Reviewer’s report

Title: Real-time forecasting of emergency department arrivals using prehospital data

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Reviewer: Thomas Schmidt

Reviewer's report:

The authors address the challenge of predicting the inflow of emergency department patients with the objective of reducing the risk of crowding. Based on an existing dataset consisting of ED arrivals at a large Norwegian hospital, the authors propose a set of forecasting models that individually seek to predict arrivals within varying timespans.

Methodologically the paper seems sound. The authors' utilization of a Poisson based regression model is less novel than their focus on various forecasting time windows. Their approach is strengthened through access to a high quality dataset, which includes pre-hospital notification.

With reference to [12] (which describes the dataset), the various prediction functions seem very much in-line with the observed reality. Thus as a reader, I struggle to transfer their results to actual daily clinical use. Consequently, I would appreciate a discussion of the applicability of the proposed algorithm. Although the full model improves the MAPE when compared to the baseline, I question how much better the proposed model is when compared expected arrivals based on historic data. Especially when considering both the increased uncertainty related to shorter time windows, and the high MAPE.

I assume there is more efficient improvement to be gained by investigating in-house bottlenecks. In other words, how frequent is crowding an effect of unexpected in-flow of patients vs. as happening due to bottlenecks and other throughput issues?

A discussion of the utility added by applying a forecasting model would be an interesting addition to the paper. In general, this is a fine addition to the existing body of literature on forecasting of arrivals in EDs.

Minor comments:

There are a few typos in the paper, e.g. 'sort' instead of 'short' (Background line 47).

MAPE is an abbreviation for Mean Absolute Percentage Error, not Mean Average Percentage Error. This is a common misunderstanding, but should be corrected nonetheless.
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

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I am able to assess the statistics

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