| Article details: 2018-0026 | |
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| Title | Organ donation by trauma and non-trauma patients in a Canadian province: a retrospective analysis |
| Authors | Sara Lanteigne MD(candidate 2020), Mete Erdogan PhD, Alexandra Hetherington MD(candidate 2020), Adam Cameron MD(candidate 2020), Stephen D. Beed MD, Robert S. Green MD |
| **Reviewer 1** | Katrina Bramstedt |
| Institution | Bond University School of Medicine, Queensland, Australia |
| General comments (author response in bold) | Comments to the Author<br>1. Page 6 lines 6-8, "Organ transplantation is the only therapeutic option for patients with terminal organ failure" is not entirely true as destination VAD therapy works in the cardiac setting. Dialysis is a therapeutic option for pts with ESRD, though not the best option. Rewording of your thoughts is needed for accuracy.<br>**We have reworded the first sentence of the Introduction section (page 3) as shown below:**<br>**Organ transplantation is the best therapeutic option for patients with terminal organ failure; however, the supply of solid organs remains inadequate to meet demands.[1-3]**<br><br>2. 20% of families vetoed registered consent-- this is shocking and ethically problematic. This needs more stress in the paper. Consider also this ref: https://www.ncbi.nlm.nih.gov/pubmed/23402483<br>**We agree with the Reviewer. We have revised the Interpretation section (page 9) to add a sentence regarding this issue without editorializing it too much:**<br>**While most did not donate due to medical unsuitability or missed referral, 20% of these patients ultimately failed to donate because their families refused consent. This is ethically problematic and constitutes a double standard in terms of the principle of substituted judgement (i.e., the surrogate's duty).[21]**<br>**We have also added the reference suggested by the Reviewer (Bramstedt et al., now reference #21) and renumbered the subsequent references appropriately.**<br><br>3. Is there a problem with DCD refusal by doctors or hospitals (page 13, line 22), for example, http://www.bioethica-forum.ch/docs/16_1/07_Bramstedt_BF9_1.pdf Why is their low uptake of DCD as a practice?<br>**In our group, DCD uptake is not low at all. About 25% of our donors have been DCD and last year it was 50%, substantially higher than most programs. We are limited here by logistics more than anything else regarding DCD. Transplant resources are severely stretched so providing DCD outside of Halifax has been as issue which we are working on. We cannot comment on why there may be low uptake of DCD as a practice at other institutions.**<br><br>4. Missed referrals are also a problem for other countries like Australia, who don't have laws which require referrals and have severe consequences when referrals are not met. Could this also be a solution for Canada? It is very easy to be too tired or uninterested to make a referral -- it is harder to NOT make that referral when the law forces you to do it. This should be discussed with the USA as benchmark.<br>**We agree with the Reviewer that mandatory referrals is a useful strategy for minimizing the number of missed referrals. Health officials in Canada have credited a 23% increase in overall donations over the past 10 years in part to a focus in some provinces on mandatory referrals for transplants. Although Nova Scotia is the provincial leader when it comes to donation rates at 21.2 donors per million population, we do not have mandatory referrals of potential organ donors in our province. At present, there is a "required request" which is an expectation that health professionals are required to advise potential donors about organ donation. We have revised the Interpretation section (page 10) to include the topic of mandatory referrals as shown below (in the interest of keeping the manuscript word count below 2500 words, we have limited this to Canada rather than using the USA as a benchmark as suggested by the Reviewer):**<br>**Legislating the mandatory referral of potential donors may reduce the number of missed referrals. Canadian health officials credit a 23% increase in donations over the past decade in part to mandatory referrals for transplants in some provinces.2 While Nova Scotia does not have mandatory referrals, there is "required request" which is an expectation that health professionals are required to advise potential donors about organ donation. Having all provinces implement mandatory referrals could further increase overall donation rates.** |
| **Reviewer 2** | Sean Keenan |
| Institution | Vancouver, BC |
| General comments (author response in bold) | Comments to the Author<br>I appreciated the opportunity to review the manuscript by Lanteigne and co-authors. It is very important to the Canadian community of donation physicians and co-ordinators to have Canadian data to describe donation practice in our nation.<br>I have some suggestions for the authors to consider to potentially improve their manuscript. I will proceed through the manuscript beginning with the abstract.<br><br>Abstract<br>Perhaps it's just me but I don't think organ donation needs abbreviation and OD is so more commonly used for overdose that the general readership may be distracted by this. Not a big point.<br>**We have removed all non-standard abbreviations from the manuscript.**<br><br>In the final sentence of the results there appear to be some discrepancies between numbers in the abstract, Figure1 and Table 3. Specifically 28/60 family refusal consistent with Table 3 but Figure 1 has 26 ... I suspect the other two may be the family withdrawal of consent in a separate box ... somehow need to tie this together. Also 18/60 medical unsuitability compares with 16 in Fig 1 and 23 in table 3. I recognize that Table 3 includes timed-out DCD but important to not mix definitions ... would not include DCD timed-out with medical unsuitability myself but the important thing is to be consistent. The major challenge I faced as a reader was following the numbers. Figure 1 is very helpful but will make suggestion later on further clarification. Data is important but tough on a reader if they have to get out pen and paper to try to add things up.<br>**As suggested by Reviewer #2 (as well as by Reviewers #3 and #4), we have not included patients who did not expire within the time frame allotted as being "medically unsuitable". Furthermore, to make it easy on the reader and to adhere to the privacy policy of the NS Department of Health and Wellness to suppress cell sizes less than 5, we have revised Figure 1 such that we report the number of trauma patients (n = 28) whose families refused consent all together (rather than reporting that n < 5 withdrew consent later) and we report the number of nontrauma patients (n = 58) found to be medically unsuitable all together (rather than reporting that n < 5 were later found to be medically unsuitable). Thus, readers have access to more data without violating the privacy policy. We have made the appropriate changes in the Abstract (page 2), in the Results section (page 8), and in Figure 1.** |

