The official daily newsletter of the 34th ISICEM

Friday 21 March 2014 Day 4

The final day of ISICEM 2014 boasts another packed program to send us home brimming with honed expertise and new ideas. At the symposium’s close, more than 200 top experts will have spoken on the most recent and clinically relevant developments in research, therapy and management of the critically ill.

Today’s sessions continue to provide the state of the art coverage of topics such as therapeutic hypothermia, transfusion, neurological emergencies, and enteral nutrition.

On top of all this, informal teaching tutorials, Round Tables and Pro/Con debates will provide open dialogue on the practicalities of plasmapheresis, necrotizing soft tissue infections, and much more besides.

We hope you’ll enjoy this last day, and we look forward to seeing you next year!

The opening session of ISICEM on Tuesday morning featured results from the Protocolized Care for Early Septic Shock (ProCESS) trial, presented simultaneously with online publication of the results in the New England Journal of Medicine.¹

Delivering the results was ProCESS investigator Derek C Angus (University of Pittsburgh, PA, USA) who began by setting up the impetus for the trial: “I don’t think there needs to be that much background or preamble for this audience about why we’re interested in early goal-directed therapy (EGDT),” he said. “There was a landmark trial back in 2001 by Emanuel Rivers that has gone on to be one of the most cited papers ever in our field.”

The single center, randomized 263-patient Rivers study protocolized EGDT versus usual care in sepsis.²

As described in the ProCESS paper, the EGDT specification in the Rivers study used ‘aggressive’ and ‘timely’ treatment using central venous catheterization to monitor central venous pressure and central venous oxygen saturation (ScvO₂), which were used to guide the use of intravenous fluids, vasopressors, packed red-cell transfusions, and dobutamine in order to achieve prespecified physiological targets.¹

“This study had a huge impact around the world, with hundreds if not thousands of hospitals adopting some or all of this protocol,” said Dr Angus. That being said, a decade on since Rivers, changes in sepsis management during that time have meant that questions abound as to the necessity of some of the elements of the protocol.

Thus ProCESS was born to investigate this aspect, pitching protocolized care versus usual care, asking specific...
ProCESSing new results in early goal-directed therapy of sepsis

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cally whether central hemodynamic monitoring to guide the use of fluids, vasopressors, blood transfusions, and dobutamine was superior to a simpler protocol that did not include these elements.

“We had two sequential primary hypotheses,” continued Dr Angus. “The first was simply to ask is protocol-based care superior to usual care?” Second, he said, was whether EGDT was superior to protocol-based ‘standard’ therapy, which does not include central venous pressure and oxygen monitoring, or instruction to give blood or dobutamine.

Patient enrollment took place from March 2008 to May 2013, incorporating 31 tertiary US centers. For inclusion, each center had to: have over 40,000 emergency department visits per year; consider lactate screening for cyclic shock as standard of care; endorse general principles of the Surviving Sepsis Campaign (SSC) guidelines; be capable of providing all requirements for study protocols. Exclusion criteria included formal sepsis resuscitation protocols, and routine use of oximetric central venous catheters in the emergency department.

“The patient inclusion criteria were essentially identical to the Rivers trial,” said Dr Angus. These included adult age, suspected infection (physician diagnosed), ≥ 2 SIRS criteria, refractory hypotension or serum lactate ≥ 4 mmol/L, and they had to be randomized while still in the emergency department (within 12 hours of arrival, and two hours of meeting shock criteria).

Patient exclusion criteria included a primary diagnosis that was not septic shock, requirement of immediate surgery, a known CD4 count < 50/mm3, limit-care orders, hospital transfer and pregnancy.

“The protocols themselves we felt was not septic shock, requirement of immediate surgery, a known CD4 count < 50/mm3, limit-care orders, hospital transfer and pregnancy,” said Dr Angus. Each team had an emergency medicine/critical care medicine physician with specific training in the protocol, alongside a minimum of a bedside nurse and study coordinator (for adherence monitoring and time-based prompts).

“The primary outcome in the trial was all-cause in-hospital mortality up to 60 days,” said Dr Angus. “Secondary mortality outcomes included all-cause mortality (regardless of whether the patient was in hospital or not) at 90 days. We followed-up for one year, including getting death record data from the National Death Index as well as interviews.”

Before moving on to discuss the results of the trial, Dr Angus outlined important statistical considerations applied in their analysis. In brief, all analyses were intention-to-treat, testing sequential primary hypotheses. The primary test was whether either protocol-based care arm (EGDT or standard) was superior to usual care. If the null hypothesis was rejected, analysis of whether protocol-based EGDT or protocol-based standard therapy was superior was assessed. If the null hypothesis could not be rejected, all other analyses were secondary.

In total, 1,341 patients were enrolled in the trial, split between EGDT (439), protocolized standard therapy (446) and usual care (456). Protocol adherence, although difficult to measure, was determined as 88% and 96% for the EGDT and standard therapy protocols respectively (at six hours).

Moving on to discuss the results from the trial, Dr Angus began with a clear message: there was no difference in primary mortality outcomes between the three groups, and this persisted out to one year follow-up. The protocolized standard therapy group saw a roughly two-times increase in dialysis-dependent renal failure.

“When we looked at secondary outcomes, if anything there was a higher use of ICU with EGDT, which really had been driven by the fact that these patients were more likely to have a central line in place,” said Dr Angus.

He added that while post-hoc subgroup analyses showed an increase in mortality rate with higher APACHE...
II scores (as would be expected), there was no suggestion that patients in the sicker group were going to do better with EGDT, in fact it had the observed highest mortality in the sickest patients.

“We concluded that for patients presenting with early septic shock, in the setting of prompt recognition, prompt intravenous fluid bolus for hypotension, and prompt intravenous antibiotics, there is no apparent additional benefit of protocol-based resuscitation, mandatory central line placement in all patients, or ScvO₂ monitoring, with triggers for blood transfusion and dobutamine,” said Dr Angus.

“There are some important caveats and limitations. I would point out that ‘usual care’ was in fact usual care when septic shock was recognized. We did not test whether early recognition was better than late recognition, nor whether prompt care was better than delayed care. Therefore this study does not undermine efforts to promote sepsis awareness, early diagnosis or prompt treatment.

“This study was also not a repeat of the Rivers study. That was a single center trial, this is multicenter. The fidelity of our protocols may have diminished in ways we didn’t understand – Rivers was conducted in the late 1990s, and our trial was much more recent, in an era of tight glucose control and low tidal volumes. We are also not well-powered to explore subgroups. We are awaiting the results of our companion trials from colleagues in Britain and Australia [ARISE and ProMISe], and ideally results from all three trials in individual patient-level meta-analysis.”

