

Promotion of Knowledge Transfer and Retention in Year 2 Medical Students using an Online Training Exercise

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INTRODUCTION

It was recently shown that novice medical students could be trained to demonstrate the speed-to-diagnosis and diagnostic accuracy typical of System-1-type reasoning. (Rosby et al., 2018) However, the effectiveness of this training can only be fully evaluated when considering the extent to which knowledge transfer and long-term retention occur as a result, the former of which is known to be notoriously difficult to achieve. This study aimed to investigate whether knowledge learned during an online training exercise for chest X-ray diagnosis promoted either knowledge transfer or retention, or both.

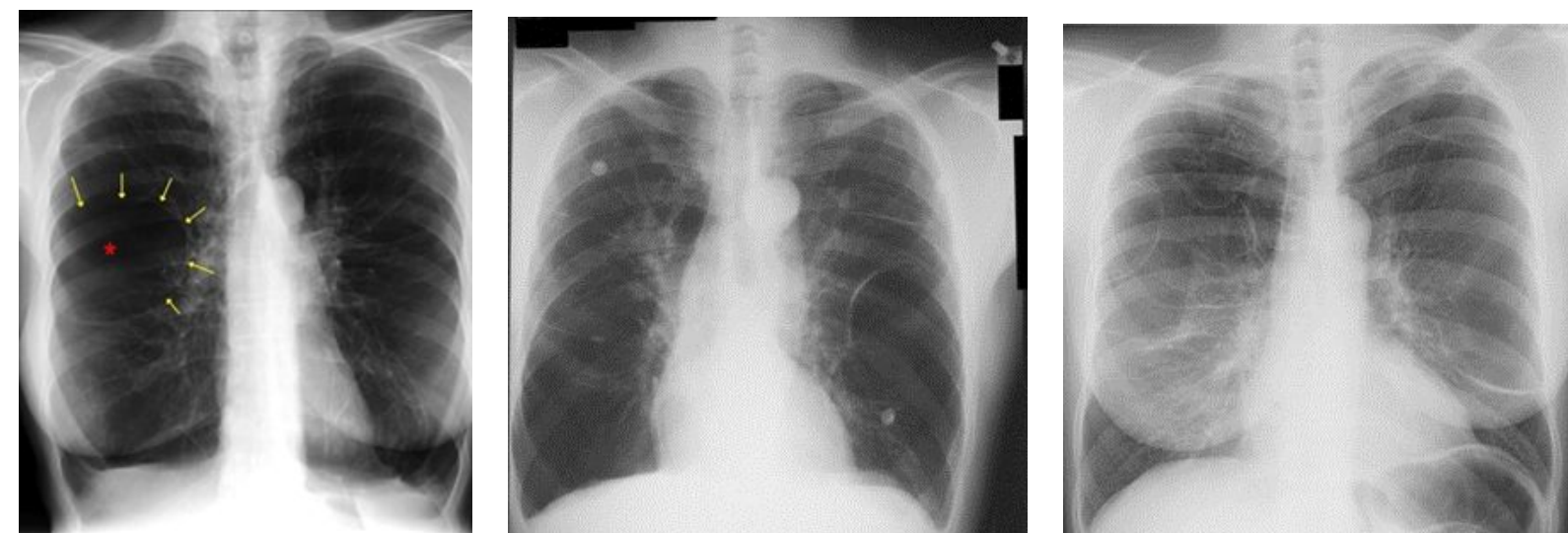
METHODS

1 Participants

- 36 Year 2 Medical Students (67% Male & 33% Female)
- Mean Age: 20.7 Years (SD=0.89)
- From the Lee Kong Chian School of Medicine, Singapore

2 Materials

- 24 online chest x-ray cases (without clinical vignettes)
- Obtained from a hospital image bank and were anonymised before use
- 8 Diagnoses: Collapse - Consolidation - Bullae - Emphysema - Effusion - Lung Mass - Pneumothorax - Fibrosis
- 3 Images per Diagnosis: Original case (all key x-ray features), near-transfer (all key features but configured differently), far-transfer (missing one or more features)



3 Design

- Independent Variable
 - Trained vs. Untrained Cases
- Dependent Variables
 - Diagnostic Accuracy Scores (out of 4)
 - Response time to generate a diagnosis (in seconds)

4 Procedure

- Part 1 (Transfer Test Phase) - 3 Phases (Familiarisation, Training, Test)
- Part 2 (Retention Phase) - Repeat of test phase in Part 1
- Two one-way repeated-measures ANOVAs were conducted for both Part 1 transfer data and Part 2 retention data. The significance level for all analyses was $\alpha=0.05$.

