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Paediatrics

Quality improvement in the PICU – a primer for intensivists, *N. Mehta*

PICU Up! A multicomponent early mobility intervention for critically ill children, *S. Kudchadkar*

PICU-acquired complications: the new marker of the quality of care, *K. Choong*

Caring for children in the PICU - from novel technology to family-centred care: new challenges for old needs, *E. Esteban, I. Jordan, F. José Cambra*

Virtual reality experience in the PICU, *M. Malakooti*

PLUS

Seven steps to design, procure, implement and maintain a Clinical Information System for your intensive care unit, *T. Kyprianou*

Respiratory physiotherapy in critically ill patients, *V. Comellini, S.Nava, A. Artigas*

A structural approach for diagnosing weaning failure - a case from a specialised weaning centre, *T. Frenzel, L. Roesthuis, J. van der Hoeven*

Vitamin D deficiency in ICU patients, *G. Martucci, K. Amrein, J. Ney*

Noise in the intensive care unit: where does it come from and what can you do about it? *J. Darbyshire*

Keeping the Person in Personalised Medicine, *M. Abrams*

European guidelines on the management of traumatic induced bleeding, *R. Rossaint*

Can Goal-Directed Therapy solve the economic burden of postsurgical complications? *W. Habenbacher*

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European guidelines on the management of traumatic induced bleeding

Interview with Rolf Rossaint, Prof. of Anaesthesiology, RWTH University Aachen, Germany.

Rolf Rossaint is a Professor and Chairman of the Department of Anaesthesiology of the University Hospital at the RWTH University Aachen, Germany. Prof. Rossaint has published several high-quality studies dealing with the treatment of severe acute respiratory distress syndrome (ARDS). He has also been actively involved in research on the pathophysiology of trauma associated coagulopathy and possible treatments. A group of international experts involved in this research is chaired by Prof. Rossaint. The group has recently published the updated European guidelines on the management of traumatic induced bleeding. Prof. Rossaint discusses these new guidelines with ICU Management & Practice.

You chair an international group of experts involved in conducting research on the pathophysiology of trauma associated with coagulopathy and possible treatments. What are the goals of this group?

The ultimate goal of this group is to improve survival in trauma patients. Back in 2004, when we founded the international expert group on advanced bleeding control for trauma (ABC-T), we realised that the knowledge about the occurrence and specific pathophysiology of trauma induced coagulopathy could be improved. Moreover, we found that there was not an evidence-based approach or standard to treat the bleeding in major trauma.

Severe traumatic injury and post-traumatic bleeding is a leading cause of death among injured patients. These patients often develop multiple organ failure and die more frequently compared to patients with similar injuries in the absence of coagulopathy. Why do you think that is?

The early acute coagulopathy associated with traumatic injury has recently been recognised as a multifactorial primary condition that results from a combination of bleeding-induced shock, tissue injury-related thrombomodulin upregulation, thrombin-thrombomodulin-complex generation and the activation of anticoagulant and fibrinolytic pathways. This pathophysiology seems to promote multiple organ failure.

The European clinical practice guidelines are part of the European STOP the Bleeding Campaign. Can you tell us about this campaign?

The STOP the Bleeding Campaign was launched in 2013 and aims to increase awareness of the phenomenon of post-traumatic coagulopathy and its appropriate management by publishing European guidelines for the management of the bleeding trauma patient, by promoting and monitoring the implementation of these guidelines and by preparing promotional and educational material, organising activities and developing health quality management tools. The campaign aims to reduce the number of patients who die within 24 hours after arrival in the hospital due to exsanguination by a minimum of 20% within the next 5 years.

The acronym **STOP** comprises the following elements:

Search for patients at risk of coagulopathic bleeding,

Treat bleeding and coagulopathy as soon as they develop;

Observe the response to interventions;

Prevent secondary bleeding and coagulopathy

Are there any major changes in the fifth edition of the European guideline on management of major bleeding and coagulopathy compared to the fourth edition?

Advances in our understanding of the pathophysiology of post-traumatic coagulopathy have supported improved management strategies, including evidence that early, individualised goal-directed treatment improves the outcome of severely injured patients. Therefore, in the fifth edition, we pronounce the importance of goal-directed treatment after an initial empiric starting phase.

Moreover, the overall organisation of the current guideline has been designed to reflect the clinical decision-making process along the patient pathway in an approximate temporal sequence. Recommendations are grouped

behind the rationale for key decision points, which are patient- or problem-oriented rather than related to specific treatment modalities.

