Reviewer's report

Title: Finish line distinctness and accuracy in 7 intraoral scanners versus conventional impression: an in vitro descriptive comparison.

Version: 0 Date: 18 Dec 2017

Reviewer: Francesco Mangano

Reviewer's report:

This study is extremely interesting and it falls within the scopes of BMC Oral Health, Digital Dentistry section. I strongly suggest publication of this paper, however there are issues that should be solved before publication. I kindly ask the authors to modify their paper according to my suggestions.

- Title. Concise and informative.

- Abstract. Too concise, please expand it a little bit. In the Methods, please insert information about the reference scanner used here (name and manufacturer) and please add info about the Companies that produce the different IOS- manufacturers names. What is the name of the desktop scanner used to scan the poured stone cast model? Please give more info about the superimposition method used here. In the Abstract results, please mention the results obtained with the scan of the stone cast model poured from conventional impressions, it is interesting to expand a little bit the Abstract here. In the Abstract Conclusions, "the results raises" please correct. The overall level/quality of the english language in this paper is good but there are some isolated mistakes like this one, that should be corrected.

- Introduction.

I believe the authors should focus their attention on the concept of accuracy, and define it. It is mandatory because this study focuses on the investigation of a different type of accuracy- the finishing line accuracy, that is of great importance in the clinics. So, i suggest to modify the
beginning of the introduction in this sense. First, the authors should define accuracy (trueness and precision). Then, it will be possible to mention the evolution with in-colour images and the possibility to scan without powder, as well as the dimension of the wand, the speed of scanning, etc. So please expand the beginning of the Intro with this information.

All sentences throughout the text should have pertinent references. No unsupported sentences should be provided. I suggest the authors to introduce new updated references, supporting their statements, it is important to expand the reference list that is too short.

When you mention reference 15 (at the end of page 3) you should specify which kind of restorations were evaluated in that specific study. Marginal adaptation of a single crown is certainly easier than that of a full arch.

Very important and interesting sentence when the authors state: "Apart from accuracy and precision, variations in triangle mesh can be analyzed through resolution (triangle density), tessellation (level of triangle regularity) and topography (variations in height)". I congratulate with the authors.

- Methods. Very well described. It is excellent that the authors used an industrial reference scanner. However, I believe the use of titanium dioxide powder represents in this study a potential source of error/bias because it is very difficult to apply it in a uniform way. This limitation should be appropriately disclosed at the end of the Discussion section, in a paragraph entirely dedicated to the limitations of the present research.

"Due to the translucent properties of the model, a thin layer of titandioxide coating, (Kronos Titandioxide; Kronos International Inc, Leverkusen, Germany), was applied with an airbrush (Iwata HP-TR1; Iwata Medea, Inc, Portland, USA)"

I believe this is a limitation of this study.
IOS and IMPR. Please remove the first sentence against the i-Tero Company: they did not provide the scanner for the test so it is nonsense to mention it here.

Did the same clinician scan all the models in the same temperature and humidity conditions? What were the environment conditions? Were those sufficiently controlled? How long did it take? 10 scans per IOS are a good sample but it is a very hard work to do it!

Why did you select the tenth file of each IOS for further inspections?

Geomagic methods. Very well described but the methods are not new, please cite appropriate references.

- Results. Please expand them and do not present only the comments of separate figures. You should put the results in a logical order and then refer to the figures. I suggest to start with the IOS that achieved the best results.

- Discussion. This section is very well written but I kindly ask the authors to introduce one or two sentences about the general accuracy (trueness and precision) of IOS with proper, pertinent references; then, the authors will state what they investigated in this study and the advantages of the present technique.

At the end of the Discussion, please introduce a paragraph with the main limits of this study, i.e. it is an in vitro study, so you cannot mimic the subgingival conditions properly (gingival crevicular fluids, blood), you used powders to acquire reference files and this can be a problem.

- References. The number of references in this article is too low. Recently, several systematic and narrative reviews have been published and they should be inserted in the reference list, I kindly ask the authors to update the reference list and to reach at least a number of 25 pertinent references.
- Figures. Are of high quality but I would like the authors to add one picture of the reference model with its prosthetic abutment. It is interesting for the reader. In addition the legends of the figures should be expanded, in order to detail all results.

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

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

**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 am able to assess the statistics

**Quality of written English**
Please indicate the quality of language in the manuscript:
Needs some language corrections before being published

**Declaration of competing interests**
Please complete a declaration of competing interests, considering the following questions:

1. Have you in the past five years received reimbursements, fees, funding, or salary from an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?
2. Do you hold any stocks or shares in an organisation that may in any way gain or lose financially from the publication of this manuscript, either now or in the future?
3. Do you hold or are you currently applying for any patents relating to the content of the manuscript?
4. Have you received reimbursements, fees, funding, or salary from an organization that holds or has applied for patents relating to the content of the manuscript?
5. Do you have any other financial competing interests?
6. Do you have any non-financial competing interests in relation to this paper?

If you can answer no to all of the above, write 'I declare that I have no competing interests' below. If your reply is yes to any, please give details below.

i declare that i have no competing interests

I agree to the open peer review policy of the journal. I understand that my name will be included on my report to the authors and, if the manuscript is accepted for publication, my named report including any attachments I upload will be posted on the website along with the authors' responses. I agree for my report to be made available under an Open Access Creative Commons CC-BY license (http://creativecommons.org/licenses/by/4.0/). I understand that any comments which I do not wish to be included in my named report can be included as confidential comments to the editors, which will not be published.

I agree to the open peer review policy of the journal