PEER REVIEW HISTORY

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ARTICLE DETAILS

TITLE (PROVISIONAL)	Benefits of medication charts provided at transitions of care - a narrative systematic review
AUTHORS	Dietrich, Fine; Hersberger, Kurt E; Arnet, Isabelle

VERSION 1 – REVIEW

REVIEWER	Rohan Elliott Austin Health, Australia; Monash University, Australia
REVIEW RETURNED	20-Apr-2020

GENERAL COMMENTS	This manuscript describes a systematic review of the literature on the benefits of documents described by the authors as 'medication charts'. Such charts are widely used in practice, so this review addresses an important research question that is very relevant to patients and health professionals. The review is well conducted, though it does have some limitations that have been noted by the authors. The most notable limitation is that they excluded studies that used electronic versions of 'medication charts'. Paper medication charts are still widely used in practice so the findings do remain very relevant, however electronic medication lists (e.g. via apps) are increasingly being utilised and therefore it is surprising that these studies were excluded. It might be helpful to add an explanation in the manuscript for why they were excluded. The manuscript is generally well written and clear, however there are some aspects that could be improved: 1. The term 'medication chart' is not clearly defined in the manuscript. This term will mean different things to different people in different countries, and may be easily misunderstood. For example, in Australia this term is commonly used to refer to paper charts on which medication administration orders are written in healthcare settings such as hospitals and nursing homes (i.e. they are used by health professionals to prescribe and record administration of medications). From what I understand of this manuscript, the term 'medication charts' actually refers to patient-held documents that list all of the patient's current medications. In Australia various terms are used to describe these, such as 'patient medication lists', 'medi-lists', 'patient-held medication lists' or 'patient-held medication charts'. Therefore it is important that the term 'medication charts' is defined or explained in the abstract and again early in the introduction section of the paper. Also, if the focus is on patient-held charts, it might be worth changing the title to 'Benefits of using patient-held medication charts.....' to

	distinguish these charts from documents held and used by health professionals. 2. Related to the above point, I note the inclusion of study 14 of which I was the primary author. This study explored the benefits of an aged care medication administration chart that was provided to patients on discharge from hospitals to nursing homes. This chart was provided for the purpose of allowing the nursing staff to administer and record medication administration after discharge from hospital. It was not a patient-held chart. Hence, whilst it was a chart that listed all of the patients' current medications, if the focus of this systematic review was patient-held charts then this study may not be eligible. This underscores the importance of clearly defining what is meant by 'medication chart'. 3. Page 4, line 10: indication is rarely included on medication labels in most countries. 4. Search strategy. Please explain why only a limited range of sources were searched. Why weren't other relevant databases included such as EMBASE, IPA and CINAHL, and why was the grey literature search limited to only German sources? This should be noted in the Discussion as a limitation. 5. Page 6. Please add details regarding how the titles and abstracts were screened, as required by the PRISMA checklist. Also please correct the page number specified in the checklist for this item. 6. Page 6, lines 20-26. Is this a validated method for categorising study quality from weak to strong? Please cite a reference if possible. 7. Page 7, lines 47-51. This data seems out of place here. Should it be under the 'Patient' subheading? 8. Page 8 (and elsewhere). What is meant by the term 'pedestrians' in the context of this research? 9. Results. When quantitative results are presented, especially as percentages, it is helpful to know the actual numbers, e.g. numerator/denominator (%). 10. Discussion, page 11, line 20 (paragraph 2). Rather than 'benefits', it might be more accurate to say 'potential benefits' or 'likely benefits'. 11. Discussion, page 11, line 39. Change 'authors' to 'studies'. 12. Discussion, page 11, line 54-56. It would be worth noting that the increase in adherence reported in the Results section for study 28 was not clinically significant (from 86% to 93%) even though it was statistically significant. 13. Discussion, page 14, line 10-11. Please provide a reference to support the statement that the US and Germany were among the first countries to promote and implement medication charts. I have not heard of this before. In Australia patient-held medication charts have been used for at least the last 30 years, although usage has become much more widespread in the last 15 years.

