colquhoun et al’s systematic review of papers focussing on methods for designing interventions to change health care professionals’ behaviour reported that designing an intervention for individual-level change includes identifying barriers, selecting intervention components, using theory, and engaging end-users. Developing interventions systematically based on evidence and theory enhances implementation success and sustainable worthwhile effect. Further, clear presentation of the methods of theory use progresses theory development by helping to understand why interventions have failed or succeeded

Reviewer #2: Improving handover is an important way to ensure safer patient care, and reduce inefficiencies. This is an interesting paper considering the implementation of a tool to improve handover. However, some changes and clarifications are necessary in order for this to be suitable for publication.

Abstract
1. Can you add a word such as "Effective" to the very beginning of the abstract (also to the main text of the paper)? It is effective handover that is fundamental to practice (not just any quality of handover), and this is what is a priority for achieving safer and better quality care globally.
Reply: Thank you for this suggestion. Effective has been added to the abstract and the beginning of the main manuscript prior to clinical handover

2. At the end of the methods I advise you add: "behaviour change techniques that can be used to support implementation. Otherwise, it is not clear what the BCTs are for.
Reply: To support implementation has been added

3. Please could you explain the following passage more clearly: "Nurses would benefit from an awareness of each speciality's needs to develop a shared mental model". This is also mentioned at the end of the main paper conclusion, but does not appear to have been explained elsewhere in the paper.
Reply: The following sentences have been added to the discussion to explain the benefit of a shared mental model
Success of the interventions would also be enhanced by nursing staff from different areas having a shared mental model, that is, a common understanding of the task (handover process) and the clinical and logistical needs to conduct handover for their colleague. It would also ensure that nursing staff from different areas of the hospital are familiar with one another’s roles and responsibilities, could anticipate each other’s needs and be flexible.
Background

4. Can you refer to any references on the impact of poor handover on patient safety or clinical incidents?
Reply: We have not included statistics on the impact of poor handover on patient safety as the numbers available are quite old (15 years). The reliable reports that are available cite single/multi-centre research and incidence, rather than population level data (which are cited in the manuscript). We have included the latest stats on how many ED to ward transfers there were in Australia last year as an indication of the risk and importance of having a robust clinical handover process.

5. In the second paragraph of the background it describes that the handover being described as inadequate coincided with reportable clinical incidents. Is there any evidence to suggest that the poor handover caused the incidents, or might this just have been a coincidence?
Reply: The incident management information system has detailed information about the causal factors and review by the hospital performance units meant that these incidents were classified as related to handover.

6. Can the characteristics of the EDWHAT tool/behaviour change techniques employed by the tool be described in more detail?
Reply: The following sentences have been added:
EDWHAT was developed by an ED and ward nurse educator and nurse manager. The tool was reviewed by a small group of senior nurses then implemented at all four hospital sites by local nurse educators using face to face education. A formal strategy was not developed.

7. In the final paragraph of the background, can you clarify what you mean by "site" and how many sites there were? I initially understood site to mean hospital, and understood that there were two sites/hospitals in the region. However, in the methods it mentions 4 EDs, so that cannot be correct. If there were more than two sites, can the wording be changed to: compliance at the different sites ranged from 45% to 90%. What was the mean level of compliance?
Reply: There were four hospital sites. This is mentioned in the preceding paragraph and has been added to the following sentence:

The tool was reviewed by a small group of senior nurses then implemented at all four hospital sites by local nurse educators using face to face education. A formal strategy was not developed.

The compliance sentence has been changed to state:
Compliance at the different sites ranged from 45% to 90% (mean 70.1%)

Methods

8. Is Figure 2 really needed? I feel this could be described more clearly in the text.
Reply: As this is a mixed methods study we are advised to insert the traditional mixed methods diagram. We will be guided by the editor.
Further detail has been added to the beginning of the methods section

This exploratory convergent mixed-method study was designed using French et al.’s four-step implementation process model; (a) clarifying who needs to do what differently (nursing staff), (b) identifying barriers and enablers (electronic survey of nursing staff, informed by the Theoretical Domains Framework), (c) selecting fit-for-purpose intervention strategies and components (mapping survey results using the behaviour change wheel) (d) evaluating implementation interventions (comparing the original implementation with the findings of this study). The study process is outlined in Figure 2.

9. I am not sure that all the questions map onto the TDF domains that they are listed under. For example, I think "The content of the handover tool meets my need in relation to safe handover" is beliefs about consequences rather that optimism (and should be classified the same as the previous question). "The form is hard to use" should be Skills. Told to transfer the patient before filling in the form, and not being supported to use the form are both related to Social influence. The form doesn't cover the information needed is beliefs about consequences. Can these be reclassified?
Reply: We debated about "The content of the handover tool meets my need in relation to safe handover" as it could be interpreted as Confidence that things will happen for the best because it is a confident statement (optimism). But, we will be guided by the reviewer who is clearly an expert in this area. We have reclassified the other questions as suggested except for “the form is hard to use” because it was referring to the functionality of the form rather than the ability of nurse

10. The differences in response options and in number of response options seems unnecessary. Most questions could have been answered by a 5-point agree-disagree scale. Also, I would have expected there to be a question addressing social/professional role and identity. Obviously these points can't be changed now though.
Reply: We note these comments and apologise for the omission of social/professional role and identity. This domain did emerge in the qualitative analysis.

