

Editorial Response

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I would like to commend Drs Macku, Hedvicak, Quinn, and Bencko for their provocative article, “Prehospital Medicine and the Future: Will ECMO Ever Play a Role?” Their review of the technology and its application to current military doctrinal concepts offers an opportunity for reflection. It also provokes this editorial response in order to present concepts that can be applied to the application of any new and emerging technology into the most austere and challenging environments.

There is no doubt that the use of ECMO or ECLS is of absolute benefit to a subpopulation of critical medical and trauma patients. In fact, as we seek to decrease morbidity and certainly mortality on the battlefield, considering any technology or novel approach to resuscitation of patients is a worthwhile exercise.

As an emergency physician and a member of the editorial staff to consider prolonged field care (PFC) applications, I take a viewpoint that may differ from that of other medical professionals. I do, however, believe that my analysis will align with the considerations of applying advanced technology to operational utilization in the field. PFC represents the challenge of diagnosing and managing complex patients in a resource-limited environment. The entire premise hinges on a prehospital provider presented with a challenging, and many times overwhelming, problem, with limited resources, personnel, and knowledge.

When considering any new technology, implementation, although possible, must be feasible and correct application should be deemed at least probable in the providers’ hands. Ultimately, when seeking to “triage” new techniques and procedures, one must at least have a concept as to what subpopulation would this indication definitively help. For instance, if the technology were present at the right place and time, which patients who died would otherwise have lived? If this, in turn, is a potentially significant percentage, can the average provider apply this technology properly from a technical aspect (e.g., resources, training, education)? And, perhaps more importantly, can we (as policy-makers) differentiate who it would benefit and, conversely, who it might harm? Further, if there is a potential for harm, can this morbidity be minimized, and how lethal could the misapplication potentially be? Put simply, placed in a provider’s hands, will it harm more people than it could potentially help? If so, we should stop considering it at this point.

I will fully submit that the application of ECMO, once considered a fringe technology for the management of trauma patients, is presenting itself as a viable option, and the indications

for initiation are, and will continue to be, refined. Like any new technology, however, it may be overused before finding its proper place in resuscitative care. I suspect it will be some time before the trauma community can correctly define the subset of patients who would benefit from this technology.

At first review of the report by Quinn and colleagues, some obviously significant hurdles must be overcome for prehospital use, not the least of which are the cost of the technology, trained staff, and resources (power and outside medications and supplies). Perhaps the most obvious hurdles for implementation of ECMO or ECLS in the prehospital space are the technical aspects. From a first blush, adding more “lightweight equipment” will immediately meet resistance. Any new technology must either work with what an Operator already carries (see our PFC telemedicine discussions in previous JSOM editions) or prove to be so valuable as to warrant reducing another critical resource. Such obvious limitations mentioned in the article include an example of a portable machine that has a battery life of “only” 90 minutes and requirements for additional medications and vascular cannulas.

Some steps in the implementation of ECMO as presented are troubling at best and frankly dangerous or lethal in the hands of the inexperienced practitioner. These steps are identified only so they may be classified as potential training hurdles:

1. Ensuring adequate hemostasis before implementation
2. Proper resuscitation before implementation
3. Anesthesia (and not just sedation or dissociation with ketamine)
4. Heparinization
5. Potential cooling

This discussion so far has considered only the technical aspects of implementation. Perhaps most importantly, the consideration should now focus on the clinical aspects of implementation.

Just because a technology *can* be taught, does not mean it *should* be taught. This is perhaps one of the biggest challenges in forming the education and training agendas with any SOF medical curriculum. Some technologies that are common practice in any medical center are best not implemented in the prehospital space. Any new treatment modality must be analyzed to ensure it is both reproducible and safe. If the potential morbidity of improperly implementing the technology unknowingly can lead to the patient’s death (a “clean kill”), control measures must be considered. A common discussion of a similar concept is the consideration of rapid-sequence intubation (or induction), and the PFC Working Group’s

subsequent recommendation against this technique in favor of surgical airways as the definitive airway of choice for most SOF Medics.

Last, in the current context of limited training time and clinical practice time, there exists only a finite amount of time for training and implementation of any patient management techniques. If we are to embrace a new technology, what other training or education will we cut out of the current curriculum? As operational planners and trainers, we currently struggle to implement accepted practice standards that we know would benefit our patients. The latest training challenge for many, undoubtedly, is ensuring the initiation of fresh whole blood transfusions as close to the point of injury as possible. With such current challenges with easier tasks, I would submit that the SOF medical community should focus on these obvious challenges and leave the academic discussions to the scientists to study further, rather than jump at the potentially

possible at the risk of not focusing on the basics. Master the basics, and don't be distracted by another new, shiny object.

The authors rightly caveat the introduction of this new technology and propose further study and research, as well as the potential introduction for consideration by other Combat Casualty Care focus groups. Their provocative report is interesting and presents challenging questions to be considered. It also provides a forum to present the greater challenges of assessing technology for recommended use in the PFC environment. “. . . will ECMO ever play a role?” I don't know—but it shouldn't, in the SOF PFC space, right now.

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