References
1. The ProCESS investigators. A Randomized Trial of Protocol-Based Care for Early Septic Shock. NEJM (Accessed online March 2014)

Wednesday afternoon in the Lippens Room, National Library played host to an intriguing plenary lecture delving into the advantages and limitations of genome-wide association studies of ICU patients.

Jean-Paul Mira (Cochin Hospital of Paris, Paris Descartes University, France) used his lecture to outline some of the different approaches to genetic studies, and detail some results from recent genome-wide association studies.

“I don’t think there needs to be that much background or preamble for this audience about why we’re interested in early goal-directed therapy. There was a landmark trial back in 2001 by Emanuel Rivers that has gone on to be one of the most cited papers ever in our field.”

Derek C Angus (University of Pittsburgh, PA, USA)

When you look what’s happened in the last 50 years, it’s huge progress,” he began. “We’ve come from DNA structure, to the resolution of the genome in 50 years.

“But this progress is really nothing compared to what’s happened in the last 10 years. I don’t know what to envision in the next ten years, but I’m sure we are going to continue to have huge advances in this field, which will then arrive in everyday medicine.” He added that geneticists now face a huge challenge correlating such vast amounts of data with disease.

Professor Mira went on to contrast so-called candidate gene studies in which researchers can select and investigate specific genes with genome-wide association studies, allowing entire genomes from large populations to be compared and analyzed for similarities and differences.

When the disease is well-known, candidate
Genome-wide association studies needed in acute disease

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studies can have advantages, he said, but they are also regarded by many as being too biased. Discussing the case for candidate gene studies in ARDS, he noted that many gene variations found in single studies have yet to be reproduced. However, some variations have been confirmed by multiple research teams and appear to belong to relevant biological pathways. “So it’s true that there is bias; you have a biased selection of genes, but the bias is based on biology,” said Professor Mira, adding that genome-wide studies, while removing this selection bias, do have their own limitations. For example, successful studies are difficult to carry out because a very large number of patients are needed. “It’s very costly,” he said. “You will be able to identify only very common variants that are responsible for modest effects.”

He went on: “[If] the other variants are not very common, and if you want to detect them, you will need tens of thousands of patients, so it’s very difficult.”

Assessing the literature Professor Mira continued: “What is interesting, is most of the studies refer to chronic disease. Very few refer to acute diseases that we see in the ICU.”

He stressed that while polymorphisms related to cardiovascular disease are relatively common, the number known to be linked with infectious diseases are far smaller, despite infectious disease being the number one cause of death in the world. Genome-wide association studies also bring with them the challenge of correctly identifying the functional basis for observed associations. However, when this happens, the results can be illuminating. A 2011 study into dengue fever, which affects an estimated 100 million people a year, compared around 2,000 patients with 2,000 controls. The researchers identified two polymorphisms; MICB and PLCE1, which Professor Mira described: “MICB was already known because it’s a biomarker the doctor will use in the blood of the patient and seems to decrease when you have symptomatic dengue. The function of PLCE1 was completely unknown, and in the paper they show that when you are producing a lot of this protein you will increase the vascular leak.”

In this case, the genome-wide association led to a new advance in the pathogenesis of the disease, he said. Professor Mira also detailed two other recent large genome-wide association studies in meningococcal disease and acute lung injury, which gave less clear cut results. “You have to be very careful when you are using these tools,” he said. “They have to be conducted by strict rules that are published and you have to follow that. And maybe with this approach you have some advances.”

Concluding his talk, Professor Mira encouraged researchers to focus on genetic studies in acute illness. “We need to be organized to have enough patients in our ICU to do that, otherwise it will be done essentially for chronic diseases and not for acute disease.”
Still looking for a clear consensus on CPR

“Survival rates from cardiac arrest are trending better anyway, so there is always a risk that, if you compare with historical controls, you are going to show apparently better outcomes.”

Jerry Nolan (Royal United Hospital Bath, UK)

Accompanying a number of presentations on the topic of resuscitation and CPR, Jerry Nolan (Royal United Hospital Bath, UK) gave a tutorial on the controversies in CPR on Thursday morning with a look to the horizon of big data.

With so much debate and controversy regarding the best approach for laypeople to adopt in the event of an out-of-hospital cardiac arrest, the vital question that must be posed is, should we be teaching laypeople to do compressions only, so that they are more willing to do CPR? For some, this approach is less likely to cause interruptions in chest compressions, but whether it produces better outcomes when compared with standard CPR is the foundation upon which this decision must be made.

In the UK what they do is 600 compressions to start with, and then they will try to take them through CPR by mouth-to-mouth.

“But the evidence from meta-analysis suggests that the outcome in terms of survival, hospital discharge, is better if dispatchers use a compression-only technique versus standard CPR. That is probably not surprising, because it is almost impossible to teach someone over the phone how to do mouth-to-mouth ventilation. You are just wasting time when they could be doing compressions.”

Professor Nolan went on to explain the controversy of observational data that, although not as rigorous as randomized clinical trial, can in some cases provide an impression of what might be going on in the real world. “There were several studies, particularly some from Japan, that initially supposedly showed better survival rates with compression-only CPR with these observational studies.”

He said, “But the more recent study from Japan actually shows that the one-month survival in the standard CPR group is actually significantly higher than compression-only.”

Using the same national database, they have come up with completely different figures; even the neurologically good outcome is better in the standard CPR group. So it gets very complicated.

Moving on to the topic of CPR specifically for children, Professor Nolan noted that, while not representing large numbers in terms of out-of-hospital arrests, in terms of quality of life and years of life saved, ensuring the optimum strategy is crucial. Coming back to the work of Ogawa et al., it is clear that young patients, aged 19 and below, fare much better with conventional CPR.

“The fact is that really almost three quarters of pediatric out-of-hospital arrests are non-cardiac; they are asphyxia-related cardiac arrests, so that is where they are not going to do as well with conventional CPR. In fact, in these observational data, they do as badly as no CPR at all.”

All of these weak conclusions have a knock-on effect when it comes to educating the public, explained Professor Nolan. The guidelines of the European Resuscitation council, which are similar to the American Heart Association guidelines, suggest that the ideal approach is, if possible, to teach standard CPR. In cases where the individual rescuer is unable to deliver standard CPR without significant interruptions to chest compressions, then they should do compression-only.

Professor Nolan went on to say that these guidelines may change next year, when a new global consensus is expected to be published.

Moving on to the perspective of the professional out-of-hospital rescuers, Professor Nolan described the minimally interrupted cardiac resuscitation protocol that was formulated by Bobrow and colleagues: “You would think that professionals out-of-hospital rescuers surely should do standard CPR according to the guidelines that we taught. There have been groups around the world that would challenge that, and probably the most prominent of those are from Arizona.”

“What they do is to get their paramedics to, when they arrive, really emphasize compressions to start with. They will deliver 200 compressions, then they will analyze; obviously they will deliver a shock if it’s a shockable rhythm, and then they go into another set of 200 compressions, and they will do that up to four times. The interesting thing about this is that they completely de-emphasize airway management. What they train their paramedics to do is simply to put an oral pharyngeal airway in, a simple oxygen mask, and then leave intubation out till much later, to the end of the first few minutes. That is very different to the guidelines we teach now.”

Several observational studies suggest better outcomes from this technique of CPR, yet Professor Nolan observed that they may not be as reliable as first glance would suggest, due to their use of historical controls. “As we know, survival rates from cardiac arrest are trending better anyway, so there is always a risk that, if you compare with historical controls, you are going to show apparently better outcomes. So the answer, I hope, is going to be provided when this study finishes. I haven’t had a recent update but I would very much hope something will be available to report later next year.

While observational studies have their limitations, Professor Nolan noted one study, by the Resuscitation Outcomes Consortium of North America, that may yet put these controversies to bed. “This is a huge study. They plan to enroll 24,000 patients. This is the kind of number you need to enroll when looking at mortality as an endpoint. Hopefully that will answer the question once and for all about what our professional rescuers should do when they first come to patients.”

References

1. Ogawa T et al. Outcomes of chest compression only CPR versus conventional CPR conducted by lay people in patients with out of hospital cardiopulmonary arrest witnessed by bystanders: a nationwide population based observa
Is society ready for the next disaster?

Today’s session on disaster management in intensive care will conclude with a cautionary presentation from Paul E Pepe (University of Texas, Dallas, TX, USA).

According to Dr Pepe, who is also the Director of Medical Emergency Services for the City of Dallas, we have become increasingly vulnerable to large scale disasters as society has evolved over the past 50 years.

“Things have changed tremendously,” he said. “We’re a larger target today... in terms of sheer numbers. We’re also beginning to live longer and live more and more in high-risk areas.”

Coupled with an increasing dependence on the societal infrastructure for sustenance, water and power, the population is now at an even higher risk from disasters, said Dr Pepe.

“I’ll give you a couple of quick examples; 50 years ago, Phuket, Thailand, might have been a seaside village of several thousands of inhabitants,” he said. “But a half-century later, when it was hit by a big tidal wave, tens of thousands of locals, business persons and tourists were now the target.”

He added: “There are also now dozens of countries represented by corporations that have set up various economic interests, such as hotels, restaurants and a myriad of other services that were swept up in the tsunami.

“Similarly if you look at New Orleans, the disastrous sequela that followed the landfall of hurricane Katrina may not have been as troublesome many years ago, because there were fewer people living there and there were fewer hotels, entertainment complexes, restaurants and tourist attractions and so on. So it became more of a larger target.

There was far more destruction in terms of economic loss but, more importantly, in the human toll.”

He continued: “Overall we’re more of a vulnerable population as well and thus an even larger target, and so when catastrophes come along, whether they’re natural disasters like earthquakes, floodings, hurricanes, or cyclones – or whatever it may be – there’s much more at risk.”

Dr Pepe stressed that populations in general, particularly in western countries, are ageing and living longer but often with chronic diseases, so they’re more vulnerable if the societal and medical infrastructures collapse. But there are other reasons why, as a whole, we are less prepared for coping with disasters, he added.

“Particularly in Western countries, the average person has become very comfortable with day-to-day life in this century and are not totally psychologically prepared, let alone physically prepared, for a disaster,” said Dr Pepe.

“When something devastating does hit their community, whether it’s going to be a nuclear device, or a pandemic, and they’re told to maybe shelter in place or have to remain somewhere for long periods of time, I don’t think they’re prepared to hold up for weeks – or even months.

“That could be the case whether it’s having enough of your medications, water and foodstuffs that are actually usable, and various other life dependant needs that we so often take for granted on a day-to-day basis. This also applies to communication systems and mobile phones.”

This will lead to problems if water or power supplies are affected, he also explained. Hygiene is a primary concern and water shortages will be compounded by diarrhea and dysentery. These are more likely to pose significant public health hazards, especially in warmer climates.

Caring for displaced populations both medically – in terms of sustenance and medication – but also psychologically speaking, is also a major issue in large disasters.

Dr Pepe continued: “For example, in Japan, the global media focused on the threat posed by nuclear radiation when that [infamous] plant went down. There is indeed some risk from that; but the real tangible problem was that we had hundreds of thousands of people, some of whom are very aged and vulnerable, who were displaced from their homes and day-to-day medical and societal infrastructures.”

But while society may be less ready for, and more vulnerable to, disasters more than ever, developed countries are getting better at responding to them, Dr Pepe underlined: “I think that we have developed some training courses and approaches and have better prepared ourselves, at least from the emergency medical services point of view. In coordination with governmental organizations, I think that we have better preparations and I think better chances of getting through such disasters – at least in socioeconomically strong nations.”

Despite this, resource management is likely to be a key issue in the event of a large-scale disaster. Envisioning the worst of scenarios, such as a nuclear detonation, he explained: “We would have to manage patients [who] are developing radiation burns, which often manifest themselves weeks later, or other irradiation problems; illnesses, such as loss of some of their white blood cells and numerous other conditions that may predispose them to serious systemic illnesses.

“As a result, our ICU beds will be overwhelmed. The same thing will happen..."
if there’s a pandemic. Even if it was a closed population, if only 10% of, say, a million people got sick, and only 10% of them needed a critical care bed, and only half of those needed a ventilator, there would still be the need for 5,000 ventilators for a population of 1 million. That’s at low risk and it’s probable that the pandemics are going to strike a much higher percentage of people. We simply don’t have those resources, not just the physical beds, but the medical staff as well, who may also be victims in some cases."

In order to cope with disasters of this scale, society cannot expect intensive care for every sick patient. Dr Pepe explained, adding that he believes that there is a need to prepare our population for much worse circumstances, to get them mentally prepared.

“They are going to need to be better focused in terms of getting ready to take care of themselves,” he said. “There is a certain amount of entitlement that we have developed in the modern democratic age. Even traditionally under-served demographics in many nations have developed a sense of entitlement because of a growing democratic philosophy worldwide.”

He added: “That expectation may fall short in the event of a major pandemic or nuclear blast; everyone needs to be better prepared to fend for themselves and their families, and be prepared for the worst.”

Dr Pepe will speak during the ’Disasters’ session taking place today at 11:05 in the Studio (Bozar).

Best Practices in Patient Blood Management

Red blood cell (RBC) transfusions are one of the most frequent procedures in every hospital and can increase risk to patients and costs to hospitals. Many transfusions are considered unnecessary, so there is a growing recognition of the need to reduce RBC transfusions. Laboratory hemoglobin values are used as a primary indicator for RBC transfusions, are only available intermittently, and are often delayed — leading to suboptimal transfusion decisions.

Masimo has invented noninvasive and continuous hemoglobin (SpHb®) monitoring, which helps clinicians optimize transfusion decisions by providing real-time trending in hemoglobin status. SpHb has been shown to help clinicians reduce blood transfusions in both low and high blood loss surgery,¹,² and has demonstrated its lifesaving potential to help clinicians detect occult bleeding in places like intensive care units and labor and delivery wards.³

With the growing recognition of the need to reduce transfusions, noninvasive and continuous hemoglobin (SpHb) can be a key tool to help overcome the limitations of existing approaches.

The Joint Commission has introduced Patient Blood Management Measures that encourage hospitals to evaluate appropriateness of transfusions as a continuous quality indicator.¹¹ The American Medical Association and The Joint Commission also recently identified RBC transfusions as one of the top five overused procedures in medicine, defining overuse as “circumstances where the likelihood of benefit is negligible or zero, and the patient is exposed to the risk of harm”.¹⁰

How SpHb Monitoring Helps with Transfusion Decisions

Masimo’s solution provides hemoglobin both noninvasively and continuously. The noninvasive aspect makes the technology easy to apply to the patient, and the continuous aspect assists RBC transfusion decision making. While SpHb monitoring is not intended to replace blood draws, it identifies significant changes in hemoglobin and lack of significant changes in hemoglobin between invasive blood sampling and laboratory analysis.¹⁴

Continuous hemoglobin means you can determine the directional trend of hemoglobin — whether it is stable, rising, or falling. This can help avoid unnecessary transfusions when the SpHb trend is stable and the clinician may otherwise perceive hemoglobin is dropping, or when the SpHb trend is rising and the clinician may otherwise perceive it is not rising fast enough. Inside and outside the operating room, a dropping SpHb trend may also allow clinicians to identify internal bleeding and permit earlier interventions.

Cost Savings Model from Capgemini

Capgemini, a leading supplier of global consulting and technology services, released a study showing that a typical 500 bed hospital incorporating Masimo rainbow® Pulse CO-Oximetry into its clinical standards and care pathways could generate nearly $500,000 in net annual cost savings and financial gains. Capgemini reported that significant financial benefits could be derived from incorporating noninvasive total hemoglobin (SpHb) by helping clinicians prevent unnecessary blood transfusions, identify internal bleeding, and increase patient throughput. The study concluded that “whether considered on a per-patient, department, or hospital-wide analysis, there are significant clinical and financial benefits to implementing Pulse CO-Oximetry technology.”

References

3. Case studies at www.masimo.com/guarantee
Larger trials needed to advance post-cardiac arrest care

Large scale register-based or national trials are needed to shine further light on the best approach to post-cardiac arrest care, delegates attending yesterday’s session on the future of CPR heard.

In the final talk of the session, Niklas Nielsen (Helsingborg Hospital and Lund University, Sweden) addressed the paucity of trials with enough power to inform clinical practice in the field of cardiac arrest critical and hypothermia.

“If you look at the Pubmed publication records for the search word ‘cardiac arrest’ and ‘therapeutic hypothermia’ there are almost 5000 papers published, and it’s increasing every year,” he said. “If you look at ‘cardiac arrest’ and ‘critical care’ it’s the same thing. But how many of these could or should inform your clinical practice? I think the answer is depressingly low actually.”

As Dr Nielsen pointed out, the data is such that more than 2,000 patients are now necessary in order for a trial to be sufficiently powered to say something significant about the field.

Foreseeing problems in interpreting the available data, he said: “We probably overestimate any potential effect of our interventions … It’s maybe not realistic to calculate with the 20% relative risk reduction or absolute risk reductions of tenths of percent that we’ve been doing the last years. Cardiac arrest trials need to be much, much larger.”

He added: “This is probably also relevant for other post cardiac arrest interventions: mean arterial pressure, metabolic intervention, post resuscitation fever, oxygenation, ventilation, coronary angiography, etc.”

Focusing on recent mortality figures, Dr Nielsen referenced a recent Swedish trial featuring 52,000 out-of-hospital cardiac arrest patients. He noted that survival has doubled during the last decade.

“It’s also for only shockable rhythms and they say that this is probably because of a higher incidence of bystander CPR but that might be only one of the explanations,” he said. “This has been shown in Denmark as well. An increase in survival, overall survival, in cardiac arrest patients.”

But why has this happened? Dr Nielsen suggested the difference is probably due to a number of factors, including improved quality of CPR, a higher level of bystander CPR, and better patient allocation. Likewise, he added that interventional cardiology and standardized intensive care will have helped, but better rehabilitation is still needed.

He continued: “If we look at the in-hospital factors; early angiography and PCI, active standardized intensive care consists of temperature management, hemodynamic support, ventilation strategies, metabolic control, extended observation time and improved neurological prognostication. It might be that they all have an effect, but I think one of the most important things is the increased enthusiasm that really started to grow after the publications of the two hypothermia papers in the New England Journal of Medicine in 2002.

“I think that might be one of the most important things that has happened. The ‘Hawthorne effect’ is very powerful,” he said.

Speculating on the best approaches to gathering more evidence, he continued: “I think we should form networks and seek collaboration; really try to identify the relevant questions. And society should participate in the large registries and in the large trials if they are performed. I think it’s only possible to move forward in a multicenter setting.”

Niklas Nielsen (Helsingborg Hospital and Lund University, Sweden)

“My conclusion is that outcomes have improved for cardiac arrest. Baseline levels for survival only give a little room for intervention benefits in a traditional sense, and large data sets are needed to prove small differences. Register-based or nation-based cluster clinical trials may be the next step, but meanwhile we should focus on the process of care.”

Niklas Nielsen (Helsingborg Hospital and Lund University, Sweden)

References
Energy requirements: How early and how much? 400 Hall Friday 21 March 09:45

Calorific needs in the critically ill: Sense or nonsense?

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imple, precise and unified models to predict the exact energy needs for ICU patients are still lacking, but there are a few tools in the arsenal that can offer a reasonable estimation, delegates will hear this morning at ISICEM.

“High energy deficits, due to underfeeding in particular, are frequently observed in critically ill patients, and these energy deficits are associated with significant morbidity and mortality, not only restricted to a patient’s stay in the ICU, but also afterwards on the ward,” Herbert Spapen (University Hospital Brussels, Belgium) told ISICEM News. “There are a lot of complications that can appear by underfeeding and underestimation of caloric needs in critically ill patients.”

Professor Spapen continued, stressing that an important but relatively uncommon technique to determine these crucial caloric needs is indirect calorimetry – a gas-based measurement system that estimates energy requirements from a patient’s oxygen consumption and expired carbon dioxide output. “It gives you the best interpretation of the actual basal energy state of a critically ill patient, but the problem is that, despite being considered as a gold standard, it is a very time-consuming technique, it is not standardized, and it is not readily available in many hospitals,” he said.

As an alternative, many clinicians turn to formulaic calculations to predict energy needs in critically ill patients, but Professor Spapen noted that some of the common equations are plagued with inaccuracy: “Underestimation of energy needs in particular is rife when using the classical formulas,” he said.

These inaccuracies generally stem from the fact that the equations themselves are obtained during resting metabolism in healthy patients, and extrapolated to critically ill subjects. “This of course is not always accurate,” he said. “These patients may have organ failure, and perhaps a higher demand for energy.”

With that in mind, many formulas incorporate stress factors, or injury factors, which act as coefficients of basal energy need, thus hopefully leading to an estimation that is more suitable for critically ill patients. However, Professor Spapen noted that in many cases these formulas have not been tested to a level that we can be confident with, saying: “One of the typical formulas that is used is the Harris Benedict Equation. It is a very old equation, and even corrected with energy and stress factors, it gives a considerable underestimation.”

He continued: “There are very few studies that have prospectively looked at these calculations, and have included all of these parameters, thereby allowing them to adjust for the type of patient and the type of critical disease.”

In their own past-exploration of the accuracy of these calculations, Professor Spapen and colleagues performed a large retrospective study which ultimately came to the conclusion that there was no formula that could accurately predict energy needs. However, he added that some of the more recent prospective studies have changed matters to some degree, most notably Frankenfield’s Penn State equation, which Professor Spapen described: “The Penn State equation includes modified versions for very critically ill patients and obesity, and if we take indirect calorimetry as the comparative gold standard, it can quite accurately predict energy needs in about 75-80% of cases,” he said.

He continued: “Today as many as 200 equations have been developed, but whether the systematic use of any one formula for estimating calorie needs will have an influence morbidity or outcomes in ICU patients at this moment is still to be determined. Conversely, there is indication that using (for instance) the Penn State equation could offer valuable information that goes even a little bit beyond indirect calorimetry, because the latter is not so easy to repeat, especially given the fact that the situation of the patient can change substantially during a longer stay in the ICU.”

Professor Spapen also stressed that it is important to consider that many patients cannot undergo indirect calorimetry due to contraindications such as continuous renal replacement therapy, those with catheters for the drainage of a pneumothorax and those with air leaks on the ventilator. In these cases, formulas become even more important. In addition, he also noted that indirect calorimetry, while still an effective tool in the right hands, is very variable depending on commercial design: “Several indirect calorimetry machines are marketed, and if you actually compare these the difference can be quite extensive. So the technique itself has its own problems, and perhaps it is not really suitable as the ‘gold standard’ after all.”

Professor Spapen will delve deeper into whether calculating energy requirements in the ICU is “sense or nonsense” during the session ‘Energy requirements: How early and how much?’ held in the 400 Hall at 09:45 today.
Finding the right balance in PEEP

Today’s session on positive end-expiratory pressure (PEEP) titration features an illuminating presentation from Neil R MacIntyre (Duke University School of Medicine, Durham, NC, USA) on the challenges of setting PEEP to optimal levels.

“I like to think of PEEP as being something of a double edged sword,” Dr MacIntyre told ISICEM News. “On the one hand the expiratory pressure will prevent lung de-recruitment, lung collapse, and thereby improve mechanical function and gas exchange and reduce ventilatory injury.

“The problem is, on the other hand, PEEP will add to the total pressure in the lungs, and as a consequence can over distend and injure healthier regions of the lung. So the whole art of applying PEEP is to try and maximize the benefits and minimize the harm.”

In his talk, Dr MacIntyre will discuss several different methods that can be used to try and strike a balance for effective PEEP. The ideal method, he added, may one day be through the use of imaging, although this technology is far from being universally available.

“Unfortunately this is not practical,” he said. “It’s too expensive, too complicated and units don’t have the imaging capabilities on site, such as a CT scanner.”

Beyond imaging, there are a variety of other ways of looking at pressure volume relationships in the lung to strike this balance, he explained. Pressure volume curves and PEEP titration curves are good examples. Dr MacIntyre continued: “The most interesting one right now is called the stress index, which is a way of analyzing mechanical properties during the delivered tidal breath. They show some promise in helping us strike this balance.

 “[This involves] examining the pressure-volume relationship of the lung during the delivery of the breath and looking at the shape of that stress index to determine if over distension is occurring or if collapse and de-recruitment is occurring, and then setting the PEEP and tidal volume combination from that.”

As Dr MacIntyre outlined, the stress index was popularized by Marko Ranieri (University of Turin, Italy). “It’s a technique where you use the tidal volume that you’re already delivering, but you deliver it with what’s called a constant flow. The patient has to be passive,” he explained.

Then, with that information, you examine the shape of the pressure curve. And if it bows upward, it suggests over distension. On the other hand, if it starts steep and then becomes less steep, that suggests there’s some recruitment/de-recruitment going on.”

He added: “If you’ve got the lungs set properly the pressure tracing should be a straight diagonal line. At the end of the day, most clinicians use P02 as a crude index of recruitment potential and will use the plateau pressure as a crude index of over distension risk.

 “[Clinicians often use] what we call PEEP FiO2 tables to strike that balance. And there’s some literature saying that in severely injured lungs, an aggressive PEEP strategy using one of these tables maybe beneficial. In less severely injured lungs, a less aggressive table might be appropriate.”

Dr MacIntyre explained: “[The aim] is trying to balance P02 with the end expiratory pressures, trying to get the best P02 you can without over distending the lungs.”

Going into more detail, he continued: “We use PEEP FiO2 tables which are simply tables whereby if your blood oxygen level is low generally below 95mmHg you go up in steps of adding PEEP or additional oxygen. And if your P02 value is high, that is usually above 80 mmHg, you reduce the PEEP or the inspired oxygen concentration.

“These tables can be constructed in such a way that the pressure, the PEEP, is added first and the FiO2 is added later, what we could call a high PEEP strategy, or you could construct a table in which case the FiO2 is added earlier and the PEEP is added later. And this would be called a low PEEP strategy.”

Dr MacIntyre continued: “These have been studied in a couple of large trials and when the results were pooled, it showed that the high PEEP strategy works better in patients who have more severe lung injury. The low PEEP table works better in patients who have less severe lung injury. That’s what I use right now and that’s what a lot of clinicians use.”

Speculating on what is on the horizon for PEEP titration, Dr MacIntyre commented: “I think the future is going to be coming up with some better imaging technology. One that might be considered is called electrical impedance tomography, which is a relatively non-invasive way to image ventilation in the lung.

“It still needs technical work to clarify exactly what the optimal pictures should be and we need to show that this indeed translates into better outcomes. But that may be the way of the future.”

Dr MacIntyre will speak about balancing competing goals in setting PEEP during the session ‘PEEP titration’, beginning at 08:00 this morning.

“I think the future is going to be coming up with some better imaging technology”

Neil R MacIntyre (Duke University School of Medicine, Durham, NC, USA)

“The whole art of applying PEEP is to try and maximize the benefits and minimize the harm”

Neil R MacIntyre (Duke University School of Medicine, Durham, NC, USA)
ARDS can be prevented

Acute respiratory distress syndrome (ARDS) is a largely preventable complication of critical illnesses, which develops as a result of a complex interaction between a patient’s underlying illness and the corresponding medical interventions, and iatrogenic factors including treatment errors and delays that dramatically increase the risk of this condition, Ognjen Gajic (Mayo Clinic, Rochester, MN, USA) will tell delegates this morning.

“Contrary to putting millions of dollars into trying to treat ARDS and find a magic cure, it seems that simple quality improvement interventions, applied across hospital settings – not just in the ICU but the emergency room, operating room and hospital ward – can have a major effect in preventing ARDS development.”

Ognjen Gajic (Mayo Clinic, Rochester, MN, USA)

Gajic explained that as a result, he and his team have been developing predictive models that can be used for enrolling patients into preventive clinical trials.

“This is what we call a lung injury prediction score,” he continued. “We can identify patients at the time of hospital admission who are at high risk of developing ARDS and in whom a prevention strategy would be justified, so that you could focus resources on a smaller number of patients who are at high risk.”

The score is based on a different weight for different risk factors for developing ARDS, and risk modifiers.

Bodies such as ARDSnet and the NIH in the US are now focusing on preventing ARDS rather than treating it, noted Dr Gajic. Similar changes are being made in Europe as well. “In trying to get the best possible outcome after critical illness there are several factors to consider,” he said, noting that these include the ‘metabolic network’ such as protein-protein interactions and regulatory pathways. There is also the ‘disease network’ – how the condition is interacting with other organ system failures such as shock or sepsis.

“Then there is something that is being largely ignored, the social network – nurses, physicians, families and all the psychological and social factors that determine who will actually be able to recover quicker or not at all,” said Dr Gajic.

“If one is to prevent complications of critical illness, you have to consider all these three layers, because no matter how advanced a new molecular based intervention for prevention of ARDS is, if the system is such that a nurse is unable to give antibiotics in a timely manner, the patient will not do well. So there are healthcare delivery factors and they are as important as the pathophysiologic factors.”

He added: “If the patients does not have emotional support or family support during the early stage of acute illness, again that may significantly affect the chances of restoring homeostasis and the whole body healing. So we need to be mindful of these things and the holistic approach to prevention of ARDS is important.”

Focusing on the pathogenesis of ARDS, Dr Gajic explained the ‘multiple hit’ hypothesis, in which a series of events lead to an increased risk of the condition. In this model the patient may have an initial risk factor, for example smoke inhalation, major surgery, shock, sepsis, or previous chemotherapy. “Then over the next 12 to 48 hours certain risk modifiers, additional hits, can increase or decrease the risk of ARDS,” he said.

Dr Gajic defined some of the modifiers: “What was found in previous studies was that using the high tidal volume mechanical ventilation, even in patients who don’t have ARDS, can increase the...
ARDS: Prevention rather than cure

Gold Hall  Friday 21 March  11:10

Breathe easy

ARDS can be prevented

Continued from page 11

chance of developing ARDS. Unrestricted transfusion, female donor plasma, delayed resuscitation, inappropriate antiviral and antibacterial drugs, too much oxygen or aspiration also do this.

“Certain modulators can decrease the risk, particularly those affecting the key pathophysiologic processes including inflammation, coagulation, and oxidative stress. Those would be the targets for pharmacoprevention.”

Dr Gajic will also detail the results of a matched pair case-control study that he and his team recently published1. He introduced the study: “We matched, over a ten year period, patients who had a similar risk of ARDS at the time of hospitalisation. We matched them by age, gender, sepsis, surgery and degree of hypoxemia at the time of hospital admission.

“Importantly, they were matched for exact risk of developing ARDS by the lung injury prediction score. We were able to find 414 pairs of patients who looked exactly the same at the time of hospital admission, of whom one group developed ARDS, and the other did not.

“We specifically looked for any of the hospital exposures that could affect development of ARDS. And what was enlightening was that potentially modifiable hospital exposures seemed to have a major influence in who is going to develop ARDS and therefore represent potential prevention targets.”

“Details of their findings, Dr Gajic explained: “Inadequate and delayed antimicrobial therapy for infections was the major factor. So if you have the flu and don’t get antiviral treatment immediately but delay it, the chances of developing ARDS are high. The same was true with bacterial infection.

“The second factor was hospital-acquired aspiration. This appeared to be a major cause of developing ARDS. High tidal volume ventilation and the onset of mechanical ventilation before ARDS was another major factor. And then transfusion. Most importantly, what we found was that a lot of what is called surgical and medical misadventures, or adverse events, were way more common in patients at risk who subsequently developed ARDS than in controls.”

He added: “So in a sense ARDS can be viewed as an iatrogenic disease. Accidental cuts, punctures, perforations and haemorrhages, dosage failures and other adverse events were all common in patients who went on to develop ARDS. Much more than in controls.

“When we look for these adverse events, the majority of them, graded by independent reviewers, were deemed to be preventable. Basically ARDS develops as a consequence of medical error in many, many patients.”

Dr Gajic and co-workers also looked at trends in the integrated medical records available in Minnesota. He described this work: “We noticed that over the past ten years the incidence of ARDS in Olmsted County has gone down quite dramatically, and we don’t really know the cause for this. But it is likely that the changes in quality improvement at the Mayo clinic, have contributed substantially.

“The things that have been done over the past ten years, with the specific intention to reduce the ICU but the emergency room, operating room and hospital ward – can have a major effect in preventing ARDS development.”

