Plenary lecture: New CRRT equipment and new features Salle M (Bozar) Thursday **15:10**

Claudio Ronco delivers plenary lecture on the future of CRRT

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conceivably serve as a bridge from a complex situation to one less severe, allowing different drugs to then exert their effects.

"We are even thinking about a sequential therapy: in the early phases, we tend to remove endotoxins; in the middle stage, we remove the mechanism and cytokines; and in the third phase, we may need to support organs and therefore replace kidney or liver function, or remove CO_2 in patients with impaired pulmonary exchange.

"This is a completely new area where intensive care and the critically ill patient can actually find very interesting responses to unmet clinical needs."

Addressing the growing importance of big data and artificial intelligence (AI) statistical techniques, Dr. Ronco highlighted the importance of interdisciplinary collaboration as the seed of innovation: "When you connect data from big data analysis – and you may use also AI to do that – what you need is the competence of specific areas that most of the time does not belong to a single specialist. So we need to merge the knowledge. We need to multiply our knowledge and to divide our ignorance.

"I'm a nephrologist but I'm working strictly with intensivists. But we should have also the competence of cardiologists, or pulmonologists, infectious diseases. I think the multidisciplinary team will be probably the best for the patient."

In a soon to be published editorial, Dr. Ronco describes his proposals for future developments in remote patient management techniques for extracorporeal therapies, encapsulated by the acronym GREEN: genetics, robotics, eco-sustainability, e-health and information communication technology, and nanotechnology.

"We always have one foot in the past, and one in the future."

Claudio Ronco

"Genetics is important because we will identify more closely the characteristics of the patient. One drug or one therapy that is useful for one patient may not be useful for another depending on his genotype. Robotics: we have an entire world to discover here and see how much mechanical actuators can operate. Eco-sustainability is very important, and we must produce solutions that are friendly to the planet, but at the same time useable and sustainable economically.

"E-health is the future because electronic information communication technology represents the future in medicine. Finally, nanotechnology will help us to miniaturize our devices, making them portable, sometimes wearable. There is also the potential that these development will be considered in light of developing specific fluids. Today, we are often speaking about nanofluids, which are specifically composed, or nanomaterials that have specific properties in (for example) extracorporeal therapy – the future is non-thrombogenic surfaces."

He concluded: "When we apply and look at the present, we always have one foot in the past, and one in the future. The foot in the past is why, today, we have consolidated and well-standardized therapies that yesterday represented the future. We are also experimenting with new therapies and proposing new studies, and we are applying experimental therapies to see whether we can have these therapies becoming the reality of tomorrow. We always move in a dynamic situation, where the past and the future are somehow mixed into a general approach to the patient."

Dr. Ronco delivers his plenary lecture today in Salle M (Bozar) from 15:10 to 15:30.

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Plenary lecture: Challenges to antibiotic stewardship 400 Hall Thursday **11:45–12:10**

We need custom-built antibiotic stewardship for the ED

Antibiotic stewardship has been relatively neglected in the emergency department (ED), says Dr. Michael Pulia, an assistant professor at the BerbeeWalsh Department of Emergency Medicine, Madison, WI, USA, who will be delivering a plenary lecture on the challenges of antibiotic stewardship today.

In an interview with *ISICEM News*, Dr. Pulia stressed that most antibiotic stewardship programs in the U.S. have focused on either inpatients or outpatients. "That still doesn't cover the ED. It is a unique work system that straddles the inpatient and outpatient settings," he said.

As Dr. Pulia noted, today approximately three quarters of patients in the US will be admitted to hospital via the ED, and with these admissions comes a reliance on large numbers of prescribed antibiotics. Despite this, stewardship in the ED is an area that is understudied. "In the ED, we are the ones handling the initial diagnosis, which very often dictates which antibiotics are prescribed downstream," said Dr. Pulia.

Five years ago, Dr. Pulia initiated an ED-specific antibiotic stewardship research program at the University of Wisconsin. He also serves as medical director for the ED antibiotic stewardship quality improvement program which was "one of the first started in the U.S. specific to emergency medicine."

Traditionally, antibiotic stewardship projects have been led by specialists from other settings, such as infectious diseases, as a form of outreach. But, said Dr. Pulia, it was important that his project was led from inside the ED by a doctor with an in-depth understanding of the way in which emergency medicine works. "We realized earlier on that the approaches and techniques that may work in an inpatient setting do not necessarily translate to the ED."

