CS100 Color Display and Keypad Controls
Datascope is now MAQUET Cardiovascular

In early 2009, the purchase agreement between Datascope and Getinge AB was completed. As a result, Datascope's innovative cardiovascular product portfolio will be integrated into MAQUET Cardiovascular, a global leader representing the Medical Systems Business area of Getinge AB.

Cardiac professionals have always relied on gold-standard Cardiac Assist products from Datascope, helping them to feel confident that they are delivering the highest quality of care to their patients. Now, as a part of MAQUET Cardiovascular, Datascope is even better positioned to focus on the future advancement of Cardiac Assist products and seeks to explore the full potential of this technology through our continued dedication to innovation, service and clinical excellence.

Quality Products:
Expect the same great quality products you have relied on over the years with names you are familiar with like: Fidelity, Linear and Sensation IAB's, CS300 balloon pumps, SafeGuard and StatLock.

Quality Service:
Rest assured that you will receive the same amazing service and clinical support you have become accustomed to from Datascope. We are still here for you 24/7 with technical support, loaner equipment and clinical help.

Worldwide:
MAQUET ranks among the leading providers of medical products, therapies and services for Surgical Workplaces, Critical Care and Cardiovascular applications. Since its foundation more than 170 years ago, MAQUET has stood for innovation and the advancement of patient care technologies in the field of medicine. The portfolio of MAQUET products is extensive, providing a comprehensive solution that is designed for efficient workflows, safety and the improvement of patient lives and outcomes.

Welcome to MAQUET Cardiovascular:
With a fresh vision of the future, this new, combined organization is committed to providing the highest quality patient care solutions for cardiologists, interventional radiologists, cardiothoracic and vascular surgeons, critical care clinicians and their teams.

For further information please visit www.datascope.com
Theory and Techniques of Intra-Aortic Balloon Counterpulsation Therapy

Course Description

This four hour seminar is designed for health care professionals with a sound understanding of hemodynamics who will be directly responsible for the care of patients requiring Intra-Aortic Balloon Pump (IABP) therapy. Recommended pre-requisites for the program include the Pre-Inservice Self-Study Guide and the self paced learning module: Intra-Aortic Balloon Counterpulsation Therapy.

The program is comprised of three modular components consisting of theoretical, clinical and technical considerations for a patient requiring IABP therapy. Module I provides an overview of the theoretical aspects of counterpulsation therapy with a focus on the physiological effects of counterpulsation, timing, trigger and arterial pressure waveform interpretation. Module II provides a review of clinical considerations for a patient requiring IABP therapy. Module III reviews the technical aspects of the therapy beginning with a discussion of percutaneous IAB insertion followed by a detailed explanation of the IABP. Troubleshooting in the clinical setting will be addressed.

Behavioral Objectives

At the conclusion of this program, the participants will be able to:

1. Describe the two (2) physiological effects achieved by the mechanics of inflation and deflation of the IAB as it relates to the cardiac cycle illustrated by an augmented arterial pressure waveform.
2. Identify four (4) indications and three (3) contraindications for IABP therapy.
3. Delineate the major clinical complications associated with IABP therapy.
4. Discuss the operation and troubleshooting of the Datascope IABP utilizing the Abbreviated Operator’s Guide and Performance Checklist.

Caution: U.S. Federal Law restricts this device to sale by or on the order of a physician. Refer to package insert for current indications, warnings, contraindications, precautions and instructions for use.
Course Schedule (Total time is 4.5 hours including a break)

15 Minutes  Introduction
            Program Review
75 Minutes  Theoretical Aspects - MODULE I
            I. Overview of Cardiac Performance
               A. Supply and Demand
               B. Normal Arterial Pressure Waveform
            II. Theory of Counterpulsation
               A. IAB Structure, Position and Sizing
               B. Increased Coronary Perfusion
               C. Decreased Left Ventricular Workload
               D. Synchronization with Cardiac Cycle
               E. Physiologic Pressure Waveform Changes
               F. Primary Effects
               G. Secondary Effects
               H. Systemic Effects
               I. Factors Affecting Diastolic Augmentation
               J. Timing Errors
45 Minutes  Clinical Considerations - MODULE II
            I. Indications/Contraindications
            II. Side Effects/Complications
            III. Weaning and Removal
               A. Frequency
               B. Balloon Augmentation
15 Minutes  Break
120 Minutes Technical Aspects – Module III
            I. The IAB Catheter
               A. Insertion
               B. Clinical Considerations for Care of the Inner Lumen
            II. The IAB Console
               A. Technical Components of the CS100/300 IABP
               B. Troubleshooting
               C. Transport Considerations
               D. Hands-on workshop and Skills Checklist
Module I