	14. Discussion. It is reported in the Results that medication charts are often inaccurate. It would be helpful to include more discussion around why this is the case and how it can be improved. 15. Conclusions. You have described the evidence for your findings as 'weak'. Whilst many of the included quantitative studies were low quality (meaning the quantitative findings are certainly weak), you also undertook a thorough qualitative analysis of all studies. I feel that the qualitative findings of your study may actually be more robust than the quantitative findings. 16. Conclusion, page 16, line 3. Clarify what is meant by the term 'experts' here. 17. Supplementary table C. The term 'medication p[an' and 'MP' is used in this table, which is not consistent with the terminology used in the manuscript. Please amend this.

VERSION 1 – AUTHOR RESPONSE

Reviewer 1 (Rohan Elliott, Austin Health, Australia; Monash University, Australia):

- Paper medication charts are still widely used in practice so the findings do remain very relevant, however electronic medication lists (e.g. via apps) are increasingly being utilised and therefore it is surprising that these studies were excluded. It might be helpful to add an explanation in the manuscript for why they were excluded.

OUR ANSWER: Thank you for this remark. We agree with the reviewer that electronic lists have been largely developed in the past years and are widely utilised. However, the content of a medication chart i.e., the medication list, will be identical for the paper and the electronic version. Our aim was to investigate the benefits of a medication chart per se, independently of a certain format. Thus, we selected paper-based lists only as they were the first to be developed and evaluated, and ignored the technical papers on the issues linked to electronic version. The following sentences were added to the methods section.

[Methods] Although electronic medication charts are increasingly being utilised, we have focused on the content and benefits of the chart rather than the method of transmission. Therefore, only articles that examine paper-based plans were included in this review.

1. The term 'medication chart' is not clearly defined in the manuscript. This term will mean different things to different people in different countries, and may be easily misunderstood. For example, in Australia this term is commonly used to refer to paper charts on which medication administration orders are written in healthcare settings such as hospitals and nursing homes (i.e. they are used by health professionals to prescribe and record administration of medications). From what I understand of this manuscript, the term 'medication charts' actually refers to patient-held documents that list all of the patient's current medications. In Australia various terms are used to describe these, such as 'patient medication lists', 'medi-lists', 'patient-held medication lists' or 'patient-held medication charts'. Therefore it is important that the term 'medication charts' is defined or explained in the abstract and again early in the introduction section of the paper. Also, if the focus is on patient-held charts, it might be worth changing the title to 'Benefits of using patient-held medication charts.....' to distinguish these charts from documents held and used by health professionals.

OUR ANSWER: Thank you for this comment that requires clarification. We omitted the definition of the term “medication charts” in the introduction section. Each country uses another term for the same document, and translation is problematic. Thus, we selected “medication chart” as the word “chart” suggests a more complex appearance of the document compared to a “list”. In our review, the “medication chart” is a document that lists all of the patient’s current medications and that will be used by both the patient and the healthcare professionals as source of information to refer to. Usually, healthcare professionals generate a current list according to a pre-set format made of columns and rows. The “medication chart” is not intended to record the administration of medications. We added a sentence in the introduction section that defines which document is meant.

[Introduction] In this review, a medication chart is a paper document that lists all of the patient’s current medications i.e., prescribed and over the counter medications. It is intended to be handed over to the patient as hardcopy and shared with healthcare professionals (e.g. doctors, nurses, physiotherapists, dentists) [3] Other terms are used in different countries such as medication schedule [4] or personal medication list [5].
… Our review aims to evaluate the benefits of medication charts for patients and healthcare providers in daily practice.

2. Related to the above point, I note the inclusion of study 14 of which I was the primary author. This study explored the benefits of an aged care medication administration chart that was provided to patients on discharge from hospitals to nursing homes. This chart was provided for the purpose of allowing the nursing staff to administer and record medication administration after discharge from hospital. It was not a patient-held chart. Hence, whilst it was a chart that listed all of the patients' current medications, if the focus of this systematic review was patient-held charts then this study may not be eligible. This underscores the importance of clearly defining what is meant by 'medication chart'.

