

CONTENTS

Preface	xiii
Mark D. Siegel	

Implementing an Electronic Medical Record	347
Lloyd N. Friedman, Neil A. Halpern, and James C. Fackler	

We consider the practical aspects of justifying, planning, implementing, and budgeting for an electronic medical record. Examples include the decision about integrating versus replacing old systems, the timing of implementation for each clinical area, preparation for installing computerized order entry, a discussion about how to implement physician progress notes, and a discussion about how electronic nursing systems interact with the EMR. Integration of other systems such as PACS and EKGs are discussed. Wireless integration and telemedicine also are addressed, as well as backup, redundant systems and budgeting. The reader will gain a full understanding of the scope of the problems involved in implementing an EMR, and will have a step-by-step description of how to approach the task.

Noninvasive Hemodynamic Monitoring in the Intensive Care Unit	383
Paul E. Marik and Michael Baram	

This article reviews the clinically available devices that have been approved for noninvasive hemodynamic monitoring in critically ill patients. In addition this article reviews some of the surrogate markers that can be used to assess adequacy of cardiac output.

Invasive Intravascular Hemodynamic Monitoring: Technical Issues	401
Sheldon Magder	

There is a lot of discussion in the literature about the best way to manage hemodynamic problems, but no algorithm can be useful

unless the hemodynamic measurements that are used in the algorithms are valid. Yet, studies repeatedly have shown that physicians and nurses do not have a strong knowledge of the principles of measurements. Key factors in the use of transducers are zeroing, leveling, and calibrating. An understanding of the concept of transmural pressure is key to avoiding many potential artifacts related to variations in pleural pressure. The location of the proper place for measurement on the actual waveform can also be a source of error. This article covers these points as well as some suggestions for trouble-shooting.

Abdominal Compartment Syndrome: Clinical Aspects and Monitoring

415

Felix Lui, Ayodele Sangosanya, and Lewis J. Kaplan

Markedly elevated intra-abdominal pressures will result in predictable hemodynamic consequences related to compromised venous return. When the hemodynamic abnormalities are associated with organ dysfunction or failure, patients suffer from the abdominal compartment syndrome. At-risk patients should be routinely monitored for intra-abdominal hypertension, and a multidisciplinary care paradigm should be established. Vigorous resuscitation of both surgical and medical patients highly correlates with IAH and ACS risk. Vigilance, prompt diagnosis, and intervention for abdominal compartment syndrome will reduce the morbidity and mortality in critically ill. Future challenges include altering resuscitation strategies to reduce ascites formation, earlier diagnosis of organ dysfunction, and intra-organ monitoring techniques.

Laboratory Testing in the Intensive Care Unit

435

Michael E. Ezzie, Scott K. Aberegg, and James M. O'Brien, Jr

Laboratory testing is ubiquitous among hospitalized patients and is more common among patients in the intensive care unit (ICU). Despite its high cost and prevalence, there are few data to support the current practice of laboratory testing in most ICUs. Although testing offers considerable potential benefits, it is not without risk, including misleading results, iatrogenic anemia, and therapeutic actions of uncertain benefit. Laboratory testing should be conducted as part of a therapeutic approach to a clinical problem, mindful of pretest probability of disease, the performance of the selected test, and the relative benefits and risks of testing. Considering the indication for a particular test can lead to a more rational approach to laboratory testing and better use of available tests.

Endocrine Assessments During Critical Illness

467

Olga V. Sakharova and Silvio E. Inzucchi

The evaluation of hormonal status in critically ill patients is challenging and has many pitfalls. This article reviews proper

assessment of glycemic status AND adrenal and thyroid function during critical care.

The Cognitive Consequences of Critical Illness: Practical Recommendations for Screening and Assessment

491

Max L. Gunther, James C. Jackson, and E. Wesley Ely

Critically ill patients are at risk for several secondary complications, including delirium and long-term cognitive impairment. The exact mechanisms of delirium and ICU-related cognitive decline are not fully understood; however, the authors review several recent investigations that have proposed plausible explanations. This article also includes several practical guidelines for the identification and management of delirium to aid in the development and implementation of clinical procedures that will lower the risk for ICU delirium and cognitive decline.

