Teaching Novice Physicians to Think Like Experts

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MEDICAL EDUCATION GRAND ROUNDS
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Disclosures

1. Financial/etc.: None
2. Content: Not an expert
3. Identity: I am not this guy.....
TEACHING STRATEGIES

Illness Scripts

Dual-process Reasoning
Objectives

1. Distinguish between System 1 and System 2 thinking in dual-process reasoning.

2. Explain illness scripts and their role in clinical decision-making.

3. Apply 1 or more of the educational tools described today during interactions with novice learners in order to facilitate their transition to expert thinking.
Dual-Process Reasoning

Quirk M. Intuition and Metacognition in Medical Education: Keys to Developing Expertise. 2006.
System 1: Intuition

NON-ANALYTIC

- Relies heavily on EXPERIENCE
- Pattern Recognition
- FAST
- “Thinking without thinking”
- LOW cognitive load
System 1: Trust sense of familiarity
System 1: Trust sense of familiarity
System 2: Metacognition

ANALYTIC

- Deductive reasoning
- Logical
- SLOW
- "Thinking about one’s own thinking"
- HIGH cognitive load
System 2: Think it through, then decide
System 2: Think it through, then decide
System 2: Think it through, then decide
System 1: Intuition

PITFALLS

Strongly influenced by ambient conditions

Atypical presentations

Pattern mistaken for something else
System 2: Metacognition

PITFALL
So how do experts think?
Context of the Learner

- Pre-clinical years: Diagnosis ➔ symptoms/signs
Co

Ambient condition

Affective state

Mod.,..., ...

Context of the Learner

- Pre-clinical years: Diagnosis ➔ symptoms/signs

- Clinical years:
  - Think once H&P complete
  - Analytic reasoning
Key points of Clinical Diagnosis Process.

Bowen JL. NEJM. 2006;355:2217-2225.
Context of the Learner

- Pre-clinical years: Diagnosis $\rightarrow$ symptoms/signs

- Clinical years:
  - Think once H&P complete
  - Analytic reasoning

- They lack experience: “n”
Novice vs. Expert
PATTERN RECOGNITION

Abdominal Pain
Chest pain
AMS
Headache
SOB
Fever

Acute
Chronic
Intermittent
Recent Traveler
Immuno-compromised Host
PATTERN RECOGNITION

Fever

Acute

Toddler

UTI

AOM

Epiglottitis

Meningitis

URI

PNA

Septic Arthritis

Appy

Sepsis
Organized Knowledge

Memorization

Blank state

Patterns

Intuition
Can you memorize this?

srettelfognirtssihdressziromemtonnaceno
STEP 1: Problem Representation

- The “ONE-LINER” after data gathering (i.e. H&P)

- “Big picture” statement

- Uses semantic qualifiers
  - Medical terms used: acute, monoarticular, posterior
  - Divergent pairs: mild & severe, acute & chronic, localized & diffuse

- Focuses on key, discriminating features
  - Febrile, toxic appearing, bilious emesis
“Full-term 2yo male with h/o neonatal hyperbili is here with difficultly breathing. The child had 3 days of runny nose, cough, and congestion but now is not taking anything by mouth. He last urinated 12 hours ago. He has had a fever since yesterday. Ibuprofen was initially working now not working anymore. He also vomited twice with coughing. NBNB, of course........
No allergies. No daily meds.
Lives with parents, 5yo brother, and beagle.
Vitals are read off chart: RR 20 HR 182 T 103.2 98% RA
PERRL EOMI TMnl
Couldn't get a good look in his throat but seemed to have MMM
Neck supple
Lungs are CTAB but seems to be breathing hard.
RRR
Nl bowel sounds, no tenderness in abdomen”
A previously well, unimmunized toddler boy presents with and acute history of respiratory distress. He is febrile, looks unwell, and is drooling and tripoding.
## STEP 1: Problem Representation

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<td>1.</td>
<td>Pt. char.</td>
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<td>2.</td>
<td>Site</td>
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<td>3.</td>
<td>Course</td>
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<td>Severity</td>
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<td>5.</td>
<td>Context</td>
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<td>Onset</td>
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STEP 2: Search for Illness Scripts

These are the separate files in the folder

Elements of the DDx

- Fever
- Acute
- Toddler w/ difficulty breathing
- RPA
- Croup
- Epiglottitis
- URI
- Meningitis
- Bronchiolitis
- Tracheitis
- Sepsis
STEP 2: Search for Illness Scripts

★ ★ Mental representation of the important elements of an illness
  ○ Presenting signs and symptoms
  ○ WHO: predisposing conditions
  ○ WHY: pathophysiologic insult
  ○ WHAT: clinical consequences

★ ★ Based on real patient experiences
  ○ Refined through learning and experience
  ○ Built by the individual
STEP 2: Search for Illness Scripts

Experts begin searching for appropriate illness scripts *prior to* patient encounter (i.e. triage note)

