

## PEER REVIEW HISTORY

BMJ Open publishes all reviews undertaken for accepted manuscripts. Reviewers are asked to complete a checklist review form ([see an example](#)) and are provided with free text boxes to elaborate on their assessment. These free text comments are reproduced below.

This paper was submitted to the JAMIA but declined for publication following peer review. The authors addressed the reviewers' comments and submitted the revised paper to BMJ Open. The paper was subsequently accepted for publication at BMJ Open.

## ARTICLE DETAILS

<b>TITLE (PROVISIONAL)</b>	Validity of AHRQ Patient Safety Indicators Derived from ICD-10 Hospital Discharge Abstract Data (Chart Review Study)
<b>AUTHORS</b>	Quan, Hude; Eastwood, Cathy; Cunningham, Ceara; Liu, Mingfu; Flemons, Ward; De Coster, Carolyn; Ghali, William

## VERSION 1 - REVIEW

<b>REVIEWER</b>	Gallego, Blanca University of New South Wales Centre for Health Informatics
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<b>GENERAL COMMENTS</b>	<p>This paper aims to check the positive predictive value (PPV) of five AHRQ Patient Safety Indicators (PSIs) obtained from hospital administrative data. Review of chart data was used as the reference standard.</p> <p>The paper is well written and is relevant for those of us concerned with the evaluation of patient safety in hospitals.</p> <p>I recommend the following clarifications or changes:</p> <p>Methodological issues:</p> <ul style="list-style-type: none"><li>- I would argue that false positives are as important as true positives for the evaluation of the utility of administrative data in the measurement of PSIs. The authors comment on false positives very briefly showing table 3 when flag for 'present on admission' was ignored. I think the 'full' evaluation of administrative data should be discussed from the beginning of the manuscript.</li><li>- The authors state in page 6 that 'earliest admission date was assigned to patients as the index date for those with multiple admissions in the study period'. It is unclear to the reader how are multiple admissions dealt with. Are subsequent admissions ignored or considered part of the same admission? Or a combination of the two depending on time between admissions? Sometimes adverse events (e.g. pulmonary embolism) appear as a primary diagnosis of a subsequent hospitalisation. Are these being ignored in this paper? Please clarify.</li><li>- Why are 'patients who underwent surgeries in the same day' not included? (page 6)</li><li>- The confidence intervals of the PPVs are on the large side, possibly reflecting small sample sizes. This fact reduces confidence in the results.</li></ul> <p>Discussion:</p> <ul style="list-style-type: none"><li>- Given that there is a gap between chart data reviews and coding, it</li></ul>
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	would be good to understand if the true positives represent a random sub sample of all positives or if they represent a biased set. Any comments?
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- The manuscript received a second at The JAMIA but the reviewers have declined to make the reviews public. Please contact BMJ Open editorial office for any further information.

### VERSION 1 – AUTHOR RESPONSE

Comments from JAMIA External Reviewer 1

Methodological issues:

1. I would argue that false positives are as important as true positives for the evaluation of the utility of administrative data in the measurement of PSIs. The authors comment on false positives very briefly showing table 3 when flag for 'present on admission' was ignored. I think the 'full' evaluation of administrative data should be discussed from the beginning of the manuscript.

Thanks for the comments. In the introduction, we added the following:

Administrative data has possible limitations for identifying complications that represent medical error or may be at least in some way preventable. First, administrative data are unlikely to capture all cases of a complication, regardless of the preventability, without false positives and false negatives. Second, when the ICD codes are accurate in defining an event, the clinical vagueness inherent in the description of the code itself may lead to a highly heterogeneous pool of clinical states represented by that code. Third, incomplete reporting may compromise the accuracy of any data source used for identifying patient safety problems, as medical providers might fear adverse consequences of “full disclosure” in potentially public records such as discharge abstracts. Fourth, the ability of these data to distinguish events in which no error occurred from true medical errors is uncertain.

Data quality is commonly evaluated using four statistical parameters. Sensitivity is a measure of the accuracy of recording presence of PSIs in administrative data when these are truly present according to reference data (i.e. gold standard). Specificity is to determine the accuracy of reporting absence of these PSIs in the administrative data when these PSIs are absent in the reference data. Positive predictive value (PPV) and negative predictive value (NPV) are to determine the extent to which PSIs present in the administrative data are also present in the reference data or the extent to which a condition absent in the administrative data are truly absent according to the reference data.

2. The authors state in page 6 that ‘earliest admission date was assigned to patients as the index date for those with multiple admissions in the study period’. It is unclear to the reader how are multiple admissions dealt with. Are subsequent admissions ignored or considered part of the same admission? Or a combination of the two depending on time between admissions? Sometimes adverse events (e.g. pulmonary embolism) appear as a primary diagnosis of a subsequent hospitalisation. Are these being ignored in this paper? Please clarify.

We clarified in the methods.

Earliest admission date was assigned to patients as the index date for those with multiple admissions in the study period without consideration of transfers. Adverse events (e.g. pulmonary embolism) are likely coded in the index admission as adverse events. Sometimes adverse events are not coded in the index admission but could be coded as the most responsible diagnosis for a subsequent admission. We missed these cases because timing of adverse event was not recorded for the primary diagnosis.

3. Why are ‘patients who underwent surgeries in the same day’ not included? (page 6)

The reason is that our administrative data does not capture day surgeries.

We added:

Patients who underwent surgeries in the same day or emergency room were not included because our administrative data does not capture these services.

4. The confidence intervals of the PPVs are on the large side, possibly reflecting small sample sizes. This fact reduces confidence in the results.

See our response to editor's comment #4.

Discussion

5. Given that there is a gap between chart data reviews and coding, it would be good to understand if the true positives represent a random sub sample of all positives or if they represent a biased set. Any comments?

Please see our response to editor's comment #1.