Author’s response to reviews

Title: Towards a patient journey perspective on causes of unplanned readmissions using a classification framework. Results of a systematic review with a narrative synthesis.

Authors:
Richelle Singotani (r.singotani@vumc.nl; r.g.singotani@vu.nl)
Fatma Karapinar (f.karapinar@olvg.nl)
Corline Brouwers (cbrouwers@zinl.nl)
Cordula Wagner (c.wagner@nivel.nl)
Martine de Bruijne (mc.debruyne@vumc.nl)

Version: 1 Date: 25 May 2019

Author’s response to reviews:

Dirk Krüger, Editor
BMC Medical Research Methodology

May 25, 2019
Re: Your submission to BMC Medical Research Methodology - BMRM-D-18-00587

Dear Mr. Krüger,

Thank you for your e-mail dated April 29, 2019, allowing us to submit a revised version of our manuscript entitled “Towards a patient journey perspective on causes of unplanned readmissions using a classification framework. Results of a systematic review.” (BMRM-D-18-00587) to the BMC Medical Research Methodology.

We have commented on the reviewers’ reports point by point, as indicated below.
Following this revision, we hope that the manuscript now meets the high standards of your journal. We look forward to learning of your decision concerning our manuscript.

Yours sincerely, also on behalf of the co-authors,

Martine de Bruijne

Editor Comments:

This work is timely and relevant. In addition to the comments from the reviewer, kindly consider the following in your revision:

1. How was "preventability" defined? How were disagreements between researchers coding preventability resolved?

2. Root cause assignment - did three individuals independently do this exercise for each identified cause?

3. How did you "adapt" PRISMA?

4. If you did not evaluate included studies for risk of bias then at least explicitly state it if you don't address it.

Answer: We would like to thank the editor for his comments. See our comments below:

1. We included studies which assessed the preventability of readmissions and used their assessment which causes they regarded preventable or not. Therefore, we do not have a definition in this review.

The selected studies were previously selected for another review. The previous review was focused on the assessment of preventable readmissions, while this review provides extensive information on the variety of causes that have been applied in readmissions studies.

To clarify the link between the previous and current review, and to explain the definition of preventability, we amended the end of the first paragraph of the Method section and ‘preventability’ in the Method section:
“In 2017, we conducted a systematic review on (the implications of) the different methods used to assess the preventability of unplanned readmissions by use of medical record review. Previous studies demonstrated that health administrative databases often lack extensive information (e.g. functional status and social support) (1). Therefore, we focused on studies which used patient record review to assess preventability of unplanned readmissions. The current systematic review is aimed at providing in-depth insight on the causes that have been used by these studies in the assessment of preventability. To do so, we reviewed the causes that have been described by the studies which have been included in the previous review.”

We added the following to preventability in the Method section:

“...In our previous review, we found that the definition of preventability varied widely among studies1. Many studies did not provide a clear definition, but they referred to a cause classification with causes that were pre-defined as preventable. For instance, Williams et al. defined potential areas to avoid readmissions; 'It was noted that readmission could have been avoided if more effective action had been taken in one or more of five areas: preparation for and timing of discharge, attention to the needs of the carer, timely and adequate information to the general practitioner and subsequent action by the general practitioner, sufficient and prompt nursing and social services support, and management of medication’ (12). Other studies such as Ryan et al. provided a broad definition of preventability; 'Providers were given no specific guidelines for deciding whether a readmission was preventable. This allowed use of their different backgrounds in choosing which elements of the clinical record to focus on’ (13).

The researchers coded whether a cause was preventable as stated by the study authors. When the study was unclear regarding the preventability of a cause, the researchers classified the cause as neutral. Causes that studies considered both preventable and unpreventable, were coded as both.”

We resolved disagreements on coding preventability with a senior researcher (see the response to question 2).

