



## **A Toolkit for Intensive Care Units to Improve the Safety and Quality of Patient Care**

**Produced under the auspices of the  
Michigan Health and Safety Coalition**

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Improve the Safety and Quality of Patient Care  
Produced under the auspices of the  
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Welcome to the ICU Toolkit brought to you by the Michigan Health and Safety Coalition.

**Toolkit Helps Hospitals Achieve ICU Physician Staffing Standards**

Michigan hospitals have demonstrated their commitment to improving patient safety and quality by participating in the Michigan Health and Safety Coalition's annual survey. The survey assesses hospital performance relative to guidelines for evidence-based best practices. The guidelines steer hospitals to use special physicians known as intensivists who are educated to provide ICU services. Additionally, the toolkit shows hospitals how to use intensivist-led teams and to adopt programs, policies and procedures that value ICU team involvement and improve safety.

The toolkit is a reference to help hospitals:

- Evaluate their ability to provide ICU care
- Identify the activities and resources needed to provide optimal care
- Implement new and strengthen ongoing patient safety improvement activities
- Measure improvements in patient and hospital outcomes of care
- Adopt an ICU model of care that reflects evidence-based best practices

**Intensive Care Units: need for a new model of care**

Of the five million patients who will be admitted into an ICU this year, nearly all will suffer a life-threatening care-giving error. The answer to improving the safety and quality of care offered to our most vulnerable patients is two-fold:

- Implement systems, processes and conditions that support top-quality performance
- Provide access to an adequate supply of the health professionals who are educated to provide ICU care, including physicians, nurses, pharmacists and others. Physicians who specialize in providing ICU services are known as intensivists.

## **Intensivists: The first choice**

Having an intensivist on staff in the ICU is the single most important factor in reducing errors and improving quality. The intensivist provides leadership for the ICU, admits and discharges every patient and drives safety improvement efforts. While the current shortage of intensivists makes it difficult for all hospitals to adopt an intensivist model of care, the Coalition toolkit helps hospitals make valuable transitional steps.

## **About the toolkit**

The toolkit was developed by a distinguished volunteer workgroup of health professionals, experienced in leading Intensive Care Units and improving safety and quality of care. The recommendations embodied in the toolkit are based on current research and best practices. The panel met in 2003 to develop recommendations based on the MH&SC ICU Physician Staffing Guideline.

## 1. Creating a Culture of Patient Safety

Hospitals are strongly encouraged to foster a culture that emphasizes safe patient care. In intensive care units, where care for patients crosses many disciplines, development of strong multidisciplinary teams is central to improving patient safety. Strengthening ICU teams involves structuring formal and informal communications and team-building activities that focus on safety.

Inherent in fostering a culture of safety are particular interaction patterns among ICU teams. Specifically, ICU team members must be comfortable asking each other questions, challenging behaviors of team members and processes of care that have the potential to compromise safety. Additionally, as the demands of a busy work environment change, ICU staff should be comfortable stating their stress level so work can be distributed in ways that maximize the ability of the staff to provide safe patient care. In communicating work-related stress, staff should not fear repercussions but instead should assume that support and a spirit of cooperation and collaboration will follow. The unit should strive for a blend of personal accountability and willingness of staff members to help teammates during crisis situations.

In creating a culture of safety, hospital and ICU leaders and staff should identify and employ a variety of formal and informal mechanisms. Formal mechanisms include continuing education and regular meetings among critical care staff. It also includes communicating the ICU's patient safety culture to the hospital's administrative and operational committees to ensure cooperation from other areas of the hospital. Informal means include networking and social gatherings where safety culture goals can be furthered.

All formal and informal safety improvement activities should approach the issue systematically. Experts in this field argue that “once health professionals are encouraged to view adverse events as errors of the system, it becomes easier for them to identify long-standing procedural routines that might be creating hazards.”<sup>1</sup> To improve the hospital's ability to systematically approach safety improvement, it may be instructive to consider the following eight steps in the process of implementing a culture of safety as adopted by the Johns Hopkins University School of Medicine.

1. Conduct a cultural survey to assess baseline (prevailing) attitudes about medical errors and safety issues
2. Educate staff on the science of safety
3. Identify staff's safety concerns through a safety survey
4. Analyze events
5. Implement improvements
6. Document results
7. Share stories and disseminate results
8. Resurvey staff — cultural survey

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<sup>1</sup> Making a Science of Patient Safety. John Hopkins University School of Medicine. Pg 5.

## **2. The Michigan Health and Safety Coalition ICU Physician Staffing Guideline**

The Michigan Health and Safety Coalition (MH&SC) Intensive Care Unit Physician Staffing Guideline was developed in 2001 and is designed to improve the safety and quality of patient care in all Michigan hospitals providing adult ICU care. Michigan hospitals with intensive care units evaluate their performance relative to the guideline through the MH&SC's annual survey of hospitals.

The MH&SC ICU physician staffing guideline recognizes the important role intensivists and other appropriately qualified physicians have in increasing and maintaining the safety and quality of ICUs.

The MH&SC ICU guideline advises that intensive care units be managed by an intensivist, a physician certified (or eligible for certification) in critical care medicine who directs clinical care for the ICU where:

- Concurrent care by the primary attending, surgical or medical doctor is encouraged for all patients; and
- The intensivist monitors admission and discharge criteria, and implementation of care protocols.