- Common
- “Can’t miss”
STEP 2: Search for Illness Scripts

- Experts begin searching for appropriate illness scripts *prior to* patient encounter (i.e. triage note)

- Experts engage in *hypothesis-driven data gathering*
  - Defining features: characteristic of particular illness
  - Discriminating features: allow clinicians to distinguish related illnesses.
STEP 2: Search for Illness Scripts

1. Pt. char. Epiglottitis
2. Site Toddler RMetropharyngeal abscess
3. Course Croup Airway ProgressivPneumoniaSevere
4. Severity Pneumonia Severe
5. Context Bronchiolitis Sepsis Febrile, Unimmunized
6. Onset Acute Tracheitis
STEP 2: Search for Illness Scripts

Infant
Acute onset
Intermittent, severe abd pain
Bloody stool

Teenager
Gradual onset
Chronic abd pain
Bloody stool

Intussusception

IBD
STEP 2: Search for Illness Scripts

1. 16yoM previously healthy in office/ED
2. Acute onset of constant abdominal pain
3. Developed fever after abdominal pain
4. Periumbilical to right lower abd pain
5. Anorexia
6. Vomiting without diarrhea
STEP 2: Search for Illness Scripts

1. 8yoM previously healthy in office/ED
2. Acute onset of crampy abdominal pain
3. No fever
4. Has purpuric rash knees distally
5. Has bilateral large joint pain
6. Proteinuria
Initial Diagnostic Scan for Illness

Gather data: Complaint + demographics

Initial Problem Representation

Before Patient Encounter

Search for Illness Scripts

Refine Diagnostic Hypotheses

Refine Problem Representation

Stuart E. Guidebook for Clerkship Directors, 2012. Ch 8
'I think you should be more explicit here in step two.'

from *What's so FUNny about Sctenee?* by Sdney Harris (1971)
Hypothetical schema of Reactscript
Tap NON-ANALYTIC Reasoning

9 month male

“What is your first impression?”

“What were the first diagnoses that came to you?”

INTUITION
9 month male

“What are the key features of your initial impressions?”

“What is your plan to sort out what’s going on?”

METACOGNITION
Priming

✓ Look at nurse’s note together

✓ Ask for 3-5 potential causes for patient’s complaint
  - “What seems most likely?” – don’t ignore the common
  - “What wouldn’t you want to miss?” – Push to consider “can’t miss”

✓ 10-15 minute limit

✓ Detective analogy

chuckjonescenter.org/sites/default/files/images/films/499DEDUCE,%20YOU%20SAY-2.jpg
Hypothesis-driven data gathering

Data

DDX

Plan
<table>
<thead>
<tr>
<th>Hypothesis-driven data gathering</th>
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<tr>
<th>9mos M fever</th>
<th>Fever</th>
<th>Cough, runny nose</th>
<th>Decr po, activity, UOP</th>
<th>Sneezing</th>
<th>Teething</th>
<th>No rash</th>
<th>Fever lower w/ tylenol</th>
<th>No travel</th>
<th>Daycare</th>
<th>AOM x 2 in past</th>
<th>Looks tired tho active</th>
<th>Ears OK</th>
<th>Lungs clear</th>
<th>RRR</th>
<th>NI abdomen</th>
<th>No rash</th>
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One Minute Preceptor
• Get a commitment
• Probe for supporting evidence
• Teach general rules
• Reinforce what was done right
• Correct mistakes

SNAPPS
• Summarize briefly H&P
• Narrow DDx to a few relevant possibilities
• Analyze the DDx by comparing/contrasting possibilities
• Probe preceptor
• Plan mgmt for pt at hand
• Select case-related self-study

7 Ws
1. What do you think is going on?
2. Why do you think this?
3. What if ... the case was a little different?
4. When I see a patient like this, I think....
5. Warm fuzzy
6. Whoops
7. What will you learn next?

ASOAP (Reverse Presentation)
• A: Initial assessment
• S: subjective
• O: objective
• A: Second assessment with key DDx and clinical reasoning stated
• P: Plan
Build Illness Scripts

Initial Intuition
Novice to Expert

Metacognition

Unconscious

Intuition

Conscious

Borrowed with permission from Dr. Satid Thammasitboon PAS mtg 2012
System 1 Review

- Must have extensive collection of illness scripts
- Generate early diagnostic hypotheses
- Identify patterns using problem representation
- Regulate mental state (alert but not too excited)
- Shift the gear when things do not quite make sense

Borrowed with permission from Dr. Satid Thammasitboon PAS mtg 2012
System 2 Review

- When things do not make sense, rethink
- Slow down, use systematic approach
- Monitor and regulate
- Embark on a plan but acknowledge uncertainty and ensure pathways for re-evaluation

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TEACHING STRATEGIES

Illness Scripts

Dual-process Reasoning
What is the diagnosis?

18 mo with low grade fever, weight loss and swollen eyes