2. Two researchers independently assigned each cause to a root cause and the final assignments were discussed. A third researcher performed this exercise as a double check. We amended the first sentences of the paragraph Root cause:

“Two researchers (RS, MB, CB, FK independently) allocated each cause to a preliminary set of root cause: technical, organization (integrated care), organization (hospital department level), human (care provider), human (informal caregiver), patient (self-management) and patient (disease). A third senior researcher performed a double check on the final cause classification. Disagreements between researchers were resolved during meetings (RS, CB, FK, MdB) until consensus was reached.”
3. We adapted PRISMA by adding extra subcategories in order to specify the causes in more detail. We added this to the paragraph of Root cause:

“We adapted these categories prior to the start of the data collection based on our experience with patient record reviewing in several Dutch hospitals (8). We sub-divided the root causes “organization, human and patient” in organization (integrated care), organization (hospital department level), human (care provider), human (informal caregiver), patient (self-management) and patient (disease).”

4. [zie opmerking bij punt 4] We did not perform a quality appraisal tool due to the large heterogeneity in study designs. To clarify this point, we added the following section “Critical appraisal of individual studies’ to the body of the text (inserted between ‘Study selection’ and ‘Data collection’):

“Critical appraisal of individual studies

A validated critical appraisal was performed to evaluate the reliability, value and relevance of each article. Commonly used quality appraisal tools were not suitable because of the large heterogeneity in study designs. Hence, a critical appraisal tool was used which is developed by the Cochrane recommendations for narrative data synthesis and analysis.12 This critical appraisal was implemented in the data synthesis. The goal of using the narrative synthesis is, similar to other appraisal tools, to avoid bias. The process of narrative data synthesis is rigorous and transparent, in which the process is specified in advance. These process steps were followed systematically.”

Reviewer reports:

Kasey Boehmer (Reviewer 1):

Thank you for the opportunity to review this manuscript. Overall, this is a well conducted systematic review that seeks to classify they different types of preventable readmissions. The study requires minor revisions prior to publication.

First, it is unclear to me why interventions are discussed. To me, this seemed like an afterthought, as it doesn't appear studies were excluded based upon interventions/no interventions, and it broke up the otherwise very clear results section. Because there are other reviews that clearly focus on interventions in depth (e.g., Leppin et al, JAMA Internal Medicine 2014), I don't think discussion of interventions is necessary for this paper to make a contribution to the literature. Therefore, I would recommend the authors either strengthen the reasoning
behind the inclusion of interventions in the manuscript, or remove the references in methods and results to these findings.

Answer: We would like to thank the reviewer for his/her comments. We agree with this comment. We decided to delete discussion of the interventions from the article and to focus on the causes of preventable readmissions only. The focus of the search strategy was the assessment of preventability of readmissions and not interventions to reduce readmissions. We removed the intervention part from both the PRISMA flow chart as the body of the text.

Second, I found one of the most interesting parts of the paper the causes of readmissions that were classified as preventable in some studies but unpreventable in others. I see in the additional file there is detailed information regarding each cause within each study. Is there some way to summarize this information in a main table, figure, or the body of the paper about which causes were described as both? I think this may be of interest to researchers/policy makers in order to come up with a more standard definition of preventable vs unpreventable. In the discussion section, I would like to see the authors point to whether they think these conflicting classifications are problematic or are they justified?

Answer: We agree with the reviewer. Differences in cause classifications can be problematic for fair comparison of studies. Therefore, it is essential that studies describe the context of the research setting/research population and elaborate on what they regard as preventable.

We added a table with examples of causes that were classified as preventable and unpreventable by different studies (Table 3). These findings are also discussed in the Discussion section.