Theoretical Aspects of IABP
Theoretical Aspects of IABP

I. Overview of Cardiac Performance

A. Myocardial Oxygen Supply and Demand

<table>
<thead>
<tr>
<th>SUPPLY</th>
<th>DEMAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Coronary artery anatomy</td>
<td>1. Heart Rate</td>
</tr>
<tr>
<td>2. Diastolic pressure</td>
<td>2. Afterload</td>
</tr>
<tr>
<td>3. Diastolic time</td>
<td>3. Preload</td>
</tr>
<tr>
<td>4. O₂ extraction</td>
<td>4. Contractility</td>
</tr>
<tr>
<td>a. HGB</td>
<td></td>
</tr>
<tr>
<td>b. PaO₂</td>
<td></td>
</tr>
</tbody>
</table>

B. Normal Arterial Waveform

Systolic Pressure

Rapid Ventricular Ejection Phase (75% SV Ejected)

Run-Off Phase (25% SV Ejected)

Dicrotic Notch
- Aortic Valve Closes
- Diastole Begins

Aortic Valve Opens

Aortic End Diastolic Pressure
II. Theory of Counterpulsation

A. Counterpulsation

1. Balloon Structure, Position and Sizing

2. Increased Coronary Perfusion
   a. Inflation
   b. Augmentation of Diastolic Pressure

3. Decreased Left Ventricular Workload
   a. Deflation
   b. Afterload Reduction

4. Synchronization with the Cardiac Cycle
   a. Timing: Inflation and deflation of the IAB in concert with the mechanical cardiac cycle.
   b. Trigger: Signal used by the IABP to identify the beginning of the next cardiac cycle and deflate the IAB if not already deflated.
5. Physiological Pressure Wave Changes
   
a. Dicrotic Notch
   
b. Diastole: Augmentation
   
c. Decreased End-Diastolic Pressure
   
d. Systole: Decreased Assisted Systolic Pressure

---

Increased Coronary Artery Perfusion

A. One Complete Cardiac Cycle
B. Unassisted Aortic End Diastolic Pressure
C. Unassisted Systolic Pressure
D. Diastolic Augmentation
E. Assisted Aortic End Diastolic Pressure
F. Reduced Systolic Pressure

Reduced Myocardial $O_2$ Demand
ARTERIAL WAVEFORM VARIATIONS DURING IABP THERAPY

1:1 IABP Frequency

1:2 IABP Frequency

1:3 IABP Frequency
6. Primary
   a. Supply
   b. Demand

7. Secondary
   a. CO/CI
   b. HR
   c. PAD-PCWP
   d. SVR
   e. B/P
      SYSTOLIC
      DIASTOLIC
      MAP
      DIASTOLIC AUGMENTATION

8. Systemic
   a. Neuro
   b. Respiratory
   c. Renal
   d. Vascular
9. Factors Affecting Diastolic Augmentation

a. Patient Hemodynamics
   1) Heart Rate
   2) Stroke Volume
   3) Mean Arterial Pressure
   4) System Vascular Resistance

b. Intra-Aortic Balloon
   1) IAB in Sheath
   2) IAB Not Unfolded
   3) IAB Position
   4) Kink in IAB Catheter
   5) IAB Leak
   6) Low Helium Concentration

c. IABP
   1) Timing
   2) Position of IAB Augmentation Control
10. Timing Errors

a. Early Inflation
Inflation of the IAB prior to aortic valve closure

**Waveform Characteristics:**
- Inflation of IAB prior to dicrotic notch
- Diastolic augmentation encroaches onto systole (may be unable to distinguish)

**Physiologic Effects:**
- Potential premature closure of aortic valve
- Potential increase in LVEDV and LVEDP or PCWP
- Increased left ventricular wall stress or afterload
- Aortic Regurgitation
- Increased MVO$_2$ demand

b. Late Inflation
Inflation of the IAB markedly after closure of the aortic valve

**Waveform Characteristics:**
- Inflation of the IAB after the dicrotic notch
- Absence of sharp V
- Sub-optimal diastolic augmentation

**Physiologic Effects:**
- Sub-optimal coronary artery perfusion
c. Early Deflation
Premature deflation of the IAB
during the diastolic phase

**Waveform Characteristics**
- Deflation of IAB is seen as a sharp drop following diastolic augmentation
- Sub-optimal diastolic augmentation
- Assisted aortic end diastolic pressure may be equal to or less than the unassisted aortic end diastolic pressure
- Assisted systolic pressure may rise

