## PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form (**http://bmjopen.bmj.com/site/about/resources/checklist.pdf**) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

## ARTICLE DETAILS

| TITLE (PROVISIONAL) | Economic burden of managing oral cancer patients in Sri Lanka |
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| **AUTHORS** | Amarasinghe, Hemantha; Jayasinghe, Ruwan; Dharmagunawardene, Dilantha; Attygalla, Manjula; Scuffham, Paul; Johnson, Newell; Kularatna, Sanjeewa |

## VERSION 1 – REVIEW

| REVIEWER | Mihail Samnaliev<br>Boston Children's Hospital, USA |
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| **REVIEW RETURNED** | 07-Dec-2018 |

| GENERAL COMMENTS | This study evaluates the per patient costs associated with oral cancer in Sri Lanka over a 12-month period. The authors focus on two types of costs, healthcare system and other, which they define as household costs and which could include health and non-health related costs (some of which are out of pocket and some are due to lost productivity). They report that these costs are high relative to the average income in the country, which suggests the need for increased prevention.<br>General comments: Conducting a study like this one while seemingly straightforward often ends up challenging in terms of data collection and being able to conduct an accurate and comprehensive costing of all relevant resources. This study addresses an important topic but in my opinion it currently lacks analytical detail which makes it hard to evaluate its quality. My suggestions therefore are aimed at improving the clarity and accuracy of the analyses and the presentation of the results.<br>Specific comments:<br>1 It is not clear how overhead costs were assigned to individual tests, procedures or patients. If the allocation was based on “discussions with experts” as stated in the paper, then more detail needs to be provided about what assumptions were made and ultimately how the allocation was carried out. If the institution already has an activity-based costing system /algorithm in place (as some hospitals do), that needs to be described briefly.<br>2 Recurrent healthcare costs: these need to be presented in a table and described in greater detail. For example, include a table that lists all types of services related to the management of oral cancers, associated unit costs and sources for the unit costs. Then multiply units x costs and aggregate these to arrive at the total (currently only the total is shown in Table 3). For example, average (std) for radiotherapy and chemotherapy visits, anesthesia, medications, etc. If these are too many, such a table could present the major (or/and most expensive) ones and include a category for all other. |
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| | 3 Similarly, out-of-pocket costs need to be presented in greater detail. What are the transportation costs, e.g. one would present average kilometers traveled to receive healthcare, and associated costs (e.g., using the national reimbursement rate per km/mile), or/and public transportation costs (bus, train). What are the other out-of-pocket costs? Again, these should be listed along with the respective unit costs before they are aggregated over the 12-month period.<br>4. What constitutes ‘other indirect costs? Specifically, absenteeism is mentioned in the abstract, but then never presented in the paper. How were lost days/hours from work estimated and costed? What surveys were used; attaching these to the paper is recommended. What about time costs more broadly to receive care and because of poor health associated with the condition? Such time costs need to be presented, and assumptions about how they are valued (e.g. using hourly wages or other values for those who did not work).<br>5. Are caregiver costs included in the calculation? These could be formal or informal (e.g., unpaid from family members)<br>6 Costs often have significant variability, which can have in impact on the accuracy of cost, budget impact and cost-effectiveness evaluations. For that reason it is a common practice to conduct sensitivity analyses. The analyst should present at the minimum a range of these costs and upper and lower bounds around the total costs, or confidence intervals. The average costs reported in all tables in the paper should also present standard deviations, and desirably other measures of variability (e.g. medians, min and max values) |

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| **REVIEWER** | Sanjay K Mohanty<br>IIPS, India |
| **REVIEW RETURNED** | 14-Dec-2018 |

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| **GENERAL COMMENTS** | 1. How did you segregate the costs to the healthcare system included surgery, ICU care, chemotherapy and radiotherapy; capital costs including estimated value for land, buildings, equipment and furniture and that of household cost. Are these institutional cost are all free of cost?. It need to be clarified. Otherwise it will be over estimated.<br><br>2.Line 15 and 16 and elsewhere , do not write decimals in words. For example fourteen point three percent was written. Round off the point to closest number and write. In this case it is 14%<br>3. Method: Apportion of the times of personnel, equipment depreciation, utility services and supportive services to the activity were derived from discussion with experts in the field: medical specialists and personnel involved in these activities. It is necessary for reader to know how the apportion was done for various coting exercise. Pl elaborate eon it.<br><br>4.Is cancer treatment is completely free? If patients are charged partly had it been accounted. Else it will be overestimation<br>5.In table 3, please give detail break up of household cost such as cost on medicine, stay etc<br>6. |

## VERSION 1 – AUTHOR RESPONSE

Reviewer 1

1. It is not clear how overhead costs were assigned to individual tests, procedures or patients. If the allocation was based on “discussions with experts” as stated in the paper, then more detail needs to be provided about what assumptions were made and ultimately how the allocation was carried out. If the institution already has an activity-based costing system /algorithm in place (as some hospitals do), that needs to be described briefly.

Answer

In Sri Lankan public health sector, there is no activity based costing or algorithm due to provision of free health services. Therefore, cost of an overhead activity was based on following formulae; (Please see the attached document - Section 1.1.1). Here, only the "Time of the Personnel" and "Depreciation Rate" were taken by the "discussion with experts" and all the other parameters were included through review of records. Example is stated in the attached document "Data Analysis - Oral Cancer Study"

2. Recurrent healthcare costs: these need to be presented in a table and described in greater detail. For example, include a table that lists all types of services related to the management of oral cancers, associated unit costs and sources for the unit costs. Then multiply units x costs and aggregate these to arrive at the total (currently only the total is shown in Table 3). For example, average (std) for radiotherapy and chemotherapy visits, anesthesia, medications, etc. If these are too many, such a table could present the major (or/and most expensive) ones and include a category for all other.

