**Article: 2019-0054**

**Title:** Is there any rhyme or reason for why patients do or do not have incentives billed on their behalf: a retrospective cohort study

**Authors:** Kimberlyn McGrailPhD, M. Ruth Lavergne PhD, Megan Ahuja MPH, Seles Yung BSc, Sandra Peterson MSc

**Reviewer and comments**

**Raisa Deber —** University of Toronto, Institute of Health Policy, Management and Evaluation, Toronto, Ont.

The paper has some very interesting findings, but as written assumes that the readers have too much prior knowledge of the program and the key reforms desired. A brief description of the primary care incentive payments program would be helpful, including its goals, who is eligible, and the nature of the incentives. The paper talks about "patients" without making it clear how large a sub-group of the population of British Columbia is included; as such, the title and manuscript is somewhat misleading. It would also be helpful to clarify what is meant by a "population health management" approach, and how that is related to the use of the incentive payments.

As written the tables are also not as clear as they could be. It would also be helpful to clarify how many visits patients with and without incentives billed on their behalf actually make to primary care physicians, particularly if a key focus is continuity of care. A number of these patients seemed to make very high number of visits (100+), although it is not clear whether this was per year, or over the 4-year period. Do the authors have any data about their health conditions?

It would also help the interpretation to clarify whether it is inappropriate for physicians to bill incentives for the patients they see most, particularly if those patients are the ones most in need of improved care management.

With some clarification, this could be an excellent contribution to the literature.

**Richard Lewanczuk** — Department of Endocrinology, University of Alberta

This study has the potential to contribute in a significant manner to the understanding of this complex area at both a national and international level. Of particular importance, the data reported herein also has the potential to directly influence policy and practice. However, in order to achieve this goal, the paper will require major revision, which I would encourage the authors to consider. My specific comments are as follows:

Major

1. It is critically important to define and explain the incentives. What are they? Who gets them? What are the details? What are the criteria for receiving them? -In the paper, comments along the line of "...billed on behalf of the patient..." are made. This would imply that the patient receives money for achieving a target? Last time I was in B.C. and had discussions about this area, this didn't seem to be the case. Thus, it is critically important to better define and explain the incentives so that the readership understands the context of the paper.

2. The Introduction needs to set the context for the study. Currently, the Introduction comes across as either a re-phrasing of the abstract or a "mini paper" in its own regard. In other words, background, methods, results and conclusions are all given in the Introduction. If the paper is to achieve maximum potential and influence, I would suggest providing the BC background, including a thorough description of the incentive program, as well as national/international experience.

3. In order for this paper to achieve maximum value to the medical community, in the Discussion, it should clearly discuss and make conclusions based on the data analyzed (I am not implying that it doesn't do this to a degree). Then, it would be of great value to discuss factors not measured, which could influence the results - the authors may wish to consult or include a clinician with administrative experience in this aspect. The reason for this is that rather being mentioned in Limitations, such a discussion would drive further research in the area, which is of great importance to health care administrators and those involved at a systems level.

Minor

4. On page 5, paragraph 1, the authors should be cautious about their contention. While roughly 10-20% of Canadians report not having a regular primary care provider, depending on province, the large majority of people with chronic diseases do have a regular primary care provider. For example, in my province, 19% of people report that they do not having a family doctor, yet 96% of people with one or more chronic diseases do have a family doctor - it is the typically the young males who report no primary care provider. Thus one shouldn't generalize or speculate without a full understanding of the provincial context.

5. page 5, line 55 - For those not familiar with the B.C. system "assigned as a continuity provider' needs to be explained as does the justification for assignment to a particular provider. For example, in neighboring Alberta, there exist both a validated "four-cut" and "six-cut" methodology to determine attachment to a primary care provider based on administrative data.

6. I would recommend adding date of eligibility for the incentive as a variable. In our research, we have found that incentives are billed for those patients who newly quality (i.e. have just developed the chronic disease complex the makes them eligible) versus those with existing eligibility prior to the onset of the program. We found incentives were much more frequently billed for newly-eligible patients than for those who had pre-existing and managed chronic diseases.

7. In Tables 1 and 2, the "p" value is confusing. Is it meant to apply to the category overall (e.g. age) or is it meant to apply to results within the category (e.g. age 0-17)? If the former, then I would shift the value up one row. If the latter, I would be very explicit about this.

8. Table 2 should be re-titled as the current titling implies a "bill or did-no-bill" dichotomy.

9. Although physician age is used as a variable, would "years in practice" be an alternative or supplemental bit of information. I realize there is considerable overlap, but it depends on the question being asked: is one hypothesizing an age effect or an experience effect.

10. I am not sure all the data presented in Table 3 is necessary, particularly all the comparisons between physician contact numbers

**Nate N —** Università di Siena, of Physiopathology, Experimental Medicine and Public Health

Title: Fine.
Abstract: Fine, Study design is missing. Change interpretation with Conclusion.
Keywords: Missing or not required
Introduction:
It might be useful to explain better what kind of incentives you are considering and which doctors can bill the incentives;
The topics covered in the period from line 45 to 53 page 2 and from line 3 to 12 pag 3 could be part of the discussion.
Drop figure 1.
The aim: Fine.