In Interpretation I wonder what you think is the most important point to make to the Canadian reader? Not sure conversion rates are nearly as interesting as the concern about potential missed donors. Would move this up front although there are limitations in conclusions drawn here.
**We have revised the Interpretation section of the Abstract (page 2) to highlight the potential missed donors, as shown below:**
**In Nova Scotia, 40% of trauma patients who died in hospital were potential organ donors, yet only 39% of these patients were referred for donation. More work is required to improve organ donation within the trauma population.**

Introduction
Need to clarify why you conducted this study and the clear question you were addressing.
First paragraph is fine although I think I would pull the sentence in para 2 referencing Canada to other nations into para 1. This first paragraph lays out the need for transplantation and the ongoing shortage. Would focus this para on current shortfall, despite improved numbers of donations and potential to improve as demonstrated by others.
**As suggested by the Reviewer, we have moved the sentence in paragraph 2 referencing Canada and other countries to the first paragraph of the Introduction section (page 3).**

Consider focusing the second paragraph on trauma as that is the focus of the paper.
**As suggested, paragraph 2 of the Introduction (page 3) has been revised to focus more on the trauma population.**

While you have to watch your word limit the rationale for this study is not as clear to the naive reader. Ask yourself why each objective is important and ensure prior to that you've built a rationale for having these objectives. Better understanding epidemiology is not of as great interest to the reader as being informed how this will help patients in the end. Reference is made to physicians having important roles but this is not tied in well with objectives. Perhaps adding "To aid physicians caring for severe trauma patients to better recognize potential organ donors our objective were ..."
The first and third objective follow this well.
The second objective has to have a separate rationale built for it. The entire introduction until this point focuses on the importance of understanding trauma patients. While non-trauma patients do provide important information this objective appears to be dropped in here without much introduction. Do the authors feel that trauma patients differ from non-trauma patients in such a way that identification, consent and conversion rates may differ? Can you add this in rationale to compare the two? I think it is important to include both and some interesting findings related to this.
**We have revised the second paragraph of the Introduction (page 3) to better present the rationale for the study objectives.**

