Reviewer’s report

Title: Prospective Monitoring of Imaging Guideline Adherence by Physicians in a Surgical Collaborative: Comparison of Statistical Process Control Methods For Detecting Outlying Performance

Version: 0 Date: 19 Dec 2019

Reviewer: Paul Shekelle

Reviewer's report:

This manuscript presents the results of a comparison of 4 different methods in statistical process control applied to indicated/appropriate vs not indicated/inappropriate bone scan imaging in men with newly diagnosed prostate cancer. The authors compared 4 SPC methods: p-chart, weighed binomial cumulative sum, Bernoulli cumulative sum, and the exponentially weighted moving average, and looked for how long the run needed to be in order to detect out-of-control rates if imaging. This was applied to a dataset of some 18,000+ patients of whom 1,366 had a bone scan. The authors found that the exponentially weighted moving average had the shortest run time, and also afforded the visual presentation of rates. The authors conclude that the exponentially weighted moving average may be the best method, although this conclusion may not be generalizable to other conditions and situations.

This manuscript is not what I expected it to be from the title. I had expected a quality improvement initiative to improve guideline adherence that used SPC as its method for detecting outliers. The authors might avoid other prospective readers from making the same mistake by changing the title to something like "...a comparison of 4 SPC methods for detecting outliers...".

I am only familiar with the exponentially weighted moving average, and am not competent to comment on the choice of the other 3 SPC methods compared, nor whether their comparisons were methodologically sound. This needs to be reviewed by someone expert in multiple methods of SPC, which I am not.

That said, I agree with the conclusion - the exponentially weighted average method works best, and Figure 5 is what I am used to seeing when using SPC or reading reports written by others.

-Paul Shekelle
Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

Unable to assess

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Unable to assess

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes

Are you able to assess any statistics in the manuscript or would you recommend an additional statistical review?
If an additional statistical review is recommended, please specify what aspects require further assessment in your comments to the editors.

I recommend additional statistical review

Quality of written English
Please indicate the quality of language in the manuscript:

Acceptable

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