Methods:
Study design is missing,
Some acronyms are not specified, at the row 3 page 4 the hash could be changed with the word number at the first time.
Some more details on the statistical methods should be provided.

Results: Fine

Discussion: Change Interpretation with discussion.
Fine but an in-depth study of the literature could be useful to understand if there are similar situations or possible further linkage of the results obtained.
I recommend to consider the following paper to expand the Discussion
D. Golinelli, F. Toscano, A. Bucci, J. Lenzi, M.P. Fantini, N. Nante, G. Messina “Health Expenditure and All-Cause Mortality in the ‘Galaxy? Of Italian Regional Helathcare Systems: A 15-Year Panel Data Analysis” Appl Health Econ Health Policy. 2017 Dec;15(6):773-783. Aimed to o examine whether and how per capita public healthcare expenditure (PHE) in the Italian regions was related to the all-cause mortality rate.

If expenditure on medical services and goods provided by public services is associated with a reduction in the very short-term mortality rate, we could assume that people without an incentive billed on their behalf not only have a different type of primary care but also a higher risk of mortality.
In addition it could be investigated whether patients with chronic diseases have been stratified by risk, so as to ensure proper assessment and identify which patients receive the incentives for the longest time;
It would be interesting to understand the reasons of the difference in incentives between males and females, in this regard I suggest reading the article
Quercioli C., Nisticò F., Messina G., Maccari M., Barducci M., Carriero G., Nante N. Gender differences in health expenditure determinants: A follow-up study. Health Care for Women International; 2018: 1-14,
that investigate if patients/physicians characteristics could differently affect males/females health expensive expenditure.

Conclusions: Fine but minor revision required.

References: Fine

**Author responses to reviewer comments**

| Reviewer comment from above | Author response | Location in paper |
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| A brief description of the primary care incentive payments program would be helpful, including its goals, who is eligible, and the nature of the incentives. The paper talks about "patients" without making it clear how large a sub-group of the population of British Columbia is included; as such, the title and manuscript is somewhat misleading. It would also be helpful to clarify what is meant by a "population health management" approach, and how that is related to the use of the incentive payments. | Thank you for these comments. Changes to the Introduction outlined above address the nature of incentives and we have tried to clarify that the entire cohort included in the analysis are eligible patients. “Population health management” is now described briefly and a reference has been added for further information. | Most changes in the Introduction, and then more information on population health management in the Interpretation section. |
| As written the tables are also not as clear as they could be. It would also be helpful to clarify how many visits patients with and without incentives billed on their behalf actually make to primary care physicians, particularly if a key focus is continuity of care. A number of these patients seemed to make very high number of visits (100+), although it is not clear whether this was per year, or over the 4 year period. Do the authors have any data about their health conditions? | | Tables are clarified, categories have been simplified, and we have indicated more clearly that visit numbers are over the four-year study period. |
| It would also help the interpretation to clarify whether it is inappropriate for physicians to bill incentives for the patients they see most, particularly if those patients are the ones most in need of improved care management. | This is not inappropriate for physicians to bill incentivise for patients they see most, but nor is it inappropriate for them to bill incentives for patients seen less often. The only criteria are eligibility based on diagnoses, and a commitment from physicians to provide longitudinal care and care management. | |

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| It is critically important to define and explain the incentives. What are they? Who gets them? What are the details? What are the criteria for receiving them? -In the paper, comments along the line of "...billed on behalf of the patient..." are made. This would imply that the patient receives money for achieving a target? Last time I was in B.C. and had discussions about this area, this didn't seem to be the case. Thus, it is critically important to better define and explain the incentives so that the readership understands the context of the paper. | | Changes to the Introduction and then minor wording changing throughout the paper we hope addresses this comment. |
| The Introduction needs to set the context for the study. Currently, the Introduction comes across as either a re-phrasing of the abstract or a "mini paper" in its own regard. In other words, background, methods, results and conclusions are all given in the Introduction. If the paper is to achieve maximum potential and influence, I would suggest providing the BC background, including a thorough description of the incentive program, as well as national/international experience. | | The Introduction was re-written and we hope addresses these concerns as well as possible within the word constraints of the paper. |
| In order for this paper to achieve maximum value to the medical community, in the Discussion, it should clearly discuss and make conclusions based on the data analyzed (I am not implying that it doesn't do this to a degree). Then, it would be of great value to discuss factors not measured, which could influence the results - the authors may wish to consult or include a clinician with administrative experience in this aspect. The reason for this is that rather being mentioned in Limitations, such a discussion would drive further research in the area, which is of great importance to health care administrators and those involved at a systems level. | We have had several discussions with clinicians throughout paper development, including those involved in developing the incentive program. We hope that changes to the interpretation section help to address this comment. | Changes in the Interpretation section are the most pertinent. |
| On page 5, paragraph 1, the authors should be cautious about their contention. While roughly 10-20% of Canadians report not having a regular primary care provider, depending on province, the large majority of people with | We agree that not all Canadian who report not having a regular provider of care are actually searching for one. Given other changes in the Introduction, we decided this statistic may be distracting and have edited accordingly. | The Introduction is re-written, as noted above. |