Methods
Study design and population
Would suggest "We conducted a retrospective cohort study ....
**We have made this change as suggested in the Methods section (page 3).**

Data sources
Can the authors add a bit more information on the LLDR. Specifically, in regards to the death audits of charts addition to the database. Are these province-wide or restricted to specific sites. Death audits are very timing consuming and therefore challenging to maintain in some places. The accuracy of potential organ donor numbers depend on these being consistent and need to understand what the denominator is ... all deaths in Nova Scotia in hospitals or only selected ones.
**The death audits referred to by the Reviewer are conducted province-wide. We have revised the Methods section (pages 4, 5) to clarify this point, as shown below:**
**The program maintains the Legacy of Life Donor Registry which contains data on potential organ donors from across the province who were transferred to the Queen Elizabeth II Health Science Centre in Halifax, as well as information on potential organ donors who were not referred to the program as determined through retrospective province-wide death audits.**
**We have also clarified the Methods section (page 4) to describe where the data in the Nova Scotia Trauma Registry is collected from, as shown below:**
**Data is collected from all regional hospitals and tertiary care centres and from the Nova Scotia Medical Examiner Service.**

I do not have any concerns with the rest of the methods as stated but would ask the authors to add why they looked at conversion and consent rates over time as well as number of trauma and non-trauma donors. There is no reference to this in the methods or a suggestion why in the introduction. A challenge when working with databases is to report what you can find. However, it can confuse the reader when no rationale has be built for why these are being presented prior to reference to Figure 2 in the last sentence of para 3 in the results. Did the authors expect differences in any of these over time? If so, please build this into the introduction and methods to prepare the reader and consider its own para in results. If not, maybe exclude it?
**We have removed Figure 2 from the manuscript as it does not directly relate to our study objectives and in the interest of reducing the word count.**

Results
I would strongly suggest that the authors change their second para somewhat. Perhaps one of the most important, if not the most important finding reported is the missed potential organ donors among the trauma population. Using the very sensitive but unfortunately less specific definition for their NSTR potential donors they note that 274 or 40% meet this criteria. I would suggest that before they go on to describe how these differ from non PODs they note the gap between the 274 POD and the 108 referred to LLDR. 60% of POD were not referred to LLDR. Clearly this is huge and there are issues with the definition of POD in the NSTR that should be discussed that will suggest the gap is not this big but still it is a striking finding that should be laid out in the results to prepare for discussion in the conclusions.
**To address this comment from the Reviewer, we have revised Table 1 to include additional data on the characteristics of trauma patients who were or were not referred to the Legacy of Life Program. These characteristics have been compared for differences using parametric or nonparametric tests as appropriate. We have revised the second paragraph of the Results section (pages 7, 8) to focus more on the characteristics of trauma patients who were not referred to the Legacy of Life Program, as shown below:**
**The Nova Scotia Trauma Registry definition of a potential donor was met by 40% (274/689) of in-hospital trauma deaths, yet only 39% (108/274) of these potential donors were referred to the Legacy of Life Program (Table 1). Potential donors not referred were older and less severely injured than those who were referred. Nearly all referred patients (94%; 102/108) died at the Queen Elizabeth II Health Science Centre, while a third of potential donors who**

**were not referred passed away at another institution. There were differences in injury type, injury cause, International Classification of Disease External Cause of Injury Codes, number of intermediate facilities, transport mode, and trauma team activation between both referred versus non-referred potential donors and between potential donors versus non-potential donors.**

In para 3 suggestion that consent rates be presented before conversion rates as that is the order the occur ... first consent, then conversion.
**We have made the change as suggested by the Reviewer (page 8).**

Last sentence needs to be reconsidered regarding place in this manuscript. What does it add, need rationale for why conversion rate would be expected to differ over time.
**We agree with the Reviewer that our Figure 2 does not add substantially to this manuscript. We have decided to remove Figure 2.**

In last para, would suggest that you reconsider your definition for medically unsuitable as timed out DCD are not considered as such by other centres and your definition seems to exclude them in some places and includes them in others ... Abstract, results text, figure 1 and table 3.
**We have removed DCD patients who timed out from the category "medically unsuitable".**

