



# E-LEARNING TO TEACH MEDICAL STUDENTS ABOUT ACUTE OTITIS MEDIA: A RANDOMIZED CONTROLLED TRIAL

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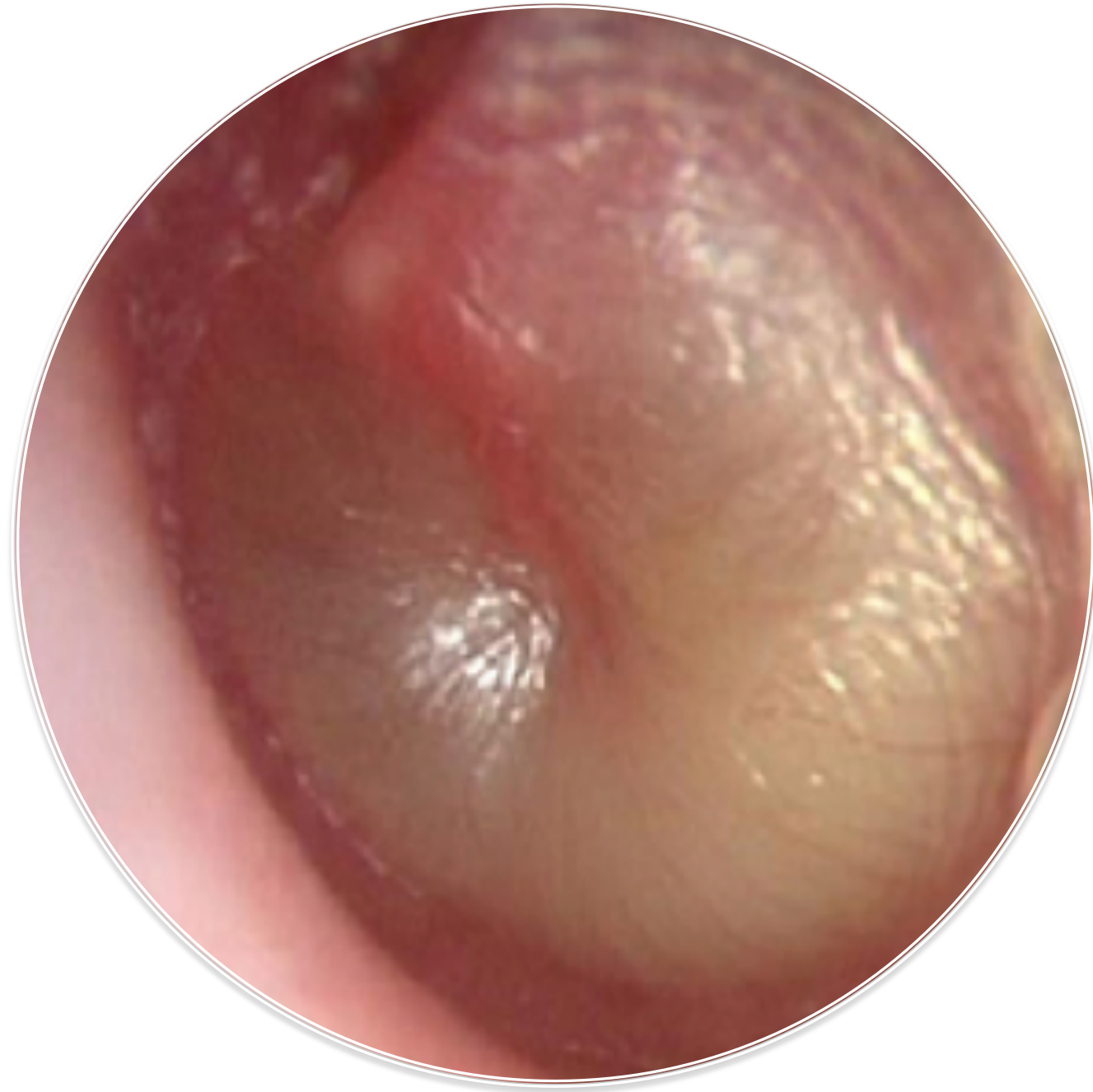
Clinical Informatics, Boston Children's Hospital

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## DISCLOSURE

We have no conflict of interest to disclose.