11. As only about half of the TDF domains are measured in the survey, it would be helpful in Table 1 to indicate which domains you measured in our survey, and potentially also how many questions were used to measure each domain.
Reply: Thank you for this suggestion. Table 1 has been altered to italicise the domains measured in the survey

12. Figure 3 - is labelled as Figure 5. Also, define acronyms. The recommendations column does not strictly look like BCTs from the Taxonomy. Can you clarify, or put in inverted commas the BCTs, or just refer to these as recommendations rather than BCTs?
Reply: Apologies for this oversight, the figure label has been corrected. The acronyms are defined in the abbreviations list. The recommendations column is a combination of the intervention function and the BCT. To reflect this, Figure 3 heading has been changed to Logic map demonstrating mapping process and selected modes of delivery/BCTs to implement the intervention functions
Results

13. Need a new subheading after the participant characteristics, when you start discussing the survey results.
Reply: A new subheading has been added

Reasons for not using the EDWHAT

14. When discussing figure 4, there appears to be differences between ED and Ward nurses in their responses about being able to access and phone near a computer, and being told to transfer the patient before filling in the form. It would be good to acknowledge this. Also, the factor of not having time also rates nearly as high as the other three factors, so should be mentioned. It would be helpful to include the TDF classification of each item in the figure, and possibly order the items so those from the same domain are next to one another.
Reply: We have reworded this section to highlight this variance within the responses and have included in brackets the relevant context. The following text is the reworded section.

Reasons for not using the EDWHAT
The most common reasons for not using EDWHAT were uniform across nurse type and hospital site. However within each reason there was some variance. For example, the most frequently cited reason for not using the tool was the inability to locate a computer near a phone (44%, n=121, but more so in the ward 47%, n=65), being told to transfer the patient before being able to complete the form (particularly in ED 52.10%, n=62), the other nurse receiving (or giving) the handover not using the form (38.83%, n=106) and not having time (34%, n=94)(Figure 4). More than half of nurses from the two sites with the poorest uptake felt the tool did not support timely (60% n=75; 55% n=50) or easy handover (54% n=68 and 54% n=49). These two sites also had the largest proportions of nurses that reported being told to transfer the patient before being able to complete the form (33%, n=42 and 55%, n=50). The site who had the highest uptake also had the highest proportion of nurses reporting the tool was important (76% n=38).

15. It would be interesting to know the uptake rates from the different EDs, and whether the response of the different questions vary according to the uptake rates. Can this be shown in Figure 4 for example?
Reply: In the methods we state that Sub analyses were conducted to identify specific barriers or facilitators by site, and/or by ward or ED location. The results on the whole did not vary by site, but where they did they are now included. There is a statement to this effect in the section titled “Reasons for not using the EDWHAT”

We have revised the participant characteristics paragraph to include The responses were proportionally representative of the size of each site.
We have added the following sentences More than half of nurses from the two sites with the poorest uptake felt the tool did not support timely (60% n=75; 55% n=50) or easy handover (54% n=68 and 54% n=49). These two sites also had the largest proportions of nurses that reported being told to transfer the patient before being able to complete the form (33.87%, n=42 and 55.56%, n=50). The site who had the highest uptake also had the highest proportion of nurses reporting the tool was important (76% n=38).
16. For the quotes, it would be useful to know whether each one was from an ED or a Ward nurse.
   Reply: These have been added to the quotes.

17. Quote from nurse 17, what does "obs are btf" mean?
   Reply: These have been added to the abbreviations list

18. Line 276, typo: "get handed Cover"
   Reply: This has been edited to “get handed over”.

19. The sentence in line 306-307 doesn't really make sense. Do you need the "such as time to handover" at the end?
   Reply: The sentence has been revised to state "Within these themes time pressure was raised as a strong influence on the ability to adequately handover,"

20. It is not entirely clear how the process from Table 4 led to the checklist in figure 6. The relevant intervention functions that have been selected and used in figure 6 should be more clearly highlighted. It would be good to identify BCTs from the Taxonomy that are being recommended to support implementation. Also, from figure 3, it is fully shaded that the content was reviewed with end users, however this seems to be a major barrier to use. Clearly more work needs to be done in this area.
   Reply: The process to develop the checklist has been enhanced. An implementation checklist for future use was developed based on the behavioural influences most prominent in the survey responses and themes, the intervention functions selected through the APEASE process and gaps highlighted by the logic map.

   We have not included the intervention functions and BCTs in the checklist as this document is intended for use by local clinicians.

   We agree more work needs to be done with end users, this the first point in the implementation checklist, and, the purpose of this study

Discussion

21. Line 370 in the Discussion - what were the three aspects of human behaviour considered by original implementation of the EDWHAT?
   Reply: The sentence has been revised to state: The initial implementation of the EDWHAT partially considered only three aspects of human behaviour (knowledge, skills and beliefs about capability)