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(866) 423-7849

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## How to Take a Proactive Approach to AKI Risk Assessment and Management

### Announcer:

You're listening to *Clinician's Roundtable* on ReachMD, and this episode is sponsored by bioMérieux. Here's your host, Dr. Javed Butler.

### Dr. Butler:

This is *Clinician's Roundtable* on ReachMD, and I'm Dr. Javed Butler. Here with me today to discuss how we can take a more proactive approach to identifying and managing a patient's risk of acute kidney injury is Dr. Azra Bihorac. Not only is she a Professor of Medicine, Surgery, and Anesthesiology, but she's also the Director of the Intelligent Clinical Care Center at the University of Florida Health.

Dr. Bihorac, welcome to the program.

### Dr. Bihorac:

Thank you so much. It's great to be with you.

### Dr. Butler:

Great. So let's dive right into the topic of acute kidney injury. Can you tell us a little bit about the epidemiology, the correlation with patient's outcomes, and, as a cardiologist actually, how do you differentiate between an acute kidney injury versus simply a bump in creatinine?

### Dr. Bihorac:

Acute kidney injury is one of the probably most common hospital complications. It's a complex medical condition that is characterized by sudden and acute loss of kidney function, and it can range from mild to complete failure when you need renal replacement therapy or simply dialysis. So we have developed a quite standardized definition of acute kidney injury, and based on that definition, we can classify AKI, or acute kidney injury, in three stages that help us really understand better the epidemiology of the disease. I think your question alludes towards the fact that some of acute kidney injury is mild and transient and recovers quickly while on the other hand, you have cases where it's more persistent and often does not lead to complete recovery of kidney function at the time when you either send the patient home or you don't see them in the clinic. So I think it's important to recognize longitudinal changes, look for persistence of the change, and really focus on those patients who have persistent change that is not coming back to baseline. I think that in terms of epidemiology, a lot of us are aware that the most severe cases of AKI—those that are at least stage three or those that require renal replacement therapy—are really associated with adverse outcomes.

### Dr. Butler:

And then if the clinical outcomes are getting worse, is there an economic burden associated with acute kidney injury as well?

### Dr. Bihorac:

A lot of physicians will think that just because it's mild or moderate changes, it does not have an impact. But we have shown repeatedly in epidemiological studies—and some of them we have done quite intensely—that even patients in mild and moderate acute kidney injury are prone to adverse outcomes after discharge, such as readmissions, increased mortality, or risk for cardiovascular disease. And again, this is all indeed connected with adverse financial impact. As an example, we looked at the cohort of patients undergoing acute surgery in a hospitalized setting and showed that among those patients, having acute kidney injury as one of your complications added additional significant costs to other complications. So on average, just having any stage of AKI added about \$10,000 extra costs to hospital admission after surgery. And if you have other complications added to that, for example, let's speak about sepsis. If you had

both sepsis and acute kidney injury, the cost of your care goes up to \$60,000, and that is absolutely a stunning finding. So I think it is really important to focus on patients who develop multiple complications during hospitalization.

**Dr. Butler:**

So can you tell us a little bit about the challenges and obstacles in the care of these patients that contribute to all of these adverse health outcomes?

**Dr. Bihorac:**

Yes, so I like to kind of talk about it like the 80/20 rule. 80 percent of patients with acute kidney injury are never seen by kidney specialists. 80 percent. And 80 percent of acute kidney injury patients who leave the ICU never actually have follow-up creatinine after discharge. That is fascinating. Not to mention that they never see a nephrologist, even those who have not just mild but moderate and severe AKI.

So it is really important also to notice that a lot of documentation does not mention AKI diagnosis. So awareness is a big problem. If you don't know that we have a problem, how can we address it, right? So bringing it back to awareness is the number one thing. The second one is really setting up the stage to understand that there is a huge heterogeneity in acute kidney injury patients. So we need to more precisely phenotype that in terms of what type of patients are those that perhaps can recover without any input from a physician. We just have to let them go, right? That's what you're asking, and which patients require our closest attention, how we deploy that attention, and what other things might be harming those patients because there's always risk and benefit between things we are doing either in the ICU or hospital as you well know. So that kind of healthy balance of actions that we perform as physicians is really important and need to be aligned with our complete and precise understanding of the patient's kidney risk profile in the hospital.

**Dr. Butler:**

For those just tuning in, you're listening to *Clinician's Roundtable* on ReachMD. I am Dr. Javed Butler, and I'm speaking with Dr. Azra Bihorac about the burden of acute kidney injury, which underscores the importance of moving beyond reactive care.

Can you tell us a little bit about your approach for proactive management of these patients?