In addition, while these recommendations provide guidance for the diagnosis and treatment of major bleeding and coagulopathy, emerging evidence supports the author group's belief that the greatest outcome improvement can be achieved through education and the establishment of and adherence to local clinical management algorithms.

A key recommendation in the guidelines is to transport patients quickly to a trauma facility and to minimise the time between injury and bleeding control. Keeping in mind the fact that there is significant variation in trauma care systems within different hospital networks, a particular region and across different countries, what measures do you think can be taken to ensure this happens?

The main point is to create the awareness of the paramedics and prehospital emergency physicians that it is important and sometimes life-determining to minimise the time between injury and bleeding control. However, equally important is that the patient is transferred to this trauma centre which is able to treat the patient appropriately, even if the transfer to the hospital is a little bit longer than to the next hospital.

There is a new recommendation in the fifth edition related to the initial management of patients with expected massive haemorrhage with fresh frozen plasma (FFP). Can you elaborate on that?

In the initial management of patients with expected massive haemorrhage, we recommend one of the two following strategies:

- FFP or pathogen-inactivated FFP in a FFP:RBC ratio of at least 1:2 as needed. (Grade 1C)
- Fibrinogen concentrate and RBC. (Grade 1C)

Since neither of the two strategies has been shown to be better than the other, we recommend both possibilities. However, we have to be aware that with fresh frozen plasma, a severe fibrinogen deficiency cannot be corrected.

There is no doubt that these guidelines are very comprehensive. But in your opinion, how closely are these guidelines adhered to in actual clinical practice?

The overall organisation of the current guideline has been designed to reflect the clinical decision-making process along the patient pathway in an approximate temporal sequence. Therefore, I believe that the guideline is closely adhered to the actual clinical practice. Moreover, since the recommendations are grouped patient- or problem-oriented, it is easy to translate them into clinical practice.

> "in the fifth edition of the European guideline on management of major bleeding and coagulopathy, we pronounce the importance of goal-directed treatment after an initial empiric starting phase"

What measures do you think can be implemented to ensure greater adherence to these guidelines?

We know that adherence to these European guidelines on the management of bleeding trauma patients resulted in higher patient survival. The implementation of our recommendations might be facilitated by a checklist approach analogous to the Safe Surgery Initiative, which led to fewer postoperative complications. In addition or alternatively, it may be possible to implement our recommendations using "bundles," as has been successfully achieved during the implementation of the Surviving Sepsis Campaign guidelines. Suggested items that should be included in such a checklist or in such bundles as listed in our guideline.

Overall, how feasible do you think correction of trauma-induced coagulopathy is in severely injured patients?

We know that about 25% of all severe and bleeding trauma patients are arriving in our hospital with a trauma induced coagulopathy. My guess would be that we are able to correct the severe coagulopathy in about 50% in the following hours if we follow all the recommendations. In some of our patients, the trauma induced coagulopathy will last for much longer. A damage control surgery approach is demanded. During the intensive care treatment, the trauma induced coagulopathy will resolve.

You have significant expertise in the treatment of severe acute respiratory distress syndrome (ARDS). Are there any future research areas or projects you are working on related to treatment strategies for patients with moderate and severe ARDS?

At present, I am leading a basic German Research Foundation research programme entitled "Towards an implantable lung" (SPP 2014). Here, we are searching for new approaches to overcome the problem in the coagulation cascade during extracorporeal lung support, which is often used in the most severe ARDS patients.

You have been involved in investigating the cardio and neuroprotective effects of Xenon? Can you tell us something about this experimental work?

Indeed, we did a lot of research in this area. Although we were able to demonstrate the cardio- and neuroprotective effects in many research projects and different species, so far, we could not demonstrate a morbidity or mortality reduction in patients.

You are also interested in the use of e-health in prehospital emergency medicine. What role do you think e-health will play in future in intensive care and emergency medicine?

Yes, I established the worldwide first holistic prehospital tele-emergency system in Aachen. Since five years, it is routinely used as a structural addition to the conventional physician-based prehospital emergency system. So far, we treated about 15.000 patients using prehospital emergency telemedicine without system-related complication. I am quite sure that telemedicine in prehospital emergencies and in intensive care will play an important role to allow for a timely and guideline-based diagnosis and therapy. ■