During the Opening Session on Tuesday morning, ISICEM Co-chair Fabio S. Taccone began by relaying an interaction with the ChatGPT artificial intelligence (AI) chatbot, asking it why someone should attend ISICEM, and the answer was a very powerful message in line with how most of us could sum up the benefits of attending ISICEM in person. Starting by underlining ISICEM’s truly great potential as a platform to exchange knowledge, and as somewhere to get the best out of networking opportunities, professional development, and continuing education, it went on to say how we can embrace the chance to learn, connect, and grow, with expert guidance of the latest trends, planting the seeds vital to change, and finally reaching our life-saving goals.

“It took me around 50 minutes to understand what it was saying,” joked Dr. Taccone, “but I think it is a nice way to welcome you here to enjoy the meeting.”

Dr. Taccone ended his introduction by passing the podium over to the “big boss”. Jean-Louis Vincent, ISICEM Chair. “Now you are the boss! I am not the boss any longer, but I am doing my best to help,” began Professor Vincent. “It is a pleasure to see you all here; we would like to warmly welcome you.”

Amongst other notices about this year’s meeting, Professor Vincent spoke of the rise in practical sessions within the program. “Of course, we still have many standard presentations, but we have more challenges sessions, more demonstration sessions, etc...” he said, “and I would like to thank the scientific advisors for their excellent advice in preparation of this meeting.”

Professor Vincent also spoke of the rising number of participants since COVID-19 – a linear progression that gives reassurance that people are getting used to being back all together to attend meetings like ISICEM en masse. Of course, without industry support and the organizational team behind ISCIEM, the meeting would not be possible, thus he thanked all sponsors and background players for their continuing excellence and collaboration.

A key hot topic for this year, AI, was also discussed. “It is amazing to think what this meeting will look like five years from now, and how AI – or augmented intelligence – will help us progress from protocolized care ... to personalized care,” said Professor Vincent. Sepsis, intravenous fluids, and respirator management are just some of the areas that could really benefit from using personalized care, for example.

Crucially, there are several variables which need to be integrated in decision-making, thus AI may have the power to help ameliorate some of the pressure. “It is getting complex to put everything together!” said Professor Vincent.

“...in the future, we will have automated measurements, we will have probes on the patient’s chest, we will continuously monitor, we will have ultrasound on the skin – allowing us to monitor patients non-invasively – and even look at the effects of fluid challenge non-invasively.”

He added: “These systems will help us integrate variables, predict catastrophes, and allow us to manage patients optimally.”
Antimicrobial resistance goes beyond the individual patient

An exploration of the real threat from antimicrobial resistance (AMR) will be discussed today by Liesbet De Bus, an intensivist at Ghent University Hospital, Belgium, with a special interest in infections, especially in the critically ill patients she treats. Antimicrobial stewardship was the topic of her PhD. “The majority of our patients admitted to the ICU are exposed to antimicrobial agents,” she said in conversation with ISICEM News. Professor De Bus will highlight the far-reaching impact and consequences of AMR. A recent Lancet study, for example, estimated that there were 4.95 million deaths associated with AMR in 2019, with six leading pathogens associated with resistance (Escherichia coli, Staphylococcus aureus, Klebsiella pneumoniae, Pseudomonas aeruginosa, Acinetobacter baumannii, and Stenotrophomonas maltophilia).

Importantly, clinicians may not fully appreciate the real impact of AMR. “This threat of antimicrobial resistance goes further than the fact that we once in a while will lose a patient from antimicrobial resistance,” she said. “It could threaten some of the advances that we have made in modern medicine, for instance in hematology, oncology, or transplant patients.”

“Take patients who are treated with chemotherapy that develop neutropenic fever. If we don’t use the correct antimicrobials, they have a high chance of dying. Sometimes when we are prescribing agents to our currently ill patients, we underestimate the fact that we are threatening the future treatments of other patients.”

