Non-Canonical Principles of Diagnosis and Management: A Resident Perspective

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**Abstract**

There are certain principles of diagnosis and management that I've come to embrace as a junior and subsequently as a senior medical resident. The hospital physician likely practices most of these principles in some form or another. I'm not claiming them as fruits of my own intellectual prowess, but instead synthesized observations based on concrete clinical examples that I've come to use in my day-to-day approach in the internal medicine patient. They are non-canonical formulations of logic in the clinical setting that may help the overnight resident for an increasingly complex patient population. These principles focus on the idea of multifactorial patient presentations, competing management strategies, establishing diagnostic dominance, recognizing negative diagnostic interference and embracing the re-establishment of homeostasis as the role of the clinician. These principles may provide a reliable armamentarium of logic by which to approach situations overnight, especially those that are complex and unfamiliar.

**Keywords:** Medical education; clinical reasoning; logic; residency; viewpoint; educational theory

**Non-Canonical Principles of Diagnosis and Management: A Resident Perspective**

There are certain principles of diagnosis and management that I've come to embrace as a junior and subsequently as a senior medical resident. The hospital physician likely practices most of these principles in some form or another. I'm not claiming them as fruits of my own intellectual prowess, but instead synthesized observations based on concrete clinical examples that I've come to use in my day-to-day approach in the internal medicine patient. They are non-canonical formulations of logic in the clinical setting that may help the overnight resident for an increasingly complex patient population.

**Multifactorialism** is the first principle. Most patients who present to the hospital have a chronic baseline of diseased equilibrium. For instance, the prototypical patient with congestive heart failure, obstructive pulmonary disease, obesity hypoventilation syndrome, chronic opioid use and a poor functional baseline may present with shortness of breath. Often times, there is a reflex to elucidate or falsely isolate a singular pathology that has
contributed to this. However, as patients become more chronically complex, discrete presentations become rare. Instead, more logically, it seems that patients with this profile will often undulate around their protoplasmic baseline until finally an insult leads to multi-etiologic or multifactorial decompensation. This method of thinking about the patient is beneficial not only for clearer synthesis or problem formulation, but it can also negate the false need for diagnostic certainty and ultimately help put in place better management strategies.

Multifactorialism goes hand in hand with another principle, namely that of etiologic dominance. Often times, multiple etiologies account for patient presentations, and treatments may be not uncommonly antithetical. In this situation, etiologic dominance based on threat to survival may be employed as a means of focusing treatment. An example of this is a patient with frank hematuria who also presents with a large pulmonary embolus. In this situation, most would take the large embolus as the etiologically dominant entity, and anticoagulate while supportively managing the urinary hemorrhage.

The third principle is pertinent to the process of diagnosis, which I have come to formulate as parameter congruence. Almost second nature but seldom characterized as thus, residents overnight often rely on clinical, biochemical, radiologic and sometimes pathologic (tissue) parameters to make a diagnosis. Confidence naturally increases about diagnosis and subsequently modality of treatment when there is congruence between the different parameters. This congruence may not always be present, but when it is, it lends to a greater sensitivity and specificity in diagnosis. There are simple cases that may demonstrate this, including cardiac presentations of chest pain with troponins and EKG parameters that confirm the diagnosis. However, the mindful use of this principle is most powerful in situations where a clinical presentation is multifaceted and a unifying diagnosis is sought for a seemingly disparate set of findings. For instance, in the undifferentiated patient who presents with weakness, abdominal pain and a skin rash, a CRP may be helpful in demonstrating an inflammatory pathology, while a CT of the abdomen that shows thickening in the gut may raise concern for a malignancy. In conjunction, the parameters may be harmonized to signify a diagnosis of inflammatory myopathy such as dermatomyositis. There is a challenge sometimes with this principle in that the diagnostic parameters may not always be compatible. In this case, a logical corollary arises, namely one that establishes the dominance of one or two of the diagnostic parameters over others. Interesting examples of this arise when biochemical tests have impressive epidemiologic sensitivities. For instance, in the undifferentiated obese patient whose JVP is undetectable, the BNP may be very helpful in ruling out an acute heart failure decomposition, even if the x-rays show potential revascularization and the clinical exam points to venous stasis or potentially atelectatic crackles. In this case, the biochemical parameter assumes diagnostic dominance. This is analogous to the idea of etiologic dominance espoused above.

