Reviewer's report

Title: Institution specific risk factors for 30 day readmission at a community hospital: a retrospective observational study

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Reviewer: Marc Silverstein

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Major Compulsory Revisions

This single community hospital study of 30-day hospital re-admissions used a retrospective cohort design to identify patient factors, hospital physician (provider or “hospitalist”) factors, hospital factors (organization and location of three types of clinical care services) and season in a cohort of patients with heart failure, pneumonia or chronic obstructive pulmonary disease admissions to identify independent predictors of hospital admission using multivariable logistic regression.

The study goals were to confirm previously studied (and presumably important and statistically significant) predictors of hospital readmission and assess institution specific factors associated with 30 day readmission.

This is a two-year retrospective cohort study from a single 257-bed community hospital study; the study size is small and of course there is limited ability to identify predictors of readmission. The analytic scheme is focused on variable reduction to develop a prediction model with a parsimonious set of predictors.

The analytic approach uses statistical criteria for variable reduction in multivariable analysis and presents the variables (odds ratios and 95% confidence intervals) in the final statistical model (age, gender, insurance, diagnostic cohort (heart failure, pneumonia or chronic obstructive pulmonary disease, morbidity score, admission in prior year, insurance, length of stay, season, and “floor” (cardiac, medical/oncology, or non-medical (previously identified as general medicine). The summary table also provides analyses of the three (non-mutually exclusive) subsets of patients by diagnosis (heart failure, pneumonia or chronic obstructive pulmonary disease).

The results focus on season with “significantly” increased odds of readmission (winter OR 1.55. 95% CI 1.21 – 2.0 compared to summer) and the “borderline significant “hospital floor (Med/onc OR1.19 (95% CI 0.99 – 1.43)

The problems with the study that require a major compulsory revision relate to the study goals, missed opportunity to fully analyze and explore factors that are available in the data and hence the analytic approach. While these are important problems, a revised study with carefully revised analysis of relatively novel or understudied risk factors would be of more interest.
Study goals: The first study goal to replicate previously studied predictors in this setting is not novel and the small size of the study precludes making any important inferences of previous predictors are or are not replicated. Thus while of great interest to the investigators, it is hardly scientific goal worth pursing. Of note is that the study results and discussion barely address this goal. It can be dropped with no adverse impact on the study. (Of course known predictors will need to be included in the analytic model.)

Missed opportunity: The paper nicely summarizes previously published studies of hospital admission and then fails to provide detail or explicit rationale for the potential institution specific factors that may be important to the quality of care and result in increase 30-day readmission. There are several process of care factors relating to work load – number of patients, hours, time required to learn about patients on switch day that -- that could be studied as factors that might increase risk of 30-day readmission: community hospital organization of clinical services, hospital census, hospital physician (patient) census, hospital physician work hours, patient discharge on hospitalist physician switch day or house staff switch day or even other weekday/weekend factors. These factors are generally not available studies with large sample size and so the investigators study of these factors would be of interest.

Analytic approach: A parsimonious prediction model that could be used as a clinical or health services prediction rule to identify patients with a high risk of readmission that should be managed differently from patient with a low risk of readmission should be validated (replicated in the same setting and other settings) and its performance evaluated overall to see if it discriminates between patients actually readmitted and not readmitted and if it is well calibrated in its estimates of the probability of readmission. This is clearly beyond the intent and scope of the current study. An alternate approach in the analysis would test all the hospital physician and community hospital factors of interest mentioned above to see if they predict 30-day readmission after adjusting for known factors and potential confounding factors. In this analysis season may be a marker of confounding reflecting may unmeasured patient, physician, hospital and extraneous factors. Thus the analytic method should more carefully follow the study goal. Since the study sample is small, the emphasis should be on estimation – the independent odds ratios and their 95% confidence intervals - for the (novel) important variables that are hypothesized to increase risk of 30-day readmission rather than a search for a parsimonious model with significant predictors. The stratified models focusing on the three overlapping disease cohorts provide little additional information and should be dropped from the analysis.

Discretionary Revisions
1. Consider the following:
   a. patient associated factors = patient factors (age, gender, insurance, diagnosis (heart failure, pneumonia, chronic obstructive pulmonary disease) morbidity score, admission in previous calendar year, length of stay, discharge on switch
day, discharge location
b. provider associated factors = (hospitalist) physician factors: physician patient census, physician hours
c. hospital associated factors = hospital factors: clinical services (medicine, medicine/oncology, cardiac/telemetry); teaching or non-teaching service; floor census
d. other factor: season
2. Carefully describe the “institution specific factors and the rationale for how they may affect 30-day readmission.
3. Consider using a health services research specific conceptual model for use of health services. For example look at the following:
4. Elixhauser comorbidity score: Clarify whether this is a total morbidity score (sum of Elixhauser categories with one or more discharge diagnoses or a total co-morbidity score (sum of diagnoses except for the primary discharge diagnosis.)
a. It may be helpful to read Elixhauser’s original paper and Deyo’s adaptation of her work for use with administrative data.
5. Discharge location: Discharge to a facility has been found to increase risk of 30-day readmission. See the following:

Level of interest:An article of insufficient interest to warrant publication in a scientific/medical journal

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.