Faculty of Medicine

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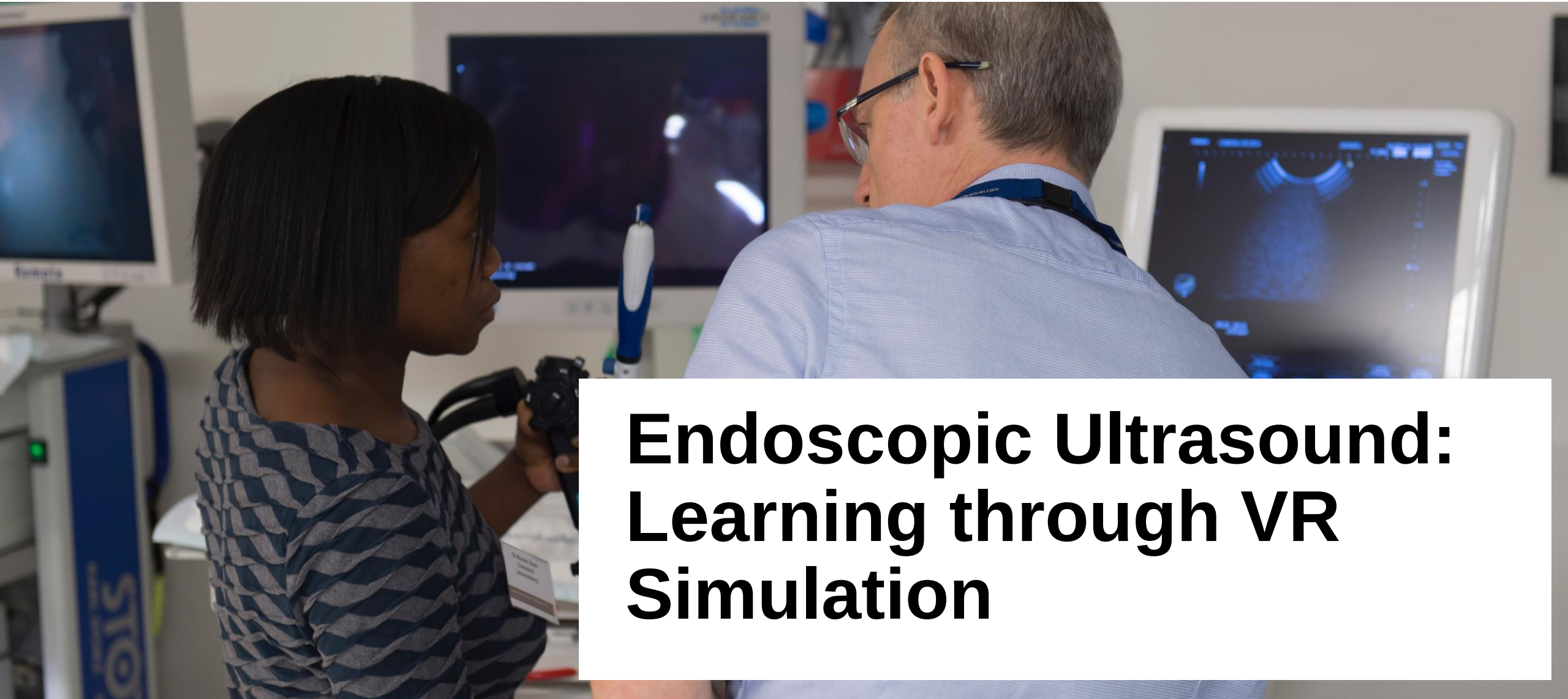

Endoscopic Ultrasound: Learning through VR Simulation

Is the Simbionix EUS Mentor a valid training tool for novices?