OUR ANSWER: Thank you for this comment. In study 14, the medication chart is the medium to convey information about the current medications between hospital and nursing home. We consider nurses as healthcare professionals, This is in accordance with our definition (see number 1) and renders the study eligible for our review.

3. Page 4, line 10: indication is rarely included on medication labels in most countries.

OUR ANSWER: Thank you for this comment. We acknowledge that the indication is usually not available on a drug label. However, it may stand on medication packages. We have deleted "indication" and adapted the sentence as follows:

[Introduction] After filling their prescriptions, patients may receive written information such as product name, strength, dose frequency, and additional information that is required on dispensing labels that are affixed on medication or medication containers. Further information might be already present on the package such as indication, expiration date, or storage temperature.[2]

4. Search strategy. Please explain why only a limited range of sources were searched. Why weren't other relevant databases included such as EMBASE, IPA and CINAHL, and why was the grey literature search limited to only German sources? This should be noted in the Discussion as a limitation.

OUR ANSWER: Thank you for this comment. More than one database is recommended to ensure optimal coverage of the literature (REF: Rathbone J. Syst Rev. 2016; 5: 27. doi: 10.1186/s13643-016-0197-5). We adapted the recommendation of Bramer WM et al. (Ref Syst Rev. 2017; 6: 245. doi: 10.1186/s13643-017-0644-y) regarding the optimal database combination for literature searches. We

searched MEDLINE through PubMed because it is the largest online biomedical database. We searched Web of Science because it covers biomedical sciences with access to disparate resources such as books or conference proceedings. Further, PubMed and WoS search tagging information. We refrained from the special topic databases CINHAL and IPA because the primary topic of our review did not directly touch nursing sciences.

When we started our research, there was a lot of discussion about the German medication chart, especially among pharmacists, due to the media coverage of its development. The chart had just be included in the law and has been in the media ever since. Grey literature is a good source to catch the status of current and controversial topics. We are not aware of such media coverage about the introduction of a “medication plan” in other countries. Finally, we included the international WHO website to cover hype media in other countries than Germany. We included a statement in the limitations section.

[Discussion] Grey literature search was focused on German sources because at the time of our research, there was a political debate in Germany about the value of the recently introduced nationwide medication chart, leading to a hype media coverage.

5. Page 6. Please add details regarding how the titles and abstracts were screened, as required by the PRISMA checklist. Also please correct the page number specified in the checklist for this item.

OUR ANSWER: Thank you for this remark. We added a sentence about how we conducted the screening of titles and abstracts in the methods section “inclusion and exclusion criteria”. We updated the page number in the PRISMA checklist.

[Methods] All hits of the search were transferred to EndNote X9 and freed from duplicates. One author (FD) examined the titles of the papers and excluded irrelevant papers. The abstract of the remaining articles were then screened. A random selection of 10% of the hits were reviewed by a second author (IA) for quality verification. FD and IA independently reviewed the full text of the articles for final inclusion. Discrepancy was solved by discussion until consensus was obtained.

6. Page 6, lines 20-26. Is this a validated method for categorising study quality from weak to strong? Please cite a reference if possible.

OUR ANSWER: Thank you for the question. Yes, the tool has been validated for quality assessment of studies for systematic reviews. We added the corresponding paper as a new reference ([23] Thomas et al. 2004).

7. Page 7, lines 47-51. This data seems out of place here. Should it be under the 'Patient' subheading?

OUR ANSWER: Thank you for this comment that we are pleased to follow. We moved the sentences to the section ‘patient’.

8. Page 8 (and elsewhere). What is meant by the term 'pedestrians' in the context of this research?

OUR ANSWER: Thank you for this remark. We agree that the term “pedestrians” is unusual. It is the exact translation of the German term used in the reference 4 (Strauss et al. 2018). In this study, participants were recruited in the street in different German cities and defined as “any individual who was present in a curtain precinct and participated in a survey”. Because it was unclear whether participants were patients or healthcare providers, we grouped them in a separate population category. We changed the term to “citizens” which might be less ambiguous.

9. Results. When quantitative results are presented, especially as percentages, it is helpful to know the actual numbers, e.g. numerator/denominator (%).