The intent and ultimate goal of the MH&SC's work related to ICU safety is to increase the number of Michigan hospitals that fully meet the ICU staffing guideline and adopt the model of ICU care endorsed by the MH&SC and other national organizations. The MH&SC recognizes that there are factors that make it difficult for some hospitals to fully adopt the endorsed model of ICU care. Even so, this toolkit suggests transitional steps hospitals can take to move closer to meeting the guideline and adopting the endorsed model of care. Although adoption of the transitional steps in the absence of an intensivist to manage the ICU will not permit the hospital to fully meet the MH&SC guideline, the efforts will bring Michigan hospitals more in line with the recommended safety benchmarks.

### 3. Why Focus on Intensive Care Units?

*“Health care has safety and quality problems because it relies on outmoded systems of work. If we want safer, higher quality care, we will need to have redesigned systems of care.”*<sup>2</sup>  
Institute of Medicine

The widely publicized 1999 report by the prestigious Institute of Medicine, *To Err is Human: Building a Safer Health System*, provided an urgent wake-up call on the need for institutional efforts to improve patient safety. The IOM concluded that each year between 44,000 and 98,000 deaths result from preventable medical errors in the United States. The complexity and cost of care in the ICU (30 percent of acute care hospital costs, or \$180 billion annually<sup>3</sup>) make it a prime target for patient safety improvement activities. Why? The complexity of ICU care leads to adverse events and poorer patient outcomes than would be expected if the errors did not occur. Adverse events cost money to cover the cost of additional tests and procedures, additional lengths of stays, more medications and increased levels of disability.

In the last few years, many national organizations, in addition to the Institute of Medicine, have focused on ICU care. For example, the Institute for Healthcare Improvement, the Joint Commission on the Accreditation of HealthCare Organizations, the National Quality Forum and The Leapfrog Group have all chosen to focus on ICU because errors are common in this complex health care environment, making some of the most critically ill patients vulnerable to an adverse event.

A 1997 study in a large teaching hospital identified 45.8 percent of ICU patients as having experienced an adverse event, of which 17.7 percent were defined as “a serious adverse event” – meaning the event produced disability or death.<sup>4</sup> In a different study in the same year, the rate of preventable adverse drug events and potential adverse drug events in ICUs was 19 events per 1,000 patient days.<sup>5</sup>

Most of these errors are due to problems related to the systems, processes and conditions of health care institutions rather than to the culpability of individual professionals.<sup>6</sup> For this reason, safety improvement activities should focus on creating systemic improvements in the structure, processes and outcomes of care. In the ICU, scientific evidence indicates that the single most important

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<sup>2</sup> Institute of Medicine. (2001). *Crossing the Quality Chasm*. Washington, DC: National Academy Press.

<sup>3</sup> Pronovost, Peter J. A Passion for Quality, Pg 2, Accelerating Change Today (A.C.T.) September 2002

<sup>4</sup> Andrews, Lori B; Stocking, Carol; Krizek, Thomas; et al. An Alternative Strategy for Studying Adverse Events in Medical Care. *Lancet*. 349:309-313, 1997.

<sup>5</sup> Cullen , David J.; Sweitzer, Bobbie Jean; Bates, David W.; et al. Preventable Adverse Drug Events in Hospitalized Patients: A Comparative Study of Intensive Care and General Care Units. *Crit Care Med*. 25 (8) 1289-1297, 1997.

<sup>6</sup> Making a Science of Patient Safety. John Hopkins University School of Medicine, Baltimore MD. Accelerating Change Today (A.C.T.) Pg 4. September 2002

factor in improving the quality and safety of ICU care is using intensivists to manage the ICU unit.<sup>7</sup> Recent literature has shown that higher mortality rates exist in hospital ICUs that are not staffed by physician intensivists who are educated in critical care medicine.<sup>8</sup> Employment of intensivists, supplemented by other structural and process improvements, leads to improved outcomes of care AND significant cost savings.

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<sup>7</sup> National Quality Forum. Background, Summary, and Set of Safe Practices.

<sup>8</sup> Pronovost PJ, Waters H, Dorman T. (2001). Impact of critical care physician workforce for intensive care unit staffing. Curr Opin Crit Care. 7(6):456-459.

#### **4. How this Toolkit was Developed**

The toolkit was developed by a nine-member Intensive Care Unit Implementation Workgroup comprised of intensive care experts, including physicians, nurses, allied health professionals and hospital administrators. Its work was supported by a seven-member team of MH&SC members, technical and policy experts and administrative staff. The workgroup developed this Web-based toolkit for use by Michigan hospitals. The toolkit is an aid for hospitals to incrementally improve structures and processes in their ICUs by adopting evidence-based best practices that meet the MH&SC ICU Physician Staffing Guideline, which recommends that intensivists manage ICUs.

The recommendations contained in this toolkit are a roadmap to help hospitals

- Evaluate their ability to provide ICU care
- Identify the activities and resources needed to provide optimal care
- Implement new and strengthen ongoing patient safety improvement activities
- Measure improvements in patient and hospital outcomes of care
- Adopt an ICU model of care that reflects evidence-based best practices

The most recent evidence-based literature was reviewed and expert clinical opinion was used to develop the recommendations. References to the literature are cited throughout the toolkit. It is highly recommended that users of the toolkit become familiar with referenced materials as they are a rich and varied source of supplemental information.

The MH&SC is grateful for the outstanding support of the health professionals and leaders in treating intensive care unit patients who served as ICU Implementation Workgroup members.

#### **Intensive Care Unit Implementation Workgroup Members**

John R. Armstrong, MD  
Medical Director, Critical Care  
Sparrow Hospital

Patti Chaivre, RN, BSN  
Director, ICU/CCU  
Chelsea Community Hospital

Bruno DiGiovine, MD  
Director, Medical Critical Care Unit  
Henry Ford Hospital

Robert C. Hyzy, MD  
Clinical Assistant Professor of Internal Medicine  
University of Michigan Health System

Angie Janik, RN, MSN, MBA  
Chief Nurse Executive  
Borgess Health Alliance

Daniel M. Navin, MD  
Pulmonologist/Intensivist  
Munson Medical Center  
Pulmonary and Critical Care of Northwest Michigan, PC

Pat Roberts, RN, MS  
Director, Critical Care and Emergency Services  
Port Huron Hospital

Carolyn Schaefer, RN, MS  
Director, MedSurg/Critical Care  
Holland Community Hospital

Frank Sottile, MD  
Chief Medical Officer  
Crittenton Hospital Medical Center  
Medical Staff Office

### **Intensive Care Unit Implementation Workgroup Support Team**

Peggy Brey  
Vice President  
Medical Review, Outreach, & Long Term Care  
MPRO

Vicky Pebsworth Debold, RN, PhD  
Clinical and Research Consultant, MH&SC

Gregory J. Forzley, MD  
Medical Director, Systems Development  
Advantage Health

Chris Goeschel, RN  
Executive Director, Keystone Center for Patient Safety & Quality  
The Health Trust  
Michigan Health & Hospital Association

Mary Ann Ingraham  
Specialist, Coalition Activities  
Blue Cross Blue Shield of Michigan

Mary Ellen Mohn  
Manager, Managed Care Communications  
Blue Cross Blue Shield of Michigan

Diane Valade  
Director, Coalition Activities  
Blue Cross Blue Shield of Michigan

## 5. The Ideal Intensive Care Unit

A culture of safety is not a casual or an inevitable outcome for an Intensive Care Unit, but rather it requires focused and constant attention and directed efforts. To improve safety and quality, hospitals should focus on three key areas:<sup>9</sup>

- Creating a culture of safety
- Reducing complexity
- Establishing independent redundancies for key processes

More specifically, successful ICUs commonly share three main features. As described below, the features of successful ICUs involve the following:

1. Using a systems approach. Successful ICUs modify the conditions that contribute to errors.<sup>10</sup> A system is a set of interdependent elements interacting to achieve a common aim. The elements may be both human and non-human (equipment, technologies, etc.).<sup>11</sup> According to the Institute for Healthcare Improvement such a system includes:
  - A leadership system that assures organized systematic care
  - An ICU care team and executive leadership that assure continuous improvement
  - Efficient and timely delivery of services within a system of care
  - Shared decision making between family and staff
  - A safe and orderly environment for patients, families and staff
  - A skilled, coordinated and collaborative care team
2. Creating a specific environment. Successful ICUs work to establish work environments that embody specific characteristics.<sup>12</sup> The ICU characteristics create an environment that:
  - Is patient focused
  - Is trusting and open
  - Is comfortable, compassionate and caring
  - Has strong leadership
  - Has everyone on the team involved in rapid cycle improvements
  - Has excellent communications
  - Has a scientific process of improvement
3. Basing changes on scientific evidence. The impetus to make changes in staff-related structures and processes of care are based on the literature. In particular, successful ICUs recognize that:<sup>13</sup>
  - Single largest affect arises from having an intensivist-led team<sup>14</sup>

<sup>9</sup> Pronovost, 2003 IHI Audio Conference

<sup>10</sup> To Err is Human, pg 49

<sup>11</sup> Reason, James, Human Error Cambridge: Cambridge University Press, 1990.

<sup>12</sup> Clemmer, Terry P. and Spuhler, Vicky J. 2003 IHI Audio Conference

<sup>13</sup> Lindsay, Mark MD, IHI Audioconference 2003

- Nurse staffing levels affect health and cost outcomes<sup>15, 16</sup>
- Pharmacists on rounds are associated with a large reduction in adverse drug events<sup>17</sup>

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<sup>14</sup> Pronovost PJ, Jencks M, Dorman T, et al. (1999). Organizational characteristics of intensive care units related to outcomes of abdominal aortic surgery. JAMA. 281(17):1310-1312.

<sup>15</sup> Aiken LH, Clarke SP, Sloane DM et al. (2002). Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. JAMA. 288(16):1987-1993.

<sup>16</sup> Needleman J, Buerhaus P, Matke S, et al. (2002). Nurse-staffing levels and the quality of care in hospitals. N Engl J Med. 346(22):1715-1766.

<sup>17</sup> Leape LL, Cullen DJ, Demspey CM, et al. (1999)/ Pharmacist participation on physician rounds and adverse drug events in the intensive care unit. JAMA. 282:267-270.

## 6. Intensivists

### Definition of Intensivist

Intensivists are board-certified physicians who are additionally certified in the subspecialty of Critical Care Medicine. This certification is awarded by the American Boards of Anesthesiology, Internal Medicine, Pediatrics and Surgery. Because subspecialty certification is not offered in emergency medicine, emergency medicine physicians are considered certified in Critical Care Medicine if they are board-certified in Emergency Medicine and have completed a critical care follow-up fellowship at an ACEP-accredited program.

