Reviewer's report

Title: The economic burden of prematurity in Canada

Version: 2 Date: 27 July 2013

Reviewer: Cindy Gauvreau

Reviewer's report:

This manuscript is a resubmission of a manuscript submitted previously in 2012. The authors did not provide a point-by-point answer to reviewers' comments for the first submission as they believe that the current study is sufficiently different to warrant submission as a new study. The previous manuscript compared the burden of prematurity in the UK and Quebec using the same decision-analytic model, although it was not a direct comparison, as in the former the authors presented utilization and cost results, while in the latter the authors presented resource utilization results only. In this current manuscript the UK portion of the analysis has been discontinued and costs were added to the Quebec setting and then projected to Canada-wide results. The decision-analytic model remains the same.

Regardless of the change in setting or scope of the current study, however, serious methodological problems that were apparent in the first submission persist in the second. These problems pertain to the failure to follow widely accepted good practices of modeling burden-of-illness studies (and economic studies in general). They include the lack of precision in defining the perspective of the analysis and aligning the outcomes with the stated perspective; the failure to characterize and assess the uncertainty of parameter estimates; and the failure to discuss the validation of the model.

Major Compulsory Revisions

1. Generalizability of model – the authors base their model on the UK decision-analytic model but do not explain why this model is relevant in the Canadian setting nor do they appear to have made any modifications to the model to reflect the research question at hand, the prevailing clinical practices in Quebec, any differences in epidemiology, or the health care systems. No description of the model parameters was provided, nor an evaluation of the continued validity of the model structure and parameters. For example, many of the values, including the transition probabilities of moving between disability states, in the original model were based on European and Australian cohort studies of survival and morbidity in the 1990’s and 2000’s, and it does not appear that the authors have done a recent literature review to update this information.

In fact, it should be noted that a recent article describing the health utilization of premature infants in Quebec was not included in the references. (Landry et al. 2012 Health care utilization by preterm infants with respiratory complications in
As the objective of the study is to characterize the burden of prematurity in Canada, and not only in Quebec as in the first submission, the authors should provide an explanation of how the original model structure and parameters have been made relevant and suitable to the Canada-wide setting.

Furthermore, most of the costs are derived from Ontario physician billing and hospital case costing data, and they appear to be applied to Quebec utilization rates. Neither of these facts are explicitly explained or justified. The section on data source does not mention that Ontario Health Insurance Plan data is used, even though it is a major source. On page 5 it is stated that unit costs are “Canada-specific”, which is a liberal and unexplained interpretation of Ontario-specific data.

In Canada public healthcare is administered and paid for by the provinces (using funds distributed from the central government), and each province operates its own health insurance program. The rates paid to medical providers through the programs are negotiated between the provincial government and provider organizations and thus specific to the province itself. The payment rates, coverage of the population and structuring of the respective healthcare systems all affect the utilization rates and costs variably from province to province. The authors should detail their assumptions and methods in reconciling these different sources of data, and fully discuss the limitations in doing so. They should explain which elements of the data and their province-specific variability are important to the results, and how acceptable that variability might be.

Greater transparency of the model is thus required, including the limitations of the underlying assumptions and structure. An explanation of its suitability and validity for extension from the Quebec/Ontario utilization and cost structures to the national Canadian level is also required.

2. Perspective and costs – although the authors state that the study was done from a societal perspective, costs were not comprehensively included. Almost all of the cost data were from physician billing and hospitals, so in fact the health system perspective is predominantly represented, and the inclusion of some limited indirect (productivity) costs does not make it a true societal perspective. For example, no costs associated with morbidity and sequelae are included, apart from special education after age five. For early pre-term children especially, medical costs such as for physical therapy and audiology and non-medical costs such as for custom equipment or household furnishings and dietary needs, would presumably be needed. The authors should explain particularly why early childhood interventions, both medical and educational, are not included in the 2-5 age groups as these costs can be considerable for families.

It is not clear what the authors mean by “individual level” perspective as they seem to calculate a per child average from total costs and not to do not appear to include any out-of-pocket costs borne by the children’s families, although out-of-pocket costs are mentioned in the introduction. Please clarify.
It appears that the model results were extended to the Canadian level simply by scaling the per child cost of the Quebec/Ontario model to Canadian preterm births. Please clarify.

The inclusion of building a neonatal care facility potentially overstates the cost it is not clear that the cost is depreciated over the study period, as in normal practice for costing. Furthermore in the first submission, the cost of building the facility was given as 2.5 million pounds sterling, and in the second submission as 2.5 million Canadian dollars. This puts into question the accuracy of the results. Please correct both points and regenerate new results if necessary.

3. Uncertainty – As in the previous submission no confidence intervals are provided for the estimates and there is no sensitivity analysis done. This is a major flaw in the paper, and unacceptable under good practice guidelines for economic studies and especially modeling studies where many assumptions are made and results are projected. A description of the uncertainty, how it is assessed and treated and the impact on results is required.

4. Discounting – Discounting the accrual of costs after the first year of the study is normal practice in economic studies. The authors should explain why they do not follow this convention if they believe it is not necessary, and they should interpret the results for policy makers and decision makers in the reading audience. Otherwise, discounting should be applied. If desired both discounted and undiscounted results can be shown.

5. Education costs – This is the single largest cost category, but the details surrounding them are few and confusing. For example, in Table A1 – 4 it is unclear why children with no disability need special education. Also, costing was based on “special school” in Table A1-3 – is this the same as “special education” in Table A1-4, which in many provinces are integrated into mainstream schools? There may be a degree of double-counting, but it is unclear from the information provided.

6. The discussion of prenatal utilization needs to be fuller so the significance of the problem can be understood. As the value assigned to this cost is largely based on a single “expert” source, sensitivity analysis is especially needed here.

5. In the discussion please explain the magnitude of the problem. The results would be intuitive even without a modeling study. The use of these results and the policy implications are not clear.

Minor essential revisions

1. Moving Table A1-3 from the appendix into the main body of the manuscript would be very helpful in improving the clarity of the paper.

2. References 14 and 23 are the same reference, and indeed, describes the model on which this study is based and to which the authors refer variously.
3. There is a typographical error on page 11, line 13 ("infants burn").

**Level of interest:** An article of limited interest

**Quality of written English:** Acceptable

**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests.