Reviewer’s report

Title: Ensemble-based methods for forecasting census in hospital units

Version: 2 Date: 12 November 2012

Reviewer: Claus Dethlefsen

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Major Compulsory Revisions

None.

Minor Essential Revisions

1. The affiliation of the third author is probably misspelled? Should be "... Infants Hospital ...". Also in the Additional File 1.

2. Methods, first section. You mention "healthy discharge". Is it possible to have "non-healthy discharge" such as death or relocation to another department? It seems so, when reading the second paragraph in the Results-section. In the Results section, the non-healthy discharged are excluded from the analysis. Is this reasonable?

3. Section 2.3. You should define the symbol for "approximately distributed as" (dot over tilde).

4. Results, 1+2 paragraph. I was confused by first the mention of 2660 consecutive admissions (first paragraph) and then only 1001 admissions that were used (second paragraph). Why not use all admissions?

5. In the legend to Figure 3, I think you should specify that the predictions are based on data observed up to the current date.

6. In Figure 3 it is hard to tell the two lines from each other. Consider using dots for the observations.

Discretionary Revisions

1. Section 2.1. You find a half-year periodicity. Is there a plausible explanation for this? Is it resonable to assume that the cycle repeats itself twice per year? Perhaps you should consider using a sum of cosines with different frequencies.

2. Section 2.1, formula (5). You describe how you estimate the
expected number of arrivals, mu-hat, by estimating beta and phi from data. How often is this done? In each time-step? I am curious regarding the computational aspects: How long does it take to compute? Do you re-compute everything in each step or can you update/reuse some estimates? Later, in section 2.3 you write up the algorithm. Do I understand it correctly, that you recalculate everything based on "previous" observations? How computer-timeconsuming is this? I wonder if a Kalman filter approach would be less computer-intensive.

3. Section 3. Did you have missing data? How was this handled?

4. Section 3.3. You find a tendency of overestimating the observed census. You also found the prediction intervals have a slightly smaller coverage than promised in most cases. I agree that it is not very much and not alarming for your data, but I wonder if you could re-calibrate your model based on the training data?

Level of interest: An article whose findings are important to those with closely related research interests

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