Additionally, there are other physicians who are considered to be appropriately qualified and meet the intensivist requirements. These qualifications were developed by the National Quality Forum (<http://www.qualityforum.org/>) and are supported by the MH&SC ICU team. Physicians who meet these qualifications are those who completed training prior to the availability of subspecialty board certification in critical care in their specialty area. Specifically, physicians who are board-certified in Internal Medicine, Anesthesiology, Pediatrics or Surgery prior to 1987 and who have provided at least six weeks of full-time ICU care annually since 1987 are determined to be appropriately qualified and meet the requirements for being an intensivist.

### Demand for Intensivists

As more and more hospitals have recognized the value of intensivist-led intensive care units, the demand for these specialists has increased. A recent study found that fewer than 6,000 intensivists are in active practice in the United States. At the same time, less than 15 percent of ICUs had dedicated intensivists and those without had little hope of hiring intensivists from the limited pool available.<sup>18</sup>

The shortage is expected to increase as many teaching hospitals have decreased the size of their critical care fellowship programs for financial reasons.<sup>19</sup>

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<sup>18</sup> COMPACCS Study, JAMA, 2000; 284:2762

<sup>19</sup> Leapfrog Group ICU Fact Sheet: [http://leapfroggroup.org/FactSheets/ICU\\_FactSheet.pdf](http://leapfroggroup.org/FactSheets/ICU_FactSheet.pdf)

## **7. ICU Infrastructure**

This section of the toolkit addresses the infrastructure needed to provide safe and effective care in the ICU. Infrastructure includes people (staff), equipment and supplies and the physical environment. The ICU nurse manager and medical director are responsible for assessing the adequacy of the ICU's infrastructure.

### **ICU Caregivers and Support Staff**

The people who support the function of an ICU can be divided into two main groups: people who provide direct hands-on care to patients and people who serve in supportive roles but do not provide direct patient care.

Direct caregivers who work in the ICU include physicians, nurses, therapists and others. Physician caregivers include ICU medical directors, intensivists and others. Hospitals that do not employ an intensivist or an appropriately certified physician as discussed under Section 6 of the toolkit should employ a hospitalist to serve as the ICU medical director. The medical director is responsible for admissions and discharges into the unit and for generating protocols of care. Hospitals may also employ various types of technology to obtain the services of an intensivist. Please note that the technology-based and hospitalist models of care do not meet the MH&SC ICU Physician Staffing Guideline.

Nurses are a major category of direct ICU caregiver. Nursing staff includes the nurse manager and staff nurses. It also includes certain types of ancillary support staff including nurse aides, patient care technicians and patient lift teams. Given the critical shortage of ICU nurses, hospitals should implement programs that contribute to the health and satisfaction of nurses. One example of such a program would be to employ a lift team. Lift teams free nurses to perform activities that do not require nursing skills. They also decrease back injuries and workers' compensation claims, increase nurse satisfaction and aid in recruiting.

Other direct ICU caregivers include mid-level practitioners including nurse practitioners and physician assistants. Additionally, other important components of direct ICU caregivers include various types of therapists, especially respiratory therapists, and specialty teams including IV and phlebotomy. Critical to the success of the ICU are the services provided by pharmacists.

Support staff includes a wide variety of very important resources that buttress the work of the direct ICU caregivers. Given the shortage of ICU staff nurses, support staff should be used as appropriate and feasible to permit nurses to focus on direct patient bedside care rather than a variety of duties that do not require their skills. To that end, unit clerks and secretaries, as well as transportation services, should be employed as appropriate.

### **Staffing Levels**

Hospitals should staff their ICUs so they have all the health professionals required to provide safe and effective care for critically ill patients. ICUs should

regularly conduct a staffing assessment and develop and implement a plan to correct all identified inadequacies. It is assumed that staffing assessments will be conducted and tracked on a quarterly, if not monthly, basis.

Each ICU must determine the appropriate ratio of staff members to ICU patients, based on the type of patients admitted to the ICU and other structural aspects of the ICU. The appropriate ratio of staff to patients should be considered on a caregiver-by-caregiver basis. In other words, the ratio of registered nurses to patients should be considered independent of the ratio of respiratory therapists to patients. Generally, ICUs should have at least one registered nurse for every two to three patients, but there may be some circumstances where certain ICUs need to have one registered nurse for each patient. The unit staff — usually the ICU charge nurse — on a shift-by-shift basis should monitor the conditions and complexity of patients, seek feedback from the staff regarding workload and make staffing decisions accordingly. Similar methods for determining staffing needs should be used by all other caregivers and their managers. Managerial staff should work collaboratively to make sure that all staffing needs are communicated and addressed appropriately.

### **Monitoring and Information Technologies**

All ICUs use numerous types of equipment and information technologies to monitor the patient's condition, support vital life functions and communicate changes in the patient plan of care to other members of the team. All equipment must be appropriate to properly care for the ICU's patient population and be properly maintained and replaced as needed. In addition, to communicate the patient's condition and changes in the plan of care, ICUs should include computerized physician order entry (CPOE) systems. CPOE should be implemented in the ICU only after it has been tested and is working well in other areas of the hospital.

### **Supplies and the Physical Environment**

Hospitals must have sufficient inventory on hand to provide safe and effective care for critically ill patients. Inventory includes the disposable products, medications and intravenous fluids, linens and equipment used in routine and emergency care. As with the staffing assessment, ICUs should determine what supplies are required to provide safe and effective care and then regularly conduct a supplies and equipment assessment. It should be assumed that on a daily basis stock is replenished as necessary.

## 8. ICU Multidisciplinary Team

As described in the previous section, successful ICU care depends on the efforts of many different types of ICU caregivers and support staff. Such teams address the complexity of today's ICU and encompass the many disciplines that must coordinate their care to provide efficient, effective and safe care. This section continues the discussion of ICU infrastructure by describing the constituency of ICU multidisciplinary teams.<sup>20</sup>

### Team Leadership

Every hospital with an ICU should have a physician-led multidisciplinary team that guides and evaluates the performance of the ICU. The multidisciplinary team should be led by an intensivist or other appropriately qualified physician as defined by the MH&SC. For hospitals where these physicians are not available, the team should be led by an FCCS-certified, hospital-based physician. As previously mentioned, having a hospitalist does not meet the MH&SC guideline but is considered an interim measure toward meeting the guideline.

### Team Constituency

Although the composition of multidisciplinary teams will vary based on patient characteristics and local needs, a team could include the following types of staff:

- An APACHE coordinator. APACHE, Acute Physiology and Chronic Health Evaluation System, is used to evaluate patient severity using statistical methods.
- Critical care nurse
- Dietician
- ICU nurse manager
- Intensivist or other appropriately qualified physician as defined by the MH&SC. For hospitals where these physicians are not available, the team should be led by an FCCS-certified, hospital-based physician.<sup>21</sup>
- Occupational therapist
- Palliative care representative
- Pastoral care representative
- Patient or family representative
- Pharmacist
- Physical therapist
- Psychologist
- Respiratory therapist
- Social worker
- Other attending physicians including surgeons where applicable

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<sup>20</sup> Brilli RJ, Spevetz A, Branson RD, et al. (2001). Critical care delivery in the intensive care unit: Defining clinical roles and the best practice model. *Crit Care Med.* 29(10):2007-2019.

<sup>21</sup> Note: Having an appropriately qualified physician or FCCS-certified physician does not meet MH&SC guidelines but is considered an interim measure toward meeting the guideline.

### **Implementing Multidisciplinary Teams**

The intensivist or the medical director of the ICU when an intensivist is not available should lead an effort that includes the nurse manager, appropriate administrative executive staff and leadership from each of the disciplines to develop a plan for establishing and deploying a multidisciplinary team. The plan should address the constituency of the ICU's multidisciplinary team, establish team roles and responsibilities, and a strategy for obtaining administrative approval for instituting multidisciplinary team-based care in the ICU.

The plan should identify all members of the team. The plan should also identify the roles and responsibilities of team members. Team responsibilities include:

- 1) establishing ICU operational procedures;
- 2) participating in individual patient management decisions during multidisciplinary patient rounds;
- 3) evaluating and setting practice standards for the ICUs;
- 4) establishing a culture of patient safety within the ICU;
- 5) planning and implementing patient safety improvement activities; and
- 6) measuring the effects of safety improvement activities.

In particular, the effects that should be monitored include assessing team effectiveness as it relates to the safety, efficiency and effectiveness of ICU care; disease and surgery-specific patient outcomes; and organizational outcomes. At least one member of the multidisciplinary team should be assigned to monitor the safety reporting literature to look for safety improvement opportunities to be incorporated into ICU practices as appropriate.

Lastly, the plan should also make explicit a strategy for obtaining administrative leadership approval for the multidisciplinary team and its related ICU responsibilities. Once the plan is developed, ICU leadership should obtain approval for the plan and implement it.

## 9. ICU Operational Procedures

In contrast to the structures of care that address infrastructure and multidisciplinary teams, ICU operational procedures address the processes of care used to manage ICU patients. Operational procedures include the criteria for admitting patients to the ICU and discharging them from the ICU. Operational procedures also include the criteria by which decisions are made regarding transferring patients from one facility to another. Additionally, operational procedures include various safety practices used during the provision of direct patient care at the bedside and elsewhere.

Decisions related to admission and discharge from the ICU are crucial safety concerns and have been discussed at length in an article published in *Critical Care Medicine*.<sup>22</sup> The MH&SC ICU physician staffing guideline recommends that these decisions be made by the intensivist or appropriately qualified physician responsible for the ICU.

### **Protocols for ICU Admission and Discharge.**

Every ICU should have and use admission and discharge criteria. The criteria should be endorsed by the intensivist or other appropriately qualified physician. In hospitals where there is no intensivist or appropriately qualified physician, the Medical Executive Committee should endorse the criteria. ICU admission and discharge criteria should address the following areas:<sup>23, 24</sup>

1. In hospitals where physicians other than the intensivist or appropriately qualified physician have admitting privileges into the ICU, the hospital should have a plan for decertifying physicians.
2. An interim step for hospitals where physicians other than the intensivist have admitting privileges is to have the intensivist or other appropriately qualified physician review all admissions within 24 hours to determine if the patient was admitted appropriately or should be transferred to another unit.
3. Hospitals should have in place plans and protocols for transferring patients as needed.
4. Hospitals should have in place regional referral networks for complex cases so every hospital (and critically ill patient) has access to the specialty and subspecialty care required by critically ill patients with complex illnesses. Every hospital should assess its ability to provide a complete range of care, identify the gaps in care that it can provide and

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<sup>22</sup> Task Force of the American College of Critical Care Medicine, Society of Critical Care Medicine. (1999). Guidelines for intensive care unit admission, discharge, and triage. *Crit Care Med* 27:3 633-638.