Multimodality Monitoring in Neurocritical Care

507

Katja Elfriede Wartenberg, J. Michael Schmidt, and Stephan A. Mayer

Multimodality monitoring of cerebral physiology encompasses the application of different monitoring techniques and integration of several measured physiologic and biochemical variables into assessment of brain metabolism, structure, perfusion, and oxygenation status. Novel monitoring techniques include transcranial Doppler ultrasonography, neuroimaging, intracranial pressure, cerebral perfusion, and cerebral blood flow monitors, brain tissue oxygen tension monitoring, microdialysis, evoked potentials, and continuous electroencephalogram. Multimodality monitoring enables immediate detection and prevention of acute neurologic injury as well as appropriate intervention based on patients' individual disease states in the neurocritical care unit. Real-time analysis of cerebral physiologic, metabolic, and cardiovascular parameters simultaneously has broadened knowledge about complex brain pathophysiology and cerebral hemodynamics. Integration of this information allows for more precise diagnosis and optimization of management of patients with brain injury.

Thoracic Imaging in the ICU

539

Ami N. Rubinowitz, Mark D. Siegel, and Irena Tocino

Imaging in the ICU plays a crucial role in patient care. The portable chest radiograph (CXR) is the most commonly requested radiographic examination, and, despite its limitations, it often reveals abnormalities that may not be detected clinically. Recent advances in CT technology have made it possible to obtain diagnostic-quality images even in the most dyspneic patient. This article reviews the significant contribution thoracic imaging makes in diagnosing and managing critically ill patients.

Monitoring the Mechanically Ventilated Patient

575

Vasileios Bekos and John J. Marini

In the intensive care setting, monitored data relevant to the output, efficiency, and reserve of the respiratory system alert the clinician to sudden untoward events, aid in diagnosis, help guide management decisions, aid in determining prognosis, and enable the assessment of therapeutic response. This review addresses those aspects of monitoring we find of most value in the care of patients receiving ventilatory support. We concentrate on those modalities and variables that are routinely available or easily calculated from data readily collected at the bedside.

Liberation from Mechanical Ventilation: What Monitoring Matters?

613

Jonathan M. Siner and Constantine A. Manthous

Over the past 2 decades, the art of “weaning” from mechanical ventilation has been informed by increasing published basic science and outcomes studies. Although monitoring technologies can provide vast amounts of information before, during, and after liberation from mechanical ventilation, little data exists on how to maximally harness even routinely monitored, basic physiologic parameters. Overdependence on technology and derived variables, without data to demonstrate benefit, may even inhibit the patient’s progress if it is used inappropriately. We review the scientific evidence for best using routinely available physiologic data and a few more sophisticated and invasive monitoring technologies during weaning. We also suggest future study designs that would better inform the process of liberation from the ventilator and endotracheal extubation.

Severity of Illness and Organ Failure Assessment in Adult Intensive Care Units

639

Bekele Afessa, Ognjen Gajic, and Mark T. Keegan

The critical care community has been using severity and organ failure assessment tools for over 2 decades. The major adult severity assessment models are Acute Physiology and Chronic Health Evaluation, Simplified Acute Physiology Score, and Mortality Probability Model. All three recent versions of these models perform well in predicting hospital mortality. Sequential Organ Failure Assessment score is the most used tool for assessment of multiple organ failure. These tools have been used extensively in clinical research involving critically ill patients and for benchmarking and the measurement of performance improvement. Their roles as clinical decision support tools at the bedside await future studies because of their unknown or poor performance at the individual patient level.

Monitoring Patient Safety

659

Sean M. Berenholtz and Peter J. Pronovost

The opportunity to improve patient safety is significant and the pressure to improve it is increasing. An approach to evaluate an organization's progress with patient safety efforts has not been clearly articulated, and existing efforts to monitor safety are likely inadequate. We present a framework to monitor patient safety, combining valid rate-based measures to evaluate outcomes and processes of care, and non-rate-based measures to evaluate structure and context of care. We present an example of how the safety scorecard from this framework is used to monitor patient safety at The Johns Hopkins Hospital and in over 150 ICUs in Michigan, New Jersey, and Rhode Island.

Index

675