What benchmarks should be used for measuring quality in CRRT

Sean Bagshaw, MD

Speaker 1:	00:00	All right. Our next speaker is a very distinguished Doctor or Professor Sean Bagshaw and he is going to discuss with us what benchmarks should be used for measuring quality in CRRT.
New Speaker:	00:14	Thanks very much Jorge. Yes, I'm an intensivist with some interest in acute kidney injury in renal replacement therapy. I think that's all you probably need to remember and I thought I will try to take pieces from the first two talks and sort of integrate them in here and I've taken a 20,000 foot view and then I'll end a little bit on perhaps some nuances around measurements that we could target in our ICU specifically. So, I don't have any specific disclosures these are my disclosures for the year, but I think the most important one is that I'm not necessarily an expert in quality improvement and quality assurance. So take everything I say with a grain of salt. I don't have a master's in,, quality improvement or patient safety, even though I've done all the IHI courses and what not.
Speaker 2:	01:04	So I don't consider myself a quality person. I don't have a quality leadership role per se. So something to keep in mind, but, that being said, by show of hands, how many people here have done formal training in quality improvement and patient safety. Okay. A few so of those, did you do like a master's degree in quips? Anyone? No. Did anyone just do it through the IHI quality courses that they took? All those courses? Yeah. Okay. I see a couple of nods what about, is there other regional sort of center specific quality courses that you know, you take in your own institutions? Is that how you're getting your exposure to quality? So it's within your organization that they organize a certificate or courses or things like that. Okay. So by a show of hands, who here has a leadership role in quality improvement in patient safety?
Speaker 2:	01:59	So that's interesting. Other than the speakers that's interesting. So there's only about three or four of you. So I assume that everyone is here in part because they've identified this as being an issue in their respective ICUs and or renal programs. But it's interesting to see that very few people have formal training in quality improvement or patient safety, nor do many people at all have leadership roles in that respect whatsoever. So something to keep in mind I'm just curious about that. So I'm going to take you right back to the beginning. What is quality? What is quality in healthcare? Well, the Institute of medicine

here in the US has defined it as the degree to which health care services for individuals and populations increase the likelihood of desired outcomes and are consistent with current professional knowledge. So it imbibe sort of the principles of quality of cost of value per se.

Speaker 2: 02:50 And really a lot of this work came from this man, and we do have one representative from the University of Michigan here. this is a Donabedian and really it's his landmark paper in 1966 published in the Milbank Quarterly called evaluating the quality of medical care. That really set a lot of this in motion. There was other work being done in quality before that. But really I think Donabedian's work translate into huge paradigm shift in how we evaluate healthcare. So he looked at a huge shift towards process evaluation and classified assessments, looking at structures, processes, and outcomes. And you heard, Theresa sort of mentioned that before. These might be the domains by which we evaluate the care that we provide. So he really promoted the importance of measurement of audits and other models to identify problems in the care we deliver, but also at the same time to inform our standards and ultimately to inform clinical practice guidelines.

Speaker 2: 03:54 So what our quality indicators, quality metrics, quality measures, those are all often used interchangeably. These really represent a method to measure, monitor, evaluate and communicate. That's important to communicate various aspects of the healthcare system for whether and for how often it does what it should. So the domains I mentioned before, our structural domains, process domains, outcome domains if you like. And really structure is about assessing the settings and the infrastructure you have. So if you have a CRRT program and you actually don't have any formal set of protocols or you only have one CRRT machine yet, you have eight patients a week requiring CRRT, I would say that you might have some structural indicators that you could utilize and perhaps improve your systems. Process indicators. Again, look at the steps followed to provide good care and outcomes are really outcomes that are important to patients or are experienced by patients, and the healthcare system, healthcare providers in general.

Speaker 2: 04:54 So if I was to think about, you know, what are the things we've learned in the first two lectures, and I sort of put it up here as this. I think understanding quality adds value in how we provide care at the bedside for patients and for our health system. But there's no question quality can always be improved. We're not perfect. I don't think any system exists in perfection. Measuring and knowing your own data is fundamental. If you don't know

your own data and your own institution, you don't know if you have a problem. There is unclear whether you actually have a process, a structure or an outcome that needs to be improved or modified. And then finally quality is informed by evidence and current best practice, but it's implemented locally. So what Theresa does, at Texas children's will not necessarily be applicable at the University of Michigan or at the University of Alberta in Canada or in the UK and I think it's important to recognize that there's a local culture and context that has to go into all the quality improvement and patient safety initiatives for example around AKI and CRRT that we initiate.