Would suggest that you reconsider approach to MSI card signing and outcomes. This is certainly of interest but also appears in the results section (similar to Figure 2 and text related to it) with no reference to this specifically in introduction or methods. Introductions necessarily are more brief and less specific but methods should include this sub analysis on registered donors. Please add to methods and think how this is related to your objectives in a clear fashion. I would have this as a separate para in the results especially as it makes up the majority of the longest para in the discussion.
**We have revised the Methods section (page 7) to mention the subgroup analysis performed on patients who had signed their MSI card, as shown below:**
**We performed subgroup analysis of organ donation among patients who indicated their intent to donate by signing their health card.**
**We have also revised the Results section (pages 8, 9) to have a separate paragraph on this subgroup analysis.**

Discussion

Para 1
Agree the most interesting finding is that identified in the first para. Would explore it more including the lack of referral of the majority of the 40% to the OPO. Should discuss the definition used for PODs and how this sensitive but not very specific definition likely significantly exaggerates the number of PODs. While discussion of limitations often takes place later in the discussion to discuss this important finding in the first paragraph is necessary. In addition, this finding needs to be placed in context with the literature on missed opportunities comparing and contrasting results with this study.
**We have revised the 1st paragraph of the Interpretation section (page 9) to mention the lack of referral of the majority of the 40% to the OPO, as well as the definition of a POD and the limitations of using that definition, as shown below: Of all trauma-related deaths in provincial hospitals, 40% met our broad definition of a potential donor and 39% of these potential donors were referred to the Legacy of Life Program. Potential donors who were not referred were older and less severely injured than referred patients. Conversion rates were 84% for both trauma and non-trauma patients. Overall, trauma victims accounted for over one third of organ donors in the province. Although the definition we used may have exaggerated the number of potential organ donors in the province, our findings still suggest that trauma patients represent a significant pool of potential donors and that increased efforts should be considered to improve referrals and donations from this population.**

Second paragraph
I don't know if I agree with the first sentence without better context. If we were to believe that 60% of PODs in trauma are not even referred to the OPO [(274-108)/274] then this is the biggest factor. Clearly this is a significant overestimate of non-referral of true PODs. The statement therefore needs to be qualified as follows "Among trauma patients referred to LLDR for potential donation, family refusal .... "
**We have revised the first sentence in the second paragraph of the Interpretation section (page 9) as recommended by the Reviewer.**

The third paragraph starts with a statement that is not derived from the study and continues into further sentences that are hard for the reader to understand relevance to the study, including reference to eCPR. Perhaps starting with a statement more directly related to the study findings such as "PODs among the trauma population were more acutely ill than non-PODs and yet were often not referred to the OPO. The necessary focus on patient resuscitation in hopes of a better outcome in the initial hours or days of these patients care may in part explain this ... " Just a suggestion. There may be collateral literature to support this.
**We have revised the start of the third paragraph in the Interpretation section (page 10) as suggested by the Reviewer.**

Para 4 of limitations should include all those identified. It is likely that the PODs identified were a definite overestimate, the question is by how much.

**We have revised paragraph 4 of the Interpretation section (page 10) as shown below:**
**Another limitation is the criteria used to identify potential donors in the Nova Scotia Trauma Registry which we based on recommendations from the Canadian Blood Services Deceased Donor Data Working Group. While the group recommended ventilation within 24 hours of death as a criterion, the Nova Scotia Trauma Registry only captures if a patient required ventilation at any time during hospital stay; thus, we likely overestimated the number of potential donors identified in the Nova Scotia Trauma Registry.**

Final paragraph. The first sentence needs to be qualified as the definition of PODs used here is recognized as not being very specific. As it stands it likely overstates the number significantly. It would be useful for the authors to contact the originators of this definition to inquire whether they have subsequently determined how much this may overestimate the true number of PODs.
**We have revised the final paragraph of the Interpretation section (page 11) as shown below:**
**In summary, using a broad definition of a potential organ donor, we found that 40% of trauma patients who died in Nova Scotia hospitals were potential donors, yet only 39% of these patients were referred to the Legacy of Life Program. Among potential donors who were referred, the most common reasons for non-donation were family refusal**