**Acute otitis media**  
**#1 condition for  
antibiotic prescription  
in children**



**Ear examination**  
**Difficult to learn and  
master**



**Trainees' AOM  
diagnostic accuracy**  
**Poor**



**How could we  
improve medical  
students' ability to  
diagnose AOM?**

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# Study objectives

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1

Measure the **impact** of an e-learning module on medical students' ability to **diagnose AOM**

2

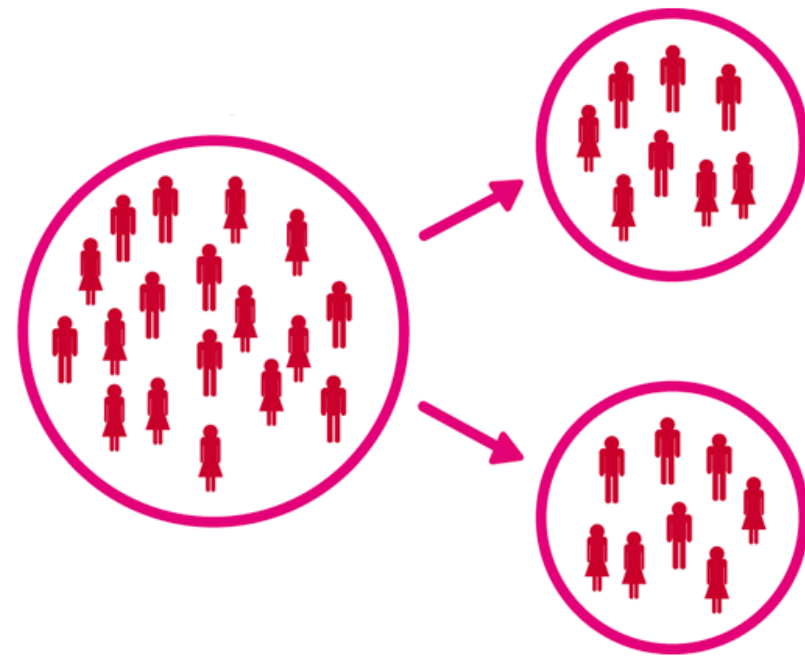
Assess which is the **preferred learning modality**

Evaluate if the e-learning module is associated with:

- Improved **knowledge** on AOM
- Better knowledge **retention**
- Improved **confidence**



