Reviewer's report

Title: Improving productivity, quality and turnaround times in the H&E workcell through implementation of Lean process changes and the Ventana Symphony

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Reviewer: Rene Buesa

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Review of BMC Clinical Pathology MS: 8661325412964908 [by Hassell LA et al.].

After reading the title and the “Abstract” I prepared a list of questions I expected to find answered in the text, this being my methodology to any MS review.

The questions were:
1- Statistical tests used to analyze the results.
2- Characterization of the laboratory in terms of staff and work load.
3- Cost analysis of the obtained improvements.
4- Productivity figures before and after the implementation process was completed, and
5- Impact of the changes in the Turn Around Time (TAT) of the laboratory.

After reading the manuscript I found the following answers:

To question 1 (Statistical analysis): at the bottom of Table 1 it is stated that the authors used the “two-tail t” test, but that should have been included in “Materials and Methods”. Also the use of a parametric test like “t” requires that the data has a normal distribution and in no part of the text that issue is addressed.

To question 2 (Staff and work load): this question was not answered at all, except for writing that the laboratory has an average workload of 500 slides/day. Finished slides are not a good indication of the workload because it varies greatly depending on the nature of the tissue sample and the pathologists’ requirements. It is always necessary to evaluate the magnitude of the problem and the best indicators are workload and staff characteristics of the laboratory and neither are included.

To question 3 (Costs analysis): this question was not answered. In the
“Conclusions” it is stated that “Introduction of an automated staining system alone has produced some small but significant improvements in productivity, which coming at the high cost of such stainers may make little sense.” This statement really warrants that the cost analysis be completed as part of the text or the reader will probably not consider embarking in a similar solution without knowing the cost that is just qualified as a “high cost”. That is not helpful at all.

To question 4 (Productivity): in “Materials and Methods” the authors write that they used the “raw blocks and slides count as tabulated monthly, combined with the worked hours” for the core activity of the lab (excluding special staining procedures). The reader has to wait until “Discussion” to find out that the productivity values presented in Table 1 (where the units are not included) refers to blocks and slides per FTE, not per worked hours. This should be stated in “Materials and Methods” and specified in Table 1.

This “productivity” unit has two problems. First blocks and slides should not be combined because the latter depend on the type of tissue sample in the blocks. Second, blocks or slides per FTE are a measure of “work load” and not of productivity. By definition productivity requires “time units”. In histology work load and productivity values are statistically independent. Different histotechs can have the same work load and different productivity levels. So, intrinsically, it is incorrect to select blocks and slides per FTE as a productivity unit.

Table 1 presents a mean value of 2309 for 5 months in 2007/8 and another of 2512 for 2008/9, and consider the difference as caused by the implementation of some Lean tactics and the use of the autostainer/coverslipper but what about the overall workload of the laboratory? With this question I return to the original “Question 2” that requires knowing the workload of the laboratory. Are the increases between 2007/8 and 2008/9 due to a concomitant increase in the work load? Did the staff change? If there was a reduction of the staff the work load (presented as “productivity”) of those remaining has to increase; was that the case? This proves the importance of answering the initial “Question 2” or defining the productivity as units of work per some unit of time.

It also points to the fact that units of work per FTE are not a measure of productivity because it can be affected by changes in the work load. Also, from the added productivity point of view, how many additional blocks the staff is now able to handle? It is supposed that there should be such
an increment, otherwise the changes determine a reduction in the staff time utilization.

To question 5 (Changes in the TAT): that question was answered, but I found some contradictions. On the one hand it is written that the time the slides were available went from 12 to 4 hours and essentially consider that the role of the autostainer/coverglassper was fundamental (at least that is what can be inferred from the text). That is not possible if the reduction of the baking -> staining -> coverglasslipping was reduced only by 50% starting from a small takt time (misspelled in Figure 2). Also in other part of the text it is written that the time saved by the autostainer/coverglassliper is 30 minutes. Additionally, in the “Abstract” is written that the total TAT was reduced by 48 minutes/case. This is almost meaningless if the total number of cases are not accounted for. The reader may think that there are less than 10 cases/day, which is absolutely impossible given the instruments in this laboratory. This whole issue is quite confusing, to say the least.

I think that reorganizing the way the tissues are processed to have small biopsies during the reception day instead of having them the next is the real factor in the reduction of the TAT, but tissue processing does not appear in Table 2, when it should.

The use of Lean tactics to modify the work flow (Figs. 3 and 4) show that 4 tissue processors, 2 embedding and 1 microtomy stations were moved to new locations, and the pathologists’ office became accessible more directly (one window opened?) and it is my opinion of that these changes bear the real credit for the improvement in the work flow productivity and the TAT reduction.

The authors also identify as a major bottle neck the H&E staining, when always the biggest bottle neck in the work flow of a histology laboratory is tissue processing, and in the text it is not even mentioned.

I think that better organization under Lean premises, better layout of the laboratory, modification of tissue processing schedules, and the use of the automated instrument, all together, account for the better work flow, but the impact of the autostainer is unjustifiably overrated.

By the way, the spaghetti diagrams (Figs. 3 and 4) should be presented side-by-side because otherwise it is difficult to appreciate the changes in the flow. It can be concluded that compared with the whole change in the operation
the autostainer has produced a minor impact. Perhaps this is why the authors point out this fact when they compare the “high cost” (unknown to the reader) with its “small” (in the text) impact that “may make little sense”.

I applaud the disclosure about “Competing Interests” between one author (CY) and the manufacturer of the autostainer/coverslipper but I am troubled by this fact and the role assigned to this instrument in the results. It is my opinion that the role of this instrument has been overrated when compared with a greater impact of other actions taken.

The authors point out to a reduction of 2.9 hours from grossing to finished slide and write that this reduction is 12% of the total time. This means that all the tasks amount to 24.2 hours, but this figure, interesting in itself, loses value if we don’t know how many cases those hours correspond to.

Summary:
It is the opinion of this reviewer that this is an interesting manuscript but that should address the above presented observations. The title, limiting the scope to the “H&E work cell” does not reflect the contents. Also the productivity units in the “Abstract” are not defined. The “Abstract” also concentrates in the H&E station and that is just a small aspect of the introduced changes.

The results are essentially caused by the different Lean actions taken, namely: the flow study and the changes in the location of tissue processors, embedding and microtomy stations and processing schedules. Those are the measures taken that have determined the obtained results and should be included in the “Abstract”.

Two H&E stainers/coverslippers (Ventana Symphony) were brought to the laboratory and placed where other H&E autostainer and one embedding station were located. They even left the old automated coverslipper presumable to be used to cover special stains sections.

Also the title refers to “improving quality” and quality is not mentioned in the whole MS. The authors have chosen to limit the scope of the title and the “Abstract” to the “H&E work cell” only, when the text touches the whole work flow. The title contains an unfortunate selection and arrangement of words that any reader can attribute to an evident interest in mentioning the automated
stainer/coverslipper, especially after reading the “Competing interests” section. Leaving the present title could even be counterproductive when the readers could end considering the whole article as a sort of a paid advertisement instead of an article with intrinsic merits, as it is.

This reviewer offers an alternate title to the authors’ consideration: “The combined positive impact of Lean techniques and the Ventana Symphony autostainer in the workflow of a histology laboratory”. This title better reflects the article contents and also mentions the autostainer, which evidently is of special interest to the authors.

Conclusion:
It is the opinion of this reviewer that the article is worth publishing after the presented comments are addressed.

Also it is of paramount importance for the credibility of BMC Clinical Pathology that the Ventana Symphony autostainer be assigned its real impact in the whole study.