Reviewer's report

Title: The Health Fair Effect: Bias in Screening for Thyroid Disease

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Reviewer: Kevin Deane

Reviewer's report:

Major

The authors did not find any difference in symptoms between those with abnormal TSH and those with normal TSH. However, because it appears that the symptom assessment and TSH testing were done after pre-screening with education about thyroid disease, they likely stacked their population with people with symptoms and therefore made it very difficult to determine if symptoms were related to TSH abnormalities. Also, this is likely why the authors found higher prevalence of symptoms and abnormal TSH's than other studies that probably lacked this pre-screening approach. If the authors had wanted to see if symptoms would predict TSH abnormalities, it would have been better to screen a general health-fair population rather than one that was pre-screened to have their thyroid function tested. The authors discuss this limitation to some extent, but this needs to be discussed in greater detail and specifically they should discuss how going forward symptoms as a predictor of thyroid disease could be better assessed because from this study it is not clear that symptom assessment isn't a good way to screen for undiagnosed thyroid disease.

Do the authors have any sense of what thyroid symptoms were in those that attended the lecture on thyroid awareness, but did not get their blood tested?

The authors need to include the fact that this was a highly thyroid disease focused health-fair in the abstract. In particular the authors state in the abstract’s conclusion that the motivations for attending the health-fair were not studied, although it seems that the motivation was to have their thyroid function tested. That should be made more clear.

I don’t like the term ‘health-fair effect’ for this paper because this wasn’t a typical health fair where multiple diseases are evaluated. Rather this was a highly focused project to find thyroid disease. Suggest dropping health fair effect and instead using title that says something like "Thyroid disease awareness education leads to high rates of identification of subjects with previously undiagnosed thyroid disease"

Perhaps the most interesting finding is that they did get a higher prevalence of thyroid disease by TSH than expected in the general population, so their approach of ‘thyroid awareness week’ with TSH testing at the end may be beneficial although it is interesting that they did not seem to get higher rates of abnormal TSH than another health fair. But, authors should highlight that this
approach may increase rates of detection of undiagnosed thyroid disease. As discussed above, perhaps changing the title and discussion of 'health-fair effect' would help to highlight the success of their particular program.

What do the authors think were the direct costs per subject to identify someone with thyroid disease by TSH? They mention it cost $5 for the TSH test, but what about costs for the whole 'thyroid awareness week'? Also, costs for testing all subjects regardless of whether they had abnormal TSH or not.

Why not use linear regression with outcome TSH level as continuous? Also, with that approach could use number of symptoms (e.g. 0, 1, 2, 3) as a predictor variable for TSH level. For example, 33 symptoms may be highly predictive of an abnormal TSH.

Minor

Is there not emerging evidence that at TSH of ~2-3 could be abnormal? Please discuss the fact that if they used too high of a cut-off for abnormal TSH it could influence results.

The results regarding the distribution of TSH levels would be easier to read if in a table and with standard measures of distribution like median [interquartile range]

**Level of interest:** An article of importance in its field

**Quality of written English:** Not suitable for publication unless extensively edited

**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.