OUR ANSWER: Thank you for this remark that we are happy to follow. We added the information numerator/denominator (%) where it was missing throughout the results section.

[Results] e.g. One study observed that only 6.5% (26/399) of the available charts were free of discrepancies.

10. Discussion, page 11, line 20 (paragraph 2). Rather than 'benefits', it might be more accurate to say 'potential benefits' or 'likely benefits'.

OUR ANSWER: Thank you for this remark. We added the term “potential” to the sentence as follows:

[Discussion] This study highlights a wide range and number of potential benefits when using medication charts ….

11. Discussion, page 11, line 39. Change 'authors' to 'studies'.

OUR ANSWER: Thank you for this remark that we are happy to accept. We changed the sentence as recommended.

[Discussion] Most statistically significant results were observed in the category “knowledge”, although its definitions varied considerably between studies.

12. Discussion, page 11, line 54-56. It would be worth noting that the increase in adherence reported in the Results section for study 28 was not clinically significant (from 86% to 93%) even though it was statistically significant.

OUR ANSWER: Thank you for the comment. We have added a statement about the adherence results accordingly.

[Discussion] Medication adherence, measured by pill counting increased from 86% to 93% for patients with a medication chart compared to patients without.[32] This assessment method has several advantages (e.g., cheap, easy, objective), and a main disadvantage that is, an empty pill bottle can fake a regular intake and is inclined to manipulation.[58] Nevertheless, a statistical significant increase was observed, but no clinical significance.

13. Discussion, page 14, line 10-11. Please provide a reference to support the statement that the US and Germany were among the first countries to promote and implement medication charts. I have not heard of this before. In Australia patient-held medication charts have been used for at least the last 30 years, although usage has become much more widespread in the last 15 years.

OUR ANSWER: Thank you for this comment. We recognize that our text was misleading. We cannot deduce from the literature which country has introduced medication charts at what time. However and to our knowledge, we observed that more articles on medication charts have been published from the US and Germany compared to other countries. We have adjusted the sentence accordingly.

[Discussion] However, as the USA and Germany were among the first countries to investigate medication charts and to publish their research, we suppose that the most relevant studies were retrieved.

14. Discussion. It is reported in the Results that medication charts are often inaccurate. It would be helpful to include more discussion around why this is the case and how it can be improved.

OUR ANSWER: Thank you for this remark that we are happy to follow. We have added the following paragraph in the discussion.

[Discussion] The percentage of accurate medication charts has been estimated at 6.5%.[49] Reasons for this alarmingly low rate include lacking information on over-the-counter medication; insufficient communication between different healthcare settings or multiple physicians; and no regular update of the medication chart.[15, 62] To reduce discrepancies, actions have been recommended such as regular medication reconciliations, and improving inter-professional communication as well as documentation of current medication. [15, 17, 62]

15. Conclusions. You have described the evidence for your findings as 'weak'. Whilst many of the included quantitative studies were low quality (meaning the quantitative findings are certainly weak), you also undertook a thorough qualitative analysis of all studies. I feel that the qualitative findings of your study may actually be more robust than the quantitative findings.

OUR ANSWER: Thank you for your positive comment that we highly appreciate. We adapted and included the following statements in the conclusion section and the discussions section “study quality”:

[Discussion, study quality] Whereas the results of the included quantitative studies were surely weak, the qualitative data that we analyzed in this review provides more robust evidence of our findings. Therefore, the evidence for the findings of our study can be claimed as moderate.

[Conclusion] Considering the overall weak study quality and the use of various data collection methods on one hand, and the more robust qualitative study results on the other hand, we claim that evidence of our finding is moderate.
… With our review, we were able to contribute moderate evidence to support this common sense.

16. Conclusion, page 16, line 3. Clarify what is meant by the term 'experts' here.

OUR ANSWER: Thank you for this comment. We deleted the term “experts” as there is no need to mention them.

17. Supplementary table C. The term 'medication p[an' and 'MP' is used in this table, which is not consistent with the terminology used in the manuscript. Please amend this.

OUR ANSWER: Thank you for this pertinent remark. The abbreviation MP stands for the German term “Medikationsplan”. We changed into “MC” for “medication chart”.

