

Design and preliminary validation of a high-fidelity vascular simulator for robot-assisted manipulation

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Questionnaire about the face, content validity and the usability of the system

PERSONAL AND PROFESSIONAL INFORMATION							
Age	18-24 years	25-29 years	30-50 years	50+ years			I don't want to answer
Sex	Male	Female					I don't want to answer
Dominant hand	Right	Left	Both				I don't want to answer
Educational level	Student	Resident	specialist	professor or expert			I don't want to answer
Specialty	General Surgery	Urological Surgery	Thoracic Surgery	Others			I don't want to answer
Only if Resident, Year of Specialization	1	2	3	4	5		I don't want to answer
Year of experience in Laparoscopic surgery	0 years	1-3 years	3-5 years	5-10 years	10-20 years	20+ years	I don't want to answer
Year of experience in Robotic surgery	0 years	1-3 years	3-5 years	5-10 years	10-20 years	20+ years	I don't want to answer
Have you ever used a simulator for surgery both laparoscopic or robotic?	Yes, only for laparoscopic	Yes, only for robotic	Yes, both for laparoscopic and robotic	No			I don't want to answer
If you replied yes to the previous question (even if only for a specific kind of surgery), which kind of simulator did you use?	Virtual reality (VR) simulator	Physical simulator	Hybrid simulator				I don't want to answer
Hours of simulation for VR simulator	0 hours	1-12 hours	12-24 hours	1-5 days	5-10 days	10+ days	I don't want to answer
Hours of simulation for physical simulator	0 hours	1-12 hours	12-24 hours	1-5 days	5-10 days	10+ days	I don't want to answer

FACE VALIDITY

		(1)	(2)	(3)	(4)	(5)
		Veramente poco realistico / Very unrealistic	Un po' irrealistico / Somewhat unrealistic	Nè realistico nè non realistico/ Neither realistic nor realistic	Un po' realistico / Somewhat realistic	Veramente realistico / Very realistic
IMPRESSIONE GLOBALE / GLOBAL IMPRESSION						
1.	Setup completo di simulazione (confrontato con simulatori usati in precedenza) / Overall simulation setup (comparing with previously used simulators, if applicable)	☐	☐	☐	☐	☐
STRUTTURE ANATOMICHE E REALISMO VISIVO / ANATOMICAL STRUCTURE AND VISUAL REALISM						
1.	Realismo anatomico del simulatore senza copertura con tessuto connettivo / adiposo / The anatomical realism of the all simulator without cover with the connective /adipose tissue	☐	☐	☐	☐	☐
2.	Realismo anatomico del simulatore con copertura con tessuto connettivo / adiposo / The anatomical realism of the all simulator with cover with the connective /adipose tissue	☐	☐	☐	☐	☐
3.	Apparenza Visiva della vena/ Visual Appearance of the vein	☐	☐	☐	☐	☐
4.	Apparenza Visiva del tessuto connettivo/ adiposo sovrastante la vena/ Visual Appearance of the connective/ adipose tissue above the vein	☐	☐	☐	☐	☐
		(1)	(2)	(3)	(4)	(5)
		Veramente poco realistico / Very unrealistic	Un po' irrealistico / Somewhat unrealistic	Nè realistico nè non realistico/ Neither realistic nor realistic	Un po' realistico / Somewhat realistic	Veramente realistico / Very realistic
RISPOSTA MECCANICA E APTICA / MECHANICAL AND HAPTIC RESPONSE						
1.	Vena al tatto / Haptic Feedback of the vein	☐	☐	☐	☐	☐
2.	Tessuto Connettivo/ Adiposo al tatto / Haptic Feedback of the Connective/Adipose tissue	☐	☐	☐	☐	☐

3.	Realismo nell'interazione dello strumento con la vena / Realism in the instrument – vein interaction	☐	☐	☐	☐	☐
4.	Realismo nell'interazione dello strumento con il tessuto connettivo (elettrocauterizzazione) / Realism in the instrument – connective tissue interaction (electrocauterization)	☐	☐	☐	☐	☐

CONTENT VALIDITY

Per ciascuna delle domande seguenti, si prega di indicare la propria risposta su una scala da 1 a 5 tenenedo presente quanto segue: / For each of the following questions, please indicate your response on a scale from 1 to 5, considering what follows:

(1)	(2)	(3)	(4)	(5)
Fortemente in DISACCORDO /Strongly disagree	In DISACCORDO / Disagree	NEUTRALE / Neutral	D'ACCORDO / Agree	Fortemente D'ACCORDO / Strongly agree

1. Il simulatore è utile nell'insegnare l'isolamento di una struttura vascolare / The simulator is useful in teaching vascular structure isolation:

	1	2	3	4	5	
Fortemente in DISACCORDO /Strongly disagree	☐	☐	☐	☐	☐	Fortemente D'ACCORDO / Strongly agree

3

2. Il simulatore è utile nell'insegnare lo stapling di una struttura vascolare / The simulator is useful in teaching the stapling of a vascular structure:

	1	2	3	4	5	
Fortemente in DISACCORDO /Strongly disagree	☐	☐	☐	☐	☐	Fortemente D'ACCORDO / Strongly agree

3. Il simulatore è utile nell'insegnare a minimizzare le forze applicate a una struttura vascolare. / The simulator is useful in teaching to minimize the forces applied to vascular structures:

	1	2	3	4	5	
Fortemente in DISACCORDO /Strongly disagree	☐	☐	☐	☐	☐	Fortemente D'ACCORDO / Strongly agree

SYSTEM USABILITY SCALE (SUS)

1. Penso mi piacerebbe utilizzare questa piattaforma per il training. / I think I would like to use this platform for training

	1	2	3	4	5	
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Fortemente in DISACCORDO /Strongly disagree	☐	☐	☐	☐	☐	Fortemente D'ACCORDO / Strongly agree
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2. Ho trovato il funzionamento del simulatore (setup e interfaccia utente) più complesso di quanto mi aspettassi. / I found the functioning of the simulator (setup and graphica user interface) more complex that what I was thinking.

	1	2	3	4	5	
Fortemente in DISACCORDO /Strongly disagree	☐	☐	☐	☐	☐	Fortemente D'ACCORDO / Strongly agree

3. Penso che il simulatore sia facile da usare. / I think the simulator is easy to use.

	1	2	3	4	5	
Fortemente in DISACCORDO /Strongly disagree	☐	☐	☐	☐	☐	Fortemente D'ACCORDO / Strongly agree

4. mi servirebbe il supporto di un tecnico per essere in grado di utilizzare il simulatore. / I think I will need a technical person to support me to be able to use the simulator.

	1	2	3	4	5	
Fortemente in DISACCORDO /Strongly disagree	☐	☐	☐	☐	☐	Fortemente D'ACCORDO / Strongly agree

4

5. Ho trovato le funzionalità dell'interfaccia utente comprensibili e chiare. / I found the interface functionalities understandable and clear.

	1	2	3	4	5	
Fortemente in DISACCORDO /Strongly disagree	☐	☐	☐	☐	☐	Fortemente D'ACCORDO / Strongly agree

6. Ho trovato difficoltà nel capire i collegamenti da fare per montare il simulatore e poterlo quindi utilizzare. / I found difficulties in understanding the physical links to setup and use the simulator.

	1	2	3	4	5	
Fortemente in DISACCORDO /Strongly disagree	☐	☐	☐	☐	☐	Fortemente D'ACCORDO / Strongly agree

7. Immagino che la maggior parte dei miei colleghi imparerebbe ad utilizzare il simulatore molto velocemente. / I image that most of my colleagues will learn how to use the simulator very fast.

	1	2	3	4	5	
Fortemente in DISACCORDO	☐	☐	☐	☐	☐	Fortemente D'ACCORDO / Strongly agree

/Strongly disagree						
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8. Ho trovato il sistema intuitivo e "plug and play". / I found the system intuitive and "plug and play"

	1	2	3	4	5	
Fortemente in DISACCORDO /Strongly disagree	☐	☐	☐	☐	☐	Fortemente D'ACCORDO / Strongly agree

9. Mi sono sentito/a a mio agio nell'uso del simulatore. / I was comfortable with the use of the simulator.

	1	2	3	4	5	
Fortemente in DISACCORDO /Strongly disagree	☐	☐	☐	☐	☐	Fortemente D'ACCORDO / Strongly agree

10. Penso sia necessario più tempo per familiarizzare con il setup del simulatore. / I think more time is need to get familiar with the setup of the simulator.

	1	2	3	4	5	
Fortemente in DISACCORDO /Strongly disagree	☐	☐	☐	☐	☐	Fortemente D'ACCORDO / Strongly agree