Table 3

<table>
<thead>
<tr>
<th>Cause</th>
<th>Example - preventable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complication</td>
<td>Foreseen complication (2, 3); complication of surgical procedures (4-6); post-</td>
</tr>
<tr>
<td></td>
<td>procedure complications and complications related to medication use (7)</td>
</tr>
<tr>
<td></td>
<td>Complications related to neurological impairment and immobility (8); complications</td>
</tr>
<tr>
<td></td>
<td>occurring in spite of best practices being followed, complications due to</td>
</tr>
<tr>
<td></td>
<td>progression of natural history of certain chronic neurosurgical disease (7)</td>
</tr>
<tr>
<td>Adherence</td>
<td>Reasons probably within control of hospital services (may include compliance (9);</td>
</tr>
<tr>
<td></td>
<td>patient compliance (10); non-compliance with prescribed medication (11); improved</td>
</tr>
<tr>
<td></td>
<td>medication compliance (12); medication non-compliance (13); caretaker related</td>
</tr>
<tr>
<td></td>
<td>- Noncompliance with discharge medications (14); Noncompliance that could have been</td>
</tr>
<tr>
<td></td>
<td>prevented</td>
</tr>
</tbody>
</table>
by care givers (15); patient compliance problems (16); fluid related - noncompliance diet and medication and hepatic encephalopathy - noncompliance to medication (17)

Reasons probably beyond control of hospital services (may include compliance (3)

Disease progression  Disease progression (15, 18); Care during index stay - Unrecognized worsening condition (19);

Unavoidable recurrence or progression of disease (5); Disease progression (18); disease related - Unforeseen worsening of disease process (14)

We further discuss this table in the Discussion section, page 13 and 14:

Furthermore, this review highlights that studies differ in which causes are considered to be preventable. In particular, complications, adherence and disease progression were seen as both preventable and unpreventable. For example, ‘foreseen complications’ were seen as preventable (2, 3). Complications of surgical procedures were also reported as preventable in many studies (4-6). Greenberg et al. reported complications related to neurological impairment and immobility as an unpreventable cause (8). Shah et al. considered complications as preventable and unpreventable. The complications were distinguished in: complications occurring in spite of best practices being followed, complications due to progression of natural history of certain chronic neurosurgical disease, post-procedure complications and complications related to medication use. The first two were reported as unpreventable, and the latter two as preventable (7). These findings highlight that preventability can differ depending on many contextual factors. In addition, two studies considered some causes as both preventable and unpreventable. For example, Shimizu considered a lack of financial resources and housing or an inadequate home as both preventable and unpreventable. This classification allows researchers and policymakers to further consider the complex nature of readmissions. Therefore, it is essential that studies describe the context of the research setting/research population and elaborate on what they regard as preventable.

Third, Table 3 is helpful, but I am wondering if there is also a way to visually represent the classification framework? Are these classifications in any way related to each other, or are they entirely separate? For example, would human - care provider, be underneath and related to organization- department level care? These do not seem independent to me and it would be helpful to clarify for the reader how they are related or unrelated. Visualization could be one way to do this.

Answer:  The causes are interdependent and not entirely separate. Imagine the following example:
a patient gets readmitted due to a wrong assessment by a physician at discharge. This wrong assessment might be a result of how readmissions are handled at a department/organization. Physicians might not be trained to ask the patient if they are ready to be discharged. Lack of skills can be considered as a result of the organization of care (organization department level care), but it can also be seen as related to human-care provider. Thus, readmissions can be caused at different levels of care. Failure on organization level (e.g. missed opportunity to train physicians) or care-provider level (lack of skills) are important to consider. In addition, it is also possible that failure on one level might be resolved by success on other levels. Each level must be considered in the study of readmissions.

The main point we are trying to make is that multiple causes of readmissions - in and beyond the hospital - play a role. All these causes should be assessed to capture the complex nature of readmissions and should be considered interdependently.

We added the following to the end of the Discussion:

“In addition, future research should take into account the interdependency of causes. For instance, when a patient gets readmitted due to a wrong assessment by a physician at discharge, this readmission might be a result of how readmissions are handled at a department/organization. Physicians might not be effectively trained to ask the patient if they are ready to be discharged. Lack of skills can be considered as a result of the organization of care (organization department level care), but it can also be seen as related to human-care provider. Thus, readmissions can be caused at different levels of care. Failure on organization level (e.g. missed opportunity to train physicians) or care-provider level (lack of skills) are important to consider. In addition, it is also possible that failure on one level might be resolved by success on other levels. Each level must be considered in the study of readmissions. Multiple causes of readmissions - in and beyond the hospital - play a role. All these causes should be assessed to capture the complex nature of readmissions and should be considered interdependently.”

