Contribution of haptic simulation for learning in odontology

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Why use haptic simulator in odontology?

• To develop clinical skills of students*
• To enhance skill acquisition rates*
• To allow repetition
• To standardize evaluation (objective assessment)
• To reduce educational support
• To minimize the cost of typodont utilisation (about 70000€ per year for typodont teeth in Nancy)


Aim of study:

To check the impact of haptic simulation as a teaching tool and progression in conservative dentistry

Study population

Group 1: « Haptic simulation training »
• N=45 □,23 □

Group 2: « Classical simulation training »
• N=43 □,21 □

Use and research of haptic simulation in odontology at Nancy University

• Since 2013
• Use of Virtex® dental simulators (23 simulators at the end of 2016)
• In implantology for workshop and optional course for student
• Now use in conservative dentistry
• Evaluation of simulator
  • But need of research to validate use of haptic simulation as a routine pedagogic strategy

Material and method

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<th>Week 1</th>
<th>Group 1 (without virtual assistance)</th>
<th>Group 2</th>
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<td>Group 1 (without virtual assistance)</td>
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<td>Week 3</td>
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Briefing/Debriefing session
Aspect of the “master” simulator preparation, different views

Assessment criteria: Objective assessment

- Objective assessment by haptic simulator:
  - % inside
  - % outside
  - Ratio: % inside + % outside
  - Time (total duration and drilling duration)

Assessment criteria: Subjective assessment

- Subjective assessment (double blind – screenshot):
  - Outline shape of the cavity
  - Proximal cavity
  - Distal cavity
  - Presence of iatrogenic milling (milling stroke) on the molar (46)
  - Presence of distal iatrogenic milling (milling stroke) on the premolar (45)

Discussion

Short-term educational value:

- Quick learning curve.
- Better (outside and subjective criteria)
- Distinguished different populations

Long-term educational value:

- Safer work practises, more reproducible
- Adapted to the constraints of lessons
- Free and unlimited access

Need of briefing/debriefing sessions

Both teaching methods are complementary

Perspectives: Use objective criteria for classical simulation

- Haptic simulation
- Classical simulation

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<td>Group 1 (with and without virtual assistance)</td>
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<td>Group 2 (without virtual assistance)</td>
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Perspectives

- Development of new cases and self evaluation module
- Validate and use for certification
- Economic valorisation

Assessment views

Economic valorisation

Both teaching methods are complementary

Subjective assessment

- Respect of the principal and secondary cavities depths
- Regularity of the cavity floor
- Presence of iatrogenic milling (milling stroke) on the molar (46)
- Presence of distal iatrogenic milling (milling stroke) on the premolar (45)

Subjective assessment:

- Outline shape of the cavity
- Proximal cavity
- Distal cavity

Immersive Simulator.

Use of objective criteria for classical simulation
Thank you for your attention

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