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## Managing AKI in ICU Trauma Patients: The Role of a Multidisciplinary Team

### 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:

Welcome to *Clinician's Roundtable* on ReachMD. I am Dr. Javed Butler, and joining me to share their expert perspectives on how we identify, monitor, and mitigate the risk of acute kidney injury in ICU trauma patients are Dr. Gates Colbert and Dr. Jim Januzzi. Dr. Colbert is an Assistant Clinical Professor at Texas A&M College of Medicine. He's also a practicing physician with the Kidney and Hypertension Associates of Dallas, located at Baylor University Medical Center. Dr. Colbert, it's great to have you with us today.

### Dr. Colbert:

Absolutely. Great to be here today.

### Dr. Butler:

And Dr. Januzzi is the Director of the Dennis and Maryland Berry Fellowship and Cardiology Research at the Massachusetts General Hospital and the Hutter Family Professor of Medicine at Harvard Medical School. Jim, thank you for joining us.

### Dr. Januzzi:

Yeah, Javed, great to be with you.

### Dr. Butler:

So, Jim, let me start with you. Can you tell us a little bit about the epidemiology of acute kidney injury and how it impacts patient outcomes in the ICU setting?

### Dr. Januzzi:

Acute kidney injury is something that we see in a broad range of patients in the ICU setting. It has such a varied list of causes. So as a consequence, when you look at the epidemiology, the numbers are somewhere to the effect that anywhere between 20 to 50 percent of patients admitted to an intensive care unit setting may develop acute kidney injury.

We do know that there are some patients that are much more likely to develop acute kidney injury. These include individuals who have sepsis or polytrauma. There are some patients that are less likely to develop acute kidney injury. These are individuals who are admitted to the ICU, for example, after an elective surgery where the overall picture is much more stable. What we do know, however, is that regardless of the inciting cause, once acute kidney injury occurs, the risk for major complications goes up dramatically.

### Dr. Butler:

Let me turn to you, Dr. Colbert. How do we identify the risk of acute kidney injury in these ICU trauma patients? Are there any emerging biomarkers? Can you give us some insights?

### Dr. Colbert:

Sure. So as Dr. Januzzi mentioned, these patients can be very complex, present in a whole host of ways, and have outcomes that surprise us, but also follow textbook. So you definitely need to make sure that you're individualizing the treatment and the care plan for each patient, no matter what their presentation is. And so when we look at specifically acute kidney injury, we kind of need to briefly discuss what have we used historically. So for decades and decades, we really only had three items: the BUN, the serum creatinine, and

then the urine outputs. And the urine outputs are probably the quickest factor that you may see as a change for a patient undergoing acute kidney injury. But the BUN and creatinine, unfortunately, are very delayed biomarkers. These can change two to four days after an episode of acute kidney injury or a temporary insult.

We can use some different blood and urine biomarkers that can be a little bit more specific and a lot earlier than BUN or creatinine. Some of these include cystatin C, which is only filtered at the glomerulus. It's a urinary test that can be detected within 24 hours of change of the glomerular filtration. We can look at different biomarkers that come from the nephron tubule. So KIM-1 can be elevated in the urine when you have acute tubular and necrosis as well as NGAL. This is another urinary biomarker that can help us determine if our nephron tubules are struggling or if there's an ischemia and tubular damage is occurring.

And then another biomarker that is a little bit more accessible is the TIMP-2/IGFBP7. This is a combination urinary check that can help us determine if patients are at risk for acute kidney injury, and we can draw this value. And if it's elevated, that will help us determine that an acute kidney injury may be occurring and really help us to determine how to best treat the patient before we would see traditional risk factors or BUN and creatinine going up. This is going to give us a lot sooner options for these patients.

**Dr. Butler:**

Can you tell us a little bit about the approach on how to monitor and manage these patients in the ICU setting then?

**Dr. Colbert:**

So we definitely want to be following the BUN and creatinine of these patients. But as we know, there's going to be a delay, and we are going to be missing time where we could intervene or stop any sort of factors that are causing acute kidney injury or, unfortunately, leading to a high possibility that acute kidney injury can occur. So those classic factors I definitely would pay attention to. And then I love looking at urine outputs. The urine outputs and the urine quantity and the quality of the urine can really tell us a lot about the health of the patient and the health of the kidneys.

We also want to be looking at the hemodynamics. One of the classic ways that our patients, especially in a trauma setting, get acute kidney injury is a drop in blood pressure or a drop in MAP maybe from a cardiogenic shock, a hemorrhagic shock, or later on if in an ICU state, maybe a septic shock. Anytime you have a drop in your MAP, you're decreasing your kidney perfusion. And then we also want to be thinking about could there be any medicines that would be nephrotoxic that can help people with perfect kidney function and perfect blood flow, but if they're at risk for acute kidney injury or if they have severe chronic kidney disease, they might not be a good candidate for certain medications and treatments.

**Dr. Butler:**

For those just tuning in, you are listening to *Clinician's Roundtable* on ReachMD. I'm Dr. Javed Butler, and today I'm joined by Drs. Gates Colbert and Jim Januzzi, who are sharing their perspectives on how we can manage the risk of acute kidney injury in our ICU trauma patients.