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| | **and medical unsuitability. Further work is required to improve organ donation by trauma victims in Canada.**<br><br>Thank you for all the hard work that has gone into this study. I believe that the findings are valuable and hope that the authors are open to suggestions made to make the flow from research question to objections, complete methods, results and conclusions easier on the reader.<br>**We thank the Reviewer for their comments and suggestions.** |
| **Reviewer 3** | Michaël Chassé |
| Institution | Ottawa Hospital Research Institute, Clinical Epidemiology Program, Ottawa, Ont. |
| General comments (author response in bold) | Comments to the Author<br>Lanteigne and colleagues conducted a retrospective cohort study aiming to compare characteristics of deceased potential organ donors and non-potential organ donors, compare the characteristics of organ donor by trauma or non-trauma and to characterize missed referrals.<br>It is a simple and informative retrospective study. The data presented is in my opinion of interest to the Canadian Donation Community. Here are a few comments and suggestions the author may wish to consider to improve their manuscript:<br><br>1) The most striking findings to me were the 39% non-referral of trauma patients mentioned in the abstract. Yet, the authors do not mention again these findings anywhere in the manuscript. We can find these patients in Figure 1 in the 166 patients not captured in the LLDR but nowhere else. I strongly suggest the authors describe these patients. Who are they? What are their characteristics? My understanding is that they were never transferred to QEII? Since these findings (high non-referral rates) are the main conclusions of the authors (see abstract and conclusion of the paper), I think it deserves much more importance in the manuscript. I think the authors planned to discuss it as they mention it in the data source and the study definition section (line 38). But then there is no other mention of them in the results, discussion or tables.<br>**We have revised Table 1 to include additional data on the characteristics of trauma patients who were or were not referred to the Legacy of Life Program. These characteristics are compared for differences using parametric or nonparametric tests, as appropriate. We revised the second paragraph of the Results section (pages 7, 8) to focus more on the characteristics of trauma patients who were not referred to the Legacy of Life Program. We have also added a sentence comparing characteristics of potential donors who were or were not referred for organ donation to the 1st paragraph of the Interpretation section (page 9).**<br><br>2) To follow-up on my last comment, does the LLDR contains data about of PODs not transferred to QEII? It seems so, but the sentence "as well as information on PODs who were not referred to the Legacy of Life Program as determined through retrospective death audits of charts." may suggest otherwise. Does the death audit occur only at QEII or at all centers? Is that the explanation for the 166 patients POD not captured by the LLDR (I think so from the study definition paragraph)? Are those patients who were potential organ donors that were never transferred and referred? Because these 166 patients seem important, and given the 84% conversion rate reported by the authors, these patients really seem to be key for improvement in donation (as the conversion may not be that high in reality depending on the reason for non-referral of these patients). Once again, I suggest the authors provide more details about them (seems to be aim 3 of the study)<br>**The death audits referred to by the Reviewer are conducted province-wide. We have revised the Methods section (page 5) to clarify this point. The new data we have added to Table 1 shows that 33% of POD who were not referred to the Legacy of Life Program were patients who died in institutions other than the QEII HSC. We have noted this in the 2nd paragraph of the Results section (page 7), as shown below:**<br>**Nearly all referred patients (94%; 102/108) died at the Queen Elizabeth II Health Science Centre, while a third of potential donors who were not referred passed away at another institution.**<br><br>3) The authors should consider discussing the impact of not having donation data regarding these 166 patients (potential for bias especially regarding causes for donation). One may hypothesize that maybe most of them were approached but declined donation (suggesting a lower consent rate outside of QEII?), or simply not identified? Can the author comment about this? (especially in light of table 3 where there is an Unknown row for several reasons for non-donation?)<br>**We have revised the 4th paragraph of the Interpretation section (page 10) to include the lack of information available on the 166 PODs who were not referred to the Legacy of Life Program as a limitation of this study, as shown below:**<br>**While the group recommended ventilation within 24 hours of death as a criterion, the Nova Scotia Trauma Registry only captures if a patient required ventilation at any time during hospital stay; thus, we likely overestimated the number of potential donors identified in the Nova Scotia Trauma Registry. Furthermore, information on why some potential donors (n = 166) were not referred for donation was unavailable. Since criteria for referral to the Legacy of Life Program are different from the criteria for eligibility, it is unclear whether missed referrals were potential organ donors.**<br><br>4) Can the authors elaborate on their selection of a definition for the conversion rates? Various definitions of conversion rates exist (Intensive Care Med. 2011 Apr; 37(4): 665–670. among numerous other examples) and can affect the number greatly. In the current study, the authors decided to exclude from the denominator the non-medically suitable patients, and they used the LLDR registry definition of a POD. This removes from the denominator the medically unsuitable patients, as well as the patients that are potential organ donors but not referred (even if they may have been potentially identified and approached by the medical teams) Is that the definition used in NS? This may at first look misleading as in fact, out of 251+108=359 POD, only 129 became actual donors (36%)... far from 84%. Please provide the reference for that definition.<br>**The definition we used for the conversion rates is the definition used by the Canadian Blood Services Deceased Donation Data Working Group. The document containing this definition is in the manuscript as reference #17. We show below the definition from this document; it does note that the denominator used may vary and should be clearly identified and defined, which we have tried to do in our manuscript. While the Legacy of Life Program does not currently calculate conversion rates, they will start doing so in the near future and they will be using this definition from the Canadian Blood Services Deceased Donation Data Working Group.** |