<sup>23</sup> Task Force of the American College of Critical Care Medicine, Society of Critical Care Medicine. (1999). Guidelines for intensive care unit admission, discharge, and triage. *Crit Care Med* 27(3) 633-638.

<sup>24</sup> Thompson DR, Clemmer TP, Applefeld JJ, et al. (1994). Regionalization of critical care medicine: Task force report of the American College of Critical Care Medicine. *Crit Care Med* 22(8) 1306-1313.

develop plans for referring patients to other hospitals for care it cannot provide.

### **Protocols for Patient Care.**

Every ICU should have protocols for patient care that have been developed by the intensivist or other appropriately qualified physician and other multidisciplinary team members. The protocols should establish procedure as it relates to:

- **Daily rounds.** Protocols should stipulate when and how multidisciplinary team rounds should be conducted; that daily multidisciplinary team rounds should be conducted; and that the rounding team member constituency should include the intensivist or appropriately qualified physician, nurse, pharmacist, respiratory therapist, social worker, physical therapist and other ancillary staff as needed (e.g., chaplain). When an intensivist or appropriately qualified physician is not available, the rounds should include the primary or attending physician. The structure and schedule for multidisciplinary team rounds should be established by ICU and hospital leadership as appropriate.
- **Patient plans of care.** Protocols should stipulate how plans of care and goals are established and evaluated, the way in which protocols for care reflect local concerns and circumstances and daily goals for each patient.
- **Protocol compliance.** Protocols should include a measure to monitor compliance with protocols. One method for accomplishing this criteria could be done in meetings where staff are encouraged to focus on protocols, rather than outcomes by using rapid-cycle improvement methods and to update protocols when circumstances dictate.
- **Protocol topics.** The following clinical care areas have well-tested protocols of care and should be adopted by all ICUs.
  - Central Line-Associated Bloodstream Infection (JCAHO)
  - Central Line Utilization (JCAHO)
  - Deep Vein Thrombosis Prevention
  - Enteral Nutrition
  - Low Tidal Volume Ventilation/Acute Respiratory Distress Syndrome
  - Management of Agitation and Use of Sedation
  - Stress Gastritis Prevention
  - Tight Glycemic Control
  - Ventilator Weaning

### **ICU Safety Tips**

The MH&SC recommends that all ICUs adopt the safety tips developed by the Society of Critical Care Medicine (<http://www.sccm.org/>). The following items are recommended strategies for improving patient safety in the ICU.

- Open communication among all staff is a key element for successful teamwork.
- Ask questions and avoid making assumptions.
- Clearly label patient beds; consider having a removable sign at the foot of the bed with the patient's name and bed number.

- Verify patient identification by verbally communicating with the patient and/or check patient's identification band.
- Institute a standard change of shift policy, where nurses handing off patients personally review orders during their shift with oncoming nurses to clarify complete and incomplete orders.
- Perform a medication audit on each patient once during each shift, which could be performed at change of shift.
- Create a mentoring culture for medical students, residents, nurses and other ICU staff where every question is welcomed and proper supervision is exercised.
- Check the Pyxis machines daily to ensure medications and doses are stored in appropriate bins.
- Incorporate "check backs" during provider team and patient interactions, where providers repeat an order during a handoff to help verify information transfer.
- Remove concentrated esmolol from Pyxis and replace it with prefilled syringes.
- Incorporate independent redundancies into patient care. An independent redundancy is when more than one person checks to make sure a clinical process is executed properly. For example, when a physician orders a medication, a nurse checks the medication order (first redundancy) for patient allergies and other drug interactions. This action is followed by a pharmacist who also checks the medication order (second redundancy) for patient allergies and multiple drug interactions.
- Reconcile drugs at the time a patient is discharged. Specifically, a nurse should complete a standardized form and confirm allergies and home medications, and resolve discrepancies before the patient is discharged.
- Use a rolling line cart to keep all sterile supplies needed for insertion and maintenance of central line catheters.

## **10. The Virtual ICU**

Hospitals that do not have on-site intensivists or other equally qualified physicians as defined in this toolkit may want to assess the feasibility of providing access to these specialists through electronic means to improve the safety and quality of the ICU. It should be noted, however, that virtual ICU access does not meet the MH&SC Physician Staffing Guideline but is an interim measure toward meeting the guideline.

The options for installing a virtual ICU range from telephone consultations, Internet access, various telemedicine options to installing new technologies and information system infrastructures. Whichever mode is selected, the goal is to establish readily available access to intensivist consultations or to other qualified physicians.

## 11. ICU Self Assessment

Provision of excellent ICU services requires a continuous commitment to self-examination and improvement. Self assessment falls into three categories:

1. Assessment of the hospital's ability to provide ICU care and at what level of service
2. Assessment of the hospital's resources and the referral systems (Regional Referral Networks) required to properly care for critically ill patients
3. Assessment of and continuous monitoring of resources and outcomes as part of ongoing improvement and quality efforts.