**Physiologic Effects:**
- Sub-optimal coronary perfusion
- Potential for retrograde coronary and carotid blood flow
- Angina may occur as a result of retrograde coronary blood flow
- Sub-optimal afterload reduction
- Increased MVO$_2$ demand

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d. Late Deflation

**Waveform Characteristics:**
- Assisted aortic end-diastolic pressure may be equal to the unassisted aortic end diastolic pressure
- Rate of rise of assisted systole is prolonged
- Diastolic augmentation may appear widened

**Physiologic Effects:**
- Afterload reduction is essentially absent
- Increased MVO$_2$ consumption due to the left ventricle ejecting against a greater resistance and a prolonged isovolumetric contraction phase
- IAB may impede left ventricular ejection and increase the afterload
Module II

Clinical Considerations
I. Indications/Contraindications

A. Indications
1. Refractory Unstable Angina
2. Impending Infarction
3. Acute MI
4. Refractory Ventricular Failure
5. Complications of Acute MI [i.e. acute MR or VSD, or papillary muscle rupture]
6. Cardiogenic Shock
7. Support for diagnostic, percutaneous revascularization, and interventional procedures
8. Ischemia related intractable ventricular arrhythmias
9. Septic Shock
10. Intraoperative pulsatile flow generation
11. Weaning from bypass
12. Cardiac support for non-cardiac surgery
13. Prophylactic support in preparation for cardiac surgery
14. Post surgical myocardial dysfunction/low cardiac output syndrome
15. Myocardial contusion
16. Mechanical bridge to other assist devices
17. Cardiac support following correction of anatomical defects

B. Contraindications
1. Severe aortic insufficiency
2. Abdominal or aortic aneurysm
3. Severe calcific aorta-iliac disease or peripheral vascular disease
4. Sheathless insertion with severe obesity, scarring of the groin, or other contraindications to percutaneous insertion

Please Refer to the Instructions for Use Prior to Insertion of the IAB
## II. Side Effects/Complications

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Prevention</th>
<th>Treatment Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Limb Ischemia</td>
<td>• Use smallest sheath/catheter sizes indicated.</td>
<td>• Remove sheath and observe for bleeding.</td>
</tr>
<tr>
<td>• Check distal pulses, color, temp. and capillary filling Q30 min x 2 hrs.</td>
<td>• Risk factors: female, diabetics, peripheral vascular diseases.</td>
<td>• Subcutaneous Xylocaine injection for arterial spasm.</td>
</tr>
<tr>
<td>• Monitor differential toe temperatures.</td>
<td>• Select limb with best pulse.</td>
<td>• Change insertion site to opposite limb.</td>
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<tr>
<td>2. Excessive bleeding from insertion site</td>
<td>• Careful insertion technique.</td>
<td>• Bypass graft femoral artery.</td>
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<tr>
<td>• Observation - anteriorly and posteriorly for blood or hematoma.</td>
<td>• Monitor anticoagulation therapy.</td>
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<tr>
<td>3. Thrombocytopenia</td>
<td>• Prevent catheter movement at insertion site.</td>
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<tr>
<td>• Daily platelet count.</td>
<td>• Replace platelets as needed.</td>
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<tr>
<td>4. Immobility of balloon catheter.</td>
<td>• Maintain adequate trigger.</td>
<td>• Notify the physician if the IAB is immobile for &gt; 30°.</td>
</tr>
<tr>
<td>• <strong>DASCOPE RECOMMENDS THAT THE IAB NOT BE LEFT IMMOBILE IN THE PATIENT FOR MORE THAN 30°.</strong></td>
<td>• Observe movement of IAB Status indicator.</td>
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</tr>
<tr>
<td>• Observation of IAB status indicator movement.</td>
<td>• If unable to inflate the IAB with the IABP, inflate and deflate the IAB by hand, using a syringe and stopcock once every 3-5 min.</td>
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<tr>
<td>• Observation of augmentation.</td>
<td>• Notify the physician if the IAB is immobile for &gt; 30°.</td>
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<tr>
<td></td>
<td>Assessment</td>
<td>Prevention</td>
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<tr>
<td>5. Balloon leak</td>
<td>• Observe tubing for blood with or without the presence of a blood detect, low augmentation, and/or gas loss or IAB catheter alarm.</td>
<td>• Do not remove the IAB from its tray until it is ready to be inserted.</td>
</tr>
<tr>
<td>6. Infection</td>
<td>• Observation of insertion site.</td>
<td>• Sterile technique during insertion and dressing changes as per infection control policy.</td>
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<td></td>
<td>• Blood cultures for symptoms of infection.</td>
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<tr>
<td>7. Aortic Dissection</td>
<td>• Assess for pain between shoulder blades.</td>
<td>• Insertion of IAB over guide wire with fluoroscopic control.</td>
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<td>• Daily hematocrit.</td>
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<td>• If suspected, aortogram may be indicated.</td>
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<tr>
<td>8. Compartment syndrome may develop after IAB removed.</td>
<td>• Observation of limb for swelling and/or hardness.</td>
<td>• Use the smallest catheter/sheath appropriate.</td>
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<tr>
<td></td>
<td>• Measure calf girth.</td>
<td>• Maintain adequate colloid osmotic pressure.</td>
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<td></td>
<td>• Monitor interstitial pressure.</td>
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</tbody>
</table>
III. Weaning and Removal