RESULTS

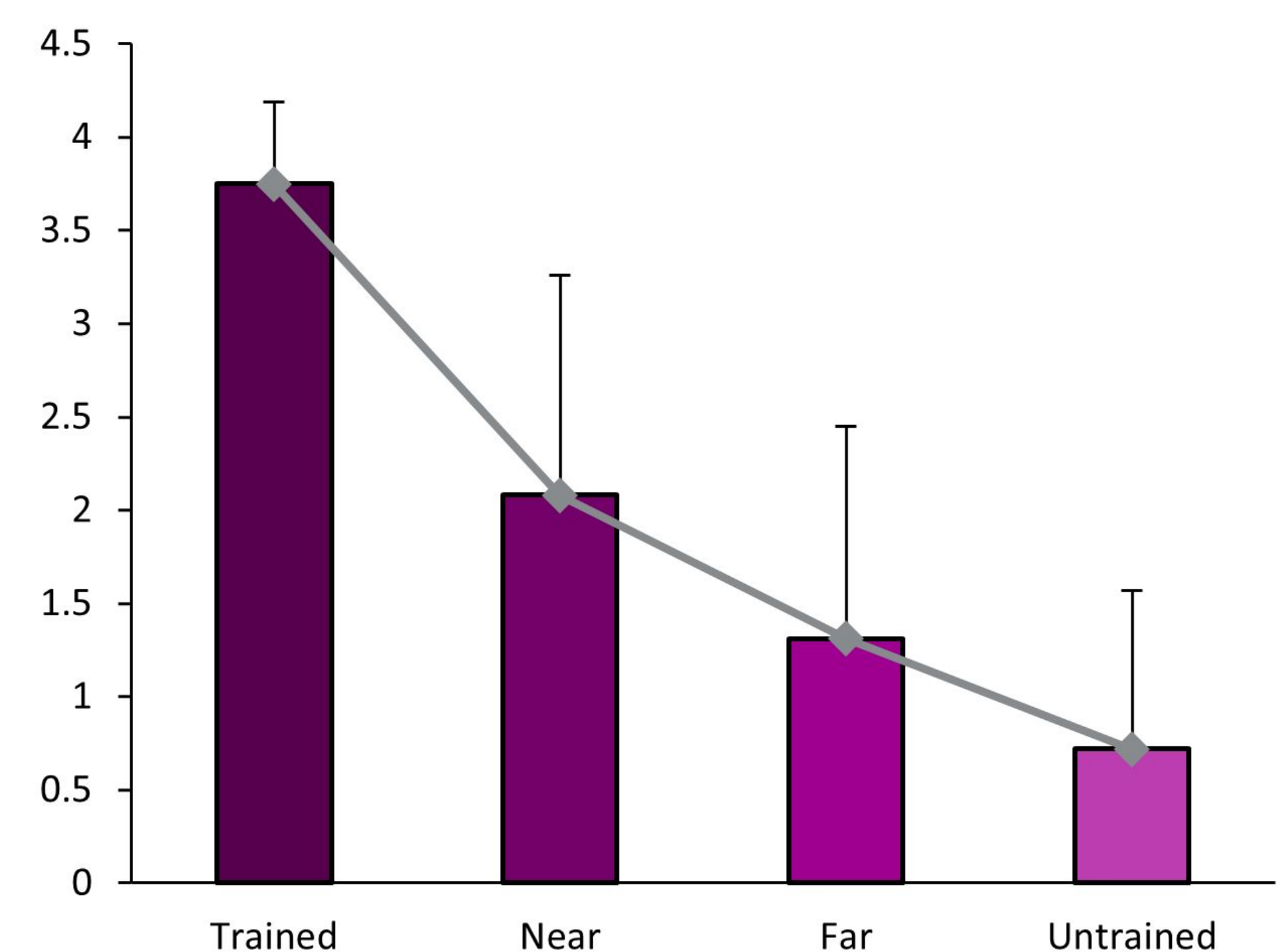


Fig. 2 Differences in diagnostic accuracy between trained, near transfer, far transfer and untrained cases for part 1, transfer test phase (mean score out of 4)

- There was significant main effect across all 4 ANOVAs ($p < 0.001$)
- Post-hoc tests revealed a significant difference ($p < 0.05$) in all groups with the exception of:
 - Transfer Phase
 - Diagnostic time for far-transfer cases and untrained cases ($p=0.69$)
 - Retention Phase
 - Diagnostic accuracy for far-transfer cases and untrained cases ($p=0.20$)
 - Diagnostic time for near- and far-transfer cases ($p=0.16$)
 - Diagnostic time for far-transfer cases and untrained cases ($p=0.52$)

DISCUSSION

It is possible to successfully promote knowledge transfer and retention in Year 2 medical students, via an online training exercise on the diagnosis of chest X-rays.

Limitations

1. Only focused on a limited field of medicine; chest radiology
2. Success was only shown when trained for 4 cases [Hatala et al. (2003) showed limited success with 9 ECG cases]
3. X-rays were considered in isolation without patient history, physical exam etc.

Future Work

Are case vignettes compared with chest radiology effective in promoting knowledge transfer and retention in medical students?

Familiarisation Phase (with annotations):

ALL 8 conditions seen

Group 1 or Group 2

Training Phase (MCQs):

4 Cases x 10 Repetitions

Time Trial

Training Phase (MCQs):

4 Cases x 5 Repetitions
(3x < 5s, 2x < 4s)

Test Phase (Free Text):

4 Original Cases
4 Near Transfer
4 Far Transfer
4 Untrained

Fig. 1 Summary of Process, part 1, transfer test phase. The test phase below was repeated during part 2, retention phase

REFERENCES

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2. Rosby, L. V., Rotgans, J. I., Tan, G., Low-Beer, N., Mamede, S., Zwaan, L., et al. (2018). Inducing System-1-type diagnostic reasoning in second-year medical students within 15 minutes. *Medical Teacher*, 40(10), 1030–1035. <https://doi.org/10.1080/0142159X.2017.1418502>.
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To watch the presentation, please click on the video below:

