

**ORIENTATION MANUAL FOR HOUSESTAFF**

**INTENSIVE CARE UNIT**

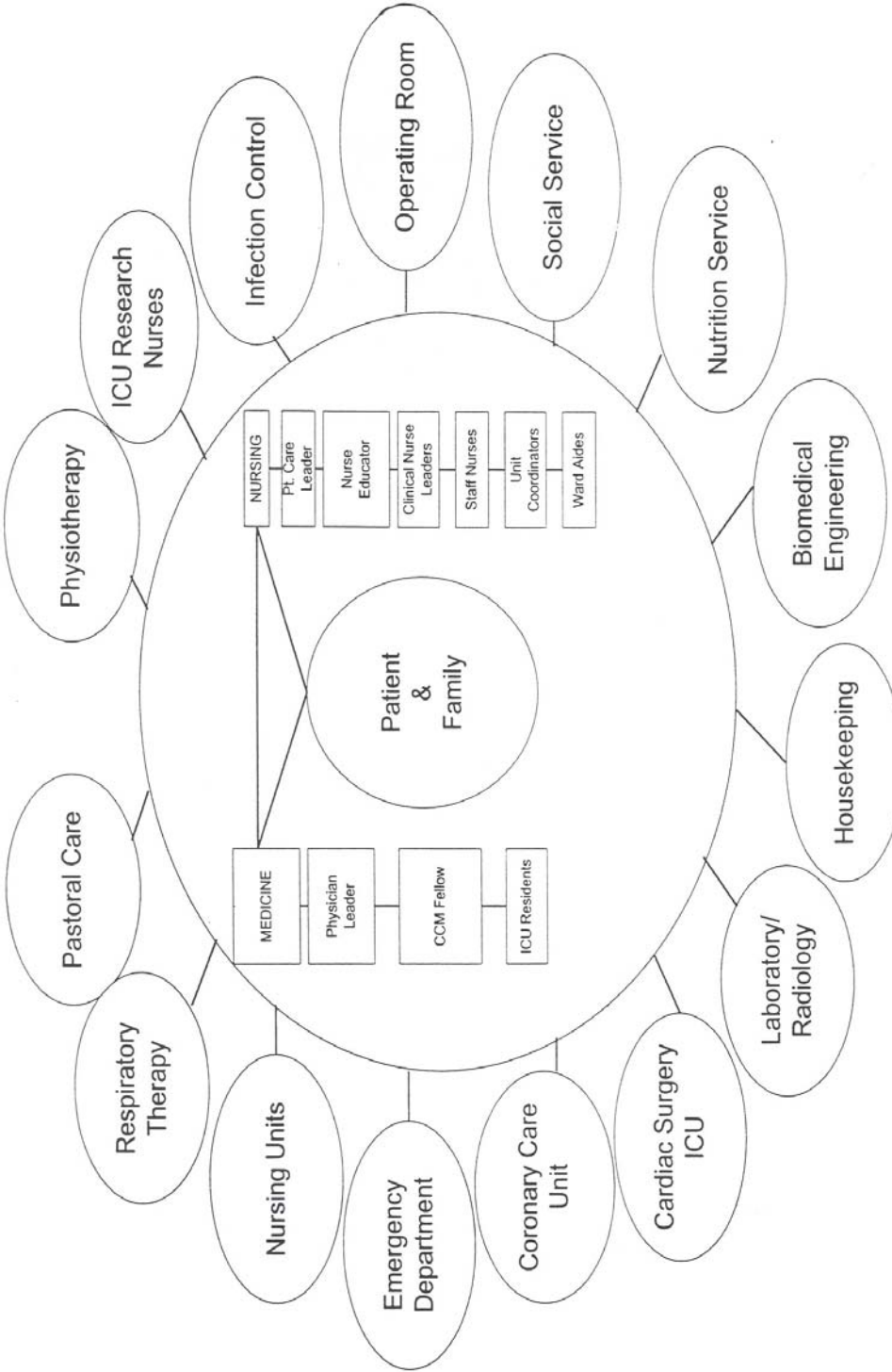
**ST. PAUL'S HOSPITAL**

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# I. ICU/SDU Organizational Chart

## INTENSIVE CARE UNIT/STEPDOWN UNIT ORGANIZATIONAL CHART



I. ICU/SDU Organizational Chart

July 2000

## **II. GENERAL OPERATING POLICIES** **INTENSIVE CARE UNIT** **ST. PAUL'S HOSPITAL**

The Intensive Care Unit is comprised of 18 critical care beds. The ICU team shares care of all intubated patients in the CCU.

- I. **Attending Intensivists:** Dr. Najib Ayas  
Dr. John Boyd  
Dr. Peter Dodek  
Dr. Del Dorscheid  
Dr. Dave Evans  
Dr. Greg Grant (Acting Physician Leader)  
Dr. Morad Hameed  
Dr. Ruth MacRedmond  
Dr. Demetrios Sirounis  
Dr. Keith Walley

### **II. Admissions**

All admissions should be discussed as soon as possible with the Attending Intensivist who is on call. Patients should be admitted under the attending intensivist on call, and, if already under the care of another staff physician, the primary staff physician. The decision whether to admit a patient to the I.C.U. rests with the Attending Intensivist. In addition, the Clinical Nurse Leader in charge should be consulted regarding availability of beds.

### **III. Consultations**

Housestaff in the I.C.U. are requested to assess and assist in management of patients in the Emergency Room, Cardiac Surgery ICU, Post-Anesthetic Care Unit or hospital wards. For various reasons, some of these patients are not admitted to the I.C.U. but rather to a ward. All of these patients should be considered consultant practice and reviewed with the Attending Intensivist. Consultation records should be photocopied and saved in the ICU and patient sticker placed in the consult book. Consult patients are often also seen and followed by the ICU Outreach service and the outcome of the consult and follow-up plan should be communicated to the Outreach nurse.

### **IV. Transfers Out of the ICU**

Patients to be transferred should be reviewed with the I.C.U. Fellow or Attending Intensivist. The resident responsible for care in the I.C.U. should discuss the case and plans for further management with the resident on the receiving service. The primary physician should be notified by the I.C.U. Resident of the patient's transfer. A transfer note detailing all ongoing issues and ongoing care plan must be written in the chart. The T-MOP must be completed and attached to the chart. These orders must include the name of the attending physician who will be assuming responsibility of the patient's care. For transfer of patients to CTU, the patient must be reviewed by the accepting team prior to their leaving the ICU.

### **V. Orders**

All orders in the I.C.U. must be entered in the computer or written in the chart, including date and time of the order. The individual writing the order should also verbally notify the patient's bedside nurse of the order and discuss its implications. In very urgent situations such as

cardiac arrest or impending respiratory or cardiac arrest, verbal orders may be given. These should later be transcribed to the chart and signed by the physician.

The ICU has pre-printed admission, transfer and CRRT orders. We also have routine bloodwork and x-rays in SCM. Please make sure if the unit is drawing the blood you scroll down to unit and not lab. If you are writing an order remember to flag the chart as the orders chart may not be reviewed until the end of the shift.

Please ensure that the bedside nurse is aware of any procedure or investigation which may require adjustment in patient care eg sedation, discontinuation of heparin or transport to radiology. A good rule of thumb is to keep the RN informed of your plans for the patient.

## VI. Notes

1) Admission: An admission history, physical examination, assessment and plan of management and problem list must be written for each patient. The resident on-call is responsible for this.

If a junior resident or medical student admits a patient, the case should be discussed with the senior resident including review of history, physical examination, differential diagnosis and management plan. The senior resident must then write a problem list with brief management plans to supplement the junior resident or student's note. The senior resident may write a review note.

2) Procedures: All procedures must be documented in the progress notes. The note should include all pertinent data such as date, time, operator, local anesthesia, compliance with practice guidelines (see below) number of passes, difficulties with procedure, etc., must be used for the following procedures. The computerised record must be completed for intravascular catheter insertion and printout placed in the chart:

- all arterial lines
- all central lines, including Swan-Ganz catheters, triple lumens, TPN catheters
- all intubations
- all chest tubes
- all pacemakers
- all cardioversions
- all sampling of body fluids (eg. thoracentesis, paracentesis, lumbar puncture, etc.)

To create the computerised record, go to [www.icunotebook.com](http://www.icunotebook.com).

A copy of the record may be kept by the resident for logging his/her procedures.

### 3) Progress Notes

All patients in the I.C.U. must have at least one progress note written daily. It is not necessary to transcribe all the physiological data from the flow chart – a short note summarizing change in condition, progress of each problem and plan is adequate and more useful to the reader. Notes should not be written before or during rounds - a more succinct note can be constructed following review of the case by the team.

### 4) Discharges Out of the Hospital and Deaths

A summary must be written and dictated as soon as possible by the resident for all patients who die in the I.C.U., who are transferred to another hospital, or who are discharged home. For patients who die in the ICU a note describing the circumstances and management at the time of death must also be written.

The resident on-call at the time of death must notify the next of kin, the referring physician (if applicable), and the patient's family physician. Please request permission for a post-mortem study on all patients who die and whose cause of death or underlying disease is not perfectly clear. The knowledge gained is useful for the ICU team and for the family of the deceased.

VII. **Interaction with Nurses, Respiratory Therapists, Physiotherapists, Nutritionists and Pharmacists**

These caregivers are highly trained individuals who may have more experience with critically ill patients than you. Listen to what they have to say. You may receive information which could help you care for the patient. If you don't know how to deal with a medical problem or are unsure about your skill at performing a procedure then ask for help. The patient's well-being comes before your pride. If interpersonal problems arise which cannot be solved directly between individuals, seek advice from the ICU fellow or Attending Intensivist sooner rather than later.

### **III. Daily Schedule**

The daily schedule is as follows:

**7 am. Sign-in/Triage.** This is a brief handover of the events of the night and presentation of new patients. This should not take more than 30 minute in total, leaving plenty of time for review of patients prior to rounds. Patients are assigned to residents by the fellow/senior residents. Please record on the board which resident is responsible for each patient. Patients assigned to Clinical Clerks must also be assigned to a senior resident, and both names should appear in the appropriate columns on the board.

**7.30-8.30 Review of patients.** All patients must be examined every day – do not rely on the nurses assessment, although this is generally excellent. This exam should include surgical wounds, skin, neuro assessment etc. Take note of pertinent blood results eg leukocytosis, electrolyte abnormalities, falling Hb which may require discussion on rounds. Culture results should be checked. Try to have a plan in mind for each of the patients ongoing problems.

#### **8.30 Rounds.**

Rounds will begin with the new patients from the previous 24 hours and the two teams will round together on these patients. Rounds are structured as follows: the bedside nurse presents events from overnight, the current assessment of the patient in a systematic fashion, and nursing concerns/queries. The respiratory therapist relates the respiratory assessment, ventilator setting and blood gas. PLEASE LISTEN to avoid repetition. The responsible resident then presents, starting with description of the x-ray (including tubes and lines). Then discuss issues and plans, beginning with the most responsible diagnosis eg “Sepsis secondary to community acquired pneumonia.....”. Much of your education in the ICU will take place on rounds and your benefit will be directly proportional to your participation. Listen, participate and learn.

**12.00-1pm** Monday, Tuesday, Thursday: CCM resident teaching.

ICU conference room. The schedule will be posted in the ICU. Timing of the teaching session may change pending activities in the unit but should be adhered to where possible.

NB First Thursday of every month, the ICU presents at lunchtime rounds in the Hurlbert at 12.15. the residents are responsible for this presentation, which should be a case-based clinical critical care topic. The Fellow and Attending physicians will assist you in choosing a topic and preparing the presentation.

#### **5 pm Sign-out Rounds.**

The purpose of this dry round is to update the team on events of the day, report results of any investigations and prepare the on-call team. The on-call team should be made aware of any potential problems (eg risk of re-bleed, sedation issues) and preferred intervention.

**10pm Night Rounds.** The on-call residents will round with the CNL on all patients in the ICU and shared-care patients in the CCU. The purpose of this round is to answer queries from the bedside nurse, follow up on issues highlighted on the sign-out rounds eg fluid balance, pending labs, and to ensure that radiology and lab orders are completed for the following day.



## **IV. INTENSIVE CARE UNIT TRAINING PROGRAM** **LEARNING OBJECTIVES FOR ROTATING HOUSESTAFF**

A two month rotation in the ICU is intended to provide residents in Medicine, Surgery, Anaesthesia, Emergency Medicine, and Family Medicine with experience in the evaluation and initial management of critically ill patients. We encourage you to identify specific learning objectives for yourself, and bring them to our attention. We expect that you will achieve the following specific educational objectives.

At the end of this rotation you will be able to:

1. Use a question/hypothesis testing approach in diagnosis and management of patients. Use knowledge of pathophysiology as a foundation for understanding clinical presentation and management of patients.

2. Recognize the patient who is in shock or who has significant cardiopulmonary compromise.

Demonstrate the appropriate use of clinical information: history, physical examination, basic laboratory and radiographic investigations to develop a reasonable differential diagnosis and management plan for such a patient.

List the indications and contraindication for invasive hemodynamic monitoring.

Provide central venous access from the internal jugular, subclavian and femoral veins, and arterial access from the radial and femoral arteries.

Place and use a pulmonary arterial catheter to obtain cardiac output, intracardiac pressures, and venous oxygen content analysis.

Demonstrate the use of this information to modify hemodynamic function and treat shock states using appropriate fluids and vasoactive drugs (including dopamine, dobutamine, nitroglycerin, nitroprusside and noradrenaline).

3. Demonstrate the appropriate use of common antidysrhythmics.

4. List the indications for pacemaker support. Identify patients requiring pacemaker support and for such patients, choose and initiate the appropriate pacemaker therapy (AAI, VV and AV sequential pacing).

5. Identify the patient who has respiratory failure.

Demonstrate the appropriate use of clinical information: history, physical, radiographic and laboratory to develop a reasonable differential diagnosis and initial management plan for such a patient.

Use and recommend oxygen delivery devices appropriately (nasal prongs, low and high-flow masks).

Provide effective bag-mask ventilation.

Describe and identify the indications for intubation and mechanical ventilation.

Describe and contrast basic modes of ventilation (assist control ventilation, pressure support ventilation, continuous positive airway pressure), and select ventilator settings (rate, tidal volume, FiO<sub>2</sub>, PEEP) appropriate for specific patients.

Evaluate a patient's potential for weaning and initiate a weaning program.

Demonstrate correct placement of a chest tube and evaluate its function using a closed drainage system.

6. Utilize radiographs to identify the correct placement of a venous and pulmonary arterial catheter, chest tube, pacer wire, feeding tube and endotracheal tube. Recognize major aberrations in chest radiographs including pneumothorax, lobar collapse, consolidation or pleural effusion, and have a practical differential of common radiographic abnormalities.

7. Demonstrate the management of patients after major vascular, abdominal, and cardiac surgery in discussion with the surgical services.

8. Demonstrate the evaluation of a patient with reduced level of consciousness, list a differential diagnosis of coma, and outline a plan to investigate it.

Describe the principles of monitoring and manipulation of intracranial pressure and demonstrate the application of this knowledge to the patient's care.

List the criteria for the diagnosis of brain death.

9. Demonstrate the evaluation of a trauma patient according to the guidelines laid out by ATLS.

10. Demonstrate cardiopulmonary resuscitation according to the principles outlined in ACLS.

11. Identify and differentiate common coagulopathies including those due to factor deficiency, liver disease, platelet deficit or dysfunction, DIC, fibrinolysis, and consequences of massive transfusion.

Use of blood products, protamine, and vitamin K appropriately.

12. List the common sites and organisms responsible for infections in critically ill patients. Identify and investigate patients with suspected sepsis and select appropriate initial antibiotic therapy.

13. Describe the nutritional needs of critically ill patients, recommend and monitor appropriate nutritional support.

Correctly place and monitor venous access for TPN and feeding tubes for enteral feeds.

14. Describe the basic pharmacology of common sedatives, analgesics, and neuromuscular blocking agents. Select and monitor the use of these drugs appropriately.

15. Describe the normal distribution of fluids and electrolytes. Demonstrate an appropriate choice of fluid therapy for patients who have shock, cardiac, or renal failure, and after major surgery.

16. Identify the patient who has significant renal dysfunction. Monitor and manage anticipated disturbances of fluids and electrolytes, including identifying the need for urgent dialysis.

17. Identify, anticipate, and demonstrate the appropriate management of common electrolyte disturbances.

Identify the patient who has a significant acid-base disturbance, and describe a reasonable differential diagnosis and management plan.

18. Identify patients who have significant intoxications (due to sedative/hypnotics, TCA, ASA, alcohols, carbon monoxide). Outline the supportive and specific therapies for each.

19. Plan the transport of a critically ill person and demonstrate this ability in arranging the transport of such a patient to or from this centre.

20. Discuss the factors determining the prognosis of critically ill patients. Demonstrate this knowledge in arriving at and discussing patient care decisions with fellow caregivers and family members.

21. Describe the condition of a critically ill patient to his/her family and address their concerns in a compassionate and therapeutic manner.

22. Demonstrate interacting with other physicians and health care workers in a collaborative way to arrive at a plan for patient care.

23. Demonstrate knowledge of ethical principles in decision making.

24. Accurately communicate your diagnostic and therapeutic plans verbally and in writing in the medical record.

25. Identify your own strengths and limitations, and appropriately seek guidance and consultation.

**V. RESIDENT RESPONSIBILITIES**  
**INTENSIVE CARE UNIT**  
**ST. PAUL'S HOSPITAL**

**Junior Resident Responsibilities**

1. Admissions: When on call, the junior resident will review all admissions with the senior resident on call.
2. History and physical examination, differential diagnoses and management plans should be recorded in problem-oriented fashion.
3. For optimal continuity of care and learning, the junior resident will follow each patients that he/she admits until the patient leaves the ICU.
4. Transfer notes on all patients leaving the I.C.U. must be done by 9:00 a.m. on the day of the transfer.
5. Orders on the chart:
  - I.C.U. admission. All previous orders on the chart are cancelled when the patient is admitted to the I.C.U.
  - I.C.U. transfer orders must be done between 8:00-9:00 a.m. the morning of the transfer.
6. Progress notes - minimum of once a day in problem-oriented fashion.
7. Junior resident must be present at his or her own case for elective intubations. The Attending Intensivist, the I.C.U. Fellow, I.C.U. Anesthesia resident or, in his absence, the Anesthesiologist on call should be called. The junior resident must be present to perform or observe and assist in any procedures being carried out on his or her patient.
8. An effort should be made to avoid "standard" or "serial" orders, e.g.:
  - (a) when the admission ECG shows diagnostic acute M.I. - 3 day serial ECG should not be ordered;
  - (b) blood gases and other blood tests should be ordered with discretion (see guidelines at each bedside).
  - (c) Remember: only order tests if you will act on a positive result and a negative result.
9. Sign-Out Rounds at 1700 hours.

10. "Good Night Rounds" should be made with the senior resident on call at around 2200 hours. At that time, all orders for x-rays, ECG's, and other investigations should be reviewed and written so that the appropriate technicians can do them all at one go the next morning.
11. Attending Rounds: The junior resident is expected to present his or her own cases each day on morning rounds. It is expected that the junior resident has already examined each patient, reviewed hemodynamic and laboratory data, and formulated a problem list and plan of management for each active problem.
12. Cardiac Arrests: The junior resident will carry a cardiac arrest beeper and attend all cardiac arrests while on call.

### **Senior Resident Responsibilities**

1. The Attending Intensivist is solely in charge of all admissions and discharges to and from the unit. He delegates this responsibility to the I.C.U. senior resident on call. If in doubt the I.C.U. senior resident on call must call the Attending Intensivist. Ultimately, all ICU consultations (admitted or not) must be discussed with the ICU Fellow or Attending Intensivist.
2. The senior resident who admits or authorizes the transfer of any patient to the I.C.U. will be primarily responsible for that patient's care in the unit. The junior resident on that case will work under his/her supervision. For optimal continuity of care and learning the senior resident will follow each patient that he/she admits until the patient leaves the ICU.
3. The senior resident will review each admission with the junior resident and then write a problem list with brief management plans to supplement the junior resident's admission note.
4. The senior resident will check and/or supervise the junior resident's orders on that patient. The senior resident will also carry out or supervise all procedures on that patient.
5. The senior resident is responsible for notifying the patient's family doctor and specialist whenever he/she admits or transfers any patient into or out of the unit (including deaths and discharges).
6. The I.C.U. senior resident on call will be in charge at all cardiac arrests. Other team members include 2 nurses, the junior resident on-call (or other designated house officer) and 1 respiratory therapist. It is assumed that each resident will have already completed Advanced Cardiac Life Support training before starting the ICU rotation.

### **SIMULTANEOUS ARREST CALLS** will be covered in the following matter:

- a) The ICU junior resident will remain with the cardiac arrest in progress.
- b) The ICU senior resident will proceed immediately to the area that has placed the second arrest call.
- c) The ICU senior resident will direct the nursing staff in the area to place STAT call to the CTU medical residents on call.
- d) The ICU senior resident will direct the CTU medical resident to assist the ICU junior resident and the medical junior resident will remain

with the ICU senior resident. A deviation from this plan is at the discretion of the ICU senior resident.

- e) Two RNs from the ICU will respond immediately to the arrest call. These RNs will bring designated cardiac arrest cart to bedside.

7. The ICU residents on-call are also members of the trauma team and will be called to the Emergency Department to assist in the resuscitation of trauma patients. The principal responsibility of ICU housestaff is to ensure a patent airway and adequate oxygenation and ventilation; other responsibilities may include insertion of chest tubes and venous catheters. The staff emergency physician or the trauma surgeon on-call are the leaders of the trauma team. Trauma patients may be admitted to the ICU directly from the Emergency Department or after they have been treated in the operating room.
8. A final note must be written and dictated by the resident for all patients who die in the I.C.U. shortly after the time of death. Do not wait for the post mortem as this detailed information can be reviewed later and related to the family physician by the consultant. It is the responsibility of the Attending Intensivist to complete the Death Certificate and M&M form.
9. Patients seen and reviewed but not admitted to the I.C.U. should have a formal consultation note written and then reviewed with the attending intensivist on-call.
10. No patient at St. Paul's Hospital or especially a referring outside hospital may be refused admission to the I.C.U. without the approval of the attending intensivist on-call.
11. Each senior resident will be asked to present one teaching session on a critical care topic pertinent to his/her specialty. Please check the teaching schedule at the start of the rotation and inform Sandi Gillis ([sgillis@providencehealth.ca](mailto:sgillis@providencehealth.ca)) or Dr MacRedmond ([rmacredmond@mrl.ubc.ca](mailto:rmacredmond@mrl.ubc.ca)) of any scheduling conflict.

**VI. CLINICAL FELLOW RESPONSIBILITIES**  
**ICU, ST. PAUL'S HOSPITAL**  
**UNIVERSITY OF BRITISH COLUMBIA**

I. **Clinical Responsibilities**

The clinical CCM fellow is responsible for the delivery of clinical care in the ICU and for consultations from other services. The attending intensivist is ultimately responsible for patient care in these areas. The specific clinical responsibilities of the fellow are as follows:

A. **Morning Triage Rounds (Daily 0700-00730 or 0730-0800)**

This is a quick review of ICU and SDU patients to facilitate triage decisions. It is essential that patients who are ready for transfer to another ward be recognized early in the day so that the ICU nurses, receiving medical or surgical resident, and Admitting Department can initiate the steps for transfer. The second purpose of the Triage Rounds is to reassign patients to housestaff if the patient distribution to housestaff is significantly unbalanced (e.g. one resident has 6 patients, while another resident has none). The third purpose of the Triage Rounds is to identify very critically-ill patients that the fellow will review in detail and manage with the housestaff directly prior to morning teaching rounds.

B. **ICU Care and Consultations**

The clinical CCM fellow is responsible to the Attending Intensivist for patient care in the ICU and for consultations to other services. The fellow is expected to be involved actively in the management of the most critically ill patients with the housestaff. Although the residents are responsible for primary care, including admitting, progress, procedure and discharge notes, the fellow is responsible for assuring that the care is adequate and also acts as an available consultant and resource expert for the residents. The clinical CCM fellow is also responsible for either doing consultations or reviewing them in detail with the residents who have done consultations, prior to review with the Attending Intensivist.

C. **Night and Weekend Call**

The clinical CCM fellow takes "second" call from home at nights. The fellow will have increasing responsibility for second call during the year as their clinical expertise improves. The residents are expected to discuss significant changes, new admissions, out-of-hospital referrals and consultations with the fellow and/or Attending Intensivist on call. The clinical CCM fellow takes 1 in 3 call and is responsible for directing daily care rounds and reviewing all new admissions and consultations during weekends. The CCM fellow must also notify the Attending Intensivist of all ICU consultations (admitted or not).

D. **Out-of-Hospital Referrals**

All out-of-hospital referrals must be reviewed directly with the Attending Intensivist on call prior to accepting or refusing the referral. Because St. Paul's Hospital is a tertiary care hospital with many clinical services and specialties not available in community hospitals, St. Paul's Hospital has an important responsibility to accept out-of-hospital referrals as a high priority. The fellow and

Attending Intensivist are responsible for reviewing in detail the allocation of ICU and SDU patients and beds to determine whether some redistribution or transfers of in-house patients may facilitate acceptance of out-of-hospital referrals. The Attending Intensivist or the fellow will call back the referring physician to obtain information regarding the referred patient in order to organize appropriate interhospital transport, to prepare the ICU staff regarding bed and equipment requirements (e.g. ventilator, arterial, pulmonary arterial line, chest tubes, pacemaker etc.) and to arrange appropriate consultations or procedures, that will be done shortly after patient arrival (eg. hemodialysis, surgical or medical subspecialty consults, CT scan etc.).

#### E. Interhospital Transport

The clinical CCM fellow and Attending Intensivist on call will determine the safest and most expeditious method of interhospital transport of out-of-hospital referrals. An Attending Intensivist at St. Paul's Hospital or Vancouver General Hospital is the Transport Advisor for Emergency Health Services regarding interhospital transports and has the responsibility of communicating with paramedics and then recommending the appropriate preparation for safe transport. For air transport, there is a dedicated Air Evac paramedic team on call and readily available for all emergency transports. The clinical CCM fellow may be requested to accompany unstable, critically ill patients during interhospital air transport. Although the clinical CCM fellow is not required to do air transports, it is highly recommended from educational and clinical experience viewpoints.

## II. Administrative Responsibilities

The clinical CCM fellow has administrative responsibilities which are an important aspect of training in Critical Care Medicine. Most CCM appointments carry moderate to heavy administrative responsibilities and it is important that the fellow acquire experience in administrative procedures.

#### A. Morbidity and Mortality Rounds/Audit

The clinical CCM fellow is responsible for presenting monthly morbidity and mortality rounds. All deaths and any significant morbid events in the preceding month must be reviewed. Each death must be briefly summarized in writing before rounds and an appropriate handout must be available for attendants at the rounds. It is expected that two or three cases will be selected for more detailed presentation. Cases should be selected that raise questions regarding diagnostic, therapeutic or ethical decision-making issues. Consultants from other services who were significantly involved in the case should be invited. Furthermore, cases with autopsies are preferred. In addition to deaths, important morbid events which require discussion should also be presented. Following the rounds, the fellow is responsible for completing the Department of Medicine M&M audit forms which will be reviewed by the ICU Director and forwarded to the Heads of Medicine and Surgery.

#### B. ICU Leadership Team

The clinical CCM fellow is a member of the ICU Leadership Team. This team meets monthly to discuss a variety of issues in the CCU and ICU that require discussion, decisions, and communication with hospital administration and other hospital or university departments.

## III. Teaching Responsibilities



The clinical CCM fellow has an important and significant teaching responsibility. The fellow is responsible for the supervision and teaching of students and residents in the ICU regarding clinical care and procedures.

A. Seminars

The clinical CCM fellow is responsible for participating in 3 times weekly seminars in CCM for the students and residents. The teachers for these seminars will include the residents in the ICU, the clinical CCM fellow, the Attending Intensivists, and other attending physicians as is appropriate for the topic.

B. Critical Care Grand Rounds

The clinical CCM fellow will be assigned to present several grand rounds each year on a suitable CCM topic to be chosen after discussion with an assigned Attending Intensivist. These rounds present an opportunity to review a topic in detail and organize an effective and useful teaching session for the attendants of the rounds. The fellow will organize bi-weekly rounds which consist of a case presentation by the resident and one or more points of discussion by the fellow, an ICU director, or non ICU consultant. X-rays and pathologic findings improve the quality of the round.

The fellow is requested to prepare a brief summary of the case presentation(s) and a pertinent list of references to be handed out at the beginning of the rounds.

#### IV. **Education**

##### A. **Royal College Specialty Training Requirements in CCM (Appendix I)**

The Royal College of Physicians and Surgeons of Canada Specialty Committee on Critical Care Medicine has prepared "Roles and Key Competences in Adult Critical Care Medicine" which must be reviewed. These requirements form a basis for the education goals and process of the St. Paul's Hospital and UBC Critical Care Medicine Fellowship. As part of the training and education process, the following didactic educational activities are important components of the clinical fellowship training.

##### B. **Critical Care Medicine Grand Rounds (Thursdays 1200-1300)**

These rounds are designed to present interesting and important aspects of CCM. The fellows are expected to attend and actively participate in all rounds. In addition, as described above under Teaching Responsibilities, the fellow will present several CCM grand rounds during the academic year. As described above, the fellow is expected to prepare a handout for the rounds.

##### C. **Journal Club/Research-in-Progress Rounds (Thursdays, 1500-1700)**

These weekly rounds are designed to inform the fellows and faculty of important current published literature in CCM. The fellow is expected to attend all sessions, participate actively in the discussion and will be assigned to present journal articles at Journal Club several times each year. The fellow will also be expected to present proposed research projects as well as "research-in-progress" at the monthly Research-in-Progress Rounds.

##### D. **Morning Rounds (Daily 0900)**

These daily combined clinical and teaching rounds present the fellow with the opportunity to pose questions regarding current cases in the ICU to the Attending Intensivist on call. The fellow should use new and unusual cases as a "springboard" for discussion of various aspects of the physiology, pathophysiology, and management of critically ill patients.

##### E. **Evaluation**

At the mid-point and end of each clinical rotation, there is a quarterly written evaluation of the clinical CCM fellow by the Attending Intensivists. This evaluation is discussed in person with the Director of the ICU.

#### V. **Research**

The clinical CCM fellow is encouraged to undertake at least one research project during the academic year. This may take the form of a retrospective or prospective clinical study or basic science project. The clinical CCM fellow is free to choose any one or more of the Attending Intensivists as supervisors of their research. In addition, the clinical CCM fellow may wish to interact with one of the research CCM fellows in a collaborative project.

## **VII. ROLE OF THE MEDICAL STUDENT IN THE ICU** **ST. PAUL'S HOSPITAL**

**Preamble:** The recognition and management of critical illness is an important part of medical practice in all disciplines. During a rotation in the Intensive Care Unit, the third or fourth year student is given the opportunity to develop skills in the diagnosis and management of critically ill patients and is encouraged to become an active part of the ICU team. One or more patients are assigned to each student to be managed conjointly with a resident or fellow and the student is encouraged to present such cases at the working rounds, to be involved in order writing, invasive procedures and day-to-day management of these patients. Students participating in this rotation are expected to work closely with the residents and fellows in both the acute and chronic aspects of critical care medicine. In addition to residents and fellows, there is close interaction with the critical care physicians who are assigned to the ICU on a weekly sessional rotation and who are always readily available for consultation and instruction.

**Learning Objectives:** See learning objectives for housestaff.

### **Responsibilities:**

1. Under the direct supervision of a senior resident or fellow, admit, provide continuing care, and discharge patients from the ICU. **Students must work in a “buddy” system with either a senior resident or fellow for each patient that they are following.** Usually, the student will be following 1 or 2 patients at a time.
2. Write admission, progress, and transfer/discharge notes for patients that are assigned - **all admission and transfer notes must be countersigned by the “buddy” resident or fellow who is supervising for that patient.**
3. Write orders for the patients that are assigned. **It is the responsibility of the student to have their “buddy” resident or fellow countersign every order or batch of orders before submitting them for processing and execution.**

## **VIII. NURSING DEPARTMENT**

### **I. Nursing - Organization and Roles**

#### **OPERATIONS LEADER**

- Amber Maudee

Manages overall operations in the unit including administrative responsibilities, setting and maintaining patient care standards, and facilitating staff development.

#### **CLINICAL NURSE LEADERS (CNL)**

- Mary Leathley
- Shirley Lee
- Colleen Smith
- Lisa Stammes
- Louise Warnock
- Carol Volpatti

CNL's manage the daily operations of the unit. This includes facilitating and monitoring the work flow, ensuring that patient care standards are maintained, and acting as a resource for staff and other members of the health care team. This group provides 24 hour coverage, 7 days per week working 12 hour shifts.

#### **NURSE EDUCATOR**

- David McDonald

Provides clinical support to the nursing staff by acting as an education resource in the clinical area. She develops, implements and evaluates education programs for nursing staff.

#### **STAFF NURSES**

There are approximately 90 staff nurses (full and part-time) that provide nursing care to the patients in the unit. The nurses have a variety of professional experiences as well as specialized education in the field of critical care nursing. The nurse/patient ratio in ICU is 1:1 and in the Step Down Unit it is 1:2. Staffing ratio is adjusted according to patient acuity. All nurses rotate through both areas on 12 hour shifts.

#### **UNIT COORDINATORS**

There are 5 unit coordinators who work in the ICU/SDU on 12 hours shifts (1 on days and 1 on nights). Their role is centered around unit and interdepartmental communications. They are responsible for all clerical duties including the transcription of orders, and booking of tests as well as telephone monitoring and assisting patient's visitors. They play an invaluable support role to all members of the health care team.

#### **WARD AIDES**

There are 5 ward aides. Their main role is to maintain the physical environment through cleaning equipment, stocking supplies in the patients care areas, and obtaining equipment as necessary. They provide these services to two areas - ICU, SDU - working 12 hours shifts, covering 7 days per week/24 hr day. They also play an invaluable support role to the staff and patients in the units.

## II. Unit Operations

### i) Daily Schedule

RN shift report occurs at 0730 and 1930 hours at the bedside. The OP Leader and CNL's meet to receive report on all patients and discuss shift occurrences (0730). At 0800 hours housestaff changeover report occurs and decisions regarding patient assignment and transfers are made. The CNL uses this information to formulate plans for the day. Patient examinations and discussions with the nurses at the bedside are carried out before Rounds commence at 0900 hours. Rounds are conducted in an interdisciplinary format.

### ii) Admissions/Transfers/Discharges

Policies regarding these functions are covered under the general operating policies section. In order to facilitate planning it is imperative that all consultations and potential patient activity be discussed with the CNL or Charge Nurse. This communication ensures the availability of staff, equipment and space for situations that may arise.

### iii) Charts

Current flowsheets (i.e. past 48 hours) see at patient's bedside.

The charts are split in the following manner:

Green - contains the Admission/Separation record, Caution sheet, Summary sheet, physician's orders, and the antibiotic order sheet. This chart is kept in the chart rack in the nursing station.

Blue - contains history and progress notes, consultations, lab results, and nurses notes and flow sheets. This chart is kept at the patient's bedside or counter top.

### iv) Physician's Orders

All orders must be written and signed with date and time. Verbal orders are not acceptable except in the case of an emergency. These orders must be written at the earliest possible convenience. All crossed out orders must be initialed.

Flagging orders            - yellow tape for routine orders    } Tape placed around  
                                     - stat orders tell nurse @ bedside    } spine of chart  
                                     - give chart to Unit Coordinator

Place all charts in the chart rack (unless stat) and the unit coordinator will process accordingly.

### v) Cardiac Arrests (Code Blue)

Residents should be competent with ACLS protocol. Cardiac arrests are managed by the team from the ICU. The team consists of the senior and junior residents, or CCU resident on call, 2 nurses, and a respiratory therapist. The calls are announced on the overhead paging system as well as transmitted through the cardiac arrest pagers. Sr. Resident runs the code. One nurse at front of cart administers drugs and/or defibrillates. One nurse at back of cart recording/supplying items from cart.

There are 18 identical Crash Carts located in various areas in the hospital. All are locked and the ICU nurses carry the key.

NOTE: Cardiac Arrests are called in non-arrest situations if:

- i) The staff require immediate assistance managing a patient situation.
- ii) If, during a consultation, the patient becomes unstable and you require immediate assistance and equipment.
- iii) Intubations on ward for respiratory distress.  
The following equipment is not stocked on the Crash Carts:

- Thoracotomy tray
- Pacemaker wires or power packs

If you require this equipment, tell the ICU nurse and they will send someone to obtain it.

vi) Transporting Critically Ill Patients

As per unit policy, all intubated/ventilated or unstable patients requiring transport inside or outside the hospital will be accompanied by a physician, nurse, and R.T. and the appropriate equipment. In some situations the physician may not have to accompany the patient - this is a team decision.

vii) Communication

Please introduce yourselves to team members. Wear your hospital identification.

Patient care is accomplished via an interdisciplinary approach, therefore, it is imperative that the direction of care for the patient be discussed with the bedside nurse and that they are kept informed about changes in the treatment plan.

Patient and/or family conferences are held to discuss the patient's medical condition and treatment plan at earliest possible convenience. Bedside nurse or CNL/CN to accompany MD to all patient/family conferences.

viii) Sterile Technique

As per hospital and unit policies all Central Lines and major hemodynamic lines ie. PA catheter and arterial lines are inserted under complete sterile technique (see attached guidelines). All the necessary equipment is provided on designated carts (e.g. Hemodynamic cart, Dressing cart). Do not bring carts into rooms w/utility here infection control precautions are in operation eg MRSA patients. The sonosite must be cleaned after each use and returned to the utility room and plugged in.

ix) Impact of the ICU Setting

The ICU environment can be emotionally and physically draining for patients, families and healthcare providers. Every effort is made to provide emotional support to all involved in caring for the patients and their families. Pastoral Care and Social Work are available to assist with this.

## **IX. ROLE OF RESPIRATORY THERAPY**

### **I. Role of Respiratory Services Department**

Respiratory Therapy provides therapeutic modalities that assist in the diagnosis and treatment of patients with respiratory and associated disorders. Therapists work in all areas of the hospital and provide many needed services. Respiratory therapists are members of the Code Blue Team and the Trauma Team.

### **II. Departmental Organization**

Coverage: ICU: 3 therapists (24 hours/7 days) - pagers 54009 & 54340  
CSICU: 1 therapist (24 hours/7 days) - pager 53938  
ER/Wards: 1 therapist (24 hours/7 days) - pager 54076  
1 therapist (12 hours dayshift/7 days)

Professional Practice Leader: Liz Jolley, RRT local - 68286 pager – 54212  
Clinical Coordinator: Chris Gagnon, RRT local - 68043 pager - 54036  
Student Clinical Site Coordinator: Scott Vigliotti local – 62081 pager - 54940

### **III. Role in Critical Care (specifically ICU)**

#### 1. Protocols:

Ventilation protocols have been established in the ICU. Therapists adjust ventilator settings to maintain the following parameters (unless otherwise ordered by the physician):

pH 7.25 – 7.48  
SaO<sub>2</sub> > 90%

As per protocol, the therapist may adjust the following ventilator settings within the parameters stated without a written physician order:

Vt (tidal volume)	6-8 ml/kg
f (respiratory rate)	8-35 breaths/minute
FiO <sub>2</sub>	0.25 – 0.60
PEEP	≤ 10 cmH <sub>2</sub> O

- \* Any change outside these ranges requires a physician's order.
- \* Any change in mode of ventilation requires a physician's order.

#### 2. Modes of Ventilation and Adjuncts:

A brief inservice will be given to residents at the start of their ICU rotation. The commonly used ventilatory modes and adjuncts will be covered.

### 3. Ventilation Orders:

On initiation of mechanical ventilation, orders must be written by the physician and should include: ventilator mode, Vt, f, FiO<sub>2</sub>, and PEEP.

Arterial blood gas maintenance orders should also be written at this time. If no maintenance orders are written, the therapist will maintain ABG's: pH 7.25-7.48 and SaO<sub>2</sub> > 90%.

### 4. Weaning from Mechanical Ventilation:

When deemed appropriate, the therapist will recommend initiation of the weaning protocol to the physician. See the weaning protocol attached.

**NOTE:** Respiratory flowsheets are used by the therapists for all mechanically ventilated patients. Information on the current ventilator settings, ABG's, assessments and interventions will be documented on the Respiratory flowsheet.

### 5. Bronchodilator Therapy:

Metered dose inhalers (MDI) are used to administer bronchodilators to all ventilated patients when ordered.

Non-ventilated patients requiring bronchodilator therapy will receive nebulized medications unless otherwise indicated.

Dosage of common bronchodilators:

Salbutamol (ventolin):	8-10 puffs via MDI 2.5-5.0 mg via nebulizer
Ipratropium bromide (atrovent):	6-8 puffs via MDI 0.25-0.50 mg via nebulizer



## ICU Weaning Protocol

All ventilated patients in ICU/CCU who meet the screening criteria will be assessed daily for weaning tolerance with the goal of extubation.

Daily Screening: Performed every morning between 0600 - 0830 h

1. PaO<sub>2</sub>/FiO<sub>2</sub> ratio > 150
2. PEEP ≤ 8 cmH<sub>2</sub>O
3. Adequate cough during suctioning (intact airway reflexes)
4. Minimal vasopressor agents (dopamine ≤ 5 µg/kg/min acceptable)
5. Minimal sedative agents (intermittent dosing acceptable)
6. Acceptable nutritional status
7. f/Vt ratio ≤ 105 (measured after 1 minute on PS=0)

If all of the above criteria are met, proceed to the next step:

Trial of spontaneous breathing:

1. CPAP with PS of 5 cmH<sub>2</sub>O for 30 minutes to 2 hours

**\*NOTE:** In CCU, T-piece will be used for the spontaneous breathing trial (unless otherwise ordered by the ICU attending physician)

2. Trial will be stopped if **ANY** of the following conditions are observed:
  - a. RR > 35 breaths/minute for > 5 minutes
  - b. SpO<sub>2</sub>/SaO<sub>2</sub> < 90%
  - c. HR > 140 beats/minute
  - d. Sustained increase or decrease in HR by ≥ 20%
  - e. Systolic BP > 180 mmHg or < 90 mmHg
  - f. Increased anxiety
  - g. Diaphoresis

**\*NOTE:** If trial is stopped, PS will be increased in 5 cmH<sub>2</sub>O increments until above conditions have corrected to a maximum PS level of 25 cmH<sub>2</sub>O (in CCU, return the patient to the ventilator – then proceed as above). If the patient does not recover on higher levels of PS, return the patient to the previous mode of ventilation.

Physician notification:

The Physician will be notified if:

1. the spontaneous breathing trial is successful – extubation will be considered
2. the spontaneous breathing trial is not successful
3. the patient does not meet the criteria for initiating the weaning protocol

NOTE: Each patient will be assessed daily for weaning tolerance until extubated.

## **X. SOCIAL WORK**

The INTENSIVE CARE UNIT has a full-time Registered Social Worker (MSW) position. The Social Worker provides a variety of clinical services to assist patients and their support network with making the necessary adjustments in order to effectively cope with the increased emotional and physical reactions associated with critical illness and hospitalization. Functions of the Social Worker may include:

- (1) **Assisting with the dissemination of information between the ICU care team, the patient, their support network, and relevant community resources.**
  - assess the psychosocial functioning of the patient
  - assess the immediate needs of the patient et al.
  - acknowledge cross-culture differences in critical/terminal illness and end-of-life issues and ensure that patients et al. receive culturally sensitive health care
  - participate in family conferences to ensure continuity of care and information flow to patients et al.
  
- (2) **Clinical counselling interventions for patients et al.**
  - patient/family education and orientation to ICU
  - advocacy and mediation on behalf of patients et al., the ICU care team, and relevant community resources/services
  - issues related to adjusting to critical/terminal illness and other related end-of-life issues
  - ongoing supportive and crisis intervention counselling as required by patients et al. (including ICU staff)
  - post-death/post-ICU follow up re: bereavement support, coping concerns, etc.
  - organizing ethical dilemma interventions required by patient and family including staff)
  
- (3) **Acting as a liaison between the ICU and the community by:**
  - consulting with a variety of community resources/services for collateral information relevant to the health care of the patient (both domestically and internationally)
  - assisting with the identification of “unknown” patients
  - locating and notifying patients next-of-kin or relevant supportive individuals
  - providing patients et al. with resource information and referrals to appropriate agencies (MHR, Public Trustee, funeral home, Family Counselling agency, organ donation, insurance agency, etc.)
  
- (4) **Administrative functions**
  - program development
  - program evaluation/research
  - staff education
  - supervise university, master level students

## **XI. PASTORAL CARE DEPARTMENT**

Pastoral Care is an integral service within the holistic health care team. It is a ministry of compassion providing emotional, spiritual/religious care of patients, families, loved ones, and staff.

The Pastoral Care Worker assigned to the Intensive Care Unit participates in interdisciplinary rounds, family conferences, offers bereavement support and liaises with various religious/faith groups when requested.

### **WHEN TO CALL PASTORAL CARE:**

- 1. For Spiritual/Religious care for patients/family**
- 2. For those experiencing:**
  - emotional distress**
  - lack of support**
  - hopelessness, fear**
  - unresolved grief**
- 3. For bereavement support during the dying process**

The Pastoral Care Associate assigned to the unit is available on-site Monday to Friday, 8:30 a.m. to 4:30 p.m., **call pager #54111**.

For evenings, an on-site Pastoral Care Associate is on-call for emergencies until 8:00 p.m., **call pager #54170**.

For nights (8:00 p.m.-8:00 a.m.), weekends and statutory holidays, a Pastoral Care Associate is on-call for emergencies, **call pager #54170**.

## **XII. PHYSIOTHERAPY**

### **I. STAFFING**

One physiotherapist for ICU and SDU.

### **II. PHYSIOTHERAPIST'S ROLE**

The physiotherapist is responsible for the ongoing assessment and treatment of the patient. Treatments may include:

1. Chest physiotherapy to mobilize sputum, if secretions are excessive and/or plugging off airways causing distal atelectasis.
2. Chest physiotherapy to improve and maintain adequate breathing control and gas exchange.
3. General exercises - both active and passive - to maintain joint range and muscle function.
4. Increasing general mobility of the patient (e.g. mobilizing up to a chair) as tolerated by the patient.

### **III. KEY ITEMS**

#### **Referrals**

A doctor's order is not required for physiotherapy treatment to be initiated but house-staff should discuss with physiotherapist the goals of treatment.

#### **On-Call**

There is a physiotherapist available on-call up to 23:00 hours daily for the management of patients with acute respiratory deterioration.

A doctor's order is required by an attending physician for physiotherapy treatment to be initiated on a call-back.

### **XIII. NUTRITION SERVICES**

1. Nutrition Services provides meals for patients, nutritional formulas for patients requiring enteral nutrition support, and a cafeteria service for staff and visitors.
2. Clinical Dietitians provide nutritional assessment and counselling to patients admitted to St. Paul's Hospital, and those seen in the many outpatient programs including Diabetes Teaching and Treatment Centre, Cardiac Rehabilitation/Lipid Clinic, Eating Disorders, Cystic Fibrosis and Renal Programs.
3. ICU Dietitian – 1.0 FTE dietitian is responsible for the provision of appropriate nutrition support to ICU, ventilated CCU, and CSICU patients. The ICU dietitian:
  - Screens and assesses all patients admitted to ICU for nutrition support as appropriate. The assessment includes a review of the patient's medical history, clinical status, laboratory parameters and measurement of energy requirements using a metabolic monitor (as appropriate).
  - Provides recommendations for a nutrition support regime to the housestaff, including appropriate nutritional formula/goal rate of feeding, mineral repletion and vitamin supplementation.

Places small bore feeding tubes as appropriate (for ICU, ventilated CCU and CSICU patients followed by ICU)

  - Liaises with the Nutrition Support Team (NST) for those patients requiring Total Parenteral Nutrition (TPN).
  - Monitors tolerance to nutrition support regimes, metabolic disturbances and relays nutritional concerns/recommendations through daily participation for ICU rounds.
  - Provides recommendations for transition to oral feedings and liaises with appropriate dietitian for continuation of patient nutritional care on transfer to ward.
  - Acts as nutrition resource for medical and nursing staff including informal education sessions as required.

#### **XIV. INTER-HOSPITAL TRANSFERS TO THE INTENSIVE CARE UNIT ST. PAUL'S HOSPITAL**

The following protocol must be followed for the safe, efficient transfer of patients in other hospitals to the I.C.U. It is essential that we are adequately prepared to manage the patient immediately upon admission to the I.C.U.

1. The referring physician will contact the attending intensivist, fellow or I.C.U. Resident on call re patient to be admitted.
2. The Attending Intensivist, Fellow or I.C.U. Resident will check with I.C.U. Charge Nurse regarding availability of beds and nursing situation.

AND

The I.C.U. Resident will discuss case with the Attending Intensivist and other staff physicians or surgeons to be involved in case.

3. If bed and nursing staff available, I.C.U. Resident will then confirm admission with referring physician and establish timing of transfer. The Attending Intensivist or his delegate will discuss transport management of the case with the referring physician before the patient leaves the referring hospital.
4. Resident will discuss management plans with the ICU charge nurse. Specifically the following information should be considered:
  - a. Arterial line set-up
  - b. Ventilator set-up
  - c. Prepare vasoactive drugs: e.g. dopamine, dobutamine, nitroprusside, nitroglycerin, etc.
  - d. Chest tube suction set-up
  - e. Dialysis requirement/set-up
5. I.C.U. Charge nurse to inform Admitting Department and Emergency Department of admission.
6. On arrival at St. Paul's Hospital the patient will be admitted directly to the Intensive Care Unit. The exception is that all trauma patients must be evaluated first in the Emergency Department.
7. If the situation in the I.C.U. has changed significantly since accepting the admission, the I.C.U. Resident will consult with Emergency physician regarding the possibility of holding the patient in the Emergency Department or transferring the patient to another facility.

**XV. RESIDENT/INTERN CORE SEMINAR TOPICS**  
**INTENSIVE CARE UNIT**  
**ST. PAUL'S HOSPITAL**

1. Cardiopulmonary resuscitation: ACLS overview.
2. Multiple Trauma: ATLS overview.
3. Emergency airway management techniques.
4. Shock ... Recognition/Assessment/Resuscitation /oxygen transport in critical illness.
5. Hemodynamic Monitoring
6. Cardiopulmonary interactions
7. Pharmacology of inotropes and vasodilators.
8. Respiratory Failure, Part I: Asthma/COPD/pulmonary embolism.
9. Respiratory Failure, Part II: ARDS, pneumonia, pulmonary contusion, aspiration.
10. Respiratory Failure, Part III: Mechanical Ventilation: modes, weaning, PEEP.
11. Fluids and Electrolytes in the ICU.
12. Acid-Base Disturbances.
13. Renal Failure.
14. Renal Replacement Therapy.
15. Liver failure
16. Acute pancreatitis
17. Infectious Diseases... Sepsis and septic shock, approach to antibiotic therapy, and AIDS in the ICU.
18. Enteral and parenteral nutrition in the ICU.

19. Blood component therapy, the massive transfusion, transfusion reactions, and thrombocytopenia in the ICU.
20. Neurology and Neurosurgery...approach to the comatose patient, traumatic head injury and control of ICP; status epilepticus.
21. Neurological determination of death and care of the organ donor.
22. Toxicology and approach to the overdose patient
23. hypothermia
24. Environmental injury – hyperthermia, hypothermia, electrical injury, drowning.
25. Endocrinology in the ICU - DKA/adrenal crisis/steroid therapy/pituitary dysfunction



## **XVI. ICU Website and Reference Library**

A reference library containing up to date reviews of core topics and seminal critical care papers is available on the ICU website – [www.providenceicu.com/main/](http://www.providenceicu.com/main/)

**Click on “Residents section”.**

**Username: icuresidents.**

**Password: biblio.**

The ICU website also contains links to other useful sites.....

### Links

- [ECGs to Lung Function](#)
- [Enhanced Anatomy Pictures](#)
- [Interpretation of the ICU Chest](#)
  - [CXR Interpretation](#)
  - [Respiratory Therapy](#)
  - [Residents Section](#)
    - [Online Merck](#)
- [Nepean ICU Quiz Pages](#)
  - [ECG Library](#)
- [Critical Care Tutorials](#)
  - [Line Placement](#)
  - [Intubation Video](#)

## **XVII. International ACLS Guidelines 2005**

### Ventricular Fibrillation/Pulseless Ventricular Tachycardia

#### **ABC'S**



#### **CPR**

New Guidelines emphasize high-quality CPR with minimal interruptions in CPR  
Prehospital: consider CPR x 2 min prior to shock if arrest unwitnessed or down time > 5 min



IF VF OR VT PRESENT ON DEFIBRILLATOR



#### **DEFIBRILLATE x 1**

(200 J Biphasic, 360 J Monophasic)



#### **RESUME CPR IMMEDIATELY** (Intubate – IV Access-Prepare Drugs)

Prehospital: Continue CPR x 2 min prior to rhythm or pulse check  
Inhospital: Physician may check rhythm and pulse prior to CPR if continuous ECG monitoring present  
Minimize interruptions in CPR (only for rhythm check and shock delivery)

↓ *Rhythm Check*

#### **DEFIBRILLATE x 1**

(200 J Biphasic, 360 J Monophasic)



#### **RESUME CPR IMMEDIATELY**

Continue CPR x 2 min prior to rhythm or pulse check  
(Hard and fast CPR-100/min)

↓ *Rhythm Check*

**EPINEPHRINE 1 mg IV** (may be given after 1<sup>st</sup> or 2<sup>nd</sup> shock)  
**(REPEAT Q 3-5 MIN)** give drugs during CPR after rhythm check

(Vasopressin 40 U IV may be an alternate to 1<sup>st</sup> or 2<sup>nd</sup> dose of epinephrine)



#### **DEFIBRILLATE x 1**



#### **RESUME CPR IMMEDIATELY**

Continue CPR x 2 min prior to rhythm or pulse check

↓ *Rhythm Check*

**CONSIDER ANTIDYSRHYTHMICS**  
**give drugs during CPR**

**AMIODARONE 300 mg IV bolus (Preferred)**

(may give 2<sup>nd</sup> dose 150 mg IV)

or

**LIDOCAINE 1.5 mg/kg IV**

(REPEAT in 3-5 min) (Max. 3 mg/kg)

or

**MAGNESIUM SULFATE 2 G IV**

(especially with hypomagnesemia, torsades)



- **Hypothermia (32-34°C) recommended for resuscitated v. fib. patients who remain comatose and intubated with a BP >90.**

# International ACLS Guidelines 2005

## WIDE COMPLEX TACHYCARDIA

ASSESS ABC'S IF STABLE, O2, MONITOR, O2 SAT, VITALSIGNS (Hx, P/E, ECG, CXR)

### Unstable

(Chest pain, SOB, LOC, low BP, CHF, AMI)

### Stable

#### **Amiodarone**

150 mg over 10 min (repeat prn)  
Infusion: 1 mg/min x 6 hrs,  
then 0.5 mg/min over 24 hrs  
(Max: 2.2m in 24 hrs)

#### **OR**

#### **Procainamide\***

30 mg/min (max 17mg/kg)

Prepare for cardioversion  
Consider premedication

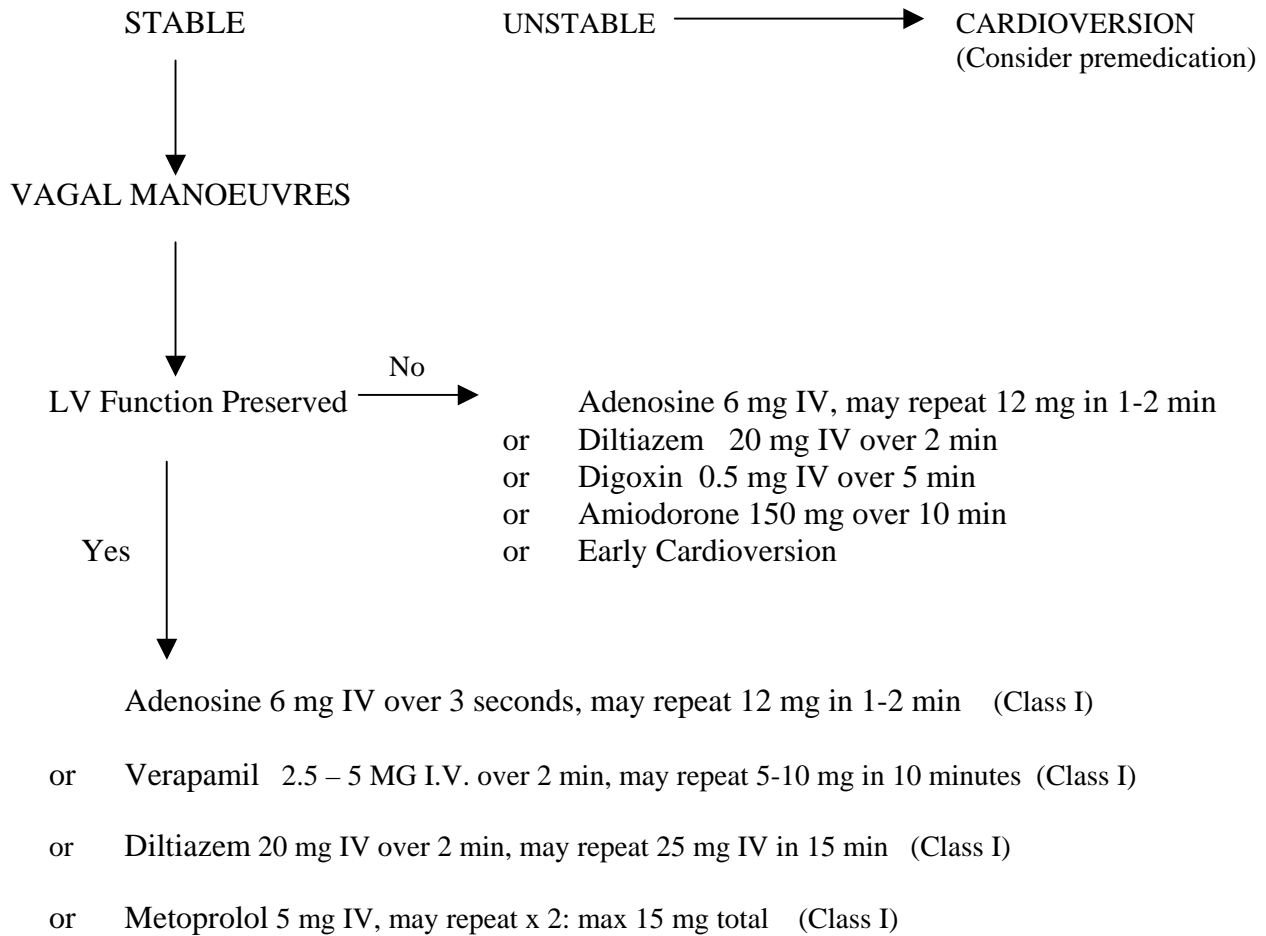
**SYNCHRONIZED CARDIOVERSION**  
Biphasic: 50-100-150-200  
Monophasic: 100-200-300-360

If Ventricular Tachycardia is polymorphic (Torsades) consider: magnesium 2 gm, overdrive pacing, isoproterenol, Phenytoin, Lidocaine, amiodorone.

\*Avoid giving multiple antidysrhythmics sequentially (to prevent proarrhythmias). If one antidysrhythmic fails, go to electrical cardioversion.

## International ACLS Guidelines 2005

### PAROXYSMAL SUPRAVENTRICULAR TACHYCARDIA (regular narrow complex tachycardia)



Others to consider:

Procainamide 30mg/min to 17/kg (Class IIa)

Amiodarone 150 mg over 10 min (Class IIa)

or

↓  
SYNCHRONIZED CARDIOVERSION (consider premedication)

Monophasic: 50,100,200,300 j

Biphasic: 30, 70, 100, 150 j

# International ACLS Guidelines 2005

## Atrial Fibrillation or Atrial Flutter \*

STABLE

UNSTABLE → CARDIOVERSION

-higher risk of stroke if a.fib/flutter > 48 hrs and patient not anticoagulated

### 1) Control Heart Rate if > 120

#### Narrow Complex

Diltiazem 20 mg IV  
Verapamil 2.5-5mg IV<sup>1</sup>  
Metoprolol 5 mg IV<sup>1</sup>  
Amiodarone 150 mg over 10 min<sup>2</sup>  
Digoxin 0.5 mg IV

#### Wide Complex (WPW or BBB)

Procainamide 30 mg/min to 17mg/kg<sup>2</sup>  
Amiodarone 150 mg over 10 min<sup>2</sup>

- 1) Do not use verapamil or metoprolol if LV function is impaired (<40%).
- 2) Do not use amiodarone or procainamide if fibrillation or flutter present for > 48 hours

### 2) Convert rhythm back to NSR

#### A fib < 48 hours

Cardiovert Electrically or with Drugs

Procainamide  
Amiodarone  
Flecainide 300 mg po  
Propafenone 600 mg po  
Ibutilide 1 mg IV

With LV dysfunction: Amiodarone

#### A. fib > 48 hrs duration

- 1) Anticoagulate x 3 weeks prior to and 4 weeks after cardioversion  
or Heparinize, do TEE, cardiovert if not clot, then anticoagulate x 4 wks post cardioversion
- 2) Long term rate control with beta or ca channel blocker

Consider long term anticoagulation with recurrent episodes, if in high risk group for stroke: previous stroke or TIA, diabetes, ASHD, hypertension, LV dysfunction

\*N.B. Medications are not effective in converting atrial flutter back to NSR and the treatment of choice is electrical cardioversion if < 48 hrs duration



# International ACLS Guidelines 2005

## ASYSTOLE

ASYSTOLE SHOULD BE CONFIRMED IN TWO LEADS

CONTINUE CPR  
INTUBATE AT ONCE  
ESTABLISH IV ACCESS



CONSIDER POSSIBLE CAUSES

- Hypoxia
- Hyperkalemia
- Hypokalemia
- Acidosis
- Drug Overdose
- Hypothermia

EPINEPHRINE, 1 mg IV PUSH Q 3 – 5 MIN

(Vasopressin 40 U IV may replace 1<sup>st</sup> or 2<sup>nd</sup> dose of epinephrine)



ATROPINE 1 MG IV (REPEAT Q 3 – 5 MIN TO MAX OF 3 MG) (0.04 Mg/Kg)



CONSIDER TERMINATION OF EFFORTS

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# International ACLS Guidelines 2005

## **PULSELESS ELECTRICAL ACTIVITY PEA**

Continue CPR



Airway control (Endotracheal tube, LMA, Combitube)



IV access



**TREAT REVERSIBLE CAUSES**



**CONSIDER POSSIBLE CAUSES**  
(6 H's and 5 T's)

Hypovolemia	Tablets (overdose)
Hypoxia	Tamponade, cardiac
Hydrogen ion-acidosis	Tension pneumothorax
Hyper/hypokalemia	Thrombosis, coronary
Hypothermia	Thrombosis, pulmonary
Hypoglycemia	Trauma



**EPINEPHRINE 1 mg IV PUSH Q 3-5 MIN**



If bradycardia, **ATROPINE 1 mg IV**  
(Repeat Q 3-5 min to max of 3 mg) (0.04 mg/kg)

# International ACLS Guidelines 2005

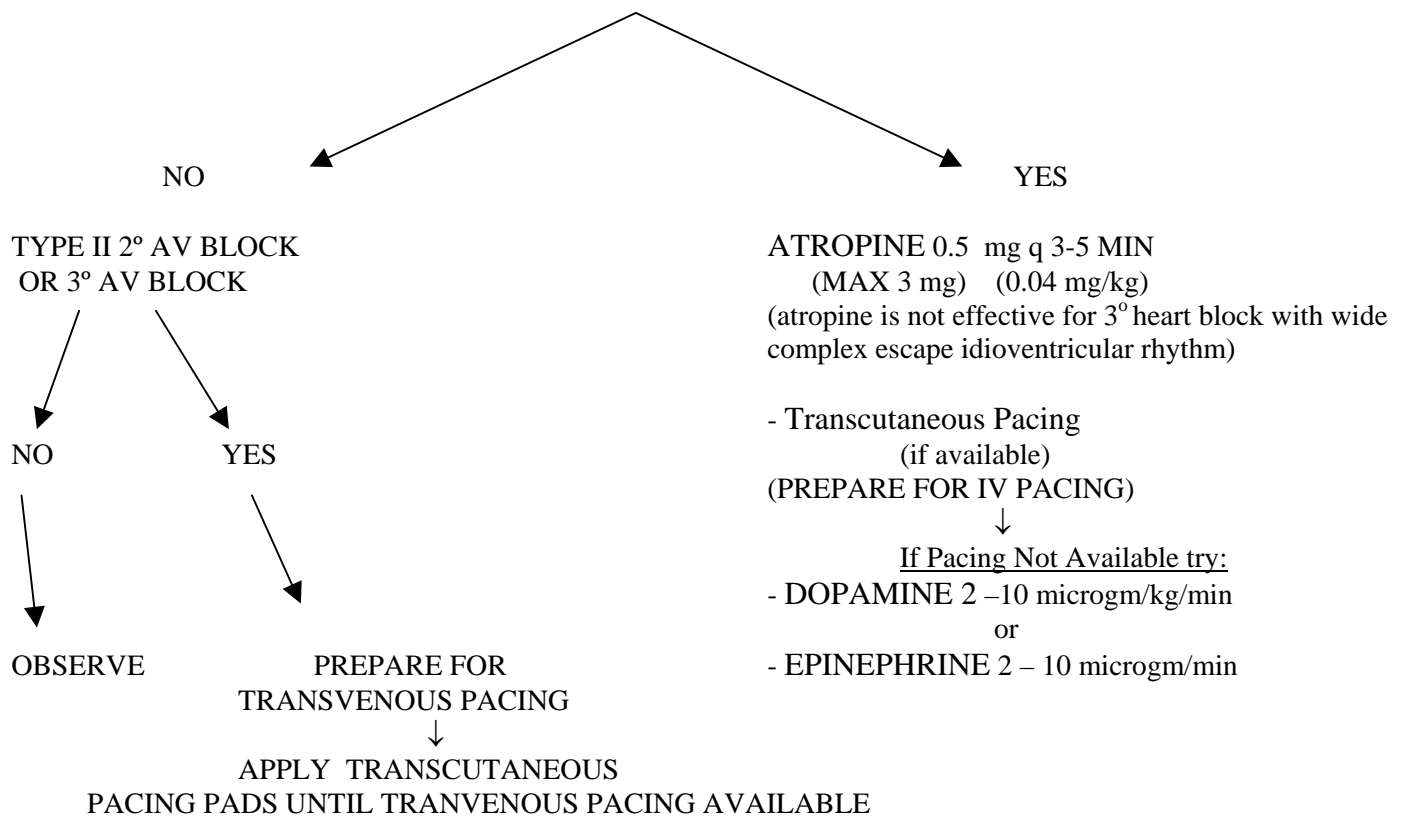
## BRADYCARDIA (SLOW H.R. < 60/MIN)

ASSESS ABC'S, O<sub>2</sub>, I.V. MONITOR

BRADYCARDIA (< 60/MIN)

SERIOUS SIGNS OR SYMPTOMS?

- Hypotension
- Chest pain, dyspnea, LOC
- CHF, acute MI



## RULE OF 250 FOR DRUG INFUSIONS

Mix one ampoule of any drug into 250 cc and run at:

30 cc/hr	3 cc/hr
<p><u>Antiarrhythmics</u></p> <p>Lidocaine (1 gm) 2 mg/min                      Procainamide (1gm) 2 mg/min                      Mag SO<sub>4</sub> (5gm) 0.6 gm/hr</p> <p><u>Adrenergic agents</u></p> <p>Epinephrine (1mg) 2 micgm/min                      Dopamine (200 mg) 5 micgm/kg/min (70 kg)                      Dobutamine (250 mg) 7 micgm/kg/min (70 kg)                      Norepinephrine (4mg) 8 micgm/min</p>	<p><u>Vasodilators</u></p> <p>Nitroglycerin (50 mg) 10 micgm/min                      Nitroprusside (50mg) 10 micgm/min</p>

Drugs Given By the Endotracheal Tube (2x the dose) **Note: The IV or Intraosseous route is preferred.**

N naloxone  
 A atropine  
 V valium, ventolin, versed (midazolam)  
 E epinephrine  
 L lidocaine

Chest Pain Nemonic

M morphine  
 O oxygen  
 N nitrates  
 A aspirin

# CORE PHARMACOLOGY REFERENCE FOR ACLS

## **ADENOSINE**

6 mg IV RAPID PUSH over 3 seconds.

May repeat at 12 mg IV and then another 12 mg IV if first dose is not effective.

IV rapid push always followed by 20 mg NS bolus. May repeat in 2-3 min.

Should not be used as a diagnostic agent to differentiate SVT from VT

## **AMIODARONE**

300 mg IV push for cardiac arrest, and may then give 150 mg if initial dose is

not effective. 150 mg IV over 8-10 min for VT, PSVT, Atrial Fibrillation/Flutter with either

good or impaired LV function. After bolus, infusion should be started immediately at 1 mg/min for 6 hours,

then 0.5 mg/min for 18 hours. An effective Class III antiarrhythmic IV medication. Dilute with D5W before infusing in normal saline IV line. Keep in mind the proarrhythmic effect of all antiarrhythmics.

**ATROPINE** 0.5-1.0 mg IV fast push to max of 0.04 mg/kg 2-2.5 times IV dose down ETT in 10 ml NS. Drug should be given quickly to offset paradoxical effect (if given too slowly). Caution should be used in high level blocks.

**BETA BLOCKER** A variety of beta blockers are available. ACLS providers should have knowledge of at least one of these agents. Short-acting beta blocker is effective for treatment of tachyarrhythmias, and for post –MI management.

## **CALCIUM CHANNEL BLOCKER**

Diltiazem: 0.25 mg/kg slow IV push over 2 minutes, repeat dose of 0.35 mg/kg in 15-30 min

Verapamil: 2.5 -5mg IV push

Caution: Common calcium channel blocker side effects: Hypotension.

Do not use in WPW with AFib or where a delta wave or short PR is apparent, sick sinus syndrome, AV block, CHF or bundle branch block.

**EPINEPHRINE** 1 mg IV Q 3-5 min (no maximum ) 2-2.5 mg in 10 ml NS ET followed by hyperventilation when IV not available (Intermediate and high dose IV epinephrine treatment is not recommended.) Continuous infusion may be appropriate for symptomatic bradyarrhythmias.

**LIDOCAINE** 1-1.5 mg/kg and repeat at 0.5 - 0.75 mg/kg Q 5-10 min to max dose 3 mg/kg. 1.0 mg/kg for stable Ventricular Tachycardia. Maintenance infusion may be used after rhythm is successfully converted.

**MAGNESIUM** 1-2 g IV push diluted in 10 ml NS Give for known or suspected magnesium deficiency or for torsade des pointes. May cause rapid drop in BP. Caution in renal failure.

**PROCAINAMIDE** 20-30 mg/min IV dose to max of 17mg/kg then 1-4 mg/min as maintenance infusion (Can mix 100 mg at a time in a syringe to give over 5 min.). Class I antiarrhythmic that can be given as rapidly as 50 mg/min in urgent situations. Administer until: dysrhythmia is suppressed, QRS widens >50%, max dose reached, hypotension occurs--watch QT Interval. Has pro-arrhythmic effects as well! Maintenance infusion may be used after rhythm is successfully converted.

## **SODIUM BICARBONATE**

1 mEq/kg IV and may repeat (half dose) in 10 min. Give for known metabolic acidosis, TCA or Barbiturate OD, long code endpoint.

**VASOPRESSIN** 40 units IV for cardiac arrest. 1-2 doses used before epinephrine. Is equivalent choice to epinephrine for cardiac arrest management.

## 2005 New Guidelines: Major changes in BLS for Health Care Providers (HCP):

- 1) Push hard and fast (100/min)
- 2) Ensure full chest recoil
- 3) Minimize interruptions in chest compressions
- 4) Once cycle of CPR for 30 compressions, then 2 breaths: 5 cycles = 2 min
- 5) Avoid hyperventilation or excessive volume.
- 6) Secure airway and confirm placement
- 7) 8-10 breaths per min
- 8) With an advanced airway, don't pause for breaths.
- 9) Rhythm check every 2 min.
- 10) Rotate compressors every 2 minutes.
- 11) Jaw thrust is the best technique (vs head tilt chin lift) for opening airway and bagging.
- 12) Children and Infant:
  - Healthcare provider "child" CPR guidelines now apply to victims 1 year to the onset of puberty.
  - - "CPR first" (provide about 5 cycles or 2 minutes of CPR before activating the emergency response number) for unresponsive infants and children (except infants and children with sudden, witnessed collapse) and for all victims of likely *hypoxic* (asphyxial) arrest (eg, drowning, injury, drug overdose).
  - Chest compressions are recommended if the infant or child heart rate is less than 60 per minute with signs of poor perfusion despite adequate oxygenation and ventilation.
  - Use 1 or 2 hands to give chest compressions for a child; press on the sternum at the nipple line.  
For the infant, press on the sternum just below the nipple line.
  - During 2-rescuer infant CPR, the 2 thumb-encircling hands technique should include a thoracic squeeze.

**TABLE 2. Summary of BLS ABCD Maneuvers for Infants, Children, and Adults**  
(Newborn/Neonatal Information Not Included) *Note:* Maneuvers used only by healthcare providers are indicated by “HCP:”

MANEUVER	ADULT	CHILD	INFANT
	Lay rescuer: ≥8 years HCP: Adolescent and older	Lay rescuers: 1 to 8 years HCP: 1 year to adolescent	Under 1 year of age
<b>ACTIVATE</b> Emergency Response Number (lone rescuer)	Activate when victim found unresponsive HCP: if asphyxial arrest likely, call after 5 cycles (2 minutes) of CPR	Activate after performing 5 cycles of CPR For sudden, witnessed collapse, activate after verifying that victim unresponsive	
<b>AIRWAY</b>	Head tilt–chin lift (HCP: suspected trauma, use jaw thrust)		
<b>BREATHS</b> Initial	2 breaths at 1 second/breath	2 effective breaths at 1 second/breath	
HCP: Rescue breathing without chest compressions	10 to 12 breaths/min (approximately 1 breath every 5 to 6 seconds)	12 to 20 breaths/min (approximately 1 breath every 3 to 5 seconds)	
HCP: Rescue breaths for CPR with advanced airway	8 to 10 breaths/min (approximately 1 breath every 6 to 8 seconds)		
Foreign-body airway obstruction	Abdominal thrusts		Back slaps and chest thrusts
<b>CIRCULATION</b> HCP: Pulse check (≤10 sec)	Carotid (HCP can use femoral in child)		Brachial or femoral
Compression landmarks	Center of chest, between nipples		Just below nipple line
Compression method Push hard and fast Allow complete recoil	<b>2 Hands:</b> Heel of 1 hand, other hand on top	<b>2 Hands:</b> Heel of 1 hand with second on top or <b>1 Hand:</b> Heel of 1 hand only	1 rescuer: 2 fingers HCP, 2 rescuers: 2 thumb–encircling hands
Compression depth	1½ to 2 inches	Approximately ⅓ to ½ the depth of the chest	
Compression rate	Approximately 100/min		
Compression-ventilation ratio	30:2 (1 or 2 rescuers)	30:2 (single rescuer) HCP: 15:2 (2 rescuers)	
<b>DEFIBRILLATION</b>			
AED	Use adult pads. Do not use child pads/child system. HCP: For out-of-hospital response may provide 5 cycles/2 minutes of CPR before shock if response > 4 to 5 minutes and arrest not witnessed.	HCP: Use AED as soon as available for sudden collapse and in-hospital. All: After 5 cycles of CPR (out-of-hospital). Use child pads/child system for child 1 to 8 years if available. If child pads/system not available, use adult AED and pads.	No recommendation for infants <1 year of age

## **XVIII. GUIDELINES FOR THE INSERTION AND MAINTENANCE OF CENTRAL VEIN CATHETERS**

All residents must be supervised by the Fellow/Attending in their first performance of any procedure in the ICU regardless of previous experience. Practice guidelines must be followed for all procedures – see below. Full sterile procedure is mandatory for all procedures. The sonosite should be used for central venous catheter insertion (excluding subclavian lines).

**PURPOSE:** To prevent intravascular infections.

### A. **INSERTION**

#### General Statements:

1. Catheters are inserted using aseptic technique and sterile equipment. This includes gown, mask, cap, gloves and large sterile drape.
2. Remember to use a catheter with as few lumens as is necessary. More lumens means an increased risk of infection. In most cases, a triple lumen catheter will be necessary – check with the bedside nurse if in doubt.
3. A catheter inserted in an emergency situation is to be removed at the earliest opportunity and an alternate site used.
4. Shaving of the site prior to cannulation is to be avoided. If it is necessary to remove any hair - use clippers.
5. Stopcocks are to be avoided if possible, but if used they must be sterile and access port(s) covered with a sterile hub.
6. Tabs on central lines to be secured/stitched.

#### Procedure:

1. Handwashing is performed for 15 seconds prior to gloving.
2. Sterile gloves are worn and a sterile drape is placed under/around the site to be cannulated. Sterile gown to be worn.
3. Cleanse the cannulation site thoroughly with chlorhexidine 0.5%. The solution is liberally applied for 30 seconds and site allowed to air dry.
4. The sonosite must be used for all IJ and femoral CVC insertions. Sterile sleeves and gel are available on the sonosite cart to allow cannulation under direct vision.
5. Dress the cannulated site with a sterile dressing.
6. Perform x-ray to check position of IJ and subclavian lines

B. **CATHETER CHANGES**

General statement:

Routine changing of central vein or arterial catheters is not necessary.

- 1) Catheters are automatically removed if a fungemia with Candida or any other fungus occurs.
- 2) Central vein catheters are changed when a patient:
  - a) Demonstrates obvious site complications such as redness, thrombus, purulent exudate. In this case a new site must be established.
  - b) Has a documented primary bacteremia and not other identifiable source of infection. In this case the catheter may be changed over a guidewire. The catheter tip is sent to Microbiology for semi-quantitative culture. A positive result (>15 colonies of the same organism as in the blood culture) necessitates subsequent changing of the site.
  - c) Swan Ganz catheters to be removed by M.D. and 1<sup>st</sup> set of cardiac outputs performed by M.D.



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