Speaker 2: 06:00 Some other high level sort of principles of of quality improvement in healthcare that I wanted to come to you is that QI is really the science of process management for QI in healthcare. If you can't measure it, you cannot improve it. So again, it has to be data driven. And Theresa really showed us a nice sort of outline dashboard if you like, of data and reporting around a number of different quality indicators that they've implemented in Cincinnati children's and presumably also with Texas children's. Managed care means managing the processes of care. This is important and not managing physicians, nurses or other healthcare professionals, so we don't need to be managed. We have to manage the process by which care is actually prescribed and delivered. Obviously the right data in the right format at the right time in the right hands is what we need to inform and improve quality in our healthcare delivery and engaging the smart cogs of the healthcare. So I think this is important because you as a quality improvement leader, let's say you all go away now with the interest in obtaining a master's and having a leadership position. If you don't engage the front-line professionals, it's unlikely that your QI programs will necessarily succeed because they're going to be the instrument by which it's implemented and disseminated.

Speaker 2: 07:14 Okay. Enough of my ranting. What's important to recognize is that it would seem trends in the literature suggest we are using more renal replacement therapy to care for critically ill patients in the last 10 or 15 years. There's been temporal trends both here in Canada as you can see the trend upwards there in the United Kingdom for sure. And also in the United States we've seen trends for greater utilization of renal replacement therapy to support patients either with acute kidney injury or multiorgan dysfunction in ICU settings. Juxtapose that with the idea that CRRT programs are reasonably complex. And Theresa put up a nice figure to this as well. I'm not going to reiterate it too much, but to say that if you put the patient at the center of this, you can understand how many stakeholders are involved in

		actually designing, maintaining, implementing a program around CRRT.
Speaker 2:	08:17	What I want to know as well by show of hands, and maybe I should just want some people to answer now, is what aspects of CRRT care do you measure? So we know what Theresa measures, right? But for the rest of you in your programs and your ICUs what do you measure? What do you track? Shout it out if you need to, but I'm curious to know who here. First and foremost we are measures, some of the indicators that have been mentioned today routinely on a weekly, monthly, quarterly basis in their ICUs by show of hands. So I would say that's less than 10% so what are some of the things that you measure? Filter changes, the number of changes, so filter lifespine and number of filters per patient treated. Okay. And the reasons for why the filter was changed. So yeah, expected versus unanticipated. Okay. I saw someone else there.
Speaker 3:	09:14	What's that? Measure that.
Speaker 2:	09:18	So you mentioned that with some patient demographics to try to understand, you know, if there's select subgroups of patients that are having higher failure rates of filters. Okay. Anything else?
Speaker 2:	09:30	catheter size, your miss measuring catheter size or is it specifically around catheter function?
Speaker 3:	09:36	Both. Okay. Any relation with unexpected changes or any others?
Speaker 2:	09:45	Well based on a lot of literature I would just ask, you know, is high quality CRRT Perhaps just if I asked these questions, do you know what your average lifespans are in your institution? Do you know what your average treatment downtimes are? In fact, if you have a treatment interruption, do you know how long it takes for you to get your CRRT back and running again?
Speaker 2:	10:05	What's your average delivered dose per day? It turns out there's actually some fairly good data on deliver dose in ICU settings. A few big randomized controlled trials, but do we know what we're delivering? What about your average fluid removal per day? Presumably CRRT you often prescribe or the clinician prescribing will prescribe a fluid balance core, a removal rate and ultrafiltration rate. Do we track what we do in a given day, whether we meet those goals or not? By show of hands, how many people say here, we routinely do this except for Theresa

because Theresa, blood, sweat, toil and tears every month that she spends 20 hours putting your data together. Okay. I would argue, I'd submit to you, and I think there's evidence in the room that we sell them routinely monitor and routinely report indicators of our CRRT programs. And it could be that there's a positive of evidence, informed standards for what we should be measuring and how is it best for us to measure it and move forward, although is changing that landscape as we speak.

