Author's response to reviews

Title: A Simulation Model Approach to Analysis of the Business Case for Eliminating Health Care Disparities

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Author's response to reviews: see over
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Natalie Pafitis MSc
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Dear Ms. Pafitis,

We are pleased to submit a revised version of our manuscript entitled “A Simulation Model Approach to Analysis of the Business Case for Eliminating Health Care Disparities” (MS 2848121744381294).

Per your e-mail on January 25, we have made several changes to address the very helpful comments of the two referees. Most of these changes have to do with the request by referee 1 (Dr. Fiscella) that we incorporate the costs of false positive mammograms into the modeling analysis and the paper. As you’ve requested, the point-by-point response follows:

**Reviewer #1’s report:**
This is an important study. To my knowledge, this is the first paper to formally model a business case for addressing disparities. Mammography and asthma are reasonable disparities to model for the reasons the authors cite.  *No response required.*

In general, the model, key assumptions and application of these inputs into the model are well described. I have only a few comments.  *No response required.*

Compulsory: At the risk of making the mammography model even more complicated, I think that false positive mammography results need to be considered in the model. False positive tests result in additional medical costs, mild transient decrements in quality of life, and potentially additional time loss from work (for outpatient breast biopsies).  *We have done this, and have added text at several points, as well as three references and appropriate changes to tables and figures.*

A related issue that could be added as a sensitivity analysis is the issue of unnecessary surgery. There is growing evidence that breast cancer screening (like prostate cancer screening) results in removal of both rapidly growing and slow growing (potentially inconsequential in some instances) tumors. Using best estimates of the prevalence of these different tumors, the authors could model the probability of having “an unnecessary” surgery that increases medical care costs and time loss from work and diminished quality of life (through direct effects e.g. having a mastectomy) or indirect through labeling (becoming a "cancer survivor" in American lingo).  *We would strongly prefer to address this significant issue in a later paper, since the suggestion on unnecessary surgery would require a major restructuring of the
Unnecessary surgery related to tumor histology is indeed an issue of growing significance, but the literature on that issue is still developing, and we are not aware of appropriate articles on that issue that are specific to any race or ethnic group. Taking this issue fully into account would alter many of the model parameters having to do with recurrences, days lost from work in various cancer stages, and QALYs gained. It would take several weeks to months to assemble the relevant literature, incorporate it into the current model, test the impacts, and summarize the results. Since the concept refers most directly to hypothetical survival effects that would have occurred in the absence of surgery that is now being performed, we feel that our analyses do accurately model the effects of mammography and subsequent treatment choices as they are currently being made. If the concept of unnecessary surgery begins to have a significant influence on treatment choices, survival, and quality of life, then our model can be adjusted in the future to take those changes into account.

Discretionary: Consider the impact of asthma deaths on employee work performance and absence. Give the low incidence of asthma deaths, I doubt that the impact of the child death's on parental QALY, absenteeism, and productivity is great at a population level (though potential devastating at a personal level), but it might be worth considering - through modeling (or in the absence of sufficient data in the discussion). Finally, there is the debatable question as to whether controller medication (including steroids) alters the trajectory of asthma and affects long-term pulmonary function. If they do, then improved treatment could "bend the curve" of worsening symptoms, ED visits, and hospitalizations that a small portion of patients experience. This might be modeled in a sensitivity analysis. Similarly, the suggestion on incorporating the effects of controller medication on long-term pulmonary function is beyond the scope and intent of our modeling effort. We chose a five-year time frame to represent a typical decision time frame by either employers or health plan administrators about initiatives to increase either preventive service use or management of chronic illness. Although there would certainly be longer-term effects beyond five years, our current model structure and analysis presented here does not seek to address those effects. Again, another paper reporting longer-term analysis would perhaps be the best way to address this issue, as the paper is relatively long and complex as it is.

Level of interest: An article of importance in its field

Reviewer #2's report:
A Simulation Model Approach to Analysis of the Business Case for Eliminating Health Care Disparities
NOTE: All comments and requests for clarification are discretionary except comment 4 – the headings and fonts should really be standardized between the two models.