### **Ability to Provide High-Quality, Safe Care**

Caring for the most critically ill patients requires a complex system of staffing, infrastructure and supply resources. It is no longer appropriate to assume every hospital should provide this type of care. Hospitals should assess their ability to provide ICU care and what level of care they can safely provide. Hospitals should determine if their ICUs meet the criteria established by the Society of Critical Care Medicine for ICUs. This assessment will help hospitals identify which patients need to be referred elsewhere and the resources required at the facility to which patients are referred. It will also help hospitals identify gaps in their resources that they need to address in order to safely provide ICU care.

Components of this assessment include:

- Determine Level I or Level II or Step-Down care based on the descriptions developed by the Society of Critical Care Medicine. The MH&SC physician staffing guidelines apply to both Level I and Level II units.<sup>25</sup>
- Determine what measures are needed to bring the units to their target level of care as defined by the Society of Critical Care Medicine.

### **Assessing Hospital Resources and Referral Systems**

Hospitals need to have a clear understanding of their ICU capabilities and any limitations. In hospitals where all ICU protocols are not present, the hospital needs to have a plan in place for transferring patients to more appropriate facilities. The components of this assessment should be shared publicly as they will become the foundation of Regional Referral Networks.

This assessment includes:

- Types of patients admitted
- Referrals to other facilities and why
- Referral patterns based on affiliation agreements among members of a health system or other integrated systems of care

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<sup>25</sup> Society of Critical Care Medicine. (1999). Guidelines on critical care services and personnel: Recommendations based on a system of categorization into two levels of care. *Crit Care Med.* 27(2):422-426.

- Ability to provide comprehensive medical, surgical and nursing specialty and subspecialty care
- Access to radiology, laboratory and other resources to care for complex cases within the hospital
- Local circumstances related to health care resources
- Geographic considerations
- Evaluation of current referral practices and gaps in specialty and subspecialty care and development of a referral plan. Each hospital's evaluation and plan will be used as a part of the Regional Referral Networks for complex cases activity.

### **Monitoring of Resources and Outcomes as Part of Ongoing Improvement and Quality Efforts**

Michigan hospitals should be working toward an environment where every hospital monitors its performance and participates in collaborative monitoring activities with hospitals statewide. By establishing a standard system of measuring performance and developing a statewide database, hospitals can learn from each other and more quickly incorporate best practices.

Data needs to be collected and converted into information to be analyzed by the multidisciplinary team. Hospitals should immediately put in place safety reporting systems that collect, review and analyze the following information:

- Mortality and morbidity
- Trend data to identify potential process or system issues, such as: was surgical case selection appropriate, were complications related to length of stay, were there any inappropriate admissions, and did complications affect mortality?
- Adverse events and near misses
- Outcomes: ICUs need to continuously monitor the following attributes, using run charts and other analysis tools to track trends:
  - Length of hospital stay
  - Length of ICU stay
  - Charges
  - Patient and family satisfaction
  - Unadjusted mortality
  - Unexpected readmissions (less than 24 hours)
  - Infection rates
  - Adverse drug events

Hospitals should develop and publicize reporting systems that allow employees to report safety problems or potential safety problems anonymously and confidentially.

Longer-term hospitals should implement:

- Risk adjustment for mortality
- Risk adjustment for morbidity

## 12. Definitions from the Society of Critical Care Medicine Website

**Adverse event:** An adverse event is any incident that leads to patient harm.

**Appropriately qualified physician:** Physicians considered to be certified in Critical Care Medicine. They are:

- Physicians who completed training prior to the availability of subspecialty certifications in critical care in their specialty (1987 for Medicine, Anesthesiology, Pediatrics and Surgery), who are board-certified in one of these four specialties, and who have provided at least six weeks of full-time ICU care annually since 1987. (The weeks need not be consecutive weeks.)
- Physicians board certified in Medicine, Anesthesiology, Pediatrics or Surgery who have completed training programs required for certification in the subspecialty of Critical Care Medicine but are not yet certified in this specialty

**Critical care:** The medical care provided to people with an immediate life-threatening illness or injury associated with single or multiple organ failure. The interventions required to manage life-threatening illnesses generally include both core supports — and intensive nursing care and cardiopulmonary monitoring — as well as supports focused on the patient’s particular illness. While nearly all CCUs/ICUs are capable of providing a spectrum of care, many have developed a focused area of excellence: care of critically ill and injured children in the pediatric ICU (PICU); adult cardiac diseases in the coronary care unit (CCU); perioperative care, trauma care, and care of multiple organ dysfunction in the surgical ICU (SICU); care of neurological and neurosurgical patients in the neuroscience ICU and so on. Many teaching hospitals also have graded critical care centers such as intermediate care units and telemetry units where patients who require more than ward care can benefit from specific monitoring and intervention.

**Critical care continuum:** The series of events that begins when the critically ill or injured person first receives medical treatment, through transport and stabilization, and hospitalization and recovery.

**Critical care nurses:** Registered nurses who receive highly specialized education and are often certified in critical care nursing as CCRNs. Because of their close contact with the family and the patient, CCRNs often serve as the patient advocate and become integral to the decision-making process of the patient, family and critical care team.

**Critical care team:** The multidisciplinary team of health care professionals who care for critically ill and injured patients. The critical care team includes the critical care intensivist, critical care nurse, respiratory therapist and pharmacologist. Other allied health therapists and technicians, social workers and clergy may also participate as members of the critical care team.

