

Appendix A Experience in learning the lumbar puncture procedure

This questionnaire will make it possible to collect information related to learning the lumbar puncture procedure. This information is for academic purposes, for the development of a virtual lumbar puncture simulator for the learning and training in this procedure. All the data collected will be used for statistical analysis and the information sent will be anonymous.

***Obligatorio**

1. 1.1 Have you already performed a lumbar puncture on patients? *

Marca solo un óvalo.

☐ Yes *Salta a la pregunta 2*

☐ No

Learning the
lumbar puncture
procedure

The objective of this section is to obtain information related to the activities that are carried out to learn about this procedure before performing it on a patient.

2. 2.1 Which activities did you do to learn and train the lumbar puncture procedure? *

Selecciona todos los que correspondan.



☐ Literature review (anatomy, steps of the lumbar puncture procedure)



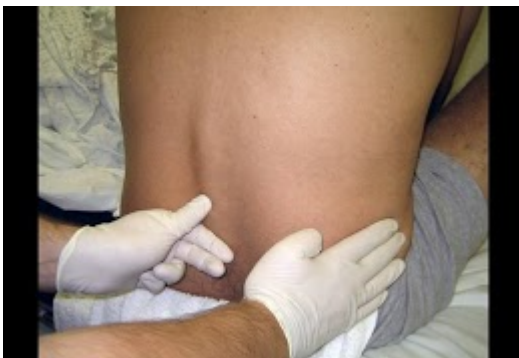
☐ Use of audiovisual materials (videos, images)



☐ Use of a manikin for training this procedure (palpation and needle insertion)



☐ Training with a virtual simulator



☐ Practice to identify the anatomical landmarks to find the insertion site (palpation)

Otro: ☐ _____



☐ Observe lumbar punctures on patients in a hospital

3. 2.2 What are the most common mistakes when physicians are learning the lumbar puncture procedure? *

Selecciona todos los que correspondan.

- ☐ Not to identify the correct insertion point
- ☐ Not to remember the correct angle of the needle for the insertion
- ☐ Not to remember the correct position of the needle for the insertion
- ☐ Not to remember the position in which the patient should be positioned
- ☐ Not to remember all the steps of the lumbar puncture procedure

Otro: ☐ _____

4. 2.3 How many times have you practiced the activities you selected from question 2.1 before performing your first lumbar puncture on patients? *

Experience of the first
LP in patients

This section will get information related to the first experience of performing lumbar puncture in patients

5. 3.1 From 1 to 10, how would you rate your performance in your first lumbar puncture in patients? Where 1 is low performance and 10 is high. *

Marca solo un óvalo.

1	2	3	4	5	6	7	8	9	10
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

6. 3.2 Do you think you were sufficiently prepared to perform your first lumbar puncture on a patient? *

Marca solo un óvalo.

☐ Yes

☐ No

7. 3.3 What would you like to have done during your training of the lumbar puncture procedure before performing it on a patient? *

8. 3.4 What did the physician evaluate you when you performed your first lumbar puncture in patients? *

Selecciona todos los que correspondan.

- ☐ The physician did not evaluate me
- ☐ Correct insertion site
- ☐ Correct insertion angle
- ☐ Correct cerebrospinal fluid sampling
- ☐ Correct use of mask, gloves and gown

Otro: ☐ _____

Salta a la pregunta 9

Use of mannequins in training the lumbar puncture procedure

This section will get information related to the experience of training and learning the lumbar puncture with mannequins

9. 4.1 Have you used mannequins to learn lumbar puncture? *

Marca solo un óvalo.

☐ Yes *Salta a la pregunta 10*

☐ No *Salta a la pregunta 16*

Use of mannequins in training
the lumbar puncture
procedure

This section will get information related to the experience of
training and learning the lumbar puncture with mannequins

10. 4.2 What were the conditions of the mannequin you used? *

Marca solo un óvalo.

☐ Good conditions (Few or no needle marks were observed, the sensation was still different when passing through each layer)

☐ Regular conditions (With multiple needle marks, but skin resistance was still present when the needle was inserted)

☐ Poor conditions (Too many needle marks which caused no skin resistance when inserting the needle)

11. 4.3 What tissues were represented on the mannequin? *

Selecciona todos los que correspondan.

☐ Skin

☐ Subcutaneous tissue

☐ Supraspinous ligament

☐ Interspinous ligament

☐ Ligamentum flavum (yellow)

☐ Dura mater

☐ Arachnoid

☐ Bones

Otro: ☐ _____

12. 4.4 When you practiced with the mannequin, what layers could you perceive? *

Selecciona todos los que correspondan.

- ☐ Skin
- ☐ Subcutaneous tissue
- ☐ Supraspinous ligament
- ☐ Interspinous ligament
- ☐ Ligamentum flavum (yellow)
- ☐ Dura mater
- ☐ Arachnoid
- ☐ Bones

Otro: ☐ _____

13. 4.5 What activities did you do with the mannequin? *

Selecciona todos los que correspondan.