Speaker 2: 11:10 But if you think about a quality management system, I think it should come from data. Don't forget our machines are a wealth of resource for data. We can get that data out of it. So in my institution, our machine data from our CRRT machines flows directly into our electronic health record and it's all displayed there over the course of 24 hours and can be extracted. How many people here have their devices connected to their clinical information systems? Not that many. So you would need car data to extract and manually put? So that's challenging. But our clinical information systems also give us lots of information around the CRRT programs that we may be using. Can certainly give us information on fluid balance. And certainly give us information on treatment downtime. But the bottom line is we need data. If you don't have data, you're not going to have a quality improvement program.

Speaker 2: 12:00 To the great extent, you'll have information in the form of quality indicators that we've talked about across these domains and that would ideally inform and provide knowledge for us to either guide our clinical decision support to design and implement continuous quality improvement initiatives and also benchmark our performance. Again, my talk was around benchmarks. I'm not sure I'm gonna be able to come up with clear benchmarks for you to target. And I think it sounds like that's pretty mature for many of us because we're not measuring much anyway. Right? So one of my fellows in Edmondson, Alexa Roa has sort of undertaken this as one of his master's projects, of which Theresa was a part of as well. And basically understanding what's the current landscape around continuous renal replacement therapy, quality indicators. Right. And he did a systematic review, some 150 papers.

Speaker 2: 12:51 He found 18 indicators and 283 instances. And he was trying to develop, conceptually come up with a toolbox of indicators that we could potentially implement that all sites could potentially use moving forward. So here you can see, we stratify them by structure, process, and outcome. And some of these are what you've heard are familiar with treatment interruptions, downtime delivered, dose clearance, filter lifespan, et cetera.

Some of these are are seemingly common sense. One of the challenges we had though was that no two studies seem to agree upon a definition for what a metric was. So if you wanted to call it filter lifespan. Well, three different studies had three different definitions for what filter lifespan was. And so there wasn't a common language, a common definition that could be used to translate these indicators, these performance standards across institutions. And I think Theresa touched on that as well.

Speaker 2: 13:43 So that was a challenge for us. No unified consensus driven definitions for what we should be measuring, how we should operationally define this. So Elixa, two years ago, some of you guys may have participated in this. He did a Delphi Panel here at the CRRT meeting of experts. from a variety of disciplines. Theresa, you were involved in that. Great. And, you know, ask them, okay, here's what we came up with in our systematic review. Are there any others that you guys can think of and which ones should we eliminate? Let's have high agreement on these. We went through three rounds and then we did an in-person round here and ultimately they came up with 13 indicators in the end. Small, I don't want you to take away from this, but 13 indicators with proposed definitions, operational definitions and proposed benchmarks potentially that could be implemented.

Speaker 2: 14:30 to some extent, in some particular units. Now I'm not going to go through each of these in detail, but some of them had to do with a standardized training programs for CRRT, qualified nurses or other healthcare professionals, right? process measures like filter lifespan, delivery dose fluid management, clearance, downtime, right? Adverse events as an outcome measure or bleeding complications or catheter dysfunction, et cetera. Transfusions. There was others in there as well. So I'd come back to this again. I think there is some, even though we may not have a broad evidence base on on how well they perform, there's some that you could probably implement immediately to get a sense about how you're performing in your own respective programs such as measuring filter lifespan, which some of you do. The number of filters, the downtime, the time to restart the delivered dose, the fluid ultrafiltration food removal, and there are others that Theresa had in her dashboard as well.

Speaker 2: 15:25 Some of these might be kid specific, others might be more specific to adults. Again, and recognize that some of this has to be implemented locally depending on your current paradigms. So if we're going to look at benchmarks, I have a couple of examples, right? We've talked about filter lifespan. If there's

any metric that people follow, this seems to be the one that's the most common. It's probably the lowest hanging fruit. The machine will tell you that, but so will your electronic health record. We've seen some data that citrate, translates into longer filter lifespans that CVVHD and HDF might as a mode might translate into longer filter lifespans and CVH. That's great. So we have data to support that. Are we tracking filter lifespan? So we can propose a definition, we can propose, you know, an operational definition specifically, and then we can actually define it as filtered lifespan.