A. Frequency

B. Augmentation
Module III

Technical Aspects
I. Intra-Aortic Balloon Catheter

Designed for sheathless or sheathed insertion
### Pressure Monitoring Through the Inner Lumen

**Precaution:** For optimal signal quality, use no more than 8 feet (2.5 meters) maximum of pressure tubing between the transducer and female luer hub of the Y-fitting.

When monitoring pressure through the inner lumen, use a standard arterial pressure monitoring apparatus connected to a three-way stopcock. Connect the three-way stopcock to the female luer hub of the inner lumen. A 3cc/hour continuous flow through the inner lumen is recommended. The anticoagulation dosage should be in accordance with standard hospital practice and may be modified, on physician discretion, for patients receiving anticoagulation therapy. Per hospital policy, a fast forward flush may be performed hourly to help maintain patency of the inner lumen.

### Precautions During Pressure Monitoring Through IAB Catheter

1. Use a standard flushing apparatus for arterial pressure monitoring with the inner lumen. Careful technique should be used in the set up and flushing of the arterial pressure monitoring apparatus to minimize the risk of an embolus entering the aorta where it could potentially enter the carotid or coronary arteries.
2. Aspirate and discard a 3cc volume of blood from the inner lumen prior to attaching a flushing apparatus to the female luer hub.
3. Ensure that all air bubbles are removed from the inner lumen and flushing apparatus. In addition, tap the Y-fitting to remove all air bubbles.
4. Prior to fast flushing, stop IAB pumping to reduce the risk of an embolus entering the aortic arch should an embolus be ejected from the inner lumen.
5. For optimal signal quality the inner lumen should not be used for blood sampling.
6. Always aspirate 3cc initially if the inner lumen aortic pressure line or the inner lumen becomes damped. If you meet resistance during aspiration, consider the inner lumen to be occluded. Discontinue the use of the inner lumen by placing a luer cap on the female luer hub.
7. The use of in-line filters or other devices can potentially alter the appearance of the arterial pressure waveform.
8. Do not over-tighten connections.

### Recommendations for Achieving Optimal Pressure Signal Quality

1. Use no more than 8 ft. (2.5 m) of a low compliance pressure tubing such as that supplied by Dataspore in the IAB Insertion Kit between the transducer and Y-fitting of the catheter.
2. Once the catheter is in place, aspirate and discard 3cc of blood from the inner lumen and then immediately perform a manual flush using a syringe filled with 3cc to 5cc of flush solution. This will minimize the chances of stagnant blood clotting in the inner lumen.
3. Apply only gentle force to the syringe when aspirating the inner lumen.
4. Do not use a R.O.S.E. (Resonance Over Shoot Eliminator) or other damping device.
5. Remove air from flush bag prior to pressurizing.
6. Prime the pressure set-up using gravity flush.
7. Maintain 300 mmHg of pressure on the flush solution and elevate it above the transducer.
8. Whenever the inner lumen of the IAB becomes filled with blood (such as after aspiration), the flush valve should be activated for a minimum of 15 seconds in addition to the time it takes to clear the pressure tubing of blood.
9. Ensure that all air bubbles are removed from the inner lumen and flushing apparatus.
10. Use room temperature flush solution.
II. Technical Components of the CS100 Intra-Aortic Balloon Pump
A. Rear Panel

1. Safety Disk/Condensate Removal System
   a. DC Input
   b. IAB Fill Port
   c. Drain Port

2. Helium Supply
   a. Pressure Gauge
   b. Manual Fill Port

3. Patient Connections
   a. ECG
   b. Pressure
   c. Monitor Input
   d. ECG/Pressure Output

4. Data Communications Outputs
   a. RS-232
   b. Phone Line
   c. Diagnostic Output

5. Power Cord/Mains
   a. Auxiliary DC Input

6. System Timer
B. Monitor CS100

1. Alarm Messages
2. Advisories
3. ECG
   a. Lead
   b. Gain
4. Pressure Source
5. IAB Fill Mode
6. Slow Gas Alarm Status
7. Operation Mode
8. IAB Status Indicator
9. Trigger
10. Heart Rate Display
11. Pressure Display
12. Augmentation Alarm
13. Battery Indicator
14. Helium Indicator
C. IABP Controls