A validation study of a novel VR EUS Curriculum using the Messick Framework

VR EUS Curriculum

- Introduction to EUS
- Endoscope controls
- Anatomical landmarks

- Performing EUS in virtual reality

- Objective assessment
- VR utilisation

Messick Framework

- Content
- Response processes
- Internal structure
- Relationship to other variables
- Consequences of testing

Content

- Landmarks for identification - National Delphi process

Anatomical structures to be identified during EUS examination
Task 1 – station 1 (40cm GOJ)
1. Coeliac axis 2. Pancreas: Body/Tail 3. Left Kidney 4. Spleen 5. Portal venous confluence/pancreatic head
Task 2 – Station 2 (Duodenal bulb)
1. Gallbladder 2. Portal vein 3. Common bile duct/Pancreatic duct 4. Liver hilum 5. Uncinate process
Task 3 – Station 3 (D2)
1. Ampulla 2. Common bile duct/Pancreatic duct 3. Portal venous confluence

Original research

UK and Ireland Joint Advisory Group (JAG) consensus statements for training and certification in diagnostic

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Response Process

- Orientation of novices to EUS and simulator
- Validated DOPS: TEESATS
- Inter-rater reliability

Relationships with other variables

- Expert/novice comparison (construct validity)

Internal Structure

- Inter-rater reliability

Consequences

- Pass/fail (TEESATS)
- Time (median expert score)

EUS – Technical Aspects

Grading:

- 1 (Superior) – achieves without instruction
- 2 (Advanced) – achieves with minimal verbal cues
- 3 (Intermediate) – achieves with multiple verbal cues and hands on assistance
- 4 (Novice) – unable to complete

Body of Pancreas	1	2	3	4	N/T	N/A
Tail of Pancreas	1	2	3	4	N/T	N/A
Head/Neck of pancreas	1	2	3	4	N/T	N/A
Uncinate	1	2	3	4	N/T	N/A
Ampulla	1	2	3	4	N/T	N/A
Gallbladder	1	2	3	4	N/T	N/A
CBD/CHD	1	2	3	4	N/T	N/A
Portosplenic confluence	1	2	3	4	N/T	N/A
Coeliac axis	1	2	3	4	N/T	N/A
Spleen	1	2	3	4	N/T	N/A
Portal vein in D1	1	2	3	4	N/T	N/A
Liver hilum	1	2	3	4	N/T	N/A
Left kidney	1	2	3	4	N/T	N/A

Overall assessment (subjective):									
1	2	3	4	5	6	7	8	9	10
Below average level of training			Average for level of training			Above average for level of training			Superior for level of training

Results –Content

Content Quality	
The e-learning provided content that exactly fitted your needs for the study	4.50
The e-learning provided useful content	4.88
The e-learning provided sufficient content	4.63
The e-learning provided up to date content	4.75
Interface quality	
The e-learning was easy to use	4.88
The e-learning made it easy for you to find all the content you need	4.75
The content provided by the e-learning was easy to understand	4.88
The e-learning was user friendly	4.88
The operation of the e-learning was stable	4.88
The e-learning responds to your requests fast enough	4.63
Testing quality	
The e-learning makes it easy for you to evaluate your learning performance	4.50
The testing methods provided by the e-learning were easy to understand	4.75
The testing provided by the e-learning are fair	4.88
The e-learning system provided a secure testing environment	4.75
The e-learning system provides testing results promptly	4.88

Wang YS.
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Results – Construct Validity

Landmark	MWU p value
Body of Pancreas	0.030
Tail of Pancreas	0.006
Head/Neck of Pancreas	0.006
Uncinate process	0.016
Ampulla	0.028
Gallbladder	0.002
Common bile duct / Common Hepatic Duct / Pancreatic Duct	0.002
Portosplenic confluence	0.006
Coeliac axis	0.002
Spleen	0.019
Portal vein in head	0.002
Liver hilum	0.006
Left Kidney	0.011

Results - Reliability

Parameter	Krippendorff's Alpha		
1. Body of pancreas	0.695	0.3619	0.4952
2. Tail of pancreas	-0.091		
3. Head/neck of pancreas	-0.331		
4. Uncinate process	0.746		
5. Ampulla	0.769		
6. Gallbladder	-0.354		
7. CBD/CHD	0.056		
8. Portosplenic confluence	0.739		
9. Coeliac axis	0.253		
10. Spleen	0.387		
11. Portal vein in D1	0.115		
12. Liver hilum	0.344		
13. Left kidney	0.514		
14. Overall	0.6944		

Inter-observer reliability
TEESATS

Conclusions

- First validity assessment of VR trainer for EUS
- Strong arguments to recommend validity
    - Content
    - Response Process
    - Relationship to other variables
- More work required: internal structure and consequences
- Exciting potential for VR assessment

Acknowledgements

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