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| Conversion Rate*** * | Utilized Donors (UD) / Approached Eligible Donors (AED) (less medically unsuitable) |
| Donor Utilization Rate | Utilized Donors (UD) / Consented Donors (CD) |
| Utilization Rate | Organs Transplanted/Utilized Donors (UD) (Distinct for NDD & DCD) |
| Non-utilized donor | Actual Donors (AD) - Utilized Donors (UD) |

* depending on how potential is being analyzed, a different denominator could be used for the potential donor rate (population, deaths, hospital deaths, ventilated deaths, brain-injured ventilated deaths), and therefore the measure must be clearly identified and defined.
** the number of referred potential donors will depend on clinical triggers in use by each province.
*** the number of eligible donors will depend on eligibility criteria in use by each province.
****depending on which part of the donation process was being analyzed, a different denominator could be used for the conversation rate (potential donor, referred potential donor, eligible donor or approached eligible donor), and therefore the measure must be clearly identified and defined.

**Source: Canadian Blood Services. Deceased Donation Data Working Group Report. June 30, 2016. Available at: https://professionaleducation.blood.ca/sites/msi/files/DDDWG_report_FINAL%202016-06-30.pdf**

5) The authors mention page 6 line 47 that they selected their sample size based on the number of patient death in the LLDR and NSTR. Why was this time interval was selected? Is April 1 2009 the start of one of the registries? A brief word about the left side of the time window for inclusion could be added.
**This time interval was selected because April 1 2009 was the start of the LLDR. We have revised the Methods section (page 4) to clarify this point as shown below:**
**Participants from the Nova Scotia Trauma Registry included all major trauma patients in Nova Scotia (as well as referred patients from Newfoundland, New Brunswick, and Prince Edward Island) injured April 1, 2009 - March 31, 2016 and died in any Nova Scotia hospital. We also included all patients (trauma and non-trauma) in the Legacy of Life Donor Registry over the same 7-year period. The start date for the study coincides with the beginning of data collection in the Legacy of Life Donor Registry.**

