



Contribution of haptic simulation for learning in odontology

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Aim of study:

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







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)

*L.M. Al-Saud, F. Mushtaq, M.J. Allsop, P.C. Culmer, I. Mirghani, E. Yates, A. Keeling, M.A. Mon-Williams, and M. Manogue: "Feedback and motor skill acquisition using a haptic dental simulator." Eur J Dent Educ, 2016.

Study population

Group 1: « Haptic simulation training »



- N=45 N=45, 23 ♀, 22 ♂

Group 2: « Classical simulation training »

- N=43 22 ♀, 21 ♂



Use and research of haptic simulation in odontology at Nancy University



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


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*JOSEPH D., JEHL J.P., MAUREIRA P., PERENNOT C., MILLER N., AMBROSINI P., BRUNETTE P., TRAN N. Relative Contribution of Haptic Technology to Assessment and Training in Implantology. J Dent Res. International Volume 2014 (2014), Article ID 413953, 9 pages, Impact Factor: 2.881

Material and method

	Haptic simulation	Classical simulation	
Week 1	Group 1 (without virtual assistance)	Group 2	
Week 2	Group 1 (without virtual assistance)	Group 2	
Week 3	Group 1 (with and without virtual assistance)	Group 2	
Week 4	Group 2 (without virtual assistance)	Group 1	

Briefing/Debriefing session

Aspect of the "master" simulator preparation , different views

Outline shape of the cavity

Proximal cavity

Discussion

Short-term educational value:

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

Long-term educational value :

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

→ Need of briefing /debriefing sessions*****

Both teaching methods are complementary

*H. Karlo, and The Executive Council, World Federation for Medical Education, "International recognition of basic medical education programmes." Medical Education, vol. 42, no. 1, pp. 12-17, 2008.
 **A. S. Kishi, H. Higham, M. Moughtin, and D. K. Othman, "Simulation training for dental foundation in oral and maxillofacial surgery - a benchmark." British Dental Journal, vol. 125, no. 11, pp. 571-6, 2013.
 ***E.J. Eve, S. Koo, A.A. Alshihri, J. Cormier, M. Kozhenikov, R.B. Donoff, and N.Y. Karimbux, "Performance of Dental Students Versus Prosthodontics Residents on a 3D Immersive Haptic Simulator." J Dent Educ, vol. 78, no. 4, pp. 630-637, 2014.
 ****M. Al-Soudi, F. Murtaza, M.J. Akrop, P.C. Culmer, I. Mirghani, E. Yates, A. Keeling, M.A. Mon-Wille, and H. El-Sayegh, "Feedback and metrics still acquire new wings in the digital revolution." Eur J Dent Educ, 2016.

Assessment criteria: Objective assessment

Objective assessment by haptic simulator *

- % inside
- % outside
- Ratio 100 - % inside + % outside
- Time (Total duration and drilling duration)

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Perspectives: Use objective criteria for classical simulation

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Simulator Objective assessment Objective assessment (Optical impress)

Assessment criteria: Subjective assessment

- Subjective assessment (double blind – screenshot) :
- Outline shape of the cavity
- 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)

Perspectives

Development of new cases and self evaluation module

Validate and use for certification.

Economic valorisation

E.J. Eve, S. Koo, A.A. Alshihri, J. Cormier, M. Kozhenikov, R.B. Donoff, and N.Y. Karimbux, "Performance of Dental Students Versus Prosthodontics Residents on a 3D Immersive Haptic Simulator." J Dent Educ, vol. 78, no. 4, pp. 630-637, 2014.



Thank you for your attention



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