1. Is the question posed by the authors well defined?
Yes, the question is well-defined – “can a business case be made for eliminating minority health care disparities?” This important question will be even more critical as elements of health care reform go into effect. No response required.

2. Are the methods appropriate and well described?
Yes, the methods are very thorough and go beyond what is usually expected for simulation models. In fact, the methods are innovative - an evaluation examining the economic trade off for an employer in reduced business costs as a result of improved quality promotion for minorities
in healthcare by an insurance carrier. Improved business productivity from the employer perspective is not a commonly cited reason to lobby for quality improvements in employee health insurance. Health insurance is often cited simply as an element of high labor costs. No response required.

3. Are the data sound?
Yes, the authors conducted a very extensive review of the relevant literature and data sources. They also conducted a thorough sensitivity analysis accompanied by a comprehensive review of the rationale for each decision in constructing the models. No response required.

4. Does the manuscript adhere to the relevant standards for reporting and data deposition?
Yes, the standards are very high in this manuscript. However, readers may benefit if the authors could standardize their headings for the two topics – breast cancer detection and asthma treatment. Elements in breast cancer that were minor subheadings were listed as major headings for asthma. This reader found it difficult to compare and contrast the methods, assumptions and data because the topic titles (mortality/survival vs. Deaths), (Values for health states, Utilities vs. QALYS) and even the heading fonts and table organization varied between breast cancer and asthma. This may represent the merging of two projects into one. I applaud the authors if that is the case. The side-by-side reading really highlights the careful consideration and data review required to conduct such an analysis. We have changed the headings so that the two sections match. The mismatch seemed to be in the Results section; headings in the Appendix do follow a parallel structure, but many of the subheadings are inherently different for the two clinical areas because the key modeling concepts and variables are different. We will be happy to take the suggestions of the journal's copy editor on any changes to tables that would represent improvements.

Standard Headings : Minor Essential Revision

5. Are the discussion and conclusions well balanced and adequately support by the data?
Yes, the discussion and conclusions are balanced and well supported by the data. In fact, an extended discussion of the business case to be made that compares the data elements important in eliminating disparities in three major healthcare endeavors: Disease Prevention, Disease Detection and Disease Treatment might be an important addition that the authors are well qualified to add. We are concerned that the paper is already relatively long and complicated, and that an extended discussion of data elements needed to model a business case for addressing disparities in three broad domains would be difficult to do without distracting from the main points that both reviewers find important and useful. We have added a brief section at the end of the Discussion on how models like this might be used in other contexts of disparity reduction, with other required data elements.

6. Are the limitations of the work clearly stated?
Yes. No response required.

7. Do the authors clearly acknowledge any work upon which they are building, both published and unpublished?
Yes, the literature and data source review is very comprehensive. No response required.

8. Do the title and abstract accurately convey what has been found?
Yes. For this subject, the title and abstract accurately convey what was done. No response required.

9. Is the writing acceptable?
There are a few areas where ideas were been duplicated. The major writing limitations were the different headings and organization structure in the breast cancer vs. the asthma simulation description, headings and tables. This limited reader ability to compare between them. See response to point 4 above.

Additional General Comments:

Eliminating quality disparities in breast cancer detection and asthma treatment both resulted in positive economic gains from the employer business case perspective. Admiringly, the authors went much farther in their analysis by quantifying each source of economic gain and performing sensitivity analyses. One goal for measuring beyond a simple “positive”, “negative” or “neutral” business effect is to use the relative magnitude for setting priorities in addressing disparities. There was an important difference in the magnitude of business benefits. It would help readers tasked with evaluating and setting these priorities to postulate specific reasons for the difference between the two programs. No response required.

Also of interest to readers would be an additional discussion of eliminating disparities in disease prevention in addition to disease detection and prevention. This would be especially important given the new January 3, 2011 Medicare coverage for “Annual Wellness Visits Providing Personalized Prevention Plan Services – Section 4104 of the ACA. (available at medicare.gov) We had been concerned about the overall length and complexity of the article, and are concerned now that any additional discussion of disparities outside the scope of the specific quality of care measures we used in the simulation models may distract from the main message of the paper. The scope of “disease prevention” is quite broad, including elements of lifestyle, diet, environmental exposure, and general access to care that are well beyond the scope of the models we describe. At the end of the Discussion now, we make passing mention of the potential for models like these to be applied to other types of disparities in disease prevention or treatment.

