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Title	Disability-free survival after major cardiac surgery in a population-based cohort
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Reviewer 1	Stephen Fremes
Institution	Schulich Heart Centre, Sunnybrook Health Sciences Centre, Cardiac Surgery
General comments and author response	Comments to the Author The authors have described disability free survival following cardiac surgery in Ontario using administrative databases. Outcomes were determined at 1 year. The primary outcome has face validity, and is supported from a previous survey performed by the investigators. The manuscript is well written. There is overlap with a previously published manuscript in BMJ Open Heart which focussed on CABG, with a further focus on sex-related outcomes with heart failure. Rakesh Arora has also published similar studies using Manitoba data - the authors should look up. I have some comments about Disability free survival. When is time 0? is it the date of discharge from hospital or the date of surgery? What about patients who remain hospitalized? Are they censored? If time 0 equals the date of discharge, then perioperative deaths are not counted in the 1 year mortality. RESPONSE/REVISION: We thank the reviewer for his appreciation of our manuscript. Time 0 was the date of surgery. Thus, perioperative deaths were included in 1-year mortality. Two patients remained in hospital for an entire year after surgery. For the rest of the patients, the median hospital length of stay was 8 (IQR, 6-12) days. I suggest that the authors also report death or disability at 1 year (including perioperative deaths) - I think that is important from a patient perspective, and is often how patients are counselled. RESPONSE/REVISION: Thank you for this suggestion. We have now reported the composite of death or disability at 30 days and 90 days in Supplemental Table 2, and 1-year outcomes in Table 2. I suggest that the authors include 30 day outcomes postoperatively. Are non-fatal perioperative strokes part of the outcome. RESPONSE/REVISION: Thank you for this suggestion. We have now included 30-day outcomes in Supplemental Table 2. Perioperative strokes were indeed a part of this outcome. The authors should indicate why they chose to limit the study to patients >40 years of age, as opposed to a younger or older age cutoff or no age cutoff. Also, presumably the study is most relevant for patients who are much older than 40 - consider a secondary analysis of patients older than 70 or 75 years of age. RESPONSE/REVISION: Thank you for the excellent suggestion. We had included patients over the age of 40, because disability is less likely to occur in a younger age group. At the reviewer's suggestion, we have now added a secondary analysis by decades of patient age, and have provided age-stratified cumulative incidence of disability, death, and the combination of disability or death in Supplemental Figures 5-7. We have also added on page 8 line 10: "Post hoc, we examined the

impact of patient age on disability, death, and the combination of these events. The cumulative incidence of these events is lowest in the 40-49 and 50-59 age groups, and is incrementally higher for each decade above age 60 (Supplemental Figures 5-7)."

Prolonged hospital stay: From my experience, patients are also very concerned about prolonged hospital stay, and in particular, prolonged ICU stay. Is that addressed in the primary study outcome?
RESPONSE/REVISION: Thank you for the excellent insight. While these outcomes were not voted by patients to be included in the current definition of disability, they are being considered in the next stage of our research program, where we solicit input from patients, caregivers and clinicians, to refine this patient-centered metric.

Figure 2: I suggest that the figure is truncated at 365 days.
RESPONSE/REVISION: Thank you for this suggestion. We have revised accordingly.

Table 3: Are these the subdistribution HRs?
RESPONSE/REVISION: Thank for you the opportunity to clarify the reporting of our methods. These are in fact subdistribution HRs. We have now added the words "Sub Distribution" to "HR (95% CI) in the column heading.

The first reference seems incorrect.
RESPONSE/REVISION: Thank you for pointing this out. We have corrected this reference.

Reviewer 2	Kelsey Uminski
Institution	University of Manitoba
General comments and author response	Comments to the Author In this study, the authors describe the incidence and risk factors for patient disability following common cardiac surgeries. This is an important patient-centered outcome, highlighting the importance of personalized disability risk prediction models. I commend the authors on this undertaking. RESPONSE: We thank the reviewer for her support of our manuscript. 1. The authors had previously solicited patient input regarding preferences and values to support their choice in measuring disability, as a compositive outcome of stroke, greater or equal to 3 non-elective hospitalizations and long-term care admission. Disability is defined as an impaired ability to carry out functional tasks. Was consideration given to parameters such as the 6-item Katz Activities of Daily Living (ADL) scale, the 7-item Older Americans Research and Services Instrumental Activities of Daily Living scale or the 7-item Nagi scale in addition to this composite outcome? RESPONSE/REVISION: Thank you for this insight. Our study is limited by what is available in administrative data, which does not include these scales. We have added this as a limitation. Page 12, line 7: "Thirdly, we were unable to incorporate commonly used clinical disability assessment tools, as our definition of disability is limited by what is available in administrative data." 2. Any thoughts as to why single valve surgery may have led to more disability than CABG alone? The increasing level of disability associated with increasing number of valvular replacements and concurrent CABG seems biologically plausible, with supportive evidence provided in the discussion. RESPONSE/REVISION: Please refer to our response to Editor's comments #22.

3. Combined CABG/multiple valve surgery, heart failure, elevated creatinine, alcoholism, dementia and depression were found to be independent disability risk factors. Increasingly frailty (such as the clinical frailty scale) is being used as an important prognostic variable in cardiac surgery outcomes, as a complex variable factoring in the complex interactions of each of the assessed risk factors. I note that frailty was captured within Table 1, but not reported in Table 3 as a multivariable predictor of disability?

RESPONSE/REVISION: Thank you for this suggestion. Frailty was a composite of many of the comorbidities that were included in the model. We had left frailty out of the multivariable model in order to avoid redundancy in our risk adjustment. This approach is in accordance to previous publications that used the Johns Hopkins ACG frailty-defining diagnosis indicator by our group (J Am Heart Assoc. 2018;7 and Ann Surg. 2020 Jun 11. Online ahead of print. PMID: 32541219) and others (JAMA Surg. 2016;151:538–545).

4. The need for personalized disability risk prediction models is well supported. With increasing evidence supporting long-term outcomes of transcatheter aortic valve replacement, how do you anticipate the results of this study may influence such decision-making in patient pursuit of invasive vs. non-invasive cardiac interventions?

RESPONSE/REVISION: We thank the Reviewer for her support and interest in our work. Our group's CIHR funded work on prediction of invasive vs. non-invasive cardiac interventions (CABG vs. PCI; TAVR vs. SAVR) is in fact already underway.

5. For the y-axis on Figure 1, I would decrease the value of the unit spacing, so that the differences amongst the curves becoming more visibly apparent. This could also be applied to supplemental Figure 2, 3 and 4.

RESPONSE/REVISION: Thank you for this suggestion. We have revised accordingly.

6. For table 1, a minor edit suggestion; however, I would reorder the categories of creatinine such that they are in ascending order erg. <120, 120- 179, etc.

RESPONSE/REVISION: Thank you for this suggestion. We have revised accordingly.