

Thinking about Thinking: Coaching Strategies to Promote Clinical Reasoning



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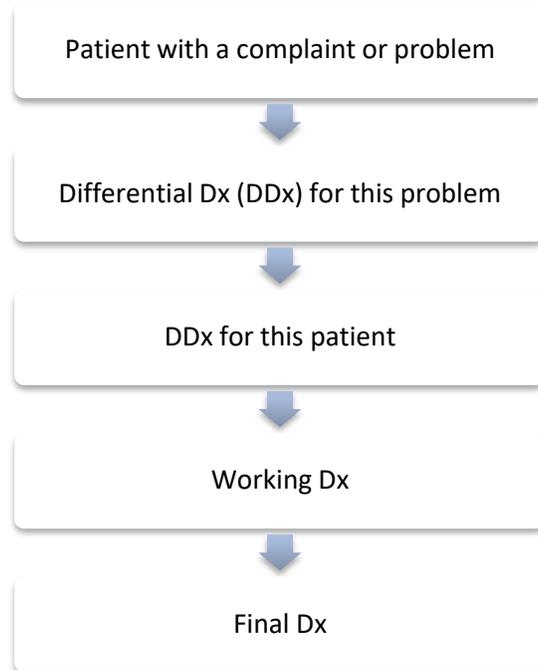
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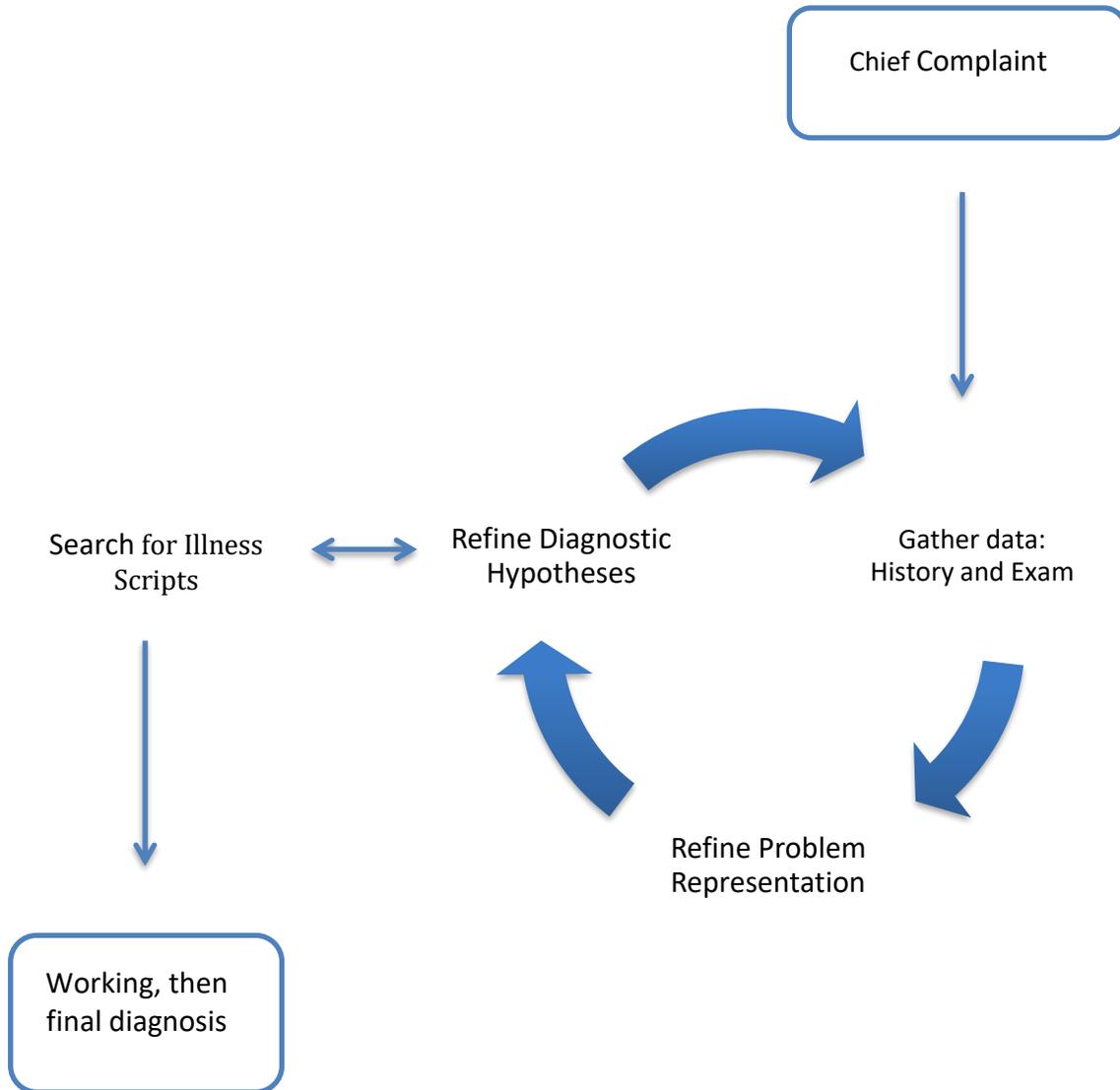
- Models of Diagnostic Reasoning
- Key concepts and terms
- Coaching toolbox
- Framework for addressing problems with diagnostic reasoning
- Cases
- EMR and Clinical Reasoning (PowerPoint handout)
- Annotated bibliography

Diagnostic reasoning: frameworks & models

Fundamental tasks in diagnostic reasoning:



Key Elements of Clinical Reasoning



Key Concepts & Terms

Elements Of Clinical Reasoning

Illness script

An abstract mental representation of an illness – developed and refined over time through new learning and experience. The process of generating a differential diagnosis or final diagnosis involves an iterative process of matching the patient’s signs, symptoms, findings to illness scripts stored in memory. Effective storage of illness scripts (e.g. with links among related illnesses/scripts) facilitates retrieval of information.

Co-selection

The simultaneous process of gathering clinical data during a patient encounter while mentally searching for illness scripts. The mental process of searching for scripts and generating diagnostic hypotheses triggers the need for additional data-gathering, which then guides the ongoing search for scripts that match the patient’s findings. Results in purposeful history-taking/exam – guided by an evolving differential diagnosis.

Defining and discriminating features

Key features of an illness - either similar among related illnesses – or unique to a particular illness. Closely related to pertinent positives and negatives (features pertinent to generating and working through a differential dx)

Problem representation

A mental summary of key findings in a patient case. Often articulated as part of patient case presentations in the summary or assessment.

Semantic qualifiers

Abstract descriptors, often paired or opposing (e.g. unilateral – bilateral). Use of semantic qualifiers may facilitate retrieval of stored information/illness scripts to facilitate diagnostic reasoning.

Problems with Presentation of Assessments

- Inaccurate summary
- Missing summary/assessment
 - SOP
 - SOSOP

Problems with Formulation of Differential Diagnosis (DDx)

Disembodied DDx:

Student presents a generic differential for the initial complaint rather than a differential specific to the patient and his/her clinical findings.

Silo DDx:

Student presents a separate DDx for each symptom or key finding, rather than a differential for the constellation of findings taken together.

Frozen DDx:

Student continues to include items on the DDx that have been ruled out by new information – or continues to present a multi-item differential after a final diagnosis has been confirmed.

Unprioritized/inappropriately prioritized DDx:

Student assigns inappropriate weight/probability to items on the DDx.

Zebra DDx:

DDx includes one or more rare, esoteric, highly unlikely diagnoses.

Coaching Toolbox

- Metacognitive overview/review
- Horizontal Reading
- Coaching to promote co-selection
- Highlighter Exercise
- Persuade the MD
- Reverse Presentation
- Articulated Problem Representation
- IDEA
- Script Sort
- DDX Reframe

METACOGNITIVE OVERVIEW/REVIEW

Rationale:

Provides a framework and common vocabulary for ongoing coaching and deliberate, mindful practice. Enables student and coach to break down the process of reasoning in order to target specific components.

Uses:

- As a general strategy to lay the groundwork for coaching and feedback on clinical reasoning.

Approach:

Coach reviews cognitive models, terms, concepts, and common problems with reasoning. Revisits the concepts and frameworks as needed during active coaching.

HORIZONTAL READING

Rationale:

Promotes storage of information in memory in a manner that facilitates retrieval and application to diagnostic reasoning. (Promotes effective filing and linking of illness scripts.) Allows students to focus on defining and discriminating features of similar/related diagnoses as they learn new material.

Approach:

Students are encouraged to read about chief complaints or presenting symptoms, rather than specific diagnoses. As they read, students are encouraged to deliberately compare and contrast key features of specific, related diagnoses.

Uses:

- Use as a basic strategy when working with new information.
- Use in remedying Incomplete or inadequate illness scripts. (Empty or unlinked file folders.)

Example - Coach's prompt:

“Read about common causes of cough in children. As you read about individual diagnoses, make note of similarities and differences in the features of each illness. The table below may be useful as a guide.”

PRESENTING SYMPTOM: COUGH			
	Diagnosis #1	Diagnosis #2	Diagnosis #3
Epidemiology			
Pathophysiology			
Typical Clinical Features			
Lab Features			
Treatment			
Complications			

References: Bowen 2006, Bordage 2004

COACHING TO PROMOTE CO-SELECTION

Rationale:

Breaks the process of purposeful data-gathering (driven by an evolving differential diagnosis) into steps. Forces awareness of and deliberate practice with co-selection. Helps focus data-gathering and presentations.

Uses:

- As a deliberate practice strategy for students whose presentations include extraneous or missing data – or for those who spend excessive time with data-gathering or have difficulty gathering meaningful information.

Approach:

- Coach reviews the concept of co-selection and provides examples of how data-gathering may change as new information is obtained.

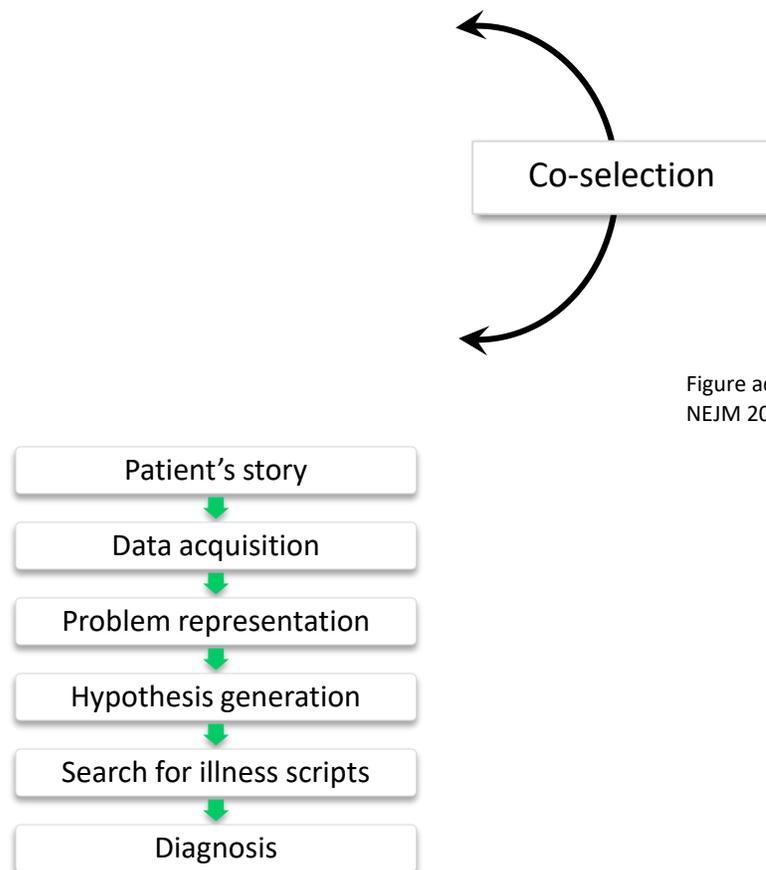


Figure adapted from Bowen
NEJM 2006

Options/formats:

- Real patient encounters:
 - Coach primes student to gather information based on an initial differential diagnosis.
 - Coach observes visit, records history-taking and exam. Post-visit debriefing focuses on co-selection - how data-gathering changed as new information emerged.

- Discussion/paper case/role play: coach provides guidance/feedback at each step of the data-gathering process.

COACHING TO PROMOTE CO-SELECTION CONTINUED

Example: Priming before a patient encounter

You are about to see James, a previously healthy, ex-full-term 9-month old with a chief complaint of cough for the past week.

1. Based on the limited information available before you see the patient, outline an initial Ddx for cough.
2. List the top 5 details that you will want to elicit in the history of present illness in order to narrow the differential and make a diagnosis.
3. List 3-5 physical findings that will be essential in narrowing the differential and making a diagnosis.
4. List 3-5 findings that will be essential in determining the severity/urgency of illness.

The coach may also opt to act as a patient, providing history and exam findings according to what the student asks for. The process can be fully broken down by having the student articulate a revised differential diagnosis after the history and again after the exam.

HIGHLIGHTER EXERCISE

Rationale:

Provides practice with identifying key features, distilling information, selective presentation of pertinent details.

Uses:

- As a diagnostic tool with students whose presentations include extraneous or missing data – to determine whether the underlying problem involves clinical reasoning or communication.
- As a deliberate practice strategy for highlighting defining and discriminating features.
- EMR: Use with auto-populated sections of the EMR as a way to promote attention to pertinent details.

Approach

- Coach provides a written/dictated H&P or progress note prepared by someone other than the student, with or without an assessment and plan
- Student highlights key clinical features (parts of the note that seem most important to consider in establishing a diagnosis and plan of care)

Additional options:

- Student creates a summary statement/explicit problem representation using semantic qualifiers.
- Student explicitly identifies important information he/she feels is missing from the note.

PERSUADE THE MD

Rationale:

Forces prioritization of details according to defining, discriminating features.

Uses:

- As a deliberate practice strategy in the context of the unfiltered data dump, presentations missing key information, or problems with far-fetched or inaccurate differential diagnoses. May be helpful with the Silo Differential to force a commitment to a unifying diagnosis.
- To promote management reasoning – asking student to defend the decision to call a consult, order a test, keep a patient another day in the hospital...

Approach:

Coach selects a common complaint/symptom with multiple causes – or uses a complaint from an active patient case - instructs student to convince the MD of a particular diagnosis (or treatment plan) within 20 seconds.

Examples:

“You have a sore throat. You are convinced the problem is Group A Strep pharyngitis. You have 20 seconds to persuade the physician you are seeing that you need a throat culture and/or antibiotics.”

“You say that your working diagnosis for this patient is bronchiolitis. You have 20 seconds to persuade me that this is, in fact, bronchiolitis.”

REVERSE PRESENTATION

ASOAP

Rationale:

Similar to Persuade the MD – forces attention to key features and allows the student to gather feedback on selection of details to support an assessment. (Teacher can pay attention to whether details fit with the up-front assessment, rather than waiting until the end of the presentation and thinking back about the details.)

Uses:

- As a diagnostic maneuver - allows teacher to distinguish between inaccurate assessment or difficulty with selecting relevant features to present
- As a deliberate practice strategy for students who are preparing to present patients in clinic or on rounds.

Coach's prompt:

“Before you present the clinical data you’ve gathered, give me your summary statement/assessment – and most likely diagnosis. Then select the details you want to present/emphasize in order to support your assessment.”

Example presentation on rounds:

- A:** This is a 3-month old with admitted with RSV bronchiolitis and hypoxemia. My assessment is that he’s ready to go home.
- S:** [Preceptor listens actively for details that support the assessment “ready to go home” – provides feedback on what the student has chosen to present.]
- O:**
- A:** So again, this is a 3-month old with RSV who has had no oxygen requirement for 24 hours. He’s eating well and parents feel comfortable taking him home.
- P:** Discharge today, with follow-up with Dr. Primary in 1-2 days.

ARTICULATED PROBLEM REPRESENTATION

Rationale:

Summarizing clinical features in terms of abstract descriptors (Semantic Qualifiers) facilitates matching to stored illness scripts.

Uses:

- As a deliberate practice strategy for missing assessments
- As remedy for problems with differential diagnosis, especially inaccurate, disembodied, or Silo Differentials.

Coach's prompt:

“Summarize the clinical data you’ve gathered in one to two sentences – using abstract descriptors (semantic qualifiers)”

List of SQs

- Acute – chronic
- Sudden – gradual
- Immediate - delayed
- Constant - intermittent
- Unilateral – bilateral
- Left-sided – right-sided
- At rest – with activity
- Painful – painless
- Tender - nontender
- Exudative – nonexudative
- Productive – nonproductive
- Tender – non-tender
- Mild – severe *Example:*

This is a

- school-aged child with an
- acute onset of
- exudative pharyngitis,
- high fever,
- tender cervical adenopathy

who also has headache, abdominal pain and no symptoms of viral upper respiratory tract infection.

References: Bordage 2007, Nendaz 2002

IDEA

Rationale:

Provides explicit guidance as to what to include in an assessment – in a manner that emphasizes communication of diagnostic reasoning. Teacher can “see” student’s effort to sort through illness scripts to find the best match to the patient’s findings.

Uses:

- As a diagnostic tool – prompts student to think out loud about problem representation and differential diagnosis. Allows teacher to identify difficulty with problem representation, incomplete illness scripts, or difficulty comparing and contrasting potential diagnoses.
- As a deliberate practice strategy for missing or inaccurate assessments, or difficulty with differentials.

Approach:

During case presentation or with case write-ups, coach prompts student to articulate the following:

- Interpretive summary (problem representation using SQs)
- Differential with commitment to the most likely diagnosis
- Explanation of reasoning in choosing the most likely diagnosis
- Alternative diagnoses and explanation for why they are less likely

Reference: Baker 2010

SCRIPT SORT

Rationale:

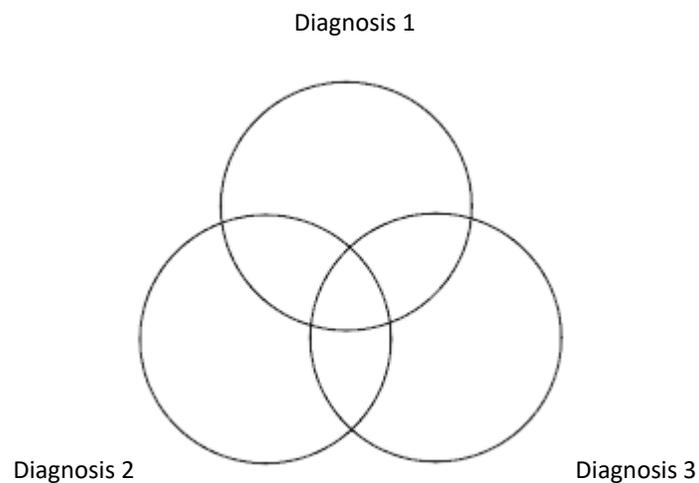
Prompts explicit comparing and contrasting of patient data against stored illness scripts as well as prioritization of items in a differential diagnosis.

Uses:

- As a diagnostic tool – may help identify incomplete or inaccurate illness scripts
- As a deliberate practice strategy for any of the following:
 - Disembodied DDx
 - Silo DDx
 - Unprioritized DDx
 - Zebras, DDx
 - Frozen DDx (new findings are added to the table/figure as they become available)

Example - Coach's prompt after student has identified key findings:

“Place each of the key findings in the appropriate space in the diagram. Findings that fit with more than one diagnoses should be placed in overlapping areas of the diagram.”