VERSION 2 – REVIEW

REVIEWER	Rohan Elliott Austin Health and Monash University, Australia
REVIEW RETURNED	03-Jul-2020

GENERAL COMMENTS	I believe the revised manuscript addresses most of the comments from my previous review. A few remaining issues for consideration follow: 1. I still find the title potentially ambiguous. The title should ideally make it clear that this study does not include 'medication administration charts' (commonly referred to as 'medication charts' in some countries). Perhaps the term 'patient medication charts' might be clearer, or 'medication charts provided at transitions of care' if that is when they were generally provided. 2. Abstract, paragraph 1, aim - consider adding "at transition points" if that is when the medication charts included in this review are generally provided. 3. Abstract, Methods, sentence 1 - The review wasn't conducted "in" 2 databases..... The databases (etc) were used to identify studies for the review. Please re-word. 4. Introduction - Start new paragraph at this point: "In this review, a medication chart is a paper document that ....." 5. Introduction - the new text "or shared with the healthcare provider" may be problematic because it may imply that the study also looked at discharge summaries, letters, etc, which may also include medication lists/charts. I don't believe your search would have captured these. I would suggest removing this phrase. 6. Introduction, aim - Amend "the benefits of medication charts..." to "the benefits of PAPER medication charts ...." to make it clear that electronic charts/apps were not part of this review. 7. Results - Thanks for adding samples sizes and denominators. I am not sure what the denominator "69" refers to with respect to the themes. Please make this clear. Also add the sample size / denominator for studies 32, 38 and 40 on page 9 where you have reports %'s only. 8. Results, page 9 - Make it clear that the setting for reference 37 study was discharge from hospital to nursing homes. End.

VERSION 2 – AUTHOR RESPONSE

Reviewer 1 (Rohan Elliott, Austin Health, Australia; Monash University, Australia):

1.	I still find the title potentially ambiguous. The title should ideally make it clear that this study does not include 'medication administration charts' (commonly referred to as 'medication charts' in some countries). Perhaps the term 'patient medication charts' might be clearer, or 'medication charts provided at transitions of care' if that is when they were generally provided. OUR ANSWER: Thank you for that remark, we agree that the title has to be clarified.

	[Title] *Benefits of medication charts provided at transitions of care - a narrative systematic review*
2.	Abstract, paragraph 1, aim - consider adding "at transition points" if that is when the medication charts included in this review are generally provided. OUR ANSWER: Thank you for that remark, we included the phrase as suggested. [Abstract, page 2, line 6] *We aimed to investigate any type of benefits associated with medication charts provided at transition points.*
3.	Abstract, Methods, sentence 1 - The review wasn't conducted "in" 2 databases..... The databases (etc) were used to identify studies for the review. Please re-word. OUR ANSWER: Thank you for this remark. We changed the wording of that sentence accordingly. [Abstract, page 2, line 8] *A systematic review according to PRISMA guidelines was performed. Two databases, 2 online journals and 2 association websites dedicated to biomedicine and pharmacy issues were consulted to identify studies for the review using the search term "medication chart" and synonyms.*
4.	Introduction - Start new paragraph at this point: "In this review, a medication chart is a paper document that ....." OUR ANSWER: Thank you for this comment that we are pleased to follow. We have inserted a paragraph before our definition of medication charts.
5.	Introduction - the new text "or shared with the healthcare provider" may be problematic because it may imply that the study also looked at discharge summaries, letters, etc, which may also include medication lists/charts. I don't believe your search would have captured these. I would suggest removing this phrase. OUR ANSWER: Thank you for that comment. We suspect a mistake in the wording "share". We added the phrase "at transitions of care" and deleted the phrase "shared with healthcare provider" in the introduction for clarity.

