Reviewer's report

Title: Understanding the Canadian Adult CT Head Rule Trial: Use of A Theoretical Domains Framework for process evaluation

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Reviewer: James Cane

Reviewer's report:

This is a nicely written paper that describes the use of the Theoretical Domains Framework (TDF) to guide an evaluation of physicians’ responses to interventions employed in the Canadian CT Head Rule Trial. The use (or overuse) of CT scans has been particular prominent recently in the media and so the reported study is both timely and important. The research also clearly demonstrates the feasibility of using the Theoretical Domains Framework to guide evaluations of implementation and behaviour change problems.

The question posed by the authors is well-defined and the methods are sound and sufficiently described. I had some concerns over the low sample size used, however this limitation is covered in the discussion and the setting of this as a ‘proof of concept study’ negates this issue somewhat.

There are, however, some other minor issues that I think need to be addressed within the manuscript (see below).

Major Compulsory Revisions
None

Minor Essential Revisions

1. The interview guide was developed based on the original TDF, however, given that a refined version of the TDF is now available which identified 14 rather than 12 domains (see Cane, O'Connor, Michie in the TDF series in IS) there should be some mention of this in the manuscript and possibly how the adoption of this new refined framework might have influenced the interpretation of the findings. For instance, ‘Beliefs about Consequences’ and ‘Beliefs about Capabilities’ were both shown as domains likely to influence use of the CT Head Rule but in the revised version of the framework the domains of ‘Reinforcement’ and ‘Optimism’ have stemmed from these domains and may provide further clarity to the results. Also, in the refined framework the domain ‘Motivation and Goals’ formed two separate domains of ‘Intentions’ and ‘Goals’, this clarification may also be important to the results of the current study.

2. Whilst there is a nice description of the TDF I feel that a sentence or two about why the Theoretical Domains Framework was chosen over other approaches / frameworks would strengthen the argument for its use. A couple of additional references to research using the original TDF could also be used as support (see
3. In the results section the domains are classified under “Domains unlikely to influence implementation...” and “Domains likely to influence implementation...”. It was hard to relate these headings to the particular criteria set down for the inclusion of a domain as a potential barrier, e.g. “Relevant domains were identified by: 1. the presence of conflicting beliefs within a domain and 2. the frequency of beliefs and 3. the likely strength of the impact of a belief on the behaviour.”. At the very least I think changing the above sentence so that it matches the headings would help, e.g. ‘Domains likely to influence implementation of the CT Head Rule were identified by: ....”, but also there should be some rationale for why these criteria were chosen (i.e. why do conflicting beliefs make a domain relevant? and to what extent do beliefs have to be conflicting before a domain is relevant?).

4. Is the statement “When in doubt physicians may err on the side of caution and order a CT scan” drawn from the data or is it the particular view of the authors (see end of ‘Domains unlikely to influence implementation...’ paragraph in the results section). If the former then there should be some indication that this was drawn from the interview data, if the latter then this should be removed from the Results section (could possibly be placed in the discussion).

5. There should be an indication of how many researchers conducted the interviews, if more than one how did the researchers ensure consistency in administering the interview questions?

6. There are some minor inconsistencies in the use of the TDF domain labels throughout the manuscript that could, in some cases, change the interpretation of the domains, e.g. ‘Nature of the Behaviours’ is referred to as ‘Nature of Behaviour’ (see Results 2nd paragraph), ‘Social Influences’ as ‘Social Influence’ (see Abstract), and ‘Memory, Attention and Decision Processes’ as ‘Memory, Attention and Decision Making’. These need to be checked for consistency with the original TDF domain labels.

7. There are a number of typos throughout (e.g. full stops missing after sentences in Background, paragraph 4, ‘clinical’ instead of ‘clinically’ at the top of page 5 (line 1)).

8. The references need to be checked as there are some differences between the numbers in the main body of the manuscript and the numbers in the reference section (e.g. The reference for the original TDF paper is wrongly numbered, should be 20 instead of 13 or vice versa).

Discretionary Revisions

9. In the methods, the authors state that “Each of the 12 behavioural domains were probed by two to five questions with additional prompts. It would be good to give some reasoning to why there was a different range of questions for different domains. Could this have affected the findings or the effectiveness of the use of the Theoretical Domains Framework?”
10. The information regarding the use of the 'Nature of the Behaviours' domain data in the results section, 2nd paragraph, might be better suited to the method section. Also, the interesting note at the end of the second paragraph of the results would possibly be more applicable to the Discussion section.

Additional references regarding the original TDF use:


**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I was involved in the development of the refined Theoretical Domains Framework and have an article in the TDF series this manuscript is intended for. I did not, however, take any part in the work included in this paper.