Human healthcare is, however, not the only area we need to invest in when we are talking about correct antimicrobial use. For example, the impact of antimicrobial resistance from within the agriculture or animal world is sometimes little acknowledged and less well-known by clinicians. “Multi-drug resistance is now present in our environment – it is in our food, it is everywhere,” stressed Professor De Bus. A One Health approach where many sectors work together to tackle the problem of AMR is required. Importantly, Professor De Bus will be relaying some of the strategies to combat AMR. Stewardship, she says, is the most important, however she will highlight myths around how well some strategies work. Take de-escalation, for example. “This strategy is often promoted in antimicrobial stewardship, because it allows for example. “This strategy is often promoted in antimicrobial stewardship, because it allows you to have early appropriate empirical therapy, but also aims to reduce the amount of broad-spectrum therapy that you use by narrowing the spectrum in a second phase.” However, investigations have carried out as part of the DIANA study revealed that de-escalation is only performed in a limited number of critically ill patients, although the use of broad-spectrum antimicrobial agents was extremely high in the studied population. In addition, up until now there is no solid evidence that the practice of antimicrobial de-escalation leads to a reduction in the emergence of multidrug resistance.

“It’s not really evidence-based,” noted Professor De Bus. “Don’t get me wrong however, despite the lack of solid data, antimicrobial de-escalation remains recommended whenever possible to reduce antimicrobial exposure.

“De-escalation may not be considered as a free pass to use broad spectrum agents in an injudicious manner. It’s not really evidence-based?”

“De-escalation may not be considered as a free pass to use broad spectrum agents in an injudicious manner.”

De-escalation may not be considered as a free pass to use broad spectrum agents in an injudicious manner. As a free pass to use broad spectrum agents in an injudicious manner.

The lack of evidence is around just what is the exact spectrum of activity these antimicrobials have. Most evidence comes from in vitro studies, and very little data exists in vivo, said Professor De Bus. “Over the last few decades, we have learned more and more about microbiota,” she said. “We do know what an antimicrobial treatment does to a pathogen in vitro, but what does it exactly do to our whole ecology, our whole microbiota? We just don’t know yet.”

Professor De Bus also believes it’s a mistake for physicians to assume new antimicrobial agents are being developed that can replace those agents that are no longer useful in these difficult-to-treat resistant pathogens. “Sometimes we are too confident that new agents will come and save us from the problem of multidrug resistance,” she said. “But then you see how many pharmaceutical companies are now having problems with developing these new agents, some companies have even filed for bankruptcy while developing these agents.”

“Stewardship and research remain the most important strategies to make sure that we use antimicrobials in the most appropriate way.”

LIESBET DE BUS
Indeed, she adds, pharmaceutical companies have turned away from antimicrobial development process because it’s just not financially viable.

There has been quite a lot of misunderstanding around drug resistance around the world too, continued Professor De Bus. For example, there is an assumption that AMR means the kind of pernicious carbapenem resistance prevalent within parts of Europe and Asia. But in many other parts of the world, deaths are not necessarily the result of extensively drug-resistant pathogens, but pathogens that are resistant to second- or third-line antibiotic agents. In fact, AMR disproportionately affects poor individuals who have little access to more expensive second-line antibiotics that are readily available in high-income countries. Patients simply can’t afford to buy them, or the agents are not available in the country they live in. Cephalosporin resistance is just one example in sub-Saharan Africa. “We focus on extensive drug-resistant and pan drug-resistant pathogens, and fancy new agents to treat them, but in low-income countries new agents are not the solution – the problem here is in the lack of resources,” she said.

Going forward, Professor De Bus said the effect of individual antimicrobial agents on the emergence of AMR in specific patient populations and settings must be better understood in order to come up with solutions. Alternatives to our antimicrobials are equally important to investigate; not just vaccines – but phage therapy, probiotic therapy, and fecal microbiota transplants. “So maybe we have to find more solutions in that area, to restore the microbiota, instead of destroying the microbiota with antimicrobial agents,” she added.