- ☐ Palpation to find the insertion site
- ☐ Needle insertion
- ☐ Cerebrospinal fluid sampling

Otro: ☐ _____

14. 4.6 What features would you add to the manikin to have better training? *

15. 4.7 The use of manikins helps you to improve your skills in the lumbar puncture procedure? *

Marca solo un óvalo.

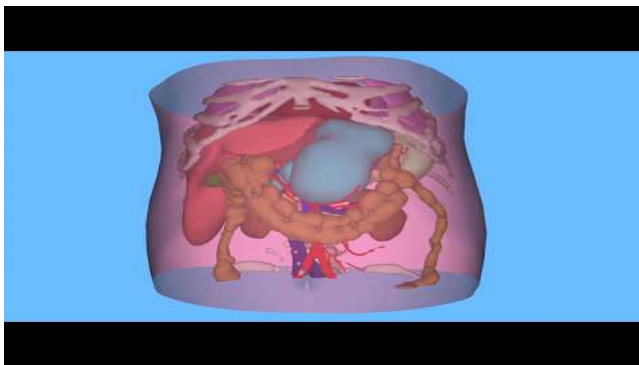
☐ Yes

☐ No

Use of virtual simulators in training of the lumbar puncture procedure

This section will obtain data about your experience with virtual simulators in your learning process of this procedure

The video below is from InSimo's Virtual Lumbar Puncture Simulator. It is presented with the aim of making the virtual simulator concept clear.



<http://youtube.com/watch?v=NBqjb3TUjeo>

16. 5.1 Have you used any virtual simulator of a lumbar puncture during your academic training? *

Marca solo un óvalo.

☐ Yes *Salta a la pregunta 17*

☐ No *Salta a la pregunta 25*

Use of virtual simulators in training of the lumbar puncture procedure

This section will obtain data about your experience with virtual simulators in your learning process of this procedure

17. 5.2 Which description mostly matches the simulator you used? *

Marca solo un óvalo.



☐ It was displayed on a monitor and operated with the mouse or keyboard



☐ It was displayed on a monitor, but it was handled with other controls (No mouse or keyboard)

☐ Otro: _____



☐ It was visualized in a head mounted device

18. 5.3 What kind of feedback did you receive from the simulator to detect if what you were doing was correct or not? *

Selecciona todos los que correspondan.

- ☐ On-screen messages or information
- ☐ Sounds
- ☐ Vibration (the controls vibrate)
- ☐ Force-feedback Fuerza (the controls showed some resistance)

Otro: ☐ _____

19. 5.4 What tissues were represented in the simulator? *

Selecciona todos los que correspondan.

- ☐ Bones
- ☐ Ligamentum flavum (yellow)
- ☐ Skin
- ☐ Dura mater
- ☐ Other ligaments
- ☐ Subcutaneous tissue
- ☐ Muscles

Otro: ☐ _____

20. 5.5 Without considering the tissues, what other elements existed in the simulation?

*

Selecciona todos los que correspondan.

- ☐ Other health professionals (nurses, doctors)
- ☐ Lumbar puncture needle
- ☐ Medical instrumentation different of the needle
- ☐ Medical furniture

Otro: ☐ _____

21. 5.6 Which layers could you perceive with the simulator? *

Selecciona todos los que correspondan.

- ☐ None
- ☐ Skin
- ☐ Subcutaneous tissue
- ☐ Supraspinous ligament
- ☐ Interspinous ligament
- ☐ Ligamentum flavum (yellow)
- ☐ Dura mater
- ☐ Arachnoid
- ☐ Bones

Otro: ☐ _____

22. 5.7 What activities did you have to do in the lumbar puncture simulator? *

23. 5.8 How did the simulator evaluate you? *

Selecciona todos los que correspondan.

- ☐ It did not evaluate me or give me information regarding my performance
- ☐ The training was recorded and the video can be played after
- ☐ With a score
- ☐ It indicated the mistakes that were made during training
- ☐ It indicated the time that each training/lumbar puncture lasted
- ☐ It compared my trajectory with an ideal trajectory

Otro: ☐ _____

24. 5.9 What were the disadvantages of the lumbar puncture simulator you used? *

Project
development

The information collected with this questionnaire will help us to develop a lumbar puncture simulator, which allows its teaching and training. To obtain the desired result, the participation of people with your profile is necessary. For which we would appreciate if you could participate in its development or evaluation, contributing with information or, when it is ready, to test and evaluate our simulator.

25. 6.1 Would you like to participate in the tests and evaluation of the lumbar puncture simulator with virtual reality? *

Marca solo un óvalo.

☐ Yes

☐ No

26. 6.2 For the development of the project we would like to obtain information on a real lumbar puncture procedure, for which we would like to make recordings of these procedures. In the event that you or your work team do them, would you allow us to film this procedure? *

Marca solo un óvalo.

☐ Yes

☐ No

27. In case you have answered yes to either of the two previous questions or to both, write your email to contact you and give you more information.

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