1. Operation Mode Keys
   a. AUTO
   b. Semi-Auto
   c. Manual
2. Zero Pressure Key
3. START key and Indicator
4. STANDBY Key and Indicator
5. Trigger Source Key
   a. ECG
   b. Pressure
   c. Pacer V/AV
   d. Pacer A
   e. Internal
6. IAB Frequency
7. IAB Augmentation
8. IAB Inflation Controls
9. IAB Deflation Controls
D. Control Panel

1. Alarm Mute Key
2. IAB Fill Key
3. Help Key Indicator
4. Menu Guide
   a. Ref. Line
   b. Aug. Alarm
   c. ECG / AP Sources
   d. Pump Options
   e. User Preferences
5. Inflation Interval Key
6. Freeze Display Key
7. Print Strip Key
E. Recorder

1. ECG

2. Pressure

3. Balloon Pressure Waveform
F. **System Battery**
   1. Charge Status
   2. Portable Operation

G. **Doppler Storage**
The inflation marker shows the period of inflation. Vertical timing marks located below the arterial waveform are also available to aid with initial timing.

A unique automatic timing algorithm allows effective balloon pumping even during atrial fibrillation. Press the Inflation Interval key to observe the period of inflation while pumping. Vertical markers located below the arterial waveform and the highlighted portion indicate the period of balloon inflation.
J. Normal Balloon Pressure Waveform

- Peak Inflation (Positive Overshoot)
- Plateau (Full Inflation of IAB)
- IAB Inflation
- IAB Deflation
- Zero Baseline
- Return to Zero Baseline
- Peak Deflation (Negative Overshoot)
Variations in Balloon Pressure Waveforms

Variations in balloon pressure waveforms may be due to the following conditions:

1. **Heart Rate**
   - **Bradydcardia**
     Increased duration of plateau due to longer diastolic phase
   - **Tachycardia**
     Decreased duration of plateau due to shortened diastolic phase

2. **Rhythm**
   Varying R-R intervals result in irregular plateau durations.

3. **Blood Pressure**
   - **Hypertension**
     Increased height or amplitude of the waveform.
   - **Hypotension**
     Decreased height or amplitude of the waveform.
4. **Gas Loss**

Leak in the closed system causing the balloon pressure waveform to fall below zero baseline. This may be due to a loose connection, a leak in the IAB catheter, H$_2$O condensation in the external tubing, or a patient who is tachycardiac and febrile which causes increased gas diffusion through the IAB membrane.

![Gas Loss Diagram]

5. **Catheter Kink**

Rounded balloon pressure waveform, loss of plateau resulting from a kink or obstruction of shuttle gas. This may be caused by a kink in the catheter tubing, improper IAB catheter position, sheath not being pulled back to allow inflation of the IAB, the IAB is too large for the aorta, the IAB is not fully unwrapped, or H$_2$O condensation in the external tubing.

![Catheter Kink Diagram]

6. **Sustained Inflation**

Theoretical possibility if the IAB remains inflated longer than 2 seconds. System 90 Series intra-aortic balloon pump will activate the System Failure alarm and deflate the IAB.

![Sustained Inflation Diagram]
III. Troubleshooting

A. Alarm Messages

1. Trigger Alarms

**AUTO Operation Mode**
   a. No Trigger
   b. Poor Signal Persists

**Semi-Auto or Manual operation Modes**
   a. No Trigger
   b. No Pressure Trigger
   c. Check Pacer timing
   d. Trigger Interference

2. Catheter Alarms
   a. Leak in IAB Circuit
   b. Rapid Gas Loss
   c. IAB Disconnected
   d. Check IAB Catheter
   e. Blood Detected
   f. AutoFill Failure - No Helium
   g. AutoFill Failure
   h. AutoFill Required

3. Pneumatic Alarms
   a. High Drive Pressure
   b. Low Vacuum

4. System Surveillance Alarms
   a. Electrical Test Fails Code # ________________
   b. System Failure
   c. Safety Disk Test Fails

B. Advisory Messages

1. Alert Messages

**AUTO Operation Mode**
   a. Poor Signal Quality
   b. No Pressure Source Available
   c. Unable to Update Timing

**Semi-Auto or Manual Operation Modes**
   a. