

Using Diagnostic Schemas and Frameworks to Expand, Recall and Assess Clinical Knowledge

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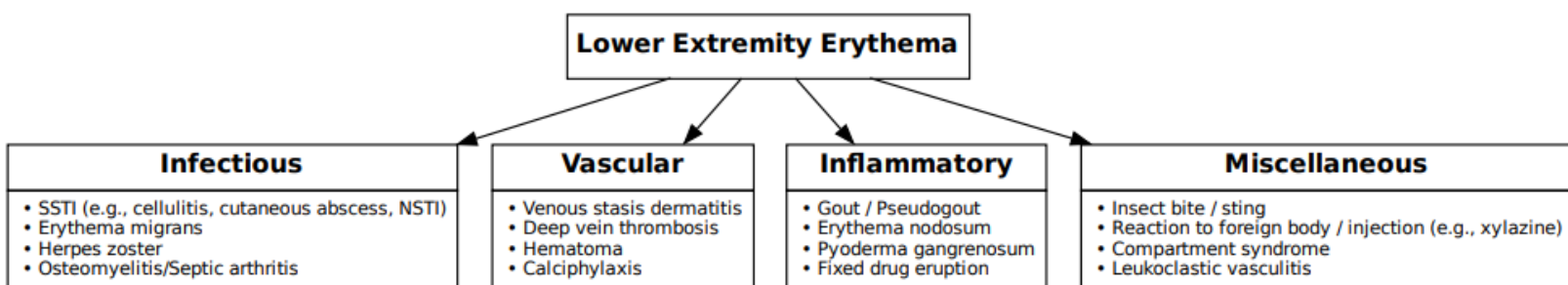
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An essential clinical reasoning skill for learners to master is the ability to generate differential diagnoses which are appropriately prioritized (including both “most likely” and “less likely” diagnoses) and comprehensive (including “can’t miss” and rare diagnoses). Teaching this type of reasoning skill requires a systematic approach which allows clinician educators to impart complex implicit knowledge in a manner that is well-organized and comprehensible to learners.

Diagnostic schemas are conceptual structures which organize clinical knowledge into hierarchal frameworks that are easier to learn and recall. They are referred to as “diagnostic schema” when activated internally within individual clinician’s minds, and as “diagnostic frameworks” when communicated in written or pictorial form. Diagnostic frameworks often provide a simplified and well-organized representation of complicated clinical knowledge. They also play a key role in the diagnostic reasoning process by allowing clinicians to systematically transform problem representations into comprehensive differential diagnoses.

Diagnostic frameworks can be generated for any clinical problem, such as a sign or symptom (e.g., “chest pain”), imaging result (e.g., “cavitary lung lesion”), or lab abnormality (e.g., “eosinophilia”), and often include broader-level categories (e.g., pathophysiological processes or organ-systems) arranged in parallel which ultimately narrow to individual diagnoses.

Below is an example of a diagnostic framework for the clinical problem of “Lower Extremity Erythema” (designed on the “Schematify” medical diagnostic schema generator webapp):



Diagnostic schemas/frameworks:

- organize learning
- reduce cognitive load
- expand and sustain clinical knowledge
- guide differential diagnosis generation and problem solving
- mitigate premature diagnostic closure
- improve diagnostic accuracy

An effective way to utilize diagnostic frameworks as teaching tools is to encourage learners to integrate them into their patient presentations during teaching rounds. Clinician educators can set the expectation that learners will name a clinical problem (based on the learner's proposed problem representation) and then articulate their diagnostic framework for that specific problem. This type of approach allows for the learner to demonstrate their ability to reason through a specific clinical problem though systematically and sequentially listing groups of potential diagnoses. It also enables educators to identify potential learner knowledge gaps which may serve as ideal points for focused teaching.

Alternatively, educators can use "whiteboard talks" to present their own diagnostic frameworks during teaching rounds; allowing for expert-level clinical knowledge to be presented in an efficient manner that is accessible to learners.

Finally, diagnostic frameworks can be modified to include typical signs, symptoms or risk factors that are specific to certain diagnoses (e.g., "illness scripts") and/or information on how specific diagnoses compare or contrast. These types of modified diagnostic frameworks can be helpful in ultimately structuring and prioritizing a differential diagnosis.

Diagnostic frameworks require repeated practice (through writing or verbal recall of schemas) and revision for them to effectively expand clinical knowledge and memory. They are most effectively used as educational tools in scenarios which require a broad overview of a clinical problem (e.g., generating potential diagnoses for undifferentiated problems). They have less educational utility in clinical scenarios where the diagnosis is known or where there are multiple interrelated problems.

In summary, diagnostic schemas and frameworks are cognitive tools which optimize learners' ability to acquire, recall and utilize the clinical knowledge needed to effectively generate differential diagnoses. Use of diagnostic frameworks by clinician educators may improve their ability to efficiently teach clinical reasoning and assess learner knowledge.

References and helpful resources:

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