Reviewer’s report

Title: Can billing codes accurately identify rapidly progressing chronic kidney disease patients: A diagnostic test study

Version: 1 Date: 15 Mar 2019

Reviewer: Meda Pavkov

Reviewer's report:

Jalal et al. examined the diagnostic accuracy of ICD-9 codes among CKD patients overall and among those with rapidly progressive kidney disease. A large insurer database was used to identify persons with eGFR criteria for CKD over an eight-year period. ICD-9-CM codes were tested for sensitivity and specificity against clinical diagnosis and rapid progression of CKD. They found that ICD-9 coding had high specificity but poor sensitivity for both CKD overall and rapid progression.

I offer the following comments for consideration:

1. The KDIGO defines CKD by both albuminuria and reduced eGFR, however, the authors only consider incident CKD stage 3 for comparison of laboratory and ICD diagnoses. I suggest including this specification in the title of the manuscript.

2. Generally, the literature defines rapid GFR decline as ≥3 ml/min/1.73m² based on longitudinal studies of aging. The ≥3 ml/min/1.73m² in stage 3 CKD seems somewhat steep. Please indicate a reference for the definition of rapid progression.

3. Would be helpful to include a table with baseline characteristics of the different studied cohorts.

4. The methods state "onset of CKD-stage 3 was considered at baseline", suggesting that persons with incident CKD stage 3 were considered for analysis. Was there a lead-time or previous encounters required to define stage 3?

5. The methods mention several cohorts for which performance of ICD codes were explored, but the description of these analyses is quite difficult to follow as written. This section is very important for understanding the results, so I suggest organizing it better. Specifically, there is very little information about the insurance database and about how laboratory data were linked to ICD codes; it is not clear if incident CKD stage 3 only
required a confirmatory eGFR; the flowchart in figure 1 does not reflect what is described in the methodology, as it does not indicate the incident stage 3 cohort.

6. Under results, lines 11-13, is stated "qualified for analysis by having serum creatinine values from which to calculate eGFR and non-missing values on other variables." Are the authors referring to the variables included in the eGFR equation or a complete-case analysis? Please specify.

7. In Table 1 please include the percentage value in each cell.

8. How was the ROC AUC determined? Did the authors use univariate or multivariate logistic regression models to determine the AUC and c-statistic?

9. The discussion section includes many results that have not been described in the corresponding section. Please limit the discussions to interpreting and commenting the results.

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Yes: CKD is one of the most prevalent chronic diseases in the US. In fact, it is more prevalent than diabetes. Even so, awareness of CKD is very low, at about 5% in early stages and less than 50% in very advanced stages, as compared with diabetes where awareness is 72%. The low awareness for CKD includes both patient and provider awareness, and the present analysis reflects mostly the latter. For these reasons I find the subject matter in the present manuscript quite important and worthy of promoting. Nonetheless, the authors still need to work on refining their analysis.
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