Negative diagnostic interference is the fifth principle I will discuss. Understanding this may be helpful in pursuing and treating atypical diagnoses in complex patients who seem to have no clear classicality in presentation. Not uncommonly, there are competing diagnoses in the patient profile that preclude a typical presentation. This again is becoming increasingly prevalent as patients accrue chronic diagnoses. One way to think about this is that each disease process has an amplitude of manifestation, with the amplitude defined as a disease intensity occurring in some abstract direction (positive or negative). Such disease amplitudes are not always unidirectional and the fact that they co-exist may cause mutual cancellation or negative interference, to the patient's detriment. The classic situation would be a poorly controlled diabetic patient. Often times, the chronically hyperglycemic state results in impaired pain sensation and impaired immunologic response. In these patients, one ongoing disease process, like cardiac chest pain, may have its amplitude of manifestation blunted by the opposing sensory neuropathy of diabetes.

Lastly, the quintessential role of the clinician seems to vary by practice and this gives rise to varying modes of logic when determining terminal points of therapy. Some clinicians pursue very discrete endpoints as parameters by which to judge treatment success. For instance, the patient with hypovolemic hyponatremia is sometimes subject to
obsessive attempts to monitor and correct the electrolyte abnormality until complete biochemical normalization. However, the principle of homeostatic deliverance may be helpful here. In my view, homeostatic deliverance is the idea that management should be minimalist and primarily focused on removing the patient from the periphery of physiologic independence. In other words, a clinician should seek to restore a patient within a range where the body can independently shift to its own non-diseased equilibrium. For example, a patient with hypovolemic hyponatremia who's sodium is corrected from being severely low to mildly low may benefit from cessation of IV support and monitoring, with avoidance of overcorrection and associated maneuvers to reverse the corrective course. Another aspect of patient care where this is useful is the idea that patients should rehabilitate while in hospital completely back to their functional baseline. This seems to be again reliant on a very discrete endpoint as opposed to delivering the patient to a state where they can be reasonably expected to convalesce and return to a suitable baseline at home, not at the hospital. In the latter case, such recovery may be speedier and less prone to complications of being in hospital, such as infection or delirium. Said in another way, restoring the patient to a clinical range where convalescence is mostly self-realized seems to be a more mature, less reactive means of achieving better patient outcomes.

I will end by saying that these principles, amongst others, may have educational consequences. Often times, residents are taught in a dogmatic manner, focusing on rigid differentials for presentations and algorithmic next steps. While the aforementioned are necessary clinical skills, it seems to me that a focus on general modes of logic should be more prevalent in residency education programs. These principles may provide a reliable armamentarium of logic by which to approach situations overnight, especially those that are complex and unfamiliar. A medical school or residency program that combines such principles along with the literature on heuristics and cognitive biases may create more confident, more mature physicians.

Take Home Messages

- Many patients will have multifactorial presentations and the quest for a singular pathology may be misguided
- Etiologic dominance is a useful principle when there are competing or antithetical management strategies
- Congruence in clinical, biochemical and radiological parameters may increase confidence in diagnosis and management
- Negative diagnostic interference from extant comorbidities can allow for detection of atypical presentations
- Management of patients should be primarily focused on removing the patient from the periphery of physiologic independence as opposed to restoring them to baseline

Notes On Contributors

Bellal B. Jubran is a second year resident physician in internal medicine at the University of Calgary, Canada. He completed his undergraduate studies at the University of Toronto in the field of biochemistry and subsequently completed medical school at McGill University. Dr. Jubran has a passion for medical education and spends a considerable amount of time researching educational theory and modes of reasoning in clinical decision making. In his spare time, he enjoys exercise, European history and learning new languages.

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Bibliography/References

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Appendices

None

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