Learning in Medicine

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TWO TOPICS

1. Update on Diagnostic Reasoning Models
2. Share the results of a study: “the effects of patient’s name and image in educational materials”

Objectives

• At the end of this activity the participant (you) will (should) be able to:
  – Mention the names of at least two diagnostic reasoning models
  – Describe the characteristics of at least one diagnostic reasoning model
  – Describe the findings of an educational study recently conducted in our medical school
  – Mention a few strategies that may foster learning in medical academic centers

Disclosures/COI

• UTHSCSA
• PhD through Mizzou (Univ of Missouri at Columbia)
• Financial Disclosures: Nothing Related

Medical Diagnostic Reasoning

~ clinical reasoning, medical problem solving, diagnostic reasoning, and decision making

Medical Reasoning

• Cognitive process involved in making a medical diagnosis and the related care decisions
• Deductive? Inductive? Or Abductive?
• Abstraction → abduction → deduction → induction
• Forward or backward driven?
• Based on the level of expertise
Intermediate Effect
May apply to reasoning, but apparently not to diagnostic accuracy.

What are the current conceptual models trying to explain diagnostic reasoning?

Four Medical Diagnostic Models

- Decision-analytic approach
  - Hypothetico-deductive (Elstein, 1978)
- Information-Processing models
  - Prototype
  - Instance-based
  - Illness script (schema) or semantic network

Let’s briefly review each one

Hypothetic Deductive Model

- Generate hypothesis
- Test hypothesis
- Deductive model, going from disease to patient’s signs and symptoms
- Doesn’t account for the differences between beginners and experts

Prototype Model

- Previous patients’ characteristics or data are abstracted
- Memory trace created with a representative model: prototype or exemplar
- New patients are categorized according to the archived prototypes
- Drawbacks:
  - Analytically decomposed (all factors are important)
  - Initially made for simple clear-cut characteristics
  - No time factor considered
Done with theory and models!

**NOW TO A DESCRIPTION OF A STUDY RECENTLY CONDUCTED HERE**

**Effects of a Patient’s Name and Facial Image on Knowledge Acquisition**

June 2011-March 2012

**PhD Committee**
- Julie A. Caplow, PhD @ Mizzou
- John H. Littlefield, PhD @ UTHSCSA
- Michael Hosokawa, EdD @ Mizzou
- James Laffey, PhD @ Mizzou
- Jai Moore, PhD @ Mizzou

**Study Collaborators**
- Glen Medellin, MD
- Jean Petershack, MD
- Jo Ann Lieberman
- John Schoolfield
Title & Research Questions

- **Title**: Effects of a Patient’s Name and Facial Image on Knowledge Acquisition
- **Research Question 1**: Does the use of a patient’s name and facial image in a CLIPP VP case summary improve MS knowledge acquisition as measured by standardized medical examinations?
- **Research Question 2**: Do MS have higher examination scores after being provided with CLIPP VP cases as a learning and study resource compared to being provided with a summary of a CLIPP VP case as a learning and study resource?

Background

- The illness script and related models stipulate that the semantic networks are created upon exposure to real cases 

  (Charlin, 2007)

- Therefore, it seems that the exposure to real patients is one of the main factors promoting the development of expertise in the medical field 

  (Smith, 1990)

Background

- Practicing Physicians: Exposure to real patients → creation of semantic networks

- Educational materials for MS try to recreate and apply the practicing physicians’ context (i.e. realism)

- Realistic elements include the patient’s name and at least a facial image

Background

**Literature on Realistic Materials**

- Better scores from students who were provided VP versus text-only materials 

  (Qayumi, 2004)

- Recommendations for showing patients’ images at the beginning of case presentations 

  (Huwendiek, 2009)

- VPs improve knowledge acquisition (MS comments only, not objectively evaluated) 

  (Botezatu, 2010)

Background

- BUT: clinical medicine and biomedical science may be two different worlds 

  (Patel, 2004)

- Clinical Knowledge → Complex taxonomy, pattern identification, categorization, etc.

- Biomedical Science → General principles and causal mechanisms of disease
Background

Different Learning Objectives of MS vs MDs

Learning to explain

→ how a set of symptoms is consistent with a diagnosis (MDs)

MAY BE QUITE DIFFERENT THAN

→ how a disease is caused (MS)

Overly contextualized educational materials may reduce knowledge transfer

Are we really helping our MS by providing them with educational materials containing patients’ names and facial pictures?

Research Question 2

Comparison of a short summary versus a complete CLIPP VP Case

Rationale

Length of Materials

• Length concerns from students and faculty re CLIPP VP cases
• How do summaries compare to complete CLIPP VP cases?
• Is summarized medical information similar to a much longer and contextualized complete CLIPP VP case regarding knowledge acquisition?
• Teaching/learning models indicate a positive relationship between study time and tests scores (to a point)

Research Questions

Effects of a Patient’s Name and Image on Knowledge Acquisition

Research Questions

Are we overly contextualizing medical students’ materials?

RQ1: Does the use of a patient’s name and facial image in a CLIPP VP case summary improve MS knowledge acquisition as measured by standardized medical examinations?

Are we providing MS with very long cases?

RQ2: Do MS have higher examination scores after being provided with CLIPP VP cases as a learning and study resource compared to being provided with a summary of a CLIPP VP case as a learning and study resource?
Effects of a Patient’s Name and Image on Knowledge Acquisition

Method

CLIPPP Materials and MS educational program

Brief Description

CLIPPP VP Cases

Please select one of the cases by clicking on the active box, or with the pop-up menu (the drop-down menu may contain more)

CLIPPP VP Case #7

Week 1

Week 2

Week 3

Week 4

Week 5

Week 6

NBME Pediatric Exam “Shell”

Clinical Cases (at time of study and very simplified)

~ 200 MS per year

Method
Method

• Recruited MS from four blocs on pediatrics
• Provided with a summary of a CLIPP VP case
  – Two blocs provided with a summary that had the
    name (29 times) and image of the patient
  – Two blocs provided with similar summary but without
    the patient’s name or image
• Scores assessed looking for a difference on
  knowledge acquisition between groups
  – Summary with name/image vs. summary without
    name/image
  – Summary vs. complete CLIPP VP cases

Katie has had swelling around the
eyes the past 10 days which is worst
in the morning. There is no eye
redness, but Katie has experienced
fatigue and increasing girth. Katie’s
physical exam reveals anasarca in
face, abdomen and legs, ascites,
weight gain and normal heart
sounds. Lab tests performed on Katie
confirm the diagnosis of nephrotic
syndrome.

Nephrotic syndrome is characterized
by swelling around the eyes which is
worst in the morning. There is no eye
redness, but patients experience
fatigue and increasing girth. Physical
exam reveals anasarca in face,
abdomen and legs, ascites, weight
gain and normal heart sounds. Lab
tests support the diagnosis of
nephrotic syndrome.

Summary vs Complete VP Case

Five pages for the study case

20+ pages for the other
CLIPP VP cases

Study Design

Quizzes

CQ1
CQ2
CQ3
CQ4

(10 MCQs)
(12 MCQs)
(12 MCQs)
(12 MCQs)

Shelf

CQA

CQA_K (knowledge)
CQA_NI (name & image)

(100 MCQs)
(10 MCQs)
Effects of a Patient’s Name and Image on Knowledge Acquisition

Results

Test Correlation Table

Comparisons
Provided a summary with the patient’s name (Katie) and facial image

ANOVA
F (3, 75) = 1.678
p = 0.179

Additionally:
Bloc 1+3 (70.9) vs
Bloc 2+4 (69.8)
t test: p = 0.8

Provided a summary with NO patient’s name or facial image

Research Question 2
Are there any differences in knowledge acquisition in MS when they are provided with a
– summary of a CLIPP VP case (5 pdf pages) versus
– complete CLIPP VP cases (>20 interactive) web pages?

Comparisons

SUMMARY

 COMPLETE CLIPP VP CASES

Bloc 1
Bloc 2
Bloc 3
Bloc 4

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ANOVA
F(4, 375) = 14.341, p < 0.0001
(pairwise comparisons showed a statistically significantly lower CQA_K score)

Name and Image

No statistically significant difference in scores, therefore it seems that there was NO difference in knowledge acquisition (more a little later)
Summary vs. Complete CLIPP

The data here found seem to indicate that tests scores are statistically significantly lower when medical students are provided with a summary of a case than when they are provided with complete CLIPP VP cases.

Effects of a Patient’s Name and Image on Knowledge Acquisition

Conclusion/Summary

Conclusion

1. The presence of a patient’s name and image on medical study materials seems not to make a difference on knowledge acquisition as shown by scores on standardized testing.
2. Tests’ scores are significantly lower when medical students are provided with a summary of a case than when they are provided with a complete CLIPP VP case.

Limitations?

- Oh, Many!
- One center, one class of MS
- Limited number of students
- Student variation (not cells or mice)
- Diminished MS interest on study materials and quiz
- Other limitations (i.e., comparing different cases or different tests at 1 week only, no pre-test, lack of interactivity, unremarkable images, curricular changes, etc., etc., and etc.)

Importance & Recommendations

- First study showing the effects of a patient’s name and image in medical study materials on tests scores (supporting the overly contextualized educational materials effect)
- Findings are interesting, but should not alter the current design of study materials
- Are we trying to apply the practicing physicians’ contextual elements into the medical students’ educational materials?
- More studies are needed to corroborate these findings before we alter our approaches

General Recommendations

There are many recommendations on how to improve learning, for example:

- Adult Learning Theory (clear objectives, learner participation)
- Gagne’s instructional design (steps of instruction, feedback)
- Backward design (planning based on measurable outcomes)
- Importantly: stimulate the formation of schemes/nodes/scripts
Foster Desired Outcome

- A little educational story about PFT’s reading

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<th>Practice &amp; Feedback</th>
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Examples and Non-Examples

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<td>Green irregular…..</td>
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What Did We Just Review?

- Medical Reasoning
- Hypothetic-deductive, prototype, instance-based, and illness-script models
- Importance of Realistic Components
- Use of those elements on MS education

What Did We Just Review?

- Very specific/focused study
- Effects of a patient’s name and facial image on knowledge acquisition
  - Background and rationale for the study
  - Research questions
  - Methodology
  - Results
  - Discussion of Results
- Conclusion 1: Patient’s name and Image in study materials may not improve knowledge acquisition
- Conclusion 2: Longer and more interactive study materials may promote better knowledge acquisition (concerns about depth vs. width)

Study Acknowledgments

- Many!
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- Jo Ann Liebermann & John Schoolfield
- Jen and Jolie (Wife and Daughter)