“You must acknowledge that although our understanding has expanded considerably over the last decades, it is still limited,” she said. “In my opinion, we have to invest in actions that simply avoid the overuse of antimicrobials, for example rapid diagnostics, and non-antimicrobial strategies to treat infections.”

In closing, Professor De Bus said prescribing antimicrobials is not just about the individual patient. “Consequences reach far beyond the medical condition of this individual patient, so we need to put AMR on the top of priority list,” she said. “Stewardship and research remain the most important strategies to make sure that we use antimicrobials in the most appropriate way, and start taking care of our future patients right now.”

References

Prepare today for an AI future

“M y Tesla nearly killed me, but it also later saved me.” These were the opening words of Vincent X. Liu, an intensivist and research scientist at the Kaiser Permanente Northern California Division of Research (CA, USA), who – speaking to ISICEM News – offered an object lesson in how interactions between artificial intelligence (AI) and humans will require foresight, training, experience, and more reliable handoffs.

Professor Liu, who oversees the implementation of real-time predictive models for the health system that are designed to improve outcomes among patients, will give a positive yet cautious take on AI this morning at ISICEM. Those in attendance may also hear a little more about his Tesla story, too.

“The future is bright, because of the breath-taking pace of change in the field of AI today,” said Professor Liu. ChatGPT is perhaps the most recent high-profile display of AI’s capabilities available in the public sphere; he went on, but it is only the tip of the iceberg in terms of emerging AI applications that will impact the way we live, and the way we use healthcare. “We are in only the very earliest stages of a revolution that will alter our lives, and societies, with a lot of potential for good, and improved efficiency.”

“Nonetheless, the future is bright as we learn to effectively and safely harness the power of AI to improve our healthcare delivery.”

Professor Liu will focus on a case example of ChatGPT. “Again, it is only one example – albeit, a high profile example – of the power of AI to unlock new insights, and even to generate new types of learning,” he said. “Even at this early stage, it may already prove to be the most wrapped into one. That being said, we just don’t know yet.”

“Prepare today for an AI future”

Vincent X. Liu

“We do know what an antimicrobial treatment does to a pathogen in vitro, but what does it exactly do to our whole ecology, our whole microbiota? We just don’t know yet.”

Liesbet De Bus

References
In terms of being cautious, Professor Liu said he will address the multiple sources from which bias can arise in AI applications. “It can arise because the data upon which its learning is built is not representative of the current setting,” he said. Bias, similarly, can also arise because the data upon which models are built contain evidence of existing biases. “We’ve seen that in applications of AI that propagate existing discriminatory patterns, like in the judicial system. Because models are built using the broad patterns across a large population, the performance of models within important subgroups can also exhibit bias.”

Finally, the application of an AI tool in care at the bedside can also propagate unfair patterns. “What critical work over the past several years has taught us is that bias is common even in some of the basic clinical tools we use every day (e.g., creatinine values, pulse oximeters),” said Professor Liu. “Thus, as AI practitioners or users, we must develop standardized tools to measure and assess that bias. Where possible, we should then use algorithmic approaches to de-bias these tools. Finally, we will have to make choices about how to use these tools in the fairest way, recognizing that some of this will involve trade-offs that favor one or another aspect of equity and fairness.”

“Where every good application of AI, there will be those instances in which it will result in dramatic and unintended consequences, and even those when it is deployed for nefarious purposes.”

VINCENT X. LIU

We don’t have all the answers, he added, but we know that we have to examine our tools for potential bias and work to mitigate it, he said.

For Professor Liu, the change in AI capabilities is profound and revolutionary, but also inevitable. “There is no longer a question that it will reshape our practice, our lives, and our societies, but a matter of how unprepared we will be when it occurs,” he said. “Thus, we must begin to train our physicians and colleagues in a future in which AI is ambient and pervasive, to use it effectively to augment our care.

“We should also begin to train ourselves to recognize when AI is leading us down a dangerous path, and how we assert control over its recommendations. In five years, the toolsets we have at our fingertips will already be dramatically different – are we preparing ourselves to master these capabilities, or will we be mastered by them?”