Speaker 2: 16:15 The time that the filter lasts, right in hours per se. And we can propose a benchmark. Now this is just, this is Theresa's benchmark actually, right? All our filters, 60% of our filters should achieve 60 hours. Right? That might be ambitious to be honest with you. But again, it sounds ambitious, but if you don't know your own data, you don't even know where you're starting from. So again, benchmarks should be implemented locally. Maybe right now you get 10% of your filters are more than 60% that's where you start. If your benchmark is ultimately 60 all you want to see is an incremental change over time to suggest that you're making improvements in the delivery of your CRRT . Some interesting studies have shown that continuous is not continuous. I love this title of a paper, right? We recognize that patients are often have their therapy interrupted for a variety of reasons, sometimes scheduled, sometimes not, but treatment interruptions translate into a diminishment in the delivered dose over the course of 24 hours.

Speaker 2: 17:19 And it does translate into changes in serum creatinine and urea for those that have prolonged downtime relative to those that are relatively continuous. So what's interesting is if you look at this as a potential quality indicator, which I think is important, effective treatment time, this is a term that I think I may have come up with, so I apologize, but you could call it treatment downtime, whatever you like. but it's really based on time again, and effective treatment time could be, obviously perfect is 24 hours and we're not perfect . So you could say minus the downtime, right? What's a reasonable amount of downtime for patient that goes to the CT scanner and or that goes, has a treatment, that has a filter that fails or whatever. And we basically said you can propose a benchmark is 20 hours per day as long as they're being prescribed CRRT.

Speaker 2: 18:08 Again, you will need to be able to decide in your own institution what your own benchmarks should be. To some extent. We mentioned dose a little earlier. It didn't seem like many of us were actually monitoring and tracking what delivered dose we

provide. We know what our prescribed dose is in all likelihood, but we have no idea what we're delivering. Right. Particularly if you factor in treatment interruptions and downtime into that. but there's clear evidence around what dose is perhaps, aligned with current clinical practice guidelines we should be implementing. Right. So the renal trial looked at CRRT dosing of 40 mils per kilo per hour versus 25 showing really no difference in survival as a consequence or renal recovery. So the floor here should probably be around 25 unless there's other mitigating circumstances that you would need higher dose in the short term. And then of course the ATN trial did something similar as well in the CRRT arm anyway, or the CRRT treated patients 35 versus 20 so again, the floor, the minimum based on current best evidence to somewhere between 20 and 25 mils per kilo per hour delivered, right, delivered, not prescribed.

Speaker 2: 19:18 So you have to recognize that if you're not measuring what you deliver, it may be different, but a quality indicator could certainly be proposed around deliver dose, right time, average dose that's actually delivered to the patient over a 24 hour period relative to the prescribed dose. And you again can propose a benchmark. They say we should be at least 80, maybe it's 90, maybe it's 95% do you have one? I missed it. 95% right? There you go. Kids want to be perfect.

Speaker 2: 19:47 And you know, all of these, this is a figure that we took from ADQI 16 a long time ago. But it really sort of gets to the heart of how these quality indicators may fit into your CRRT program and help inform various aspects of it over time. Okay. Particularly ultimately translating into improved outcomes and improved quality of care for patients, value for the health system. and probably some degree of, efficiencies. So I think I'm almost done. So what are the next steps? Well, I would argue that you, you need to implement and evaluate the feasibility of selected QIs like this in your clinical practice and you need to understand your own data. You need to evaluate the association of these QIs with care processes and patient and health system related outcomes and know your culture, right? What are the barriers to implementing quality indicators and measures such as this and changes to how you provide CRRT in your own institutions that's own culture that may not be translatable across other institutions that will be unique to where you work. And then of course, evaluate your performance, generate CRRT quality reports, generate again, your own benchmarks. Right now there is another option too. You could participate in a registry. So, for instance, you could share your data and benchmark it against, you sort of national registries and there's one that's currently being developed that I

		can tell you about in some more detail later. But, you could compare against like wise institutions that deliver similar volumes to similar case mix and see how you're performing relative to those.
Speaker 2:	21:28	I put Theresa's up here now it's going to comment. This was just an error, right? Yes, that was obviously a high standard and she didn't achieve any of it, but it was an error. I saw one of the other slides that you presented, but you can present in a dashboard. One of the challenges with dashboards like this which are outstanding and can communicate and can show how you're performing as a unit, as an institution, is it can be time consuming to put together. And I think, you know, that's something that I think, Kanish touched on originally that if you start a QI project process related to this, more resources will come your way. Or you can ask for the resources that ultimately you save as a consequence of your QI program to invest in further initiatives related to this.
Speaker 2:	22:17	Of course there are industry sponsored, software programs that can help you understand your own metrics. So this is from Baxter and I think it's called share source and it's basically downloadable from your cards. It doesn't have any patients specific demographics or case mix, but it will give you some operational parameters around your CRRT for your patients. So that's something to consider as well. Okay. Final thoughts So multi-dimensional QIs are critical to guide the prescription delivery of high quality CRRT care, but it would appear that they'd been poorly characterized to date, although that's improving. QIs had been proposed focused on structure, process and outcomes of CRRT deliverables. But I think they require more data, more verification and we're starting to see some of that percolated into literature, Theresa's nice study from Cincinnati Children's in the last couple of months, select QIs could be implemented now, monitored, reported and benchmark within your own institution with your own culture, and we've listed some of those,, before already. And then finally, quality management systems should integrate CRRT machine and patient clinical information system data to benchmark your performance over time. So as we get increasingly automated, we have, clinical information systems, we need to make sure that there's no issues with interoperability and that our systems can communicate with one another such that your CRRT machines can just dump all that data into your CIs and generate reports for you. I believe that's all I had. This is my home in summer. It's not summer.
Speaker 3:	23:59	questions.

Speaker 2:	24:05	Can I just go back to sort of where you started at the beginning where you sort of asked about has everybody got QI qualification or a trainee and just being a little bit controversial, maybe we don't need one and surely from what we've seen today, we can all be doing simple QI, It should be part of everybody's role and if we insist on courses and qualifications and the sort of lingo, if you like, that actually can put people off. I think that's a great idea and thought as well it is probably advantageous within a given institution or a group that works together like an ICU to have some one or a group of people that have had some advanced training in quality improvement methodology and processes. becaus, some of the quality improvement, it sounds very simple in many respects and we start with four patients,
Speaker 2:	25:01	But to be honest, to do it in a rigorous fashion to implement the change and all the steps that can be associated with it, I think can be quite complex. And I think it became, be reassuring to have some local expertise. So if it's provided at an institutional level, great. but I think it's not uncommon now to have some people within a given institution and within my ICU, if I look at my intensivist group, I know at least two people have formal training in quality improvement, patient safety, at at amaster's level now. I think if you're going to take a leadership role in quality, unless you've been doing it for 10 or 15 years, you probably do need some credentialing. It's not to dissuade for people from participating in it. And again, we're all cogs in the system as one of my comments, right? So we should all be actively engaged and involved in quality improvement processes within our given institutions some expertise and be able to design and implement them is probably a value that would be my only controversial rebuttal.
Speaker 1:	26:03	So if we do our outcomes measurement, of this session, how many of you are, the majority did not participate in a quality assurance program in your institution. How many of you are convinced? Honestly, it doesn't need to be anything complicated that developing your quality assurance system of some sort would be appropriate. Raise your hands.
New Speaker:	26:30	Full disclosure, if you guys go to the IHI website, all the courses provided by the Institute of healthcare improvement are free. You can get a an entire quality certificate, almost like a masters to some extent, or at least a quality certificate. It's usually about 16 hours. If you did it, sat down and did it, it's probably what, 16 hours. But it goes through all the steps for quality improvement, patient safety, designing, implementing, disseminating, reporting, building leadership, all of that. It's all outlined in the

		IHI website. It's all free, and I'd highly recommend that to some extent. Sean, just like to kind of reiterate your message about benchmarking for each institution, because this may scare off, if you talk about 60% of patients,,filters stay more than 60 hours. If your institution, average lifespan of your filter is like 18 hours, you can go from point A to point B to point C. You can say that I want about 15% of our patients to have lifespan or filter more than 60 hours. Then you achieved it. Then you go to the next reiteration of the project. It doesn't need to happen. You can't make a system perfect overnight. It has to be a kind of a longitudinal project.
Speaker 2:	27:49	Excellent. Thanks very much.