Finally, I would like to see patient-centered language used instead of "non-compliance."

Answer: We changed the term non-compliance to non-adherence (page 10, 11 and 13).

Jenni Murray (Reviewer 2):

As the authors have clearly identified, the topic of avoidable and unplanned hospital readmissions is highly important and studies that seek to provide clarity on the causes should be
of value. However this paper fails to deliver in terms of both the methodology and therefore the conclusions.

My comments are as follows:

The introduction lacks key reference to support statements for lines 65 to 66 and 68. Specifically the statement regarding 25% of unplanned readmissions not being related to hospital care.

Answer: We would like to thank the reviewer for her comments. We added the references to the referred lines.

Lines 71, and lines 75-77 don't make sense.

Answer: We deleted line 71 and we amended line 75-77:

“The variation in different sets of causes used makes comparison between studies difficult. Comparison between studies is crucial to fully understand the complex nature of readmissions.”

Line 83 - please explain why studies using patient record review were used.

Answer: We selected studies that used patient record review because patient records contain extensive information that electronic prediction algorithms often fail to capture. As a result, electronic prediction algorithms tend to overestimate potentially preventable readmissions. We added this explanation to line 83, page 4:

“Previous studies demonstrated that health administrative databases often lack extensive information (e.g. functional status and social support) (6). Therefore, this review only included studies on unplanned readmissions which used patient record review.”

Methods

This is where the manuscript states to become very confusing. The 2017 review that they refer to is in figure 1a I think and it is labelled as 2018. Is the 2017 review published? Does the current review represent an offshoot of the earlier review i.e it does not have its own search strategy? I'm not clear on why the PRISMA for the earlier review is even reported here - it
doesn't make sense. Figure 1b states that the included studies were qualitative- do they mean observational? - only 12 of the identified studies included interviews with patients so I am assuming they don't mean qualitative. They do not mention study type as an inclusion criterion but according to the PRISMA that seems to be quite important. What actually worries me most is that the methods for identifying the both the studies on causes of readmissions and the intervention studies all derive from one search - this is not appropriate.

I’m not really sure why a figure is need to report the selection criteria - it seems excessive.

Answer: We can understand the confusion and we would like to explain the PRISMA flowchart. The current review includes studies that were previously selected for a previous review. This review focused on the assessment of preventability of readmissions. We decided to write a separate review on the causes of readmissions to discuss the causes in-depth. Thus, the reviewed studies (current and previous review) were selected using one search strategy.

We amended the PRISMA flow chart and have removed the paragraph on the interventions. The focus of the search strategy was the assessment of preventability and not interventions to reduce readmissions. We removed the intervention part from both the PRISMA flow chart as the body of the text.

Line 105 - The authors say that they aimed to explore the interventions which were proposed / developed by the authors (in the included studies). This is very unusual methodology for identifying intervention studies - this is not systematic, most likely not robust and is not shown in the PRISMA flow diagram.

Answer: We agree with this comment and we decided to remove the focus on intervention from the article.

Figure 1b reports that 22 studies were excluded - this should be 32.

Answer: We amended this mistake.

Table 2 - could the authors report the mean and age ranges of study populations and could they check that the final 2 columns for references 14 - 32, which are completely blank, are not just missing data.

Answer: We added ‘NA’ (not applicable) to the blank columns in Table 2.
12 studies reported conducting interviews with patients - it's not clear if this data was included in the current review.

Answer: We selected studies which used patient record reviews to assess preventability of readmissions. We reported which of the studies performed interviews in addition to patient record reviews. We found that interviews can provide additional information, however, the data (transcripts) of the interviews) was not available and thus not included in the current review.

We clarified this point in the following sentence (line 334, page 15):

“The transcripts were not available and therefore not included in this review. However, studies indicated that the use of interviews with patients and/or caregivers can provide additional information on factors beyond the hospital setting which cannot be found in medical records (80).”