	[Introduction, page 4, line 10] *It is intended to be handed over to the patient as hardcopy and conveys information to healthcare professionals (e.g. doctors, nurses, physiotherapists, dentists) at transitions of care.* [Introduction, page 5, line 4] *Usually, a medication chart is distributed to the patient as a hardcopy at transitions of care.*
6.	Introduction, aim - Amend "the benefits of medication charts..." to "the benefits of PAPER medication charts ...." to make it clear that electronic charts/apps were not part of this review. OUR ANSWER: Thank you for this comment. We added the term “paper-based” to the sentence for clarity. [Introduction, page 5, line 10] *Our review aims to evaluate the benefits of paper-based medication charts for patients and healthcare providers in daily practice.*
7.	Results - Thanks for adding samples sizes and denominators. I am not sure what the denominator "69" refers to with respect to the themes. Please make this clear. Also add the sample size /denominator for studies 32, 38 and 40 on page 9 where you have reports %'s only. OUR ANSWER: Thank you for this remark that we are happy to follow. The denominator “69” refers to the total number of codes (= each mentioned benefit that we found in the included studies). We agree that this needs clarification and we adapted the following sentences for all three themes. We also added the missing information about numerator/denominator for the mentioned studies. [Results, page 8, line 21] *From the total 69 codes, 51 (74%) were assigned to the theme “Patient”. They concerned mainly ambulant/nursing home patients (23/51, 45%) and knowledge (18/51, 35%).* [Results, page 10, line 15] *From the total 69 codes, 13 (19%) were assigned to the theme “Process”. They were reported by the two populations “physicians/pharmacists/hospital” (…)*

	[Results, page 11, line 9] *From the total 69 codes, five (7%) were assigned to the theme "Terms and conditions", for example the possession of a medication chart (…)* [Results, page 9 line 3] *The increase in knowledge was reported by means of patients who answered all questions correctly as follows [intervention group vs. control group]: 83% (81/98) vs. 47% (47/99; p < 0.001),[32] 66% (48/73) vs. 35% (37/106; p < 0.001),[38] 60% (24/40) vs. 17.9% (5/28; p = 0.001),[41]. Similarly, using medication charts increased perceived knowledge (p = 0.049),[34] or was associated with the ability to provide correct information (OR 2.21).[46] Finally, the number of correctly answered questions increased by 23.2% (baseline 56/138; follow up 88/138) compared to the control group (baseline 55/126; follow up 58/126; p < 0.01).[33]*
8.	Results, page 9 - Make it clear that the setting for reference 37 study was discharge from hospital to nursing homes. OUR ANSWER: Thank you for this remark; we agree that this information should be added. [Results, page 9, line 16] *Another study measured a significant reduction of missed or delayed medication doses per patient after the implementation of a medication chart at discharge from hospital to nursing homes (from 37/202 [18.3%] missed or delayed doses, to 6/226 [2.7%], p < 0.001).[37]*

VERSION 3 – REVIEW

REVIEWER	Rohan Elliott Austin Health and Monash University, Australia
REVIEW RETURNED	15-Sep-2020

GENERAL COMMENTS	Thanks for addressing my comments. Just a couple of minor suggestions now: 1. The abstract doesn't mention that the review only included paper charts, so this should be added somewhere, perhaps in the objectives or methods section.

	2. Add "patients and" to this sentence in the main text introduction section, to ensure it is clear that the information in medication charts is usually also for patient use: "It is intended to be handed over to the patient as hardcopy and conveys information to PATIENTS AND healthcare professionals (e.g. doctors, nurses, physiotherapists, dentists) at transitions of care."

VERSION 3 – AUTHOR RESPONSE

Reviewer 1 (Rohan Elliott, Austin Health and Monash University, Australia):

1.The abstract doesn't mention that the review only included paper charts, so this should be added somewhere, perhaps in the objectives or methods section.

OUR ANSWER: Thank you for that remark, we included the word “paper” in the methods section of our abstract.

[Abstract, methods section] Studies of any study design, intervention, and population which examined the effect of paper-based medication charts were included.

2. Add "patients and" to this sentence in the main text introduction section, to ensure it is clear that the information in medication charts is usually also for patient use: "It is intended to be handed over to the patient as hardcopy and conveys information to PATIENTS AND healthcare professionals (e.g. doctors, nurses, physiotherapists, dentists) at transitions of care."

OUR ANSWER: Thank you for this comment; we adapted the sentence as suggested.