References

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EU-HYPROTECT shows reduced time in hypotension using HPI™ software

"Median time-weighted average MAP was very low when using this HPI™ software, and as such, the software may help reduce the duration and severity of intraoperative hypotension."

BERND SAUGEL

Time spent in hypotension was very low in patients being monitored with Acumen™ Hypotension Prediction Index (HPI™) software (Edwards Lifesciences, Irvine, CA, USA), according to results of the EU-HYPROTECT™ multicenter registry study on intraoperative hypotension during non-cardiac surgery.

This message was delivered yesterday at ISICEM during a session which addressed the management of hemodynamic instability in critically ill and surgical patients. Leading specialists in intensive care medicine and anesthesiology discussed the integration of the Acumen HPI™ software into the management of tissue oxygenation and hemodynamic instability, as well as the first results of EU-HYPROTECT.

Bernd Saugel, from University Clinic Hamburg-Eppendorf, Hamburg, Germany, presented findings from three studies, including EU-HYPROTECT, looking into the incidence, duration and severity of intraoperative hypotension.

The European, multicenter EU-HYPROTECT trial involved 749 patients undergoing major non-cardiac surgery under general anesthesia that was expected to last at least 120 minutes. Monitoring of intraarterial blood pressure was conducted using Acumen HPI™ software, and the primary endpoint was the median time-weighted average mean arterial pressure (MAP) below the threshold of 65 mmHg.

"A key strength of this observational registry study was its large sample size, and the fact that it collected real-world evidence," highlighted Professor Saugel. "However, it is an observational study, not a randomized controlled trial."

"From this study, we can conclude that the median time-weighted average MAP was very low when using this HPI™ software, and as such, the software may help reduce the duration and severity of intraoperative hypotension. All of this justifies that we now go on and perform large, randomized trials with this software."

The median time-weighted average MAP <65 mmHg (the primary endpoint) was 0.03 mmHg (0.0–0.2 mmHg). The median number of ≥1-minute-episodes of a MAP <65 mmHg was 1 (min. 0, max. 3), and patients spent a median of 2 (0, 9) minutes below 65 mmHg, he reported.

The Acumen HPI™ provides predictive analytics in anesthesia, and was developed using artificial intelligence – specifically machine learning – to predict hypotension from blood pressure waveform features.

Professor Saugel also reviewed the AWAKE trial that showed continuous intraarterial monitoring reduced hypotension during the induction of general anesthesia in non-cardiac surgery patients compared with intermittent oscillometric monitoring. "We concluded that in patients for whom an arterial catheter is planned, clinicians should consider inserting the arterial catheter before, rather than after, induction of anesthetic."
The third trial that he referred to was the DETECT trial, conducted in non-cardiac surgery patients randomized to either continuous finger-cuff or intermittent oscillometric monitoring during anesthetic induction, and surgery. Compared with intermittent monitoring, continuous finger-cuff monitoring reduced hypotension during both stages.

Discussing the use of near infrared spectroscopy (NIRS) for the assessment of cerebral autoregulation in critically ill patients was Chiara Robba, Consultant in Neuro and General Intensive Care at Policlinico San Martino, Genova, Italy.

“The hemodynamic status and management of patients should be targeted not only on their systemic needs, i.e., peripheral organ perfusion, but also (and especially) on the brain, which is the final target of all our treatments,” she said. “NIRS is a non-invasive method which is able to assess cerebral autoregulation and to calculate the optimal arterial blood pressure in order to optimize cerebral blood flow.”

Referring to findings from key studies, Professor Robba explained that the correlation between changes in arterial blood pressure and cerebral oxygenation is calculated as an index, called TOx. “TOx quantifies the autoregulatory capacity of the brain,” she explained. “When TOx is negative, it means that cerebral autoregulation is preserved. If positive, it means that it is impaired.”

Monitoring tissue oximetry helps clinicians understand the relationship between systemic oxygenation and its effects on the brain, she noted, adding that the use of general targets to optimize systemic haemodynamics may not be sufficient for the brain. “Using TOx can help us to target the appropriate blood pressure to optimize cerebral blood flow.”

Alexander Vlaar, Intensive Care Medical Specialist, Amsterdam UMC University, the Netherlands, opened the session with a talk on the prevalence and associated risks of hypotension in the intensive care unit.

“Hypotension has a high prevalence, and is associated with acute kidney injury, myocardial injury, and even mortality,” he said.

Hypotension has a high prevalence, and is associated with acute kidney injury, myocardial injury, and even mortality,” ALEXANDER VLAAR

Professor Vlaar has also checked the software’s validity in the intensive care unit with success. He has just completed the Hypotension Prediction (HYPE) 2 trial with these data, which will be published soon.

References

For more information, please visit: https://www.edwards.com/gb/devices/hemodynamic-monitoring. PP—EU-5928 v1.0
Towards personalization in organ failure management  400 Hall Thursday  08:30

Towards personalization in organ failure management

Ways to personalize the management of traumatic brain injury (TBI) will be discussed tomorrow by David K. Menon, head of the Division of Anesthesia at the University of Cambridge, UK. As well as establishing the Cambridge Neurosciences Critical Care Unit and Cambridge Acute Brain Injury group, he has been a driving force behind the International Traumatic Brain Injury Research Initiative, and was joint coordinator of the CENTER-TBI, a large European project that aims to improve the care for patients with TBI, which finished last year. The goal was to try and find ways of matching patients to treatments better. "The problem with brain injury is that we’ve had very crude ways of classifying it," Professor Menon told ISICEM News. "When people are conscious, we call it mild TBI, when they’re deeply comatose it is severe TBI, and moderate is in between the two."

However, this is a very inexact classification, said Professor Menon. "Patients who have severe TBI can sometimes recover fairly well, and conversely, some of the patients with mild TBI may continue to have problems, and develop both neurological and non-neurological complications," he explained.

Finally, there are no mechanisms by which physicians can match treatments to patients. "All of our current treatments are very physiologically based – and very crude measures used to titrate and select therapies," noted Professor Menon.

Tomorrow he will first touch upon prognostic precision as one way to better classify patients. "Age, level of consciousness, and whether the pupils are reacting or not only accounts for about 35% of the variance in outcome in TBI," explained Professor Menon. MRIs or blood biomarkers that are emerging might also improve the precision of prognosis. "Other markers, such as the cytokines in blood, or genetics, could predict better how patients might respond, or what their outcome is likely to be," he said. "A study we did last year indicates that maybe a fifth or so of the outcome is genetically predictable."

This kind of information can open up further research possibilities, he added, as once it is known what genes are involved, and if those genes are influencing outcomes, they also become targets for new mechanistic therapies.

Secondly, Professor Menon proposes multimodality monitoring. Delving deeper, he stressed that while there is whole range of existing therapies – from simple sedation and putting someone on a mechanical ventilator, to decompressive craniotomy and barbiturate coma for those people with very severe rises in intracranial pressure – in between, when the pressures are okay, it is not known whether there are other ways of titrating therapy. "What if monitoring brain tissue oxygenation or brain chemistry from brain microdialysis could help better titrate therapies?" he said.

"Perhaps we can avoid the hazards of some of the more dangerous therapies," he went on, adding that in other patients, where the biochemistry in the brain is not right, even when the pressures are not particularly high, it might be possible to escalate treatments to prevent damage.

Multimodality monitoring has so far been driven by what the literature has suggested in terms of associations between outcome and those monitored variables, said Professor Menon: "So, for example, we know that an intracranial pressure of somewhere between 20 and 22 mmHg is the threshold for an association with worse outcome." Other parameters also have thresholds for association with mortality or functional outcome, such as levels of brain tissue oxygenation and brain glucose, which help decide when to pursue more extreme treatments. "Multimodality monitoring ensures we're using dangerous treatments only when they are warranted," he said.

Thirdly, continued Professor Menon, is to deploy multimodality monitoring and prognostic precision in combination with advanced neuroimaging using MRI and positron emission tomography (PET) to identify and test new mechanistically based treatments.

Three classes of mechanistic treatments are currently of great interest to TBI researchers. The first deals with energy failure – i.e., hypoxia in the brain, causing cell death. "We understand it’s not just pushing the blood pressure, there are other mechanisms involved," he said. Blood glucose levels, mitochondrial dysfunction and increasing interest in other fuels are being investigated. "Lactate, for example, is seen as a byproduct of the metabolism when there isn’t enough oxygen," he explained.

The second class is neuroinflammation, a rapidly emerging field. "We know that there’s inflammation in the brain both from experimental models and also from bedside studies that we’ve done with microdialysis and PET scanning," he said.

The good news is that pharmaceutical industry already has a whole range of anti-inflammatory therapies that can be tested. "COVID-19 has shown us that many anti-inflammatory therapies we were worried about using in our patients are actually beneficial," he said, with tocilizumab being one example. "There is now a case now for trialing these therapies, but only in those patients in whom the inflammation is going away at breakneck speed," he said.

Third is neurodegeneration. Physicians have known for a long time that patients who have TBI have an increased risk of accelerated neurodegeneration such as Alzheimer’s, Parkinson’s, and other diseases. "But what we’ve also shown using PET scanning is that those abnormal proteins
David K. Menon

are deposited in the brain within hours to days after brain injury," said Professor Menon. "So, finding those patients with increased proteins in the brain early one might be very important."

Interestingly too, Alzheimer’s disease literature has revealed a range of blood biomarkers that seem to correlate very well with deposits of these proteins in the brain. "We can start using those biomarkers to try and identify which patients are most likely to have these deposits," explained Professor Menon. "The first step will be to show that the biomarkers are associated with a worse outcome."

Therapies identified for Alzheimer’s disease and other similar processes might be tested too, using them in patients at the early stage to see whether they make a difference.

"Multimodality monitoring ensures we’re using dangerous treatments only when they are warranted."

"Multimodality monitoring ensures we’re using dangerous treatments only when they are warranted."

David K. Menon

All told, prognostic precision by adding biomarkers, advanced neuroimaging and genetics, titrating treatments using multimodality bedside monitoring, and better matching patients to therapies could be transformative. Together they provide a foundation to detect and characterize mechanisms that could be translated into effective therapeutic interventions. "But we have to find better ways of doing trials," stressed Professor Menon, who has seen many pharmaceutical companies pull out of research in recent years.

Identifying patients for trials, enriching the cohort, and determining endpoints that can be tracked using bedside monitoring and advanced neuroimaging will help. Several platforms are being set up to do just that across the world. For example, the consortium behind Professor Menon’s CENTER-TBI is proposing a platform for trials of TBI among a plethora of other proposed studies. "It’s an exciting time," he concluded.

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Validating blood culture machine learning: a lesson in AI

Machine learning as a tool to prevent unnecessary blood cultures will be discussed by W. Joost Wiersinga, chair of the Division of Infectious Diseases at the Department of Internal Medicine and the Center for Experimental Molecular Medicine at Amsterdam UMC. Professor Wiersinga, who also contributes to the international Surviving Sepsis Campaign Guidelines on how to treat sepsis patients, combines research with patient care, particularly those with sepsis.

In conversation with ISICEM News, Professor Wiersinga emphasized the potential of the machine-learning tool in improving blood culture practices. Specifically, it may help step away from the routine of taking blood cultures for almost everyone who comes into the emergency room with a fever. “Sometimes you get an exact diagnosis that you can treat specifically, but perhaps we have been a little bit ‘too good’ with our protocols for all patients coming to the emergency room sick, because there is also a large detrimental effect,” he said.