**Critical Care Unit (CCU):** A location in the hospital where critical care is provided. Also referred to as the intensive care unit (ICU). Common reasons for admission to the CCU/ICU include: respiratory compromise, hemodynamic compromise, myocardial ischemia or infarction, neurological compromise, life-threatening gastrointestinal bleeding, complications of renal failure and postoperative patients who may still be on a ventilator or may have other invasive monitoring.

**FCCS-certified:** A physician with Fundamental Critical Care Support Certification has completed a two-day comprehensive course addressing the fundamental management principals for the first 24 hours of critical care. The course prepares the non-intensivist for management of the critically ill patient until transfer or appropriate critical care consultation can be arranged. In addition the certification is intended to:

- Assist the non-intensivist in dealing with sudden deterioration of the critically ill patient;
- Prepare house staff for ICU coverage;
- Prepare nurses to deal with deterioration in the critically ill patient

**Harm:** Harm is death, injury, suffering, dissatisfaction or disability experienced by a person.

**Hospitalist:** Hospitalists are physicians who spend at least 35 percent of their professional time serving as the physicians-of-record for inpatients, during which time they accept hand-offs of hospitalized patients from primary care providers, returning the patients back to the care of their primary care providers at the time of hospital discharge.

**Incident:** An incident is an event or circumstance that could have, or did, lead to unintended and/or unnecessary harm to a person.

**ICU Safety Reporting System:** ICUSRS is a pilot, Web-based reporting system being tested by a team of investigators at Johns Hopkins, in collaboration with the Society of Critical Care Medicine and funded by the Agency for Healthcare Research and Quality in a cohort of ICUs across the U.S. The ICUSRS goal is to improve patient safety in intensive care units. To improve safety, systems are needed to identify potential problems that then can be addressed. However, there are significant barriers to reporting and most incidents are neither reported nor acted upon. This represents a lost opportunity and may see the same mistakes recur. An early finding of the ICUSRS is that excessive workload and problems with communications contributed to the majority of mistakes.

**Intensive Care Unit (ICU):** Same as Critical Care Unit; see definition above.

**Intensivists:** Board-certified physicians who are additionally certified in the subspecialty of Critical Care Medicine. This certification is awarded by the American Boards of Internal Medicine, Surgery, Anesthesiology and Pediatrics. Because sub-specialty certification is not offered in emergency medicine, emergency medicine physicians are considered certified in Critical Care Medicine if they are board-certified in emergency medicine and have completed a critical care follow-up fellowship at an ACEP-accredited program.

**Level I units:** These units care for the complicated, critically ill patients requiring the continuous availability of sophisticated equipment, specialized nurses, and physicians with critical care training. These units are subdivided into Level 1A (academic) and Level IC (comprehensive) units. Both Level I units provide comprehensive critical care, but Level I A units have an additional academic mission. Level I academic units require the additional commitment of the clinical staff to education and research in the field of critical care medicine.

**Level II units:** These units have limited resources to provide critical care. While these units may be able to deliver a high quality of care to patients with single organ failure, transfer agreements must be arranged for patients whose problems are complex or highly specialized. Standards described for Level II units in these guidelines represent minimal standards required to provide quality care to critically ill patients.

**Near miss:** A near miss or close call is any incident that could potentially lead to patient harm.

**Philosophy of critical care medicine:** A physician-led, multidisciplinary team can provide optimal care to the patient. The term multidisciplinary refers not only to other physicians who may participate as consultants or co-attendings in the ICU, but also to other health care professionals who work side by side, around the clock in the ICU. The most numerous of these are critical care nurses. Others include acute care nurse practitioners and clinical nurse specialists who complement the physician staff in establishing plans, writing orders and directing management. Physician assistants also provide care in the ICU. Respiratory therapists are experts in many forms of pulmonary diagnosis and intervention. The ICU team also typically includes a pharmacist, dietitian, medical social worker, chaplain and trainees.

**Society of Critical Care Medicine (SCCM):** The SCCM is the leading professional organization dedicated to ensuring excellence and consistency in the practice of critical care medicine. SCCM is devoted exclusively to the advancement of multidisciplinary, multi-professional intensive care through excellence in patient care, professional education, research and advocacy. Members include intensivists, critical care nurses, critical care pharmacists, clinical pharmacologists, respiratory therapists and other professionals, which may include technicians, social workers, dietitians and members of the clergy.

**System factor:** The elements or things that influence how we work. For the ICUSTS study, these elements are broken into six categories:

1. Patient factors: any factors specific to the patient, such as condition (severity of illness), language barriers, behavioral or mental health (combative, delusional, social factors (religious or other beliefs).
2. Task factors: Factors relating to the task at hand such as availability of protocols, needed test results.
3. Provider factors: Factors relating to the provider, such as his or her knowledge or skill level, fatigue, motivation and attitude.
4. Team factors: Any factors that relate to teamwork such as effective communication, supervision, ease in seeking help, team structure.
5. ICU environmental factors: Factors that describe the internal structure of a unit such as staffing levels, workload, proper maintenance of equipment, poor/good working space.
6. Institutional environmental factors: These factors involve the overall structure of the institution/hospital, such as financial resources, health insurance pressures.

### **13. Other Links**

**Michigan Health and Safety Coalition guideline for intensive care units**

[http://mihealthandsafety.org/guidelines/guidelines\\_intensive.html](http://mihealthandsafety.org/guidelines/guidelines_intensive.html)

**National Quality Forum**

<http://www.qualityforum.org/>

**Society of Critical Care Medicine**

<http://www.sccm.org/>