This reviewer suggests that the greatest difference between the two models was due to the fact that cancer screening requires all 50-65 year old female employees to be screened to detect the few cancer cases – because no one knows who has cancer until after screening. The benefits are enormous for the cancer patient and her family when detected early enough for treatment to irradiate disease. In contrast, the asthma patients are already clearly self-identified, and so a much greater proportion of those receiving the intervention can directly benefit immediately from a simple improvement in ICS medication use targeted only to those with known asthma. No response required.

In addition, the asthma intervention presumed children of employees were directly gaining health benefits in school days attended that resulted in the parent employee (without asthma) missing fewer work days due to avoided child-care. In contrast, the only benefits in the cancer detection simulation were those gained by the cancer victim employee herself; not family members. For example, the end-stage cancer victim may very well have a spouse working for an employer with the same insurance carrier who will miss work and children missing school or who must be cared for by another relative. Again, these considerations likely reflect an underestimation of the potential employer gains and so strengthens the business case; a proof
by contradiction. The point about asymmetry between the two models in terms of the
treatment of spouses missing days of work is a good one, but there is relatively little that we
can do about this given the state of published information available. Given our focus on
racial/ethnic disparities, a full treatment of the issue raised here would require us to have race-
or ethnicity-specific information about days lost from work by spouses of working women with
cancer. We have not been able to locate information at this level of granularity, but would be
happy to address the issue in a future round of analysis if relevant information does become
available.

These effect size differences are certainly expected due to the nature of detecting occult severe
disease versus chronic disease treatment improvements. No response required.

Placing these two medical problems adjacent in the same report really highlighted the diverse
elements that must be considered in this new research direction. The side-by-side discussions
will aid others as they undertake priority-setting based on this and future studies. No response
required.

In the same vein, readers may be perplexed that the asthma model indicated that the prevented
death rate among targeted asthma patients was extremely small. The prevented deaths among
those with early breast cancer were larger. The paradoxical reversed difference in overall
economic outcome is partially due to the fact that the asthma intervention only occurs in
identified chronic asthma patients while the cancer screening must occur among all patients to
detect an occult disease process that may result in a preventable death or reduction in
productivity and quality of life. Also, the loss of life years prevented by cancer screening only
occurs in those 50-65, while the deaths in asthma occurred at a younger ages with greater
expected years of life. No response required.

The authors may want to cite a review by Cochrane, et al; (Inhaled Corticosteroids for Asthma:
Patient Compliance, Devices, and Inhalation Technique. CHEST 2000; 117:542-550). They
found failure to use a prescribed ICS, but also ineffective lung delivery based on faulty
inhalation techniques. The model might need to include further expenses to increase patient
ICS use education. This may be increasingly achievable because of the new Medicare
allowances for reimbursement of clinician prevention services. We did not follow the
discretionary suggestion to cite the paper by Cochrane et al. The paper makes some important
points about the issue of appropriate inhaler use, but since the HEDIS measure of asthma
medication use does not include any attention to the issue of appropriate use of inhalers, it
seemed best to keep the model (and related discussion) simpler and focus it on known
relationships between general patterns of medication adherence (including the mix of
appropriate and inappropriate uses represented in the various studies cited) and costs and
outcomes. The HEDIS measure reflects primarily the filling of controller medication
prescriptions, and does not get into detail about exactly how those medications are used.
Modeling the effects of initiatives to promote more appropriate or effective use of inhalers that
are provided is beyond the scope of our current effort. As in the case of other suggested
enhancements to the model, we would prefer to deal with these in subsequent publications and
let this paper illustrate a novel approach to addressing questions of a “business case” for
disparity reduction in specific quality of care measures.
Level of interest: An exceptional article

The manuscript version that is being uploaded has all changes identified using the “track changes” function of Word.

Thank you very much for your review and for the referees’ helpful comments. Please let me know if there are any other changes that would be helpful, or any questions I can address.

Sincerely,

David R. Nerenz, Ph.D.
Director, Center for Health Policy and Health Services Research