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| chronic diseases do have a regular primary care provider. For example, in my province, 19% of people report that they do not having a family doctor, yet 96% of people with one or more chronic diseases do have a family doctor - it is the typically the young males who report no primary care provider. Thus one shouldn't generalize or speculate without a full understanding of the provincial context. | | |
| page 5, line 55 - For those not familiar with the B.C. system "assigned as a continuity provider' needs to be explained as does the justification for assignment to a particular provider. For example, in neighboring Alberta, there exist both a validated "four-cut" and "six-cut" methodology to determine attachment to a primary care provider based on administrative data. | We have added information indicating this is consistent with previous analyses. | A small bit of text and two references added to the Methods section. |
| I would recommend adding date of eligibility for the incentive as a variable. In our research, we have found that incentives are billed for those patients who newly quality (i.e. have just developed the chronic disease complex the makes them eligible) versus those with existing eligibility prior to the onset of the program. We found incentives were much more frequently billed for newly-eligible patients than for those who had pre-existing and managed chronic diseases. | Thank you for this suggestion – this has been done, as noted above in response to the Editors. | Variable added to methods and relevant tables in the results section. |
| In Tables 1 and 2, the "p" value is confusing. Is it meant to apply to the category overall (e.g. age) or is it meant to apply to results within the category (e.g. age 0-17)? If the former, then I would shift the value up one row. If the latter, I would be very explicit about this. | We have modified statistical testing to report standardized differences, as suggested by the Editors. | Tables are updated. |
| Table 2 should be re-titled as the current titling implies a "bill or did-no-bill" dichotomy. | | Table titles adjusted. |
| Although physician age is used as a variable, would "years in practice" be an alternative or supplemental bit of information. I realize there is considerable overlap, but it depends on the question being asked: is one hypothesizing an age effect or an experience effect. | We did not have access to this variable so were unable to make this adjustment. Previous analyses, however, have indicated that physician age vs. years in practice are highly collinear and generally using one or the other does not alter analytic outcomes. | |

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| I am not sure all the data presented in Table 3 is necessary, particularly all the comparisons between physician contact numbers. | We have used more parsimonious categories after sensitivity testing suggested by the Editors. | |
| Abstract: Fine, Study design is missing.<br><br>Methods: Study design is missing. | This is now added. | Change to Abstract an in the text of the main body of the paper. |
| It might be useful to explain better what kind of incentives you are considering and which doctors can bill the incentives.<br><br>The topics covered in the period from line 45 to 53 page 2 and from line 3 to 12 pag 3 could be part of the discussion. | Changes to the Introduction were intended to address this. | |
| Drop figure 1. | We feel that Figure 1 offers readers important contextual information for the analysis, but are happy to remove this if the Editors agree. | |
| Some acronyms are not specified, at the row 3 page 4 the hash could be changed with the word number at the first time. | We have addressed acronyms. | |
| Some more details on the statistical methods should be provided. | This has been expanded. | Methods. |
| Fine but an in-depth study of the literature could be useful to understand if there are similar situations or possible further linkage of the results obtained. | We have tried to modify the Interpretation in line with other comments and within the word limits. | |
| I recommend to consider the following paper to expand the Discussion<br>D. Golinelli, F. Toscano, A. Bucci, J. Lenzi, M.P. Fantini, N. Nante, G. Messina “Health Expenditure and All-Cause Mortality in the ‘Galaxy? Of Italian Regional Helathcare Systems: A 15-Year Panel Data Analysis” Appl Health Econ Health Policy. 2017 Dec;15(6):773-783. Aimed to o examine whether and how per capita public healthcare expenditure (PHE) in the Italian regions was related to the all-cause mortality rate.<br><br>If expenditure on medical services and goods provided by public services is associated with a reduction in the very short-term mortality rate, we could assume that people without an incentive billed on their behalf not only have a different type of primary care but also a higher risk of mortality. | Thank you for pointing us to this paper. This is an interesting analysis, but we feel the intent of the analysis and focus on mortality make it not directly relevant to the intent of our paper. We agree that in a longer discussion we could tie incentive payments to overall public health spending, but have not been able to find a way to incorporate this into the Interpretation section here given word limits. | |

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| In addition it could be investigated whether patients with chronic diseases have been stratified by risk, so as to ensure proper assessment and identify which patients receive the incentives for the longest time; | This was why we adjusted for the number of incentivized-conditions for which people were eligible (as this is an indication of complexity) and why we compared the incentives in all four years group to those who did not receive incentives. | We hope changes to the text, particularly in the Interpretation section, help to address this comment. |
| It would be interesting to understand the reasons of the difference in incentives between males and females, in this regard I suggest reading the article Quercioli C., Nisticò F., Messina G., Maccari M., Barducci M., Carriero G., Nante N. Gender differences in health expenditure determinants: A follow-up study. Health Care for Women International; 2018: 1-14, that investigate if patients/physicians characteristics could differently affect males/females health expensive expenditure. | Thank you for this pointer. We have tried to expand discussion of this issue as suggested by the Editors. | |