Indeed, Dr. Pulia said much of the existing research on antibiotic stewardship was borrowed from other departments and retrofitted for the ED, where it achieved only limited success. "There was a significant misunderstanding of the ED as a work system," he said. "You must have that frontline insight to really understand what the barriers and the problems are."

To tackle the problem with overprescription, Dr. Pulia has been working with systems engineers

to study how the ED works at close range. "You don't just observe and look at the processes, you talk to the frontline providers and understand their day-to-day jobs and why do they do certain things in certain ways," he explained. "As an emergency physician I thought I had a lot of insight, but when I studied the department within a more formalized framework I found I could better identify the ED specific barriers to appropriate antibiotic prescribing and work out targeted interventions."

As a result of this analysis, Dr. Pulia initiated research programs targeted at those areas where antibiotic overprescription happens most frequently, notably infections of the skin, soft tissue, urinary tract and respiratory tract.

Today many of his group's programs are testing how well targeted interventions work. For example, Dr. Pulia is conducting the largest clinical study to date using a heat-sensing camera to distinguish cellulitis from other nonbacterial skin conditions. The study came about after talking to physicians across the country to understand how they make decisions when prescribing for soft tissue and skin infections. "We found that often there would be diagnostic uncertainty," he said. "The physician would look at the infected, red leg, and if they thought there was even a remote possibility of cellulitis they would prescribe antibiotics. That's the message we heard over and over again."

The exploration continued following observations in the literature that cellulitis causes a significantly elevated temperature in the leg. "If you compare a leg infected with cellulitis to a normal leg, you should be able to see a substantial temperature gradient and that may help physicians decide when redness is related to cellulitis," he explained. "It's the largest study to examine thermal cameras for this condition."

Dr. Pulia's group has also been investigating at the use of procalcitonin in the ED to help distinguish viral from bacterial pneumonia.

"It's an interesting topic," he said. "A lot of research has established that it is quite effective in reducing antibiotic exposure for pneumonia and respiratory tract infections. It has been studied and used in Europe for a number of years."

Interestingly, a recent U.S. study on procalcitonin[1] did not reach the same conclusions as the European studies. But Dr. Pulia, whose response to the study was published in the *New England Journal of Medicine*[2], believes the study results were misleading, notably because many of the emergency physicians ignored the procalcitonin test when it displayed a negative result. "We know from all the other studies that when the test is negative you probably don't need to prescribe an antibiotic. But in most of the cases physicians prescribed an antibiotic anyway," he explained, adding: "Why didn't they listen to the test?"

What the procalcitonin debates do help to highlight is the impact of behavioral and implementation science – another vital component of antibiotic stewardship, and one which requires far more research according to Dr. Pulia. "There are groups working heavily on behavior modification to help improve physician compliance," he said. "We aren't just dealing with systems like a factory, we are dealing with people, and therefore we need to understand the behavioral motivators."

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>
> *Dr. Michael Pulia*

It's obviously a rich yet emerging research field, continued Dr. Pulia, with studies still limited to either one or just a few centers. "The trouble is we don't have a lot of large-scale implementation studies yet."

Dr. Pulia reasoned that the biggest impact on antibiotic stewardship will come when interventions currently being tested are able to be disseminated and implemented nationally. "If you achieve a reduction of 10 or 20% in antibiotic prescription – which is seen to be a success – you are cutting down on a huge number of prescriptions nationwide."

In the meantime, Dr. Pulia advises hospitals that their priority must be to implement their own antibiotic stewardship programs within EDs. And there are plenty of resources that can help, e.g. the MITIGATE Antimicrobial Stewardship Toolkit[3] which is a step by step guide to establishing an ED based stewardship program. "The ED is a very important setting for stewardship that has been under-recognized. It's challenging but it's not impossible," he said.

It's vital, too, to give staff the space and time to work specifically on stewardship. "You need to partner with the emergency physicians at your hospital and find someone who wants to be a champion for antibiotic stewardship within the department," said Dr. Pulia. "You need an inside person to get the buy-in and get the programs accepted. That's probably the most critical step for success in the ED."

Such champions will be able to keep abreast of all of the new interventions in the pipeline. "There's going to be a lot of papers, finally, in the literature on EDs," said Dr. Pulia. "And this research is better. It has not been adapted from other studies – but rather has been custom built and targeted to barriers specific to the emergency setting".

References

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3. https://qioprogram.org/sites/default/files/editors/141/MITIGATE_TOOLKIT_final_approved%281%29_508.pdf

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