# Methods



Randomized controlled trial



*Centre Hospitalier Universitaire  
Sainte-Justine*



May 2017 – September 2018



3<sup>rd</sup> and 4<sup>th</sup> year medical students



Intervention:  
e-learning module

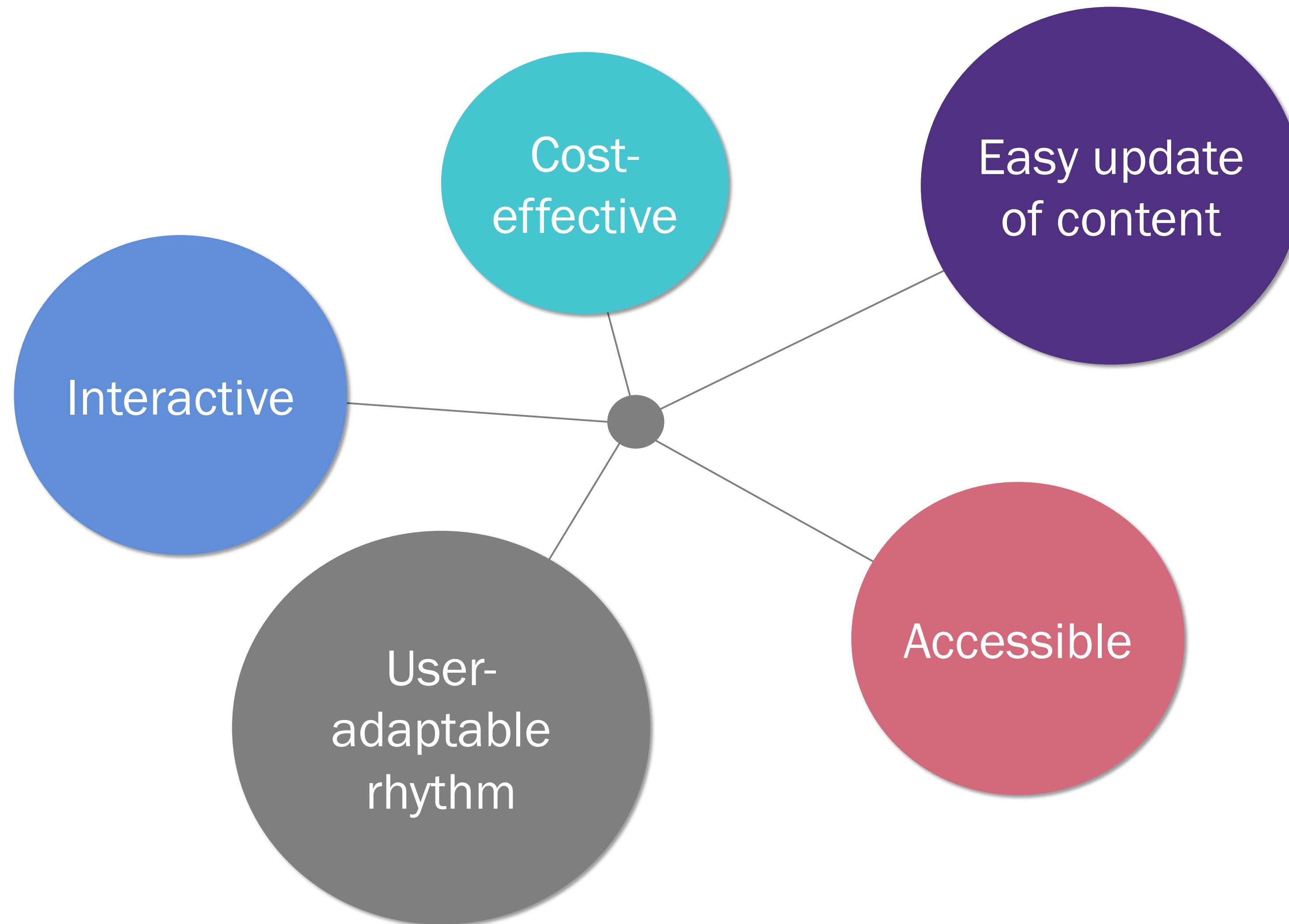


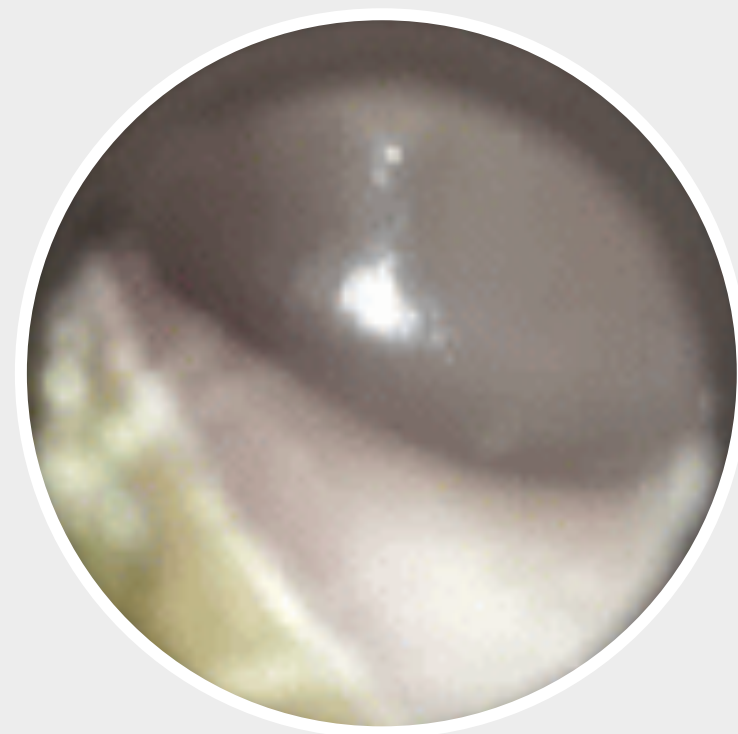
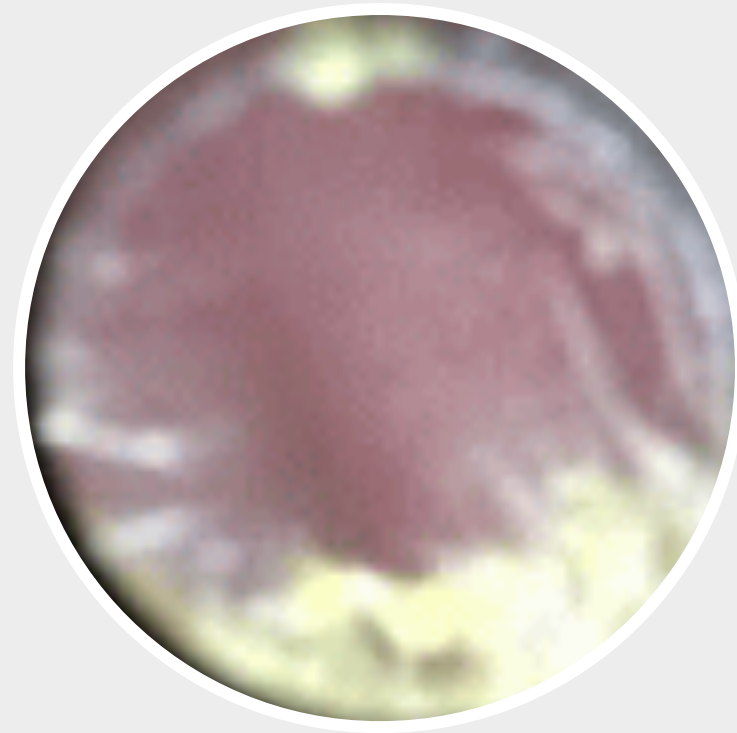
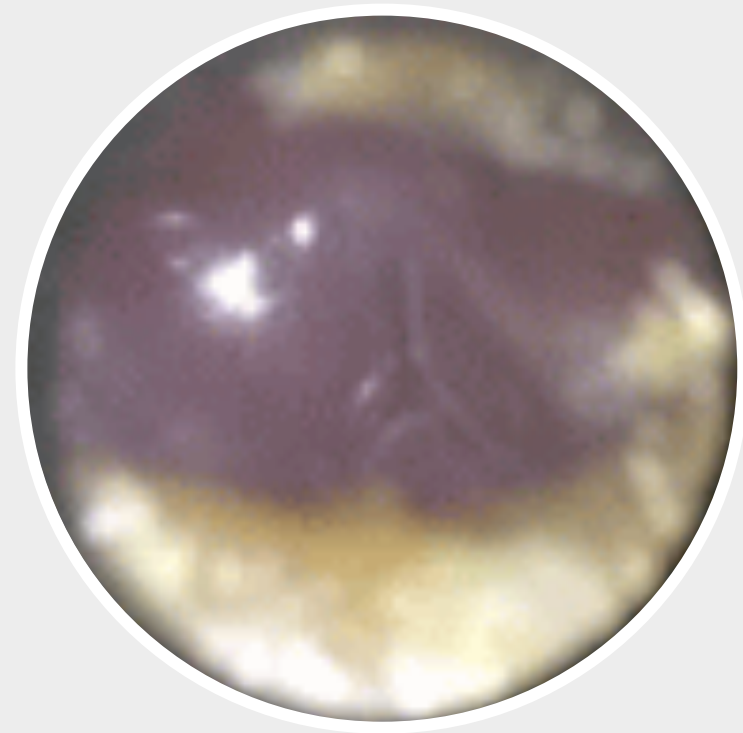
Control:  
small-group lecture