So Jim, in heart failure, we say it's a team sport and how a multidisciplinary team is really important to take care of these patients. Can you put that perspective on the management of these patients at risk for or with acute kidney injury in the ICU setting? What exactly is the role of a multidisciplinary team and who constitutes a multidisciplinary team?

**Dr. Januzzi:**

Presently, we have an intensivist largely as the quarterback, if you will, to use the sports analogy of the team. But we have nurse practitioners, PAs, and medical doctors. In the cardiac ICU, we will have a cardiologist involved as well with frequent involvement of our nephrology colleagues. There has even been a discussion around the concept of critical care nephrology as a specialty, particularly to the extent that our patients are increasingly medically complex and are more likely to require renal replacement therapy, such as continuous venous hemofiltration than they did in the past. Our patients are older, and the likelihood for transitioning to hemofiltration has become more and more common, right? And so having that competency as part of the team is increasingly discussed as part of the optimal composition of an ICU team. Really, when it comes down to it, Javed, it's who are you most likely to need and at the highest frequency. And to the extent that half of our patients in the ICU develop acute kidney injury, it speaks to having either very rapid accessibility to nephrology colleagues or even having someone from nephrology rounding with the team on a frequent basis.

**Dr. Butler:**

So that's great. Now you have led an intensive care unit setting at the Mass General for a long time. Can you share with us some best practices? Not what a multidisciplinary team looks like, which you just did, but how do you sort of get to that point of implementing that paradigm?

**Dr. Januzzi:**

The change over to a team-based approach in our intensive care unit was clearly a necessity. And I think regardless of the institution type, it's pretty clear now that having an intensivist as the center of the team is just critically important given the increasing medical complexity of the patients that we're seeing. How do you make it work? It's about having a well-organized team and understanding who's responsible for what different roles. It's important to keep your eye on the major complications that may occur in our patients. As Dr. Colbert said, we depend on kidney function markers to then adjudicate the presence of acute kidney injury.

Now people say, well, okay, you've identified injury, but what are you going to do about it? And Dr. Colbert already discussed having a structured protocol in place to withhold certain therapies that may not be appropriate for someone suffering the acute effects of acute kidney injury. I can't tell you how many times I've seen patients in the ICU go down for a high-volume contrast CT for one reason or another, and then a day later, we recognize that the creatinine was rising already. So, you know, there are things that we frequently do in the ICU setting that can be avoided to minimize or mitigate the severity of AKI.

**Dr. Butler:**

That's great. And that now makes me sort of think of another question, and maybe, Dr. Colbert, I can get your opinion on this. There are a lot of things in the ICU setting, ICU trauma patients or otherwise, which are pretty standardized and we follow them. So do you think that for acute kidney injury risk reduction, there is a need to standardize our practices, and how do we optimize their care from a protocol perspective?

**Dr. Colbert:**

Yeah, so absolutely there's a big need. As Dr. Januzzi mentioned, our patients are getting more complex; they're coming back to the ICU for their second and third rounds because they survived the first round, but they may be coming with a repeat problem or a secondary problem. And so these compounding problems that occur all lead to chronic organ damage, such as heart failure, chronic kidney disease, and acute kidney injury. And so we have a lot of standard protocols for all different issues in terms of ventilation management and ECMO coordination, and I think that acute kidney injury should definitely be a part of that. One thing that I've seen that's been successful in our ICU in Dallas, which I think is pretty standard around the country, is when you're doing a presentation of rounds, usually it's going to be a multidisciplinary group.

And on a lot of rounds, we may just be hearing about urine outputs and net volume status for 24 hours, but I really think that we need to dive deeper into describing what's going on. Maybe talking about how the urine output has looked in the last six hours and 12 hours; are we seeing a change in the actual volume per hour? Are we seeing labs that are worsening or potentially getting better? And at the same time, it'd be a great time for one of the team members to discuss that, "Hey, we're not seeing a creatine change yet, but is this patient high risk given the certain medication or certain treatment option that we're choosing? Is this maybe the best thing for a patient who has a high risk for acute kidney injury?" So I think that's a great way to try to capture these patients early because we're all about prevention. Acute kidney injury takes time for recovery, but if we can prevent it, that's going to be the best outcome possible.

And then, as I mentioned earlier in this presentation, we do have a lot of newer biomarkers that are available and under study and something we need to be considering. And so I think that we should advocate to our healthcare systems and our ICUs where we practice that we need to have access to these biomarkers. Just because it's available in research isn't going help my patient here in front of me. We need to have these resources and these tests and biomarkers available to us so that have the highest impact of preventing further injury and disease for our patients.

**Dr. Butler:**

Well, these are some really insightful comments and a great discussion. I would like to thank my guests, Drs. Gates Colbert and Jim Januzzi, for joining me to discuss how we can mitigate the risk of acute kidney injury and improve outcomes for trauma patients in the intensive care unit setting. Dr. Colbert, Dr. Januzzi, it was great having both of you in the program.

**Dr. Colbert:**

Yes, this has been a great discussion today.

**Dr. Januzzi:**

Absolutely. Thanks for having me, Javed.

**Announcer:**

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