Test-enhanced case-based learning: A Randomized Trial

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Introduction

ERROR

Objective

Learn

Evaluation

Clinical reasoning

Conceptual Framework: *test- enhanced learning*

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Objective

To determine the effectiveness of

case-based learning with key feature questions

compared with case-based learning alone

in fostering clinical reasoning in medical students

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Materials & Methods

⚙ **Study design**

Quantitative

Randomized controlled trial

🏠 **Setting**

Center of Clinical Medicine

Rajavithi Hospital & Queen Sirikit National Institute of Child Health

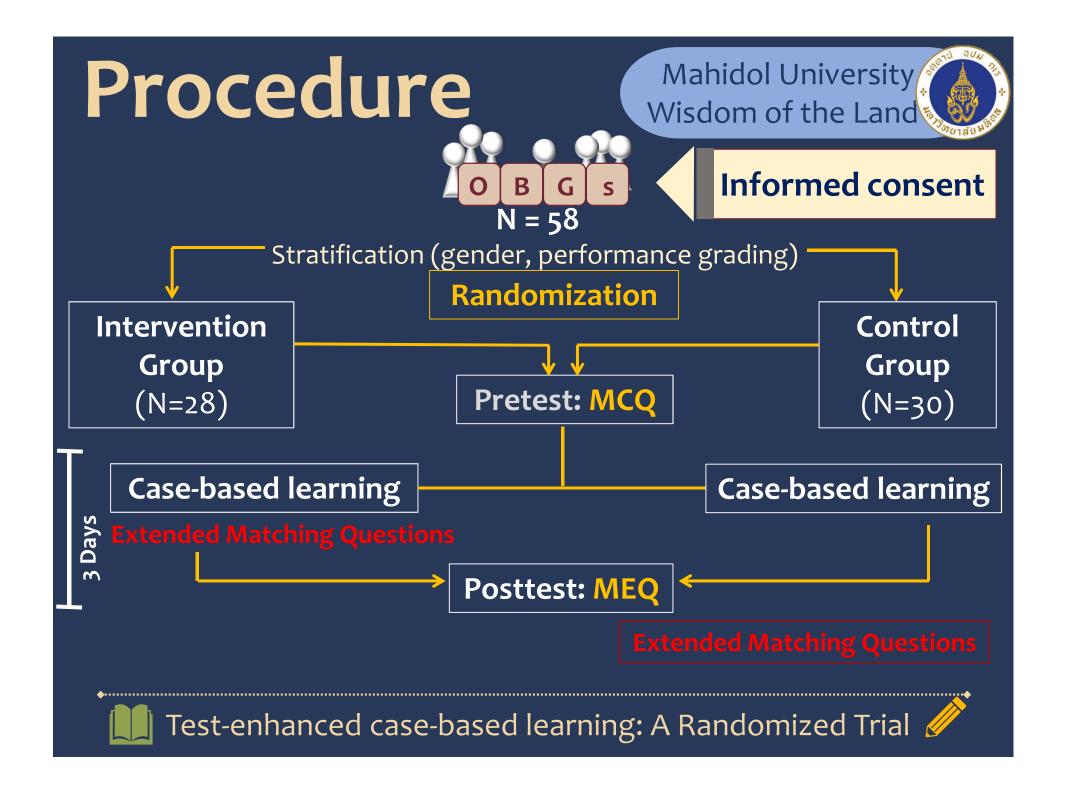**Rangsit University, Bangkok, Thailand**

👥 **Participants**

4th year medical students

O B G s

🧩 **Instrumentation**

📝 *Test:* MCQ EMQ MEQ

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Procedure

O B G s

N = 58

Informed consent

Stratification (gender, performance grading)

Randomization

Intervention Group (N=28)

Control Group (N=30)

Pretest: MCQ

3 Days

Case-based learning

Case-based learning

Extended Matching Questions

Posttest: MEQ

Extended Matching Questions

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Data analysis

- **Demographic characteristics of the participants**
  - Gender
  - Age group   **Pearson Chi-square statistic**
  - Performance grading

- **Pretest and Posttest scores**

  Independent sample t-test

Table of specification

Topic	Diagnosis	Management
Pregnancy related		
Abortion Ectopic Molar preg	X	
Non pregnancy related, Non uterine		
Cervical cancer	X	
Non pregnancy related, Heavy uterine bleeding		
Submucus myoma	X	
Non pregnancy, others		X (DUB)

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In CBL class

Clinical scenario: Chief complaint

Q1 Hypothesis generation

Q2 Key history points

Q3 Key physical examination points

Data gathering

Assess clinical data

Q4 Key diagnostic investigation

Assess test results

Q5 Key diagnosis

Plans for patient treatment

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🧪 Intervention group

EMQ

- **Cervical biopsy**
- **Pap smear**
- **Coagulation profile**
- **Colposcopy**

- **Endometrial biopsy**
- **Hysteroscopy**
- **Serum beta hCG**
- **Urine pregnancy test**

A 36-year-old HIV-positive woman presents with post-coital bleeding. Pelvic examination reveals cervical erosion with contact bleeding. She had four children, all by different partners.

A 20-year-old woman presents with a vaginal spotting and lower abdominal pain for 1 week after unprotected sexual intercourse 1 month ago.

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Demographic characteristics

	Intervention (N=28)	Control (N=30)	Statistic
Gender			
Female	18 (48.60)	19 (51.40)	χ² = 0.006,
Male	10 (47.60)	11 (52.40)	P = 0.94
Age group			
20-21	12 (52.20)	11 (47.80)	χ² = 3.646,
22-23	10 (41.70)	14 (58.30)	P = 0.51
24	6 (54.54)	5 (45.46)	
Performance grading			
≤ 3	15 (53.57)		
> 3	13 (46.43)	17 (56.67)	P = 0.79

51.60 ± 13.95

50.17 ± 12.35

Mean ± SD

t = .417, *p* = .678

Extended Matching Questions

Pretest: MCQ

Randomization

N = 58

OBGs

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Reliability of Posttest

No.	Cronbach's Alpha	Diagnosis	Mean $\pm$ SD
1.		Threatened abortion	53.17 $\pm$ 17.73
2.		Cervical cancer	51.00 $\pm$ 18.45
3.	.48	DUB	35.37 $\pm$ 11.68
4.		Submucous myoma	53.82 $\pm$ 12.68

Minimal passing level = 199/ 400

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Comparison of Posttest score

Group	Intervention Mean + SD	Control Mean + SD	*p*
Performance grading			
≥ 3	221.08 ± 29.42	208.71 ± 32.80	.29
< 3	190.47 ± 33.20	174.65 ± 33.32	.22
Gender			
Female	209.75 ± 30.45	195.29 ± 38.16	.21
Male	195.55 ± 41.21	195.29 ± 38.16	.82
Posttest			
Posttest I	59.21 ± 13.35	47.53 ± 19.60	<.05
Pretest score < 60	208.70 ± 34.94	186.60 ± 32.63	<.05

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Discussion

- 💬 Number of subjects
  - ✒ Effect size
- 💾 Learning method

  Factual knowledge

  Clinical reasoning skill
- 📋 Repeated testing and learning

  Immediate examination

- 📔 Posttest MEQ examination
  - ✒ Reliability

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Limitation

👎 One topic

👎 Testing threat

Future study

👍 Repeated Testing

Multiple CASE STUDY EXAMPLE

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Conclusion

Test-enhanced case-based learning

- A powerful learning tool
- Special group of the students
- Appropriate topic
- Proper level of difficulty of the tests

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