

THINKING OUTSIDE THE BOX - JUSTIFIED BREAKS WITH MANAGEMENT PROTOCOLS

by John Marini MD



Patient care protocols have been implemented for many common tasks related to critical care in an attempt to standardize, routinize, and streamline management. Using them, personal judgments are intentionally kept to a minimum. Rather, a series of conditional steps with evaluation criteria are spelled out, with either progression to the next level of the algorithm or a mandated "exit flag" that aborts the sequence. Their contributions to everyday practice are beyond reasonable doubt when the objective, the evaluation criteria, and the interventions are unquestioned. A good example here is the reminder for sedation to be lightened on a daily basis so that only enough drug is given to assure comfort without unnecessary and unnoticed suppression of consciousness. It seems certain that potentially costly and high risk days on ventilator have been reduced by implementing rule-based sedation monitoring and management. With limited resources, and the varying education and experience of the increasingly turbulent caregiver pool, eliminating undesired variability in common tasks helps to expedite care, improves safety, and makes sense--doesn't it? Ironclad rules can be applied by caregivers of varying ability and work well for the majority of patients. Sound pretty good--so far.

Strong advocates of protocolized care believe that we should approach even complex problems in this fashion, citing the well worn parallel to the "checklist" routines pilots undertake pre-flight before leaving the gate and during the landing

process. These serve as invaluable reminders of what to check and what to do in sequence. To a point, this seems an instructive analogy with clear implications for bedside practice. After all, aviation does indeed have an admirable safety record, considering the enormous number of daily take-offs and landings and the complexity of modern aircraft. Superficial similarity, however, does not itself validate the practice for ventilatory care. Aircraft are engineered with proven principles in mind, manufactured to uniform specifications, hard-wired to behave predictably, and monitored reliably at all crucial points. Moreover, they are managed on the ground and in flight by experts (mechanics and pilots) who know how to interpret and appropriately respond to checklist or gauge violations. Very importantly, there is redundancy and backup built into these routines. Not one of these characteristics is shared by the complicated ICU patient scenario--for all but the least challenging cases, I have serious reservations about relying on protocols for guidance. Protocols are no substitute for experience; inherently complex problems, such as graded ventilator withdrawal /extubation ("weaning") cannot easily be put on autopilot. A recent case from my own practice illustrates my concern.

A 48 year-old non-English speaking and indigent man with short stature who weighed more than twice his ideal value was admitted to our intensive care unit with acute-on-chronic respiratory failure precipitated by pneumonia, hypoxemia and presumed obstructive sleep apnea. Deterioration had set in over a three week period, culminating in the fever and hypercapnia-induced obtundation that forced his family to seek medical attention for him. After one week of invasive ventilation, he had been diuresed, administered adequate oxygen, and treated appropriately for bacterial pneumonia. Basilar infiltrates had improved. Hemoglobin, electrolytes and endocrine tests were in order. Arterial blood gases had been corrected to values appropriate to his compensated abnormal baseline (PaCO₂ ~ 60 mmHg). Cardiac contractility was judged normal by echocardiogram. With the upper airway bypassed by the endotracheal tube, we knew that obstructive sleep apnea had been relieved and he appeared progressively alert and cooperative. Sedation needs were minimal. In short, we believed that we had addressed the acute problems that precipitated admission. From the viewpoint of our care team, we had little else to work on. Although supportive, the family--fearful, inquisitive and exhausted by their near-constant bedside vigil--pressured for signs of progress.

Yet, multiple "spontaneous breathing trials" were attempted, with discouraging results. Following protocol, a very high rapid-shallow breathing index (RSBI >150) almost immediately forced his exit from such trials. As the attending physician, I was faced with the prospect of continuing orotracheal intubation, ordering a tracheostomy on this man with very high risk neck anatomy, or scrapping the protocol and attempting extubation. After considerable deliberation and with the poorly concealed skepticism of our excellent Respiratory Care Practitioners and Pulmonary/ICU fellow, I chose the latter course. To our collective relief, my "Spruce Goose" sputtered a little, but flew.

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every way possible but must not be lulled into a sense of security that we become complacent. How often do we hear people ask how something could have happened? Our world is not 100% safe yet our technology and systems mislead us into thinking that it is and everything is taken care of.

What can we do?

We can be safer and reduce the risks in our everyday lives if we acknowledge and understand how our minds and their models work. The most important thing we can do is getting off autopilot when it comes to operating in areas or risk. Protocols and checklists do if fact work but we must also slow down the process and examine what you are doing. Does the phrase "take a time out" sound familiar? The Joint Commission looks for this procedure in every operating room to reduce the risk of operating on the wrong patient to cutting off the wrong leg. It is simply a break in the fast routine of everyday operations to reexamine and think. Allow yourself time for a second thought, because first thoughts are sometimes not thoughts at all. Have you heard of the acronym STOP (Stop, Think, Observe, Plan)? In diving we have a similar recipe when faced with problems and nearing a panic situation: STA (Stop, Think, Act). First Stop, get off autopilot, this may be a situation you never before experienced so don't act yet. Think, see all your options and pick the best. Act, implement your plan. I would add to this, take a slow Deep Breath, which actually helps to break the panic cycle. Your world will be safer when you are not operating on autopilot and just think how wonderful the world is when you are actually observing it. Slow down the pace. Just think how many accidents occur when you are rushed and autopilot is in high gear. When you are interrupted during a routine safety check, start over! Yes it takes time but then ask yourself how important is it and what are the consequences if something is missed. In the hyperbaric environment that cost may be extremely high. Before you close the chamber door, take a time out.

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She is a completely normal young female in appearance except for the findings when examining her chest and chest x-ray. Auscultation reveals clear breath sounds throughout with the presence of plural rub bilaterally and the Heimlich valve with an air leak located on her right chest. The chest x-ray report notes the presence of an FBO located over the medial aspect of the left hemidiaphragm. Normal mediastinum is noted in the radiology reports. Also seen has been the presence of multiple small pulmonary cysts, bilaterally, renal and liver lesions, and multiple sclerotic bone lesions, all consistent with TS and LAM. A stable right pneumothorax with thoracotomy tube is in proper placement for treatment of persistent pneumothorax on the right side.

Treatment options for this patient are limited. "Without lung transplant, there is a 50-80% 5-year survival rate". Since LAM primarily occurs in child bearing aged women it is thought that hormonal stimulus affects the disease process. Treatments with; progesterone, oophorectomy, tamoxifen, gonadotropin-releasing hormone (GnRH) agonists, and androgen therapy have been used to diminish estrogens effects with varying results and unwanted side effects. Treatment with doxycycline may have little side effects and sirolimus is being tested as a treatment for LAM.

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I was not being deliberately foolhardy--I respect my co-workers greatly and made preparations to use bi-PAP temporarily and re-intubate quickly if necessary. To justify my decision to myself and to others, I had to integrate many pieces of unquantifiable data and weigh their influence against that of an accepted numeric index of 'weanability'. I was aware that rapid shallow breathing is inherent to ambulatory patients with restrictive (low compliance) diseases of the chest and to those with reflexes triggered by lung parenchymal disorders. Moreover, the RSBI rises predictably when ventilatory requirements increase--even in healthy exercising normal individuals. The patient had good cardiac reserve, appeared alert, and although working noticeably to breathe, did not appear in marked distress, despite his frighteningly high RSBI. His minute ventilation did not fall when on low level pressure support, and there was noticeable variation in the depth and frequency of breathing. Perhaps most convincingly, he had only a modest secretion load and seemed to exhibit some strength reserve when his cough reflex was stimulated by the suction catheter. Finally, I explained as best I could what adverse events might happen when we removed the tube, and yet the patient remained eager to try. The "gleam in the eye" and breadth of the smile were hard to score on the protocol sheet.

Widespread enthusiasm for protocolized ventilator care reflects its generally positive impact. If thoughtfully designed and implemented, protocols expedite quality care. even Even when unsuccessful identify those patients whose management details need closer attention. Many of the toughest problems, however, seem to yield only to experience and a reasoned analytical approach that integrates clues from a variety of sources. Some of these signals defy facile coding into rules and care directives. In these all-too-frequent instances, the rules must and should be broken.

Dr. Marini, MD, Professor of Medicine at the Univ of Minnesota, is a clinician-scientist whose investigative work has concentrated in the cardiopulmonary physiology and management of acute respiratory failure. In the majority of his research, he has been positioned at the interface between basic physiology and clinical medicine so as to develop insights into advancing clinical practice.