Dr Gajic went on to describe the Checklist for Lung Injury Prevention (CLIP), a series of recommendations that could help to limit the risk of ARDS (Table 1).

“Something like CLIP could be used in clinical practice,” he said. “We don’t have proof that it works but this checklist is based on sound epidemiologic data and best practice recommendations.”

Summarizing his presentation, Dr Gajic commented: “If you identify patient risks, apply standardized care delivery in a timely manner and avoid errors, then we will be able to test new pharmacological or other prevention strategies in clinical trials. If you don’t take those first steps, then it’s unlikely that you can prevent ARDS with some new medication.”

Looking to future of ARDS care, he concluded: “Moving critical care closer to the onset of illness is very important, I think it should be applied to patients with ARDS and before development, the same way as we have done for severe sepsis and septic shock in what is called early goal-directed therapy.”

Dr Gajic will discuss the factors leading to ARDS during today's session ‘ARDS: Prevention rather than cure”; 11:10 in the Gold Hall.

References


“Most importantly, what we found was that a lot of what is called surgical and medical misadventures, or adverse events, were way more common in patients at risk who subsequently developed ARDS than in controls.”

Ognjen Gajic (Mayo Clinic, Rochester, MN, USA)

Table 1, Checklist for Lung Injury Prevention (CLIP). (Slide provided by Dr Gajic)

<table>
<thead>
<tr>
<th>Clip Elements</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung protective mechanical ventilation</td>
<td>Tidal volume between 6-8 mL / kg predicted body weight and plateau pressure &lt;30 cm H2O; PEEP&gt;25 cm H2O, minimize FiO2 (target O2sat 88-92% after early shock)</td>
</tr>
<tr>
<td>Aspiration precautions</td>
<td>Rapid sequence intubation supervised by experienced providers, elevated head of the bed, oral care with chlorhexidine, gastric acid neutralization in those not receiving tube feeds</td>
</tr>
<tr>
<td>Adequate empiric antimicrobial treatment and source control</td>
<td>According to suspected site of infection, health care exposure, and immune suppression</td>
</tr>
<tr>
<td>Limiting fluid overload</td>
<td>Modified ARDSnet FACCt protocol after early shock (first 12 hours)</td>
</tr>
<tr>
<td>Restrictive transfusion</td>
<td>Hemoglobin target &gt;7 g/dL in the absence of acute bleeding and/or ischemia</td>
</tr>
<tr>
<td>Appropriate handoff of patients at risk</td>
<td>Providers taking care of patients at risk who require ICU admission will complete a structured handoff to the ICU team to continue with CLIP protocol for the duration of ICU stay</td>
</tr>
</tbody>
</table>

Checklist for Lung Injury Prevention (CLIP)

Table 1, Checklist for Lung Injury Prevention (CLIP). (Slide provided by Dr Gajic)
Making the call in neurological emergencies

Surgery is not something that’s standalone or necessarily the panacea in every case; if you do surgery but don’t provide the physiologic care in the ICU, you’re not necessarily going to make a difference to outcome.

Peter Le Roux (MLHC Spine Center at Lankenau Medical Center, Wynnewood, PA, USA)

“Timing is often a crucial factor,” he added. “When there’s a delay, things tend not to have as good an outcome as if you get to things early. There are also some radiological predictors, or predictors from physiologic monitoring, that can indicate a need for surgery before there’s clinical deterioration,” he said.

“There’s a third thing I’ll probably try and emphasize, what’s known as the ‘ENLS’, which the Neurocritical Care Society in the US has developed. ENLS stands for Emergency Neurological Life Support, and it really is very similar to such things as, at least in the United States, ACLS and ATLS, or the cardiac and trauma protocols.”

ENLS helps clinicians improve patient care and outcomes during the first critical hours of a neurological emergency. It focuses on multidisciplinary approach, while providing a framework for decision making, said Dr Le Roux.

Moving on to discuss how advances in mobile technology and data sharing have affected neurosurgery, he explained: “Let’s say I’m at home and you’re in the ICU and you’ve got something happening – what would I find most valuable that’s going to allow me to make a decision over the phone and get the ball rolling? What’s the patient’s age, perhaps, or what other pre-health information do we have? What is his current coma scale? What’s his coagulation status, other co-morbidities, and then what does the imaging show?”

Advances in informatics and computer systems mean that intensivists can communicate this information, and more, offsite. For example, trauma surgeons can now share CT scans with neurosurgeons before they arrive, allowing neurosurgeons to make decisions before arriving in the operating room, said Dr Le Roux.

“In the 30 minutes it takes me to drive to the hospital and get changed, the guys are already in the operating room and we’ve got the ball rolling, rather than having to wait for that, so there’s a lot of value of informatics in health,” he explained.

Dr Le Roux will discuss the treatment algorithms that help decision making when treating patients with stroke or traumatic brain injury, before delving into some of the specific conditions that require emergency surgical intervention.

“When intracerebral hemorrhage, there’s a lot of debate about what needs to be done surgically; there are some new and non-invasive techniques,” Dr Le Roux explained.

He’ll also touch on the management of subarachnoid hemorrhage, traumatic brain injury and other condition including intraventricular hemorrhage and acute hydrocephalus. In discussing these situations, Dr Le Roux will focus on how it is possible to identify when a condition becomes a true emergency requiring surgery, and when it is better to wait.

Moving on to spinal-cord injury, he said: “There is still a lot of debate about timing of surgery and the acuteness of intervention; one cannot underestimate the simplicity of reduction, closed reduction, for example, and traction for a cervical spine fracture – the value of stabilization in the sense of how it impacts long-term care with early mobilization and limiting pneumonias and DVTs.”

He added: “The other aspect of the spine can be the acute non-traumatic weakness, how one...
Making the call in neurological emergencies

Continued from page 13

might evaluate that. This could be from stroke, or infection, or a spinal-cord problem, or metabolic abnormalities and how one approaches that. I’ll finish [by discussing] the need for acute intervention with spinal-cord compression or cauda equina syndrome. In general, with all of these interventions, the sooner you do it, the better the outcome is.”

Dr Le Roux also touched upon data from the UK, saying: “If a patient has lost the ability to walk for less than 24 hours and you intervene, he’s got an 80% chance of walking again; if it’s more than 24 hours, he’s got a 20% chance of walking again.”

He added that weighing up whether you’re going to intervene, and if it’s going to be major surgery or more limited surgery, with the prognosis of the patient and what they have to go through, is a key concern.

“We, as surgeons, are only part of a larger team; the ultimate outcome of the patient is often dependent on what is done in, for example, the intensive care unit beforehand. Certainly, after surgery, post-operative care can have a big impact on the success of surgery and also in rehabilitation.”

