

# Validity of digital study models compared with their original plaster study models: a systematic review

G De Luca Canto<sup>1,2</sup>, C Pachêco-Pereira<sup>1</sup>, M O Lagravère<sup>1</sup>, C Flores-Mir<sup>1</sup>, P W. Major

<sup>1</sup>University of Alberta, Canada <sup>2</sup>University of Santa Catarina, Brazil

## Clinical Relevance

Since the storage dental models is a challenge in dentistry the purpose of this study is to assess the validity of measurements made from digital models obtained from physical casts in comparison to actual measurements directly obtained from the same physical dental casts. The present systematic review provides very strong evidence that laser scanning of previously obtained plaster study models is an appropriate alternative to maintaining plaster models long-term as the original dimensions in the new format are maintained.

## Introduction

The replacement of plaster orthodontic models with virtual information has further potential benefits including:

- instant accessibility of 3D information without need for retrieval of plaster models from a storage area;
- the ability to perform electronically accurate and simple diagnostic set-ups of various extraction patterns;
- virtual images may be transferred to other formats for instant referral or consultation;
- objective model grading system analysis.

597 articles retrieved  
34 full-texts assessed

↓  
Finally, 16 studies included in the Systematic Review

## Methods

**Eligibility Criteria.** Studies that compared digital models produced from laser scanning of gypsum poured dental models (gold standard) with the original plaster model. Measurements from the dental casts should have been performed using a manual or digital caliper.

**Search** strategies for: Cochrane, EMBASE, MEDLINE, PubMed, and LILACS. References cited in the finally selected articles were screened and grey literature search by Google Scholar. Search up to May 7, 2014.

**Selection.** Phase 1: two reviewers independently reviewed the titles and abstracts of all database citations. Phase 2: the same selection criteria were applied to the full articles. Any disagreement in study selection process was resolved again by discussion and mutual agreement between the authors.

**Data Collection Process and Data Items.** Two authors collected the required information from the selected articles, after which cross checking procedures ascertained the completeness and precision of the retrieved information. Any disagreement in data collection process was resolved again by discussion and mutual agreement between the authors.

**Risk of Bias in Individual Studies.** The methodology of selected studies was evaluated using the 14 - item Quality Assessment Tool for Diagnostic Accuracy Studies (QUADAS)<sup>1</sup>. Two reviewers scored each item.

**Summary Measures.** Any type of outcome measurement was considered (continuous variables - mean difference, range, ratio and p value).

## Results

Only 16 studies were finally included for the qualitative/quantitative synthesis. The selected studies consistently agree that the accuracy of measurements obtained after using a laser scanner from poured models is similar to direct measurements. Any stated differences would be unlikely clinically relevant

## Digital models/Plaster models



Caliper – the actual Gold Standard measurements' tool

## Conclusion

**There is consistent scientific evidence to support the validity of measurements from digital dental arch models in comparison to measurements directly obtained from them.**

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