The problem is the sheer volume of false-positive or contaminated results, noted Professor Wiersinga. Various studies over the past three decades have consistently indicated that unnecessary blood culture testing can potentially cause harm, he added. Not only are resources such as microbiological and radiological testing being wasted, but there are prolonged hospital stays, and unnecessary antibiotic treatments. It is estimated that unnecessary antibiotics are given up to 40% of patients with contaminated blood cultures, increasing the risk of adverse events, and raising the chance to develop antibiotic resistance. “It’s a really big, big problem,” he said. “You find bacteria, but you don’t know if it’s really causing a problem, or if it’s a contaminant.”

Professor Wiersinga will be talking about the machine-learning protocol designed in his hospital to reduce the number of blood cultures, based on a large database of patients entering the emergency room at Amsterdam UMC. “We can now use simple lab characteristics to predict which patients have a higher chance of a positive blood culture,” he said. “That could diminish blood cultures being drawn, which is extremely cost effective, and better for patients.”

Professor Wiersinga emphasized that in sepsis patients, there is no discussion – a blood culture should always be performed. “However, you don’t have to do it for every patient who comes into the emergency room sick or with a fever, and the tool gives us the chance for better selection. This is what we call diagnostic stewardship – already a hot topic in the emergency department – but it is about optimization of diagnostic tools.”

The next step is to test whether this machine-learning tool translates into accurate diagnoses. “We will see if the algorithm leads to safer treatment of patients, cost savings, and hopefully fewer side effects due to contaminated blood cultures,” he commented, adding that validation tests must be always performed before the algorithm is used more widely. “It is important to always validate in your own center, because test characteristics in other regions and hospital settings might be a little different.”

Artificial intelligence (AI) tools already exist and already impact sepsis care, continued Professor Wiersinga, but it’s important to remember that up to now, no large-scale evidence at the level of a randomized controlled trial has demonstrated the clinical benefits of AI-based alerts for patients with sepsis. That is why the plan is to prospectively test the algorithm in multiple sites in the Netherlands. The principal investigators of the new prospective trial include a PhD student, Michiel Schinkel, and Prabath Nanayakkara, head of acute internal medicine at Amsterdam UMC.

The danger of not validating algorithms is that machine learning tools with, say, sepsis alerts may end up triggering the unnecessary use of antibiotics too. Professor Wiersinga mentioned a particularly high-profile example, the Epic Sepsis Model (ESM), an algorithm for detecting sepsis implemented and utilized by hundreds of hospitals, using an algorithm based on thousands of US patients. “It uses their characteristics, including clinical characteristics, to predict which patients would develop sepsis, and then you get an alert,” he said. Later attempts to validate ESM by others found that ESM had poor discrimination and calibration. Without prospective randomized trials, users are blind, therefore. “We can’t really see if there’s
“We will see if the algorithm leads to safer treatment of patients, cost savings, and hopefully fewer side effects due to contaminated blood cultures.”

JOOST WIERSINGA

been a real benefit in care,” added Professor Wiersinga. “So, we should sound a word of caution for these new algorithms.”

The proprietary nature of many AI tools can make independent validation particularly challenging. “Caution should be exercised when using early sepsis detection tools,” said Professor Wiersinga, “because sometimes it’s a black box that is not published, and you don’t know what the algorithm is.” For that very reason, the basic algorithm Professor Wiersinga’s group is working on has already been published.

In conclusion, Professor Wiersinga underlined how important it is to be wary of tools that are untested. “There is a lot of hype around machine learning in healthcare and also sepsis, and lessons need to be learned,” he said. However, he hopes the new blood culture machine learning tool, when validated, will truly translate into more accurate diagnoses. “I think we can be a little bit smarter, in order to become more cost effective,” he concluded.

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**CHAIR:**
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Should Extracorporeal Blood Purification be Considered?

**Rinaldo Bellomo**
Melbourne, Australia

**Wednesday, March 22nd**
12:30-13:30 CET | ARC room

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**CHAIR:**
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Nutrition Support Optimization in the ICU: The Role of Parenteral Nutrition and Indirect Calorimetry.

**Pierre Singer**
Tel Aviv, Israel

Fluid Choice: What is the (New) Evidence?

**Manu Malbrain**
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