Reviewer’s report

Title: Locating Helicopter Emergency Medical Service Bases to Optimise Population Coverage versus Average Response Time

Version: 0 Date: 05 Jul 2017

Reviewer: Nico Hoogerwerf

Reviewer's report:

In this study, the authors explore the mathematically optimal locations of HEMS bases in NSW (Australia) comparing the MCLP and ARTM and a proposed hybrid model.

This is an important publication because it mathemizes the location and the spread of medical aid (i.e. the HEMS bases). Limitations were of course the strictly mathematical way of looking to the present situation, but also financial and infrastructural arguments were addressed.

A few remarks on the manuscript:

- In general (but it appears to be finally clear in the limitations section in the Discussion), the authors are talking about HEMS teams, but in fact they mention "retrieval teams". When mentioning a neonatal, a ECMO team or these-like, it is a fully different job than performing HEMS with emergency physician medical aid on an incident spot in the street. This explains maybe also the different start up times between the two different groups of helicopter services in this manuscript. This unclearity has to be solved in a revision.

- In the model has been found that addition of two more bases will decrease the response time with a 1,27 min (p10, L37). But, a much faster startup than 10min as assumed in the methods, will have more effects, with lower costs, as other HEMS organisations worldwide pretend a startup time of 2-5minutes... It has been nice if the authors had calculated these effects also.

Specific:

- p5, L25: In my opinion a startup of 45 minutes is a long period, when in need for urgent medical help. I agree, every time is arbitrary, but … In many countries (the Netherlands, Germany Belgium) every patient should be reached within 15minutes by a ground ambulance. HEMS is then additional without a time slot.
- p5, L48: Is there also a ground ambulance (paramedic?) system, parallel running? Who is dispatching the doctors HEMS? Always secondary to the paramedics or also Primary? Please explain more your local system.

- p6, L33: 200-400 people per square: This implies a 4-fold variation. Does this have consequences for your results? What happens when you define more or less people per square?

- p6, L48: Is your system only acting in daytime or 24/7?

- p7, L16: Definition of Major Trauma with an ISS>12. Why 12? The international cut-off is usually ISS>=16. The consequence is a much smaller number I think...

- P7, L36: Startup time of 10 min. This is a really long start-up time. In calculating models it has a huge influence… Is there a difference between contracted and real (measured) startup time?

- p8, L34: The difference in startup time (10 min, vs 4 min with the CCRH). These 6 minutes are really crucial. 6 min flying are equal to 24 km area, thus a large difference when talking about coverage.

- p9, L19: In the introduction it is not clear to me what the differences are between the two operators (CRRH and HEMS). Who is dispatching, what were dispatch criteria. Both only daytime?

- p13, L21: In general: please indicate these places (and not only the names in the text) somewhere in the map. Someone from abroad doesn't have the local geographical knowledge… (different places in the manuscript...)

- p16, L37: This is particularly dependent on how the contracts were made: a light, twin engine helicopter like te EC145 which can land "everywhere", or a larger one… This is the variable in lot of HEMS literature, but also depending on the definition of HEMS...

Are the methods appropriate and well described?  
If not, please specify what is required in your comments to the authors.

Yes

Does the work include the necessary controls?  
If not, please specify which controls are required in your comments to the authors.

Yes
Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
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I am able to assess the statistics

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