Reference: Bowen 2006

SCRIPT SORT CONTINUED

Alternative approach:

“List the patient’s key findings in the top row; list potential diagnoses under consideration in the left-most column. Rate the strength of the connection between the finding and the diagnosis using the following key:”

- +2 Speaks strongly for the diagnosis
- + 1 Speaks for the diagnosis
- 0 When the finding speaks neither for or against the diagnosis
- 1 Speaks against the diagnosis
- 2 Speaks strongly against the diagnosis
- ? Do not know

	Fever	Exudative pharyngitis	HA	Total
Strep	++	++	++	8
Mono	+	++	+	4
Adenovirus	+	+	+	3
Brain tumor		-	++	1

NOTE: CLIPP cases use similar tables (diagnostic networks) to promote diagnostic reasoning.

References:

- Charlin 2000
- CLIPP: Computer-assisted Learning in Pediatrics Project, eds. Fall and Berman
<http://www.clippcases.org>.

DDx REFRAME

Rationale:

Focuses attention on essential components of the differential diagnosis.

Uses:

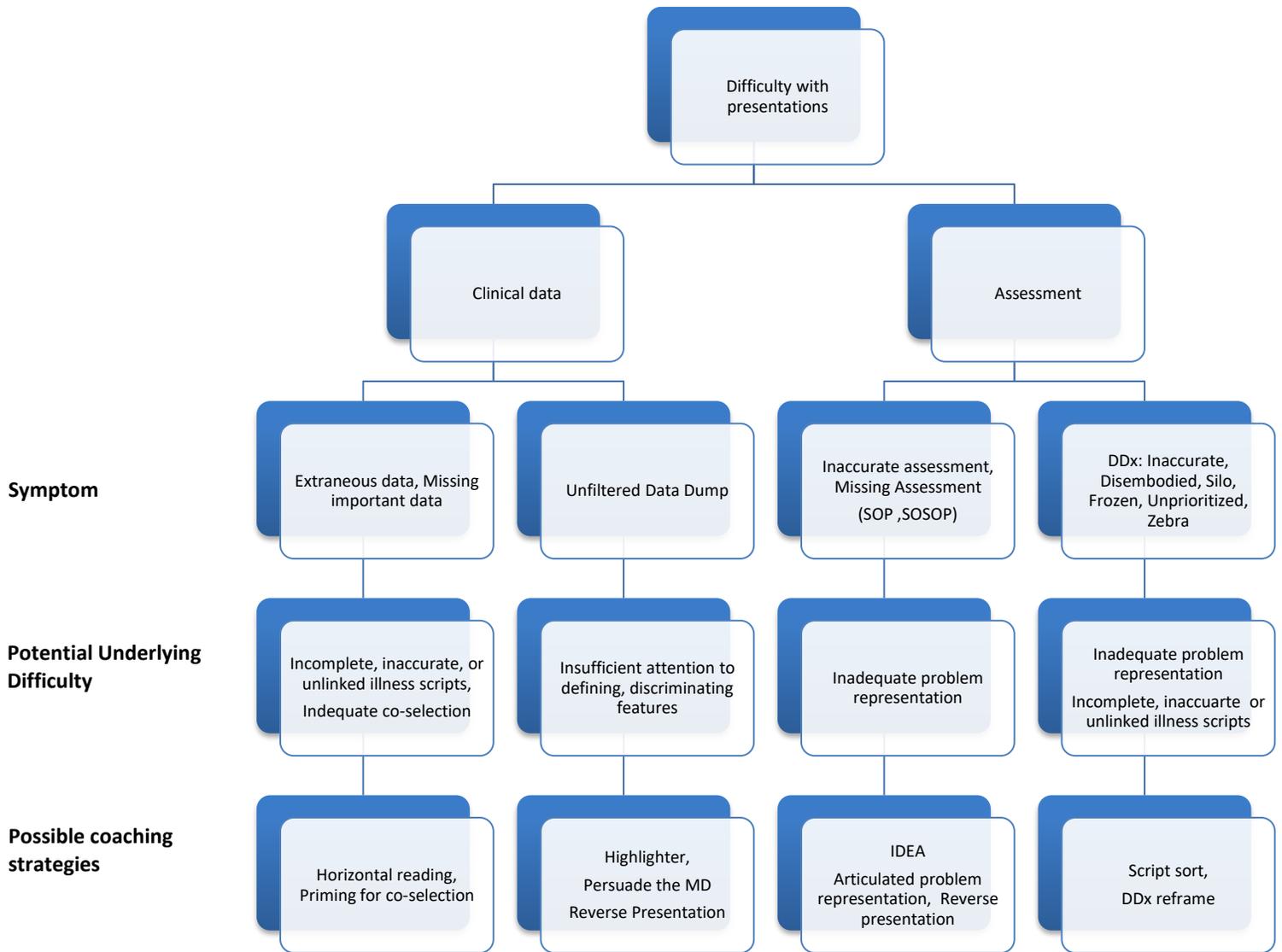
- As a deliberate practice strategy for developing practical, realistically prioritized differential diagnoses. May be particularly useful for students who seem to be stuck in the textbooks as they think about clinical problems.