# Why e-learning?

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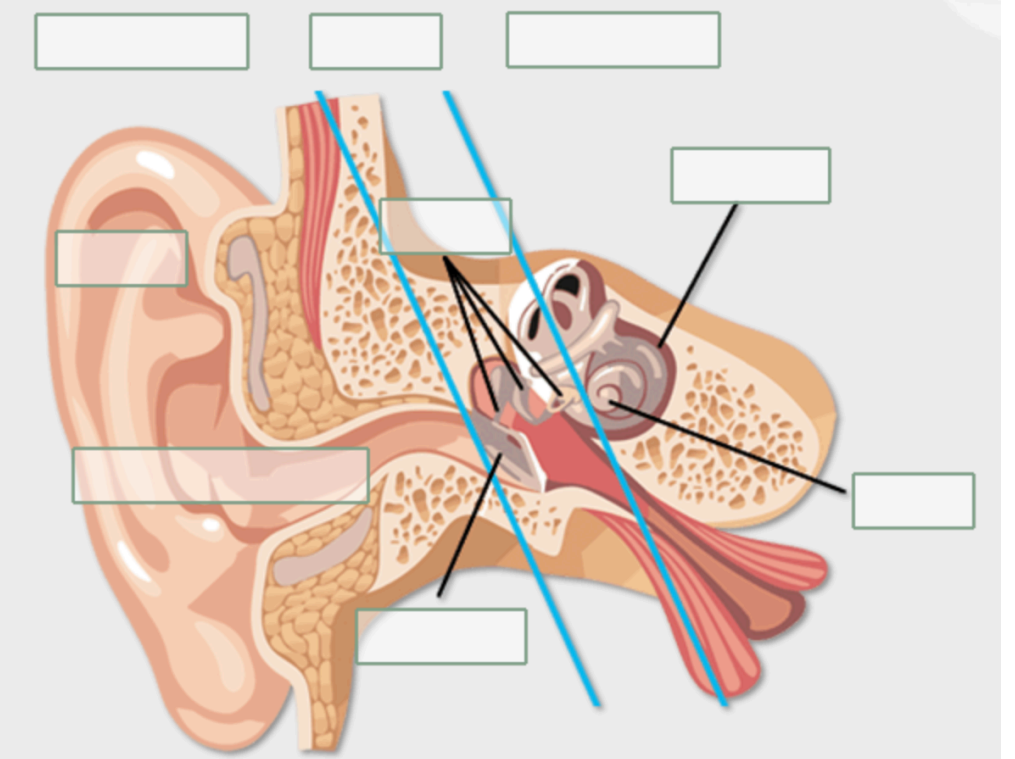


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### Anatomie de l'oreille

Parmi la banque de mots suivants, veuillez choisir le bon nom sur la partie de l'oreille correspondante en glissant celui-ci à l'endroit approprié sur le schéma.

- |                     |                         |
|---------------------|-------------------------|
| COCHLÉE             | CONDUIT AUDITIF EXTERNE |
| NERF AUDITIF        | PAVILLON                |
| OSSELETS            | OREILLE EXTERNE         |
| OREILLE MOYENNE     | OREILLE INTERNE         |
| MEMBRANE TYMPANIQUE |                         |



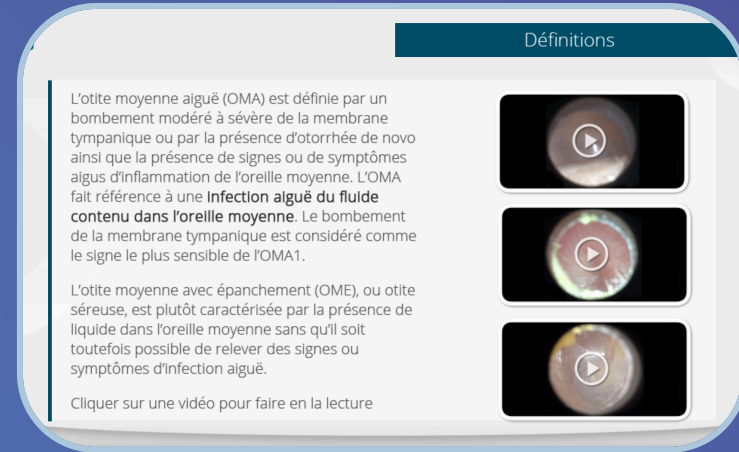
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### Examen otoscopique

Voici une courte vidéo d'une durée de moins de 5 minutes dans laquelle vous seront démontré comment procéder à l'examen du tympan en pédiatrie ainsi que les signes associés à l'otite moyenne aiguë et l'otite séreuse.







+/- 30 minutes

# E-learning module

- Additional material:
  - Quizzes
  - Videos of different ear conditions
  - Five-minute video on the pediatric otoscopic examination



1-hour duration

# Standardized small-group lecture

- Given by a trained pediatrician or pediatric emergency fellow
- Using the same PowerPoint presentation