The intervention section in the results - Unsurprisingly, because of the lack of robust methodology for this part of the study, the authors only refer to 5 studies. What they identify as 55 interventions are equally regarded as intervention components and if the authors had performed a dedicated search for this part of their review, they would have been awash with a sea of interventions, particularly relating to transitions, that aim to reduced (avoidable) readmissions. The limited data obtained by the authors make this part of the study almost pointless providing spurious conclusions that interventions lack details about the role of patients and community services.

Answer: We agree with this comment and we decided to remove the intervention section from the article. The focus of the search strategy was the assessment of preventability and not interventions to reduce readmissions. We removed the intervention part from both the PRISMA flow chart as the body of the text.

Line 257 - the authors say that all studies were conducted in the hospital. This is a finding that should be reported in the results section of the paper.

Answer: We agree with this comment and we added the following sentence to the Result section:

“The majority of the studies (64.4%) was conducted in the US and all studies were performed in a hospital setting (75.6% were monocenter studies).”
The authors state that the causes of readmissions depend on the context of the study…BUT all studies were conducted in the hospital so how can they therefore comment on the influence of the study context (setting)?

Answer: It is correct that all studies were conducted in the hospital setting, however, the study context is not only defined by the study setting. The study context is determined in many ways: the researchers determine which department/healthcare organization they include, how the patient mix is, who does the assessment on preventability and what is considered preventable.

We added this explanation to the ‘Key results compared to other studies’: The study context was determined in many ways: the inclusion of department/healthcare organization, patient mix, assessor of preventability, and definition of preventability were mainly determined by researchers.

Furthermore, we found that studies also included causes beyond the hospital setting. The inclusion of causes beyond the hospital setting emphasizes that unplanned readmissions are not a direct result of suboptimal care. This is also acknowledged by studies that include causes such as social support and frailty of patients.

Line 258 - ‘the last studies’ …which studies?

Answer: We added the references of these studies to the body of the text.

Line 258 - The authors state use the phrase ‘the majority of readmissions’. As far as I can tell the review doesn't provide data on rates of readmissions so how can they use this phrase.

Answer: In the next sentence we state that in 39 studies other factors than suboptimal care were considered as a cause for readmissions. We clarified this point by amending the sentence:

“The latter studies often identified other causes for readmissions in addition to hospital care (e.g. social support) “

Line 264 - this sentence doesn't make sense

Answer: We amended this sentence.

“We also found that factors such as self-management, social support, and type of healthcare organization can play a role. “
There are several words missing and grammatical errors in sentences throughout the manuscript.

Finally and unfortunately, I'm not really sure what this study adds to existing knowledge, We already know that unplanned hospital readmission are multifactorial and complex in cause and that causes can be due to post-discharge care and self-care.

Answer: We respectfully disagree with this comment. With this review, we want to emphasize the fact that studies differ in which causes they believe are important and whether or not they are preventable. The current use of different causes limits the opportunity to compare studies and to learn from unplanned readmissions. A shared vision on unplanned readmissions improves the uniformity and transparency on the causes of readmissions, and can thereby reduce readmission rates and improve patient safety.

To further emphasize this in the review, we amended the Conclusion section:

“In conclusion, we aimed to: (1) evaluate the range of causes for unplanned readmissions, and (2) present a cause classification framework for causes related to readmissions. The results show that the causes of readmissions used differ considerably among the studies. The current use of different causes limits the opportunity to compare studies and to learn from unplanned readmissions. A shared vision on unplanned readmissions is necessary to improve the uniformity and transparency on the causes of readmissions. This can be achieved by ordering all causes in the new cause classification framework based on the PRISMA cause classification. The new cause classification framework may contribute to the standardization of designing and conducting readmission studies, and the comparability of readmission studies. The findings of this review may help us to understand the complex nature of readmissions and emphasizes the importance of using a broad range of causes that may occur on the patient’s journey when examining unplanned readmissions. As described by the studies, unplanned readmissions can be caused by many factors at all levels of the health care system throughout all the phases of the patient journey.”