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Title: Continuity of physician care over the last year of life in different cause of death categories: a retrospective population-based study

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Reviewer 1

General comments (author response in bold)

This retrospective, descriptive study aimed to examine continuity of outpatient physician care in the last year of life across differing end of life trajectories and those factors associated with higher degrees of continuity with the aim of examining the utility of currently used continuity of care indices.

The study reporting conforms to STROBE criteria.

1. Abstract: my only comment regarding the abstract might be that the interpretation could be strengthened, given the limited utility of current continuity of care measures

As per similar comments from the editor, we have revised the conclusion of the abstract as follows:

“Continuity of physician care in the last year of life is low, especially in those dying of cancer. Further research is needed to validate measures of continuity against EOL healthcare outcomes.”

2. Introduction: this well written introduction makes the case for continuity of care towards the end of life and correctly notes that this is often disrupted in end-of-life scenarios. The only point I would make here is that the utility of geriatrician care is not mentioned (entirely a personal comment, given my specialty, but geriatrician care for older adults can often reduce the need for multiple specialist care thus enhancing continuity and quality of care). The research question is well articulated

Thank you for this suggestion, we agree it would be important to investigate this aspect of continuity in our next stage of research. While geriatricians would have been included, we did not specifically investigate this type of specialty. We have added a comment on this in the Interpretation (Pg 13, para 1):

“The relative lack of access to palliative care physicians and other specialists such as geriatricians in rural areas compared to urban areas⁵⁴⁻⁵⁶ may decrease the likelihood of receiving care from multiple physicians in outpatient settings.”

Methods:

3. Please could the authors give justification for exclusion of those living in long term care?

We agree this is an important concern. We restricted our population of interest for this analysis to decedents who remained in the community because the model of physician care in long-term care institutions is different than in the community in Ontario. The involvement of different physicians is largely determined by the physician or group of physicians employed by the home. A previous study in the same province found that only 12% of people were seen by their previous family physician after admission to long-term care. We felt that a separate study would be warranted for this population, because the opportunity for continuity is

different in long-term care. We have added this limitation, Interpretation (Pg 14, para 2):

“The study was based on decedents who were never admitted to a long-term care home in the last year of life, as access to a variety of physicians, and hence continuity, is mainly determined by the institution that contracts the physicians. Continuity may be higher in this group after entry to a long-term care home.”

4. Given the increasing use of alternative relationship plans for physician remuneration, what is the impact of these relationships upon the utility of physician billing claims in Ontario? is a meaningful proportion of clinical activity missed by using these data or do members of alternative relationship plans “shadow bill”, as in some other provinces?

This is correct, nearly half of family physicians in Ontario are remunerated through capitation (rostering of patients) and some specialists are remunerated by salary-type alternative payment arrangements, although shadow billing is required and is financially incentivized. Methods (Pg 7, para 2):

“Shadow billings are submitted by physicians paid through alternative funding arrangements.”

5. Otherwise, the methods and analysis plans seem appropriate for the data. Please could the authors give a comment on the quality of data and the proportions of missing data, once exclusions had been applied? How was this handled?

We have changed Table 1 to indicate where there was missing data for socio-demographic characteristics among the study population. We have added a sentence in the statistical methods to note that cases with missing data were excluded from the regression models (Pg 9, para 3):

“All prespecified variables were included in the model and anyone with missing data was excluded.”

6. Pedantic comment: Data are plural.

We have corrected the grammar where necessary.

Results: A well written section with combination of text and tables. The results are comprehensive and easy to read.

Thank you.

Interpretation:

7. The authors correctly note that continuity maybe specialty specific rather than provider specific. Many palliative care services use other care providers in addition to physician services. this may well have an impact on specialist palliative care “continuity”. **We agree it is important to consider the team-based care aspect of palliative care in interpreting continuity.**

8. The authors note that the relative lack of access to specialist primary care in rural areas may result in less ability to receive care from multiple outpatient physicians, but they probably note that this relative lack of access extends to specialized physicians in general rather than just those involved in palliation.

We have changed the sentence and citations to include specialists in general and have added a citation (Pg 13, para 1):

“The relative lack of access to palliative care physicians and other medical specialists in rural areas compared to urban areas may result in less ability to receive care from multiple physicians in outpatient settings.”

9. Care by family physicians may well increase in association with advancing age and number of comorbidities because of the increased burden of care associated with such multiple specialist visits, particularly as a palliative approach to care becomes more relevant (rather than specialist, palliative care).

We have added this to the relevant sentence (Pg 13, para 1):

“Previous research has shown care by family physicians increases relative to specialists with advancing age and comorbidities²⁹ and family physicians may also implement a palliative approach themselves rather than referring to a palliative care specialist, which may partially explain the greater continuity in older decedents.”

10. The authors have considered the limitations of the study appropriately but the exclusion of older adults in long term care settings remains an additional limitation.

We have now noted this as a limitation in the relevant paragraph in Interpretation Pg 13, para 2):

“The study was based on decedents who were never admitted to a long-term care home in the last year of life, as access to a variety of physicians, and hence continuity, is mainly determined by the institution that contracts the physicians. Continuity may be higher in this group after entry to a long-term care home.”

11. The authors appeared to be focused upon the provision of palliative care, and rightly note that a minority of individuals receive such care at end of life. However, the paper has mostly theoretical application given its thrust on definitions of continuity of care and the utility of current indices.

We acknowledge that this manuscript is a theoretical application of existing continuity of care indices for the end of life. However, we have discussed the pragmatic consequences of our findings. In addition, we will continue our work in adapting these continuity of care measures for the end-of-life period in future work.

Reviewer 2: Prof. Heiner Berthold

Institution: Bielefeld Evangelical Hospital

General comments (author response in bold)

Categorizing end-of-life-trajectories (terminal illness, organ failure, frailty etc.) from an administrative database is difficult. The trajectories may overlap or even change during last months of life. Can you please elaborate on this methodological problem?

The authors who created the groupings have addressed this in their process, as follows: The researchers conducted a modified Delphi process consisting of literature review (of studies describing clinically and functionally different end-of-life trajectories), expert opinion, and cluster analysis to obtain consensus on which causes of death corresponded to the trajectories. The trajectory definitions demonstrated discriminant validity in that they were significantly different from each other in terms of healthcare utilization costs and they predicted initiation and intensity of palliative care services.

Due to word limitations in the current paper we referred to previous publications describing this. We have also changed the wording of trajectory throughout the paper to 'cause of death category', as a similar point was raised by the editors. We have changed the description to note this in Methods (Pg 9, para 1):

"Codes for cause of death information used in this algorithm was captured through the Ontario Registrar General – Deaths database, which includes the exclusive primary cause of death documented on the decedents' death certificate."

Fassbender K, Fainsinger RL, Carson M, Finegan BA. Cost trajectories at the end of life: the Canadian experience. *J Pain Symptom Manage*. 2009;38:75-80.

Canadian Institute for Health Information (CIHI). Health care use at the end of life in Atlantic Canada. Ottawa 2011.

Seow H, O'Leary E, Perez R, Tanuseputro P. Access to palliative care by disease trajectory: a population-based cohort of Ontario decedents. *BMJ Open*. 2018;8:e021147.