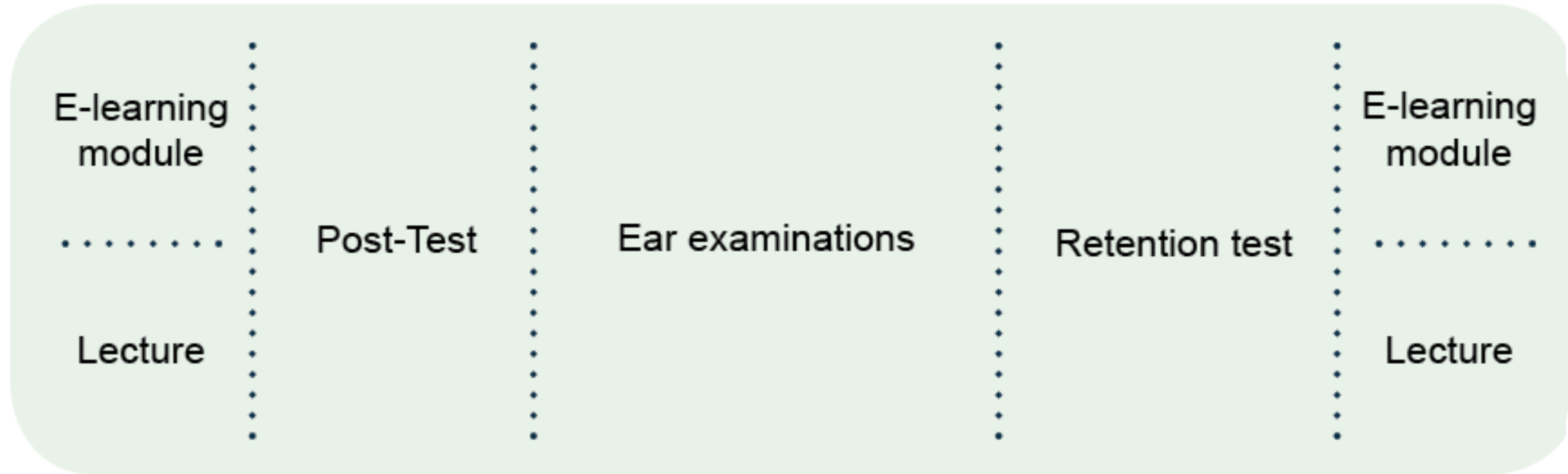
**Group 1**



A ...

B ...

Emergency department



E-learning module

.....

Lecture

Post-Test

Ear examinations

Retention test

E-learning module

.....

Lecture

Appreciation questionnaire



## Baseline characteristics of participants ( $n = 139$ )

	E-learning group $n = 69$		Small-group lecture group $n = 70$	
	included in primary analysis, $n$ (%) $n = 45$	not included in primary analysis, $n$ (%) $n = 24$	included in primary analysis, $n$ (%) $n = 38$	not included in primary analysis, $n$ (%) $n = 32$
4th year medical students	9 (20)	0 (0)	3 (8)	9 (28)
Male	17 (38)	8 (33)	14 (37)	10 (31)
Previous teaching on AOM	27 (60)	18 (75)	24 (63)	20 (63)
Previous ENT rotation	15 (33)	6 (25)	13 (64)	10 (31)
Previous pediatric rotation	19 (42)	4 (17)	14 (37)	12 (38)



## Mean diagnostic sensitivity, specificity and accuracy of ear exams among students who evaluated at least ten patient ears ( $n = 83$ )

	E-learning group (intervention), %	Lecture group (control), %	Difference, % (95%CI)
Mean sensitivity	67.7	63.6	4.1 (-9.0 to 17.3)
Mean specificity	79.0	80.8	-1.8 (-8.7 to 5.1)
Mean diagnostic accuracy	76.5	76.4	0.1 (-6.2 to 6.4)



## Secondary outcomes (n = 201)

	E-learning group <i>n</i> = 99	Lecture group <i>n</i> = 102	Difference (95% CI)
Mean difference between pre- and post-test	4.6	4.1	0.5 (-0.8 to 1.2)
Mean difference between post- and retention test	4.9	5.2	-0.2 (-1.2 to 0.8)
Mean increase in confidence in ear exam technique, pre-post study, /10	3.6	4.1	-0.4 (-1.3 to 0.3)
Mean increase in confidence in ear exam interpretation, pre-post study, /10	2.9	2.8	0.1 (-0.7 to 0.9)



# Preferred learning modality

86 students



# Conclusions

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**No difference** on clinical knowledge, clinical skills, and confidence in diagnosing AOM

A majority of medical students **preferred e-learning** to the small-group lecture

Future studies should focus on evaluating **new teaching modalities** for AOM that could have a real impact on future physicians.





# Thank you !

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Dr. Marc Lebel

Mrs. Maryse Lagacé  
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Mr. Nicolas Guillemot