**Dr. Bihorac:**

We have this approach called think, act, balance, and share. So it was based on the fact that acute kidney injury is one of the complicated syndromes we encounter. That's why maybe people don't want to be aware because it's really complicated. It's also because, as I said, the value, the importance of the effect of AKI, is often underappreciated. It does not have a real owner because most of the time, it occurs in the setting which don't naturally have nephrologists. It'll happen on the floor with general practitioners, hospitalists, or ICU doctors, and most of the patients in early stage will never see nephrologists. So you don't really have a real specialist in the room, and the main stakeholders just don't know enough about it and experts cannot be there when it matters. We cannot have nephrologists everywhere. So we really need to be able to think about it, act wisely, balance and share our knowledge, and develop simple and standardized approaches.

We developed a standardized approach for the management and treatment of AKI in our own institution. And it's really simple. It starts with the fact that we can combine several tools we already have. We understand from our guidelines that the risk for acute kidney injury is a combination of your susceptibility, meaning your resilience, and exposures that you have that are new in the hospital. So in other words, we well know that certain patients have more fragile kidney health, right? So you might have a chronic kidney disease, diabetes, or hypertension. These are the patients who we know carry vulnerability. So we can quantify that, and we have developed a little tool that in Epic can just pull those risk factors and tell us, hey, this is a vulnerable patient, this is a patient who has a high susceptibility.

Now if you combine that with certain exposures, we know that certain things that happen in hospitals are particularly harmful for the kidney. So I'll give you an example. The number one is low blood pressure. Another condition that is of high risk is sepsis. We know that sepsis is very, very much attuned to attack the kidney. Almost half of patients with sepsis will have AKI. Very important. Other patients are perioperative patients, patients who had a major surgery and also had hypotension in the operating room. The fourth group of patients will be patients who have had a severe bleeding defect. And the final group are drugs; there are several types of nephrotoxic drugs that particularly affect tubular cells of the kidney as an organ, and we need to be attuned to them. So by combining these factors, we can develop clinical tools that can identify patients at high risk of having AKI.

**Dr. Butler:**

Can you give the listeners at large some advice on how in various different clinical settings they can bridge some of these gaps in the management of these patients in a more proactive fashion?

**Dr. Bihorac:**

Absolutely. What we decided that was a simple act for us in the ICU is that for every patient that was coming in our ICU, we would start

this kidney health assessment protocol. So that is really simple. This little tool that I just described is made as a simple automated tool in Epic. It produces an alert that this is a high-risk patient. Maybe about half of our patients, about 50 percent of patients in the surgical ICU where I work, will end up having high clinical risk. Now that's a lot, right? So you have to ask yourself, should I really have a kind of protocol for all these patients, or can I filter them even more? Can I triage even more precisely? So for the next step, we turn now to biomarkers.

We really said this is a clinical-wide risk. About half of our patients are now superimposed on that clinical risk or biological risk by looking at the biomarker either in the urine or blood. There are several of them. We can now further narrow this group. So looking in our data and prospective validation of this in our ICU, we found out that among half of these patients with a high clinical risk, only half of them also had high biomarker value. So now we were able to cut in half the patients that we need to focus on. In other words, for us to implement certain protocols, you need to be both high clinical risk and high biomarker, double positive, right? These double-positive patients are patients you want to focus on. And that's a quarter of our ICU patients, and for them, we started something like kidney CPR. So we did like a very intense monitoring.

We would follow creatinine average of hours; we would start hourly urine output follow-up. We would adjust their antibiotics. We would do personalized blood pressure management, meaning we would want you to be within 20 percent of your reference blood pressure. So that was our CPR, and we wouldn't do any additional tests unless we see that you are not progressing and responding. So every two hours you appear, you repeat this, and what you want to see is decline. You don't want to see progression in creatinine upwards because if you start progressing, that will implicate that injury was really higher. And then you need to really start cutting antibiotics or simply understanding this is the group of patients where perhaps we can't do anymore at this point, but we need to be very attune to that so they don't progress to dialysis.

**Dr. Butler:**

So just to make sure I understand the construct that you're providing, the proactive management is not only sort of identifying patients at high risk or at the earlier stages of AKI, but that management protocols proactively can improve patient outcomes, correct?

**Dr. Bihorac:**

Absolutely. And we've seen that after we implemented the protocol. So I think a lot of this is paying attention and really understanding that often, as you know, in hospitalized patients, micro insults can lead to more permanent damage because not a single organ acts in isolation. You know, this is an orchestra. We have to conduct the symphony in a synchronized manner and help everyone have something to say, right? So the kidney is a very important organ because it regulates many homeostatic mechanisms in the body, including volume and blood pressure. So for that sense, it acts centrally. So I think personalized risk assessment, longitudinal risk assessment, and personalized therapy is what we need to be attuned to.

**Dr. Butler:**

Given all that we have learned from you regarding the burden and the consequences and the management of these patients in a proactive fashion, those with acute kidney injury, I really want to thank my guest, Dr. Azra Bihorac, for joining me in this discussion related to the management of these patients and risk-based proactive approaches. Dr. Bihorac, thank you so much for sharing all your expertise and knowledge related to this very important topic.

**Dr. Bihorac:**

Absolutely. Thank you so much for having me.

**Announcer:**

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