Coach's prompt:

"Now that you've developed a full differential diagnosis, see if you can reframe it..."

	<u>Traditional</u>	<u>Alternative</u>
V	Vascular	• Common
I	Infectious, inflammatory	• Common
N	Neoplastic	• Common
D	Degenerative	
I	Iatrogenic, idiopathic	• Don't miss Atypical presentation
C	Congenital	• Rare
A	Autoimmune, allergic	
T	Toxin, trauma	
E	Endocrine/metabolic	

CASE PRESENTATIONS AND DIFFICULTY WITH DIAGNOSTIC REASONING: IDEAS FOR LINKING SYMPTOMS, CAUSES, AND SOLUTIONS



Cases for Discussion

COUGH

This is four-month-old with a past medical history significant for hyperbilirubinemia requiring phototherapy after birth but no other problems. Mom's concern today is that the baby has had a cough and runny nose for the past 10 days. The cough is getting worse and keeps her from sleep at night. Mom says there are episodes when it seems the baby just can't stop coughing. The cough is non-productive, but mom says she vomits after she coughs and her face turns purple-red. Her dad has had a cold for the past few weeks. She's also in day care. She's eating a little less than usual. She's had a normal number of wet diapers and stools.

There's a family history of asthma and allergic rhinitis in her 3-year-old brother.

Born at full term. She's never been hospitalized; no surgeries.

She hasn't had any shots since birth.

T 100.2 RR 30 HR 120 O2 sat 100% in room air.

Her weight and height are at the 60th percentile.

On exam, she's alert and quiet, in no distress. She didn't cough while I was examining her.

- Ears were hard to see. There was some crusted nasal discharge.
- Neck was supple with no adenopathy.
- Chest was clear with no wheezes or crackles. There were no retractions, grunting or flaring.
- Heart had regular S1S2 with no murmurs, rubs, or gallops.
- Abdomen had normal bowel sounds. Soft, non-tender no masses or organomegaly. Extremities were warm, and everything else was normal.

So in summary, this is a 4-month-old with who likely has RSV bronchiolitis. RSV is very prevalent this time of year. 3-9 per 1000 children younger than 1 year are hospitalized annually for RSV. The pathophysiology is very interesting and involves spread of the virus along intracytoplasmic bridges from the upper to the lower respiratory tract. RSV usually requires just supportive care, but we should consider catching up her immunizations.

VOMITING

This is a really cute 6-week-old male with a chief complaint of vomiting.

The baby was in his usual state of health until this past week, when he started spitting up after every feeding. The vomit looks like milk. Sometimes it's curdled. It's never green or bloody. Mom says it makes a big mess every time. She is breastfeeding and pumping and sometimes gives pumped breast milk in a bottle, but she gave some formula last Tuesday. She thinks it was about 5 oz. of Enfamil. Normally the baby breastfeeds for 10 minutes per side every 2 hours. The baby has 5 wet diapers a day, with two non-bloody stools.