Answer

Table 3 and Table 4 included into the results section which contains details of all cost categories.

3. Similarly, out-of-pocket costs need to be presented in greater detail. What are the transportation costs, e.g. one would present average kilometres travelled to receive healthcare, and associated costs (e.g., using the national reimbursement rate per km/mile), or/and public transportation costs (bus, train). What are the other out-of-pocket costs? Again, these should be listed along with the respective unit costs before they are aggregated over the 12-month period.

Table 3 and Table 4 included into the results section which contains details of all cost categories.

4. What constitutes ‘other indirect costs? Specifically, absenteeism is mentioned in the abstract, but then never presented in the paper. How were lost days/hours from work estimated and costed? What surveys were used; attaching these to the paper is recommended. What about time costs more broadly to receive care and because of poor health associated with the condition? Such time costs need to be presented, and assumptions about how they are valued (e.g. using hourly wages or other values for those who did not work).

A detailed description of the conducted analysis is attached document "Data Analysis - Oral Cancer Study" - Section 1.2

5. Are caregiver costs included in the calculation? These could be formal or informal (e.g., unpaid from family members)

Name Carer costs are mentioned instead of Bystander Cost during ward stay and Companion Cost during a Clinic Visit

6. Costs often have significant variability, which can have in impact on the accuracy of cost, budget impact and cost-effectiveness evaluations. For that reason it is a common practice to conduct sensitivity analyses. The analyst should present at the minimum a range of these costs and upper and lower bounds around the total costs, or confidence intervals. The average costs reported in all tables in the paper should also present standard deviations, and desirably other measures of variability (e.g. medians, min and max values)

Sensitivity analysis was not performed.

Reviewer 2

1.How did you segregate the costs to the healthcare system included surgery, ICU care, chemotherapy and radiotherapy; capital costs including estimated value for land, buildings, equipment and furniture and that of household cost. Are these institutional cost are all free of cost?. It need to be clarified. Otherwise it will be over estimated.

Table 3 and Table 4 included into the results section which contains details of all cost categories.

2.Line 15 and 16 and elsewhere , do not write decimals in words. For example fourteen point three percent was written. Round off the point to closest number and write. In this case it is 14%

Rectified

3.Method: Apportion of the times of personnel, equipment depreciation, utility services and supportive services to the activity were derived from discussion with experts in the field: medical specialists and personnel involved in these activities. It is necessary for reader to know how the apportion was done for various coting exercise. Pl elaborate eon it.

In Sri Lankan public health sector, there is no activity based costing or algorithm due to provision of free health services. Therefore, cost of an overhead activity was based on following formulae; (Please see the attached document - Section 1.1.1). Here, only the "Time of the Personnel" and "Depreciation Rate" were taken by the "discussion with experts" and all the other parameters were included through review of records. Example is stated in the attached document "Data Analysis - Oral Cancer Study"

4.Is cancer treatment completely free? If patients are charged partly had it been accounted. Else it will be overestimation

Yes. In Sri Lanka any treatment in the public sector is free at the point of delivery. But sometimes when the respective drug, consumable or investigation is not available in the public sector, patients have to get it done outside through their own expenses. This is termed as Out of Pocket Expenditure (OOPE)

5.In table 3, please give detail break up of household cost such as cost on medicine, stay etc

Table 3 and Table 4 included into the results section which contains details of all cost categories.

## VERSION 2 – REVIEW

| REVIEWER | Mihail Samnaliev<br>Boston Children's Hospital<br>USA |
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| REVIEW RETURNED | 29-Mar-2019 |

| GENERAL COMMENTS | The authors have done a great job addressing my comments. The only thing I would add is some measure of variability around the cost estimates, e.g., confidence intervals. |
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| REVIEWER | Sanjay K Mohanty<br>International Institute for Population Sciences (IIPS), Mumbai, India |
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| REVIEW RETURNED | 28-Mar-2019 |

| GENERAL COMMENTS | Remove decimals in SLR and US$ throughout |
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## VERSION 2 – AUTHOR RESPONSE

Reviewer: 2

Reviewer Name: Sanjay K Mohanty

Institution and Country: International Institute for Population Sciences (IIPS), Mumbai, India

Please state any competing interests or state 'None declared': None declared- Rectified

Please leave your comments for the authors below

Remove decimals in SLR and US$ throughout - Rectified

Reviewer: 1

Reviewer Name: Mihail Samnaliev

Institution and Country: Boston Children's Hospital

USA

Please state any competing interests or state 'None declared': None declared- Rectified

Please leave your comments for the authors below

The authors have done a great job addressing my comments. The only thing I would add is some measure of variability around the cost estimates, e.g., confidence intervals.- Some of the cost items in the recurrent cost, there is no SD as same value is added to all patients eg- Biopsy, Xray, scan same cost added for one procedure for all the patients.

In Health system cost -capital cost, all the values are the same as this is calculated for one patient, not depending on the no of days stay in the hospital. Therefore. no SD

Other variable we can calculate the SD or CI. It is not nicer to include SD for some variables whereas some does not have, therefore we would like to give our results without SD with your permission.