Peter Le Roux (MLHC Spine Center at Lankenau Medical Center, Wynnewood, PA, USA)

Congratulations to this year’s Poster Award winners for their fantastic work!

P99

The use of a specific antidote to Dabigatran (idarucizumab) reduces blood loss and mortality in Dabigatran- and trauma-induced bleeding in pigs
Authors: M Honickel; O Grottke; J Van Ryn; H Ten Cate; R Rossaint; H Spronk

P260

The win ratio method, a novel hierarchical endpoint for pneumonia trials in patients on mechanical ventilation
Authors: A Montgomery; T Abuan; M Kollef

P466

Acute and long-term outcomes of ICU-acquired weakness: A cohort study and propensity matched analysis
Authors: G Hermans; H Van Mechelen; B Clercx; T Vanhullenbusch; D Mesotten; A Wilmer; MP Casaer; P Meersseman; Y Debaveye; PJ Wouters; R Gosselin; G Van den Berghe

On minimizing all the other issues,” said Dr Le Roux. “Certainly we’ve operated on people with bad disease who’ve got, say, liver disease and following surgery they develop a profound coagulopathy and it just all goes downhill thereafter.

“Surgery is not something that’s standalone or necessarily the panacea in every case; if you do surgery but don’t provide the physiologic care in the ICU, you’re not necessarily going to make a difference to outcome.”

Dr Le Roux will discuss emergency neurosurgery in his talk ‘Call the neurosurgeon now’, during the session ‘Neurological emergencies’, held this morning at 08:00 in the Gold Hall.
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Lower-income country ICUs can be effective and cheap

By Marcus J Schultz
Academic Medical Center, University of Amsterdam, Amsterdam, the Netherlands

Intensive care around the globe 100 Hall Friday 21 March 08:00

In essence, the treatment of intensive care unit patients in a resource-poor setting should not be different from any Western country. Adaptation to the local circumstances, however, is essential. Every form of medicine in a resource-poor setting faces great challenges; think for instance, of the shortness of drugs, poor infrastructure and lack of properly educated personnel. This certainly also applies to intensive care medicine.

But intensive care medicine in a resource-poor setting faces a number of other, special challenges; namely that this form of medicine is predominantly considered of less importance than other forms of medicine, that intensive care medicine is not as effective as public health care and that intensive care medicine is too expensive.

Economic viability

There is only very little truth in all this. Like in the Western world, there are patients in a resource-poor setting who may benefit from intensive care medicine. Moreover, improvements of public health care do not prevent patients from becoming seriously ill – maybe to the contrary? So the question is not as to whether intensive care medicine is necessary in resource-poor settings, but more, which parts of it are possible or should be made possible?

Furthermore, intensive care medicine is not necessarily synonymous with ‘expensive’. Implementation of low tidal volume ventilation, which is a highly effective measure to improve outcome of critically ill patients, costs absolutely nothing, neither in the resource-rich nor in the resource-poor setting. Other simple strategies, such as timely administering antibiotics for sepsis is a cheap but very effective intervention.

We need to keep in mind that the case-mix of patients who need intensive care medicine in resource-poor settings differs from that in the Western world. Critically ill patients in resource-poor settings are usually much younger, and are admitted for complications with diseases that can easily be treated. Successful intensive care treatment for these patients may provide an important contribution to the economic productivity of a country, and of the family in particular.

Thus, investing in intensive care medicine in resource-poor settings makes sense!

Real terms

There often is a shortage of equipment like monitors, ventilators, syringe pumps and much more, and supply of oxygen and electricity, and sometime even running water is frequently not uninterrupted. Certainly, each hospital aiming to invest in intensive care medicine will have to take care of such matters.

Western hospitals frequently donate old equipment to resource-poor hospitals. Although at first glance these seem valuable, they are not always that useful. After all, not all equipment is suited for use in an environment with other (higher) temperatures and humidity. More importantly, equipment requires maintenance, which is often more expensive than the purchase price of a new machine. We must prevent resource-poor hospitals from becoming ‘cemeteries of medical equipment’. It may be better if each ICU purchases their most suitable equipment themselves and arrange maintenance locally, and it is our valuable task to assist the local teams in making the right choices in what they purchase.

A much larger and more important problem is the lack of well-educated personnel. Most, if not all knowledge of intensive care medicine does not come from textbooks, but from the scientific journals. Indeed, textbooks are often outdated and lagging behind developments, specifically in intensive care medicine, where developments went extremely fast. Unfortunately, doctors in resource-poor settings hardly have access to these journals. The subscription costs are too high. Moreover, in most resource-poor settings the Internet is often non-existent or else it is too slow to allow downloading a PDF file.

Improvements

Despite all these challenges, intensive care medicine in resource-poor settings is slowly improving. In close collaboration with Professor Arjen Dondorp (Mahidol-Oxford Tropical Medicine Research Unit, Bangkok, Thailand), doctors and nurses from Amsterdam (Academic Medical Center, Amsterdam, the Netherlands) a training course was developed and executed in three ICUs in Kathmandu, Nepal, in Rourkela, India and in Chittagong, Bangladesh.

The course was divided in six modules, teaching was provided by intensive care physicians and nurses from Amsterdam, Maastricht and Apeldoorn (the Netherlands) and intensive care physicians from United Kingdom, Austria and the United States.

This is just one example of help provided by Western hospitals. In Sri Lanka, in collaboration with Rashan Haniffa, an intensive care physician from United Kingdom, and Nicolette de Keizer and Ameen Abu-Hanna, two information technologists from Amsterdam we are developing an adjusted disease severity scoring system.

We also linked up with the initiatives of the group of Ognjen Gajic from the Mayo Clinic in Rochester, MN, USA who developed a smartphone application for simple bedside decision support.

Best of both worlds

Finally, I would like to echo some words from a Dutch colleague with much experience in research in infectious diseases in Asia: “Doctors who have worked in the ‘tropics’ are of great value to our health care after returning to the Netherlands.” We feel the same: doctors and nurses who have worked in ICUs in resource-poor hospitals are an asset for our own system – they work cheaper, work more efficient, but above all, they are conscious of how well everything is arranged in a resource-rich setting. The interaction with colleagues in the hospitals in Asia provided us with an enormous boost to personal growth and development.

Professor Schultz will present ‘Implementing cheap but effective ICUs in lower income countries’ as part of the session ‘Intensive care around the globe’, held at 08:00 this morning in the 100 Hall.
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20th

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ISICEM Chairman, Dept of Intensive Care,
Rome December 7-10. “That is quite a
Is genomic medicine ready in practice?
Continued on page 2
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