Nutrition: Baby takes breastmilk, plus the formula last Tuesday.

Development: He smiled last week. He tracks to midline. Lifts his head while prone.

Sleep: He sleeps on his back in a crib.

Medications: None

Allergies: NKDA

Review of Systems: No fever, no cough, no runny nose, no eye discharge, no ear pain, no neck stiffness, no breathing difficulty, no sweating, no diarrhea, no problems with urination, no problems with sleep, no rashes.

PHx. Full term, SVD. Mom is a G1P0-1 who had good prenatal care and normal labs. Her blood type was O+. HBSAg, RPR, and GBS were negative.

FHx. Grandmother has hypertension. Grandfather has Type 2 diabetes. There is a cousin with Tourette syndrome, and a maternal great uncle with lung cancer.

SHx. Mom and dad are from Nicaragua – which is really cool – I've never met anyone from Nicaragua. Baby lives with mom and dad. Dad is an engineer. Mom used to teach school, but she's on maternity leave. She plans to pump breast milk and go back to work in a couple of months. No one smokes, no pets.

Exam

- T 37° HR 110 RR 40 Weight and height are at the 40th percentile.
- Baby was alert, crying but consolable.
- Lips seem somewhat dry. Red reflex was present bilaterally. I didn't check ears.
- Neck is supple.
- Chest is clear
- Cardiac exam showed regular S1S2 with no murmur. Femoral pulses were 2+
- Abdomen had normal bowel sounds with no masses or organomegaly.

- GU was normal.
- Hips were stable. Spine was straight.
- I tried to do the Moro reflex, but I couldn't really get it. Grasp was normal. Tone seemed normal.

My assessment is that this is a baby with vomiting. The differential for vomiting in infants includes:

- malrotation/volvulus
- UTI
- pyloric stenosis
- viral or bacterial gastroenteritis
- gastroesophageal reflux
- formula intolerance.

So – we could do a KUB to look for volvulus or an ultrasound to look for pyloric stenosis or a stool culture, or urine culture, or maybe – do we do stool eosinophils to test for allergy?

FEVER

So, this is a 16-month old child with a chief complaint of fever and red eyes. The fever started about 6 days ago, seemed to get a little better yesterday, but it's back to 102 today. Yesterday her eyes were noted by mom to have become red but there was no noticeable discharge. This morning mom also noticed a rash on the baby's chest. She has been fussy and has had trouble sleeping. Mom says the whole family has had a cold recently, but the baby has had no associated cough or runny nose. No vomiting or diarrhea.

For past medical history, she's been healthy; no surgeries or hospitalizations, was born on time.

For family history everyone's had a cold, but not much else. No relatives with any autoimmune or heart problems.

In regards to social history, there is a cat at home. No smokers.

On exam,

- T 39 HR 110 RR 25 Weight and height are at the 50th percentile.
- She was pretty fussy, and had red, injected conjunctiva – but no eye discharge.
- Her lips were red and chapped.
- Tonsils were 3+ with no erythema or exudate.
- External ear exam and TMs were normal.
- There was a 1.5 cm non-tender, mobile cervical lymph node on the left.
- Her heart and lungs sounded fine and her abdomen was soft.
- There is a fine, pink, macular, blanchable rash over her entire trunk. While I was doing my exam, mom noticed that the baby's hands seem swollen.

My assessment is that this is a 16-month-old with a chief complaint of fever and red eyes. The Ddx is pretty broad.

- The fever could be URI, UTI, strep throat, Kawasaki, cat scratch. Less likely malignancy or a rheumatologic problem, but 5 days of fever is a lot.
- The conjunctivitis is probably viral, but it could also be bacterial.
- She has swollen glands, so that makes me think about strep or adenovirus or Kawasaki or malignancy. Or she could just have an enlarged node secondary to a URI.
- I think her rash could be viral – or if she has strep, it could be scarlet fever.
- The swollen hands make me think we need to consider rheumatologic processes.

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