



# 'A Man Walks Into a Bar': Riddles in the Teaching of Medicine

For some years now, one of us (AV) has enjoyed posing this riddle on teaching rounds with residents.<sup>1,2</sup>

*A man walks into a bar and makes a wager: He will keep his head submerged in a bucket of water for as long as the patrons wish. If he succeeds, the patrons must each buy him a drink. If he fails, then the drinks are on him. The wager is accepted. He wins the bet. What medical condition allows this to happen? Note: The man does not have a tracheostomy.*

As with most riddles, medical or otherwise, a seemingly impossible scenario is used to focus the listener's attention: How can a man survive with his head underwater for 30 minutes? (The solution is provided at the end of this article,<sup>1</sup> but we encourage the reader to first think through the problem). The required answer is logical and makes sense of what initially seemed absurd. But for the riddle to have teaching value, it is necessary to ask those trying to solve it not to "Google" an answer and to resist the urge to answer it without thinking it through. Both these caveats go against the grain of our present electronic medical record–centered, "4000 clicks a day" culture.<sup>3,4</sup> In a world full of handheld computers and Global Positioning Systems, instant answers are available, and the need to ponder a question is diminished. However, the exercise of solving a riddle requires thought and deliberate practice, qualities that have their benefits in many aspects of clinical care.

## RIDDLES, THINKING, AND LEARNING

In clinical medicine, we often use what Kahneman calls "System 1"<sup>5</sup> thinking when synthesizing clinical information, for example, by immediately suspecting cholangitis in a patient with fever, jaundice, and right upper quadrant pain.

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This method of thinking "operates automatically and quickly, with little or no effort and no sense of voluntary control." Such heuristics can be useful ways to solve many clinical problems because they require little endurance, effort, and time. But such thinking is not foolproof: Not all patients presenting with breathlessness after a long plane flight have had a pulmonary embolism. System 1 thinking is also prone to bias; cognitive errors relating to the use of heuristics are a major contributor to diagnostic error.<sup>6</sup> By contrast, System 2 thinking "allocates attention to the effortful mental activities that demand it, including complex computations."<sup>5</sup> We deploy System 2 when we encounter an uncommon or new clinical situation, when we carefully review decisions or conclusions based on System 1 thinking, or when we fail to reach a solution by using System 1. System 2 reasoning is commonly demonstrated in Morning Report and Morbidity and Mortality conferences.

Riddles are useful in that they provide a means of promoting System 2 thinking. The clinical pearl is a form of medical aphorism well established in medical education.<sup>7</sup> The riddle is often a clinical pearl presented in the form of a question. For example, the clinical pearl "Beware of the patient with a glass eye and a big liver"<sup>8</sup> could be stated as a riddle: "A woman presents with jaundice in the right eye, and a big liver—what is the unifying diagnosis?" The clinical pearl requires explanation but does not demand that the learner provide it. The riddle does, and the undertaking of forming and rejecting hypotheses makes the solution memorable and more likely to be retaught than when the same information is presented as a statement of fact. Entering the terms "glass eye big liver" into a Google search provides the answer but circumvents both Systems 1 and 2, short-circuiting the practice of analytical thinking and clinical reasoning, the main objective of the exercise.

An interesting parallel to the use of riddles in teaching is the development of alternative testing forms in assessment. Standardized test questions are used extensively in medical examinations, most commonly in the form of the "multiple choice question." Such questions may be solved by System 1 or 2 thinking but have been suggested to impede the development of analytical thought in some disciplines including medicine.<sup>9-11</sup> Although with careful design, it is thought that

multiple choice questions can be developed to adequately examine higher-level reasoning.<sup>9,12</sup> “Open book” examinations, in which the candidate has access to textbooks during the examination, can support analytical thought given the right questions, but if “open book” equates to internet access where the questions can simply be entered, the testing is undermined.

We suggest that a better means for promoting the development of analytical thought is to present multiple choice questions without the multiple choices. That is, in the form of a riddle:

“A 67-year-old woman was referred with a 3-month history of painful legs, malaise, and weight loss. She had long-standing type 2 diabetes mellitus and hypertension. Her medications were glipizide 10 mg twice daily, ramipril 2.5 mg daily, and atorvastatin 20 mg daily. On examination, her blood pressure was 145/90 mm Hg. There was some tenderness over her spine and legs. Laboratory results revealed an elevated potassium and creatinine, a low calcium, high phosphorus, and high parathyroid hormone level. What therapy is most likely to correct the calcium and parathyroid hormone concentrations?”

The reasoning (and System 2 thinking) might take the following form:

“The patient has diabetes and hypertension, presents with painful legs and spine, and has hyperkalemia, elevated serum creatinine, hypocalcemia, hyperphosphatemia, and hyperparathyroidism.”

“The hyperparathyroidism is an appropriate response to the hypocalcemia and the hyperphosphatemia.”

“This is therefore secondary hyperparathyroidism.”

“Treatment of the hypocalcemia and limitation of dietary phosphorus intake would help control the hyperparathyroidism.”

“Hypocalcemia precludes the use of a calcimimetic drug like cinacalcet.”

“Supplementation of Vitamin D levels could help the hypocalcemia by encouraging intestinal calcium absorption.”

“Patients with chronic kidney disease often have relative deficiency of 1,25-OH-vitamin D as the 1-hydroxylation step is performed in the kidney.”

“The optimal management of this patient would be 1,25-vitamin D.”

This form of question is known as “very short answer,” and the limited evidence comparing the degree of difficulty of multiple choice question and very short answer suggests that very short answer is more challenging for learners, when identical content is used.<sup>13</sup> There are some data to suggest that retention of information after short-answer testing is enhanced compared with multiple choice question,<sup>14</sup> although this may be mitigated when optimized multiple choice question techniques are used.<sup>15</sup> In the context of medical education, very short answer testing has been suggested to offer improved validity compared with multiple choice questions.<sup>16</sup> The comparative impact of these different item forms on learning habits, information retention, clinical thinking, and clinical outcomes is unknown.

## CONCLUSIONS

The relative paucity of riddles in medicine is striking when one considers the long and storied history of passing medical knowledge from one generation to the next through eponyms, aphorisms, rules, and other means. Our review identified only one set of recently published medical riddles, created to help learners remember specific drugs.<sup>10</sup> We believe riddles promote analytical thinking and deductive reasoning. As the practice of medicine becomes increasingly automated and dependent on technology, more clinical care and decisions will be provided using passive information gathering and heuristics. Emphasizing and preserving the skill of analytical thought remain important, particularly in patients with unusual illnesses or unusual presentations of illness. As the scientific revolution in medicine continues, and as new diseases and therapies appear, there is a need for the canon of riddles to grow.

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<sup>1</sup>The solution to our initial riddle is a bronchocutaneous fistula, perhaps a consequence of an empyema that ruptured out to the skin (*empyema necessitans*) and healed in this manner. The logic used to reach this conclusion might take the following form:

“With his head underwater, the patient will not be able to ventilate.”

“Is there a medical condition that eliminates the need for ventilation?”

“No.”

“Then, the patient must be ventilating through a manner other than his mouth, such as a direct connection between his lungs and his skin.”

“He does not have a hidden tracheostomy, but what if a large bronchus was connected to his skin? By closing his epiglottis and inhaling, air could pass through this connection, and the patient could ventilate.”

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