**Haptically-enabled Simulators in Dentistry for Assessment of Psychomotor Performance**

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**Objectives**

This research explores how haptically-enabled operative dentistry tasks can be used to provide accurate assessment and comparison of psychomotor skills between fourth and fifth-year dental students.

**Methods**

In this anonymous, non-interventional study that required no ethical approval, fourth- and fifth-year dental students (n=227) were issued two tasks involving the removal of a cross-shaped target whilst minimising encroachment onto the 0.2mm leeway space and the outer container, using direct vision (MAN04) and indirect vision (MAN11).  
  
Students were to submit their best attempt. No limits on the number of attempts or time constraints were imposed, but students had to submit MAN04 before progressing to MAN11. For guidance, tutors set “clinically acceptable” parameters: removal of ≥96% target, ≤7% leeway and <1% container, which we used as inclusion criteria.

**Results**

The percentages of target removed, leeway space encroached into and container hit on submitted attempts were evaluated using the inclusion criteria.  
  
61.3% of fourth-years opted to proceed from MAN04 (direct vision) to MAN11 (indirect vision) compared to 52.5% of fifth-years. However, in fulfilling the inclusion criteria, 41.7% of fifth-year students succeeded compared to 35.2% of fourth-years for MAN04; similarly, for MAN11, 47.9% of fifth-years versus 24.1% of fourth-years succeeded. Yet among the students accepted by the inclusion criteria for MAN04, there was no statistically significant difference between the two years for the mean percentage of leeway encroached upon and target removed.

**Conclusions**

Accurate feedback provided on haptically-enabled tasks has enabled comparison of performance characteristics between groups; a consistently higher percentage of fifth-years fulfilled the inclusion criteria for both tasks, particularly the more technique-sensitive indirect vision task. However, where results between groups were not statistically significant, the fifth-years could have reached a threshold level on par with fourth-years, beyond which any further clinical experience offers little improvement in psychomotor performance.