COMMENTARY

Encouraging Students to Challenge Assumptions

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Sound logical reasoning requires a critical examination of all available evidence and the willingness and ability to challenge key assumptions implicit in the conclusions we reach and the informed decisions we make. Student pharmacists should be encouraged to recognize and challenge assumptions that practicing pharmacists frequently make, which threaten patient safety.

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A student in a course I teach on logical reasoning recently engaged me in a discussion of Zeno's Arrow Paradox.¹ In his famous arrow paradox, the Greek philosopher Zeno of Elea (490-430 BCE) began by stating the obvious: for motion to occur, an object must change the position it occupies in space. Using the example of an arrow in flight, he then observed that at any instant in time, the arrow is motionless in space. The arrow, he reasoned, cannot move to where it is because it is already there. At the same time, it cannot move to where it is not because no time elapses to move there. That being the case, at any (and, importantly, *every*) instant in time, the arrow is at rest and no motion is occurring. Thus the apparent paradox: If the arrow is motionless at every instant in time, and if time consists entirely of such instants, then how is motion possible? How does the arrow ever get from the archer to the target? Indeed, how do we explain motion or change of any kind?

Over the 25 centuries since it was proposed, many solutions have been suggested to explain Zeno's apparent paradox, most of which are beyond the scope of our objectives here. However, one approach is to challenge assumptions implicit in the argument. For example, Zeno's Arrow Paradox assumes that time is composed of durationless instants. A plausible alternative is that time consists of indivisible increments of non-zero duration. If so, Zeno's fabled arrow is never actually at rest. Rather, the apparent rest is an illusion created by infinitesimally slow progress.

To be clear, I am not suggesting that time does behave in this fashion, as I am completely unqualified to even opine on the matter. Rather, the example serves as a reminder that challenging the assumptions implicit in our

thinking can sometimes help us recognize and avoid fallacies in the conclusions we draw, the decisions we make, and the subsequent actions we take, or fail to take.

As a pharmacist and pharmacy educator, deliberating this philosophical argument with my student put me in mind of assumptions pharmacists routinely make in daily practice that can put patients at risk. For example, do we assume the prescription order we receive accurately represents the prescriber's intent? If that is our default hypothesis are we not more likely to overlook that misplaced decimal point or incorrect medication that was inadvertently selected from the e-prescribing software application's dropdown menu? Would it not be more prudent to begin with the alternative hypothesis that the prescription order is somehow erroneous and require the observable evidence to disconfirm that hypothesis?

If the prescription order is handwritten, do we assume our technician read and entered it correctly? If so, when we review his or her work are we doing so critically, or merely perfunctorily confirming our pre-existing bias that it is correct?

Do we assume the scanned image of the written prescription order accurately represents the original? If so, are we likely to notice the decimal point, sans leading zero, where the prescriber's pen skipped? It is very clear on the original prescription order, which only the technician viewed, but when the three-dimensional prescription order was converted to a two-dimensional image, the clearly observable indentation in the paper vanished.

If we are processing a refill, do we assume the original was processed and dispensed correctly? If so, are we likely to recognize the error made by our colleagues during a previous fill? Is it then even more likely that it will be missed on subsequent refills?

If we are practicing in a state that allows technicians to take new prescriptions over the telephone, do we assume the technician correctly understood and accurately

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recorded the prescriber's order? Are they sufficiently trained and has their proficiency been appropriately assessed to ensure they are able to do so?

Do we assume our pharmacy's internal prospective drug utilization review (DUR) software application and/or that of the adjudicating pharmacy benefit manager (PBM) or claims processor is able to reliably recognize a potential threat to patient safety? If so, what is the role of the pharmacist in the critically important process of prospective DUR? What about the dose of that atypical antipsychotic that is technically within the recognized dosage range but is 10 times the appropriate dose for this particular patient's indication? Do we further assume it was prescribed for an FDA-approved indication and not for an off-label purpose?

Do we assume that our otherwise conscientious and proficient pharmacy staff behave the same when placed in an environment with too many prescriptions to fill and too little time? Do we assume that our procedures, processes and protocols will not break down during such system stresses?

Finally, do we assume that when our patients reply "no" to the technician's question "do you have any questions for the pharmacist" that we are obtaining a truly informed response to what the patient perceives to be a legitimate offer to counsel them about their medications?

Upon reflection, I think virtually any seasoned pharmacist could generate a list of potentially questionable assumptions made in daily practice that would be similar to those cited above. Regrettably, mine are neither imagined nor hypothetical. Rather, they were culled from a modest amount of expert witness work I have done over the years, primarily to inform my teaching and scholarship relative to medication safety. Even given the relatively limited number of cases on which I have assisted, however, I have seen every one of the above assumptions violated. In some of those cases, patients were permanently injured. In some cases, they died. Those experiences have taught me to challenge assumptions and to encourage my students to challenge theirs and those of their preceptors and employers.

A good place to start is to carefully scrutinize the safety-sensitive decisions we make relative to our routine processes and procedures by asking the question, "are there unstated assumptions upon which the appropriateness of this decision depends?" A closer inspection will sometimes reveal unverified assumptions, premises and/or inferences that may, under some circumstances, threaten the quality of patient care. Moreover, we should resist the inclination to take solace from the fact that we usually get away with the unwarranted assumptions we make. It is instructive to recall that until the end of the 17th century it was considered indubitable that all swans were white. When a Dutch explorer discovered black swans in Australia in 1697, this assumption had to be reconsidered. Absence of evidence is not evidence of absence. My experience has taught me that pharmacy practice remains rife with black swans, and the de-identified cases I use in my medication safety management course assist students to recognize them.

Zeno's Arrow is indeed a paradox if one is willing to accept all of the unstated premises and assumptions that are implicit in his argument. But while they may all be perfectly justified, each deserves to be explicitly recognized and considered. The study of philosophy^{2,3} has helped to sensitize me to the unrecognized assumptions in my own reasoning and those of others. In so doing, it has made me wary of the hidden traps to good decision making that I set for myself, as well as those that have been set for me by others.

Our students deserve nothing less as we prepare them for careers in which the assumptions they make or accept can mean the difference between the life and death of their patients.

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