6) Are all the data normally distributed? The authors used parametric tests everywhere in table 1. It may not be appropriate for all variables presented in the various tables (un thus overestimating the p-value). A non-parametric test may be more appropriate for some variables (ISS? GCS? AIS? Age?)
**We thank the Reviewer for this comment. We explored each of the variables to determine whether or not they were normally distributed using the Shapiro-Wilk Normality Test. For any variable found to departure from normality, we used a non-parametric test (i.e., Mann-Whitney U test or Fisher's exact test) for comparisons. We have revised the Methods section (page 6) to clarify this point, as shown below:**
**We compared patient characteristics using parametric tests (Student's t-test, chi square analysis) and non-parametric tests (Mann-Whitney U test, Fisher's exact test) as appropriate.**

Other minor points:

1) Figure 2 is not very informative. Could be moved in appendix and referred to in text.
**We have removed Figure 2 from the manuscript.**

2) The authors may wish to consider using a bit less abbreviations in text as the manuscript can be at time hard to read until you get familiar with all the abbreviations (NSTR, LLDR, ISS, TTA, ED, POD, QEII HSC, MSI...)
**We have removed non-standard abbreviations from the manuscript.**

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| **Reviewer 4** | Andrew Healey |
| Institution | Ancaster, Ont. |
| General comments (author response in bold) | Comments to the Author<br>This is an excellent assessment of the gap between organ donation potential and realized actual donors. I would recommend the paper be accepted but I would ask the authors to consider strengthening their paper in four ways. These should really be discretionary edits but I do think it makes the paper more helpful to others.<br>**We thank the Reviewer for their comments.**<br><br>1. It seems you should have the data necessary to even further improve your registration in the MCI database. A common myth is that if patients are registered donors, they are less likely to be resuscitated or survive. It seems you should have the data in this paper alone to comment on this. While I realize one might think this distracts from the main message, it would add an additional question easily.<br>**We suspect the Reviewer is referring to improving registration in the "MSI database". While there is an MSI database in Nova Scotia, we did not access it for the purpose of this study. Furthermore, since our study population was limited to patients who died in hospital, we are unable to determine whether or not patients who had indicated their intent to donate by signing their MSI card were more/less likely to be resuscitated (we did not capture resuscitation attempts) or to survive.** |

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| | 2. Either tabulated specifications for the definitions of conversion as you have calculated them, approach rate and consent rate could be added OR one could consider annotating your flow chart to describe these calculations. Some clarification is necessary as there is some diversity to those definitions.<br>**We have described the calculation of the conversion rate and consent rate in the legend for Figure 1.**<br><br>3. Your discussion highlights how this paper could result in system improvements but then goes on to talk mainly around education. Are there other hard system level changes that could be implemented to close this gap of non-realized potentials? Education will only take us so far.<br>**We have revised the 3rd paragraph of the Interpretation section (page 10) to suggest that implementing mandatory referrals for organ donation across Canada has the potential to improve overall donation rates. We also describe other plans we have to improve the system in Nova Scotia, as shown below:**<br>**In Nova Scotia, we are working to improve the system by developing a more focused plan with the transplant group, establishing regionally based donation physicians (i.e., intensivists with an interest in donation), and a data management system so missed opportunities can be recognized and information is fed back to professionals on the front line in a timely fashion. Legislating the mandatory referral of potential donors may also help to reduce the number of missed referrals. Canadian health officials credit a 23% increase in donations over the past decade in part to mandatory referrals for transplants in some provinces.2 While Nova Scotia does not have mandatory referrals, there is "required request" which is an expectation that health professionals are required to advise potential donors about organ donation. Having all provinces implement mandatory referrals could further increase overall donation rates.**<br><br>4. Lastly, could you add a few simple clarifications about the quality control mechanisms in the trauma database. I emphasize this point only because your paper is completely reliant on retrospective database analysis and the robustness of the databases needs some emphasis.<br>**We have revised the Methods section of the manuscript (page 4) to clarify the quality control mechanisms in place at the NSTR:**<br>**The registry has quality control procedures in place to ensure accurate and complete data entry including computer checks (e.g., drop down menus), visual checks (registry coordinator visually scans data) and a re-abstracting audit of 10% of cases annually.**<br><br>Thank you for this excellent analysis and for the call to action for system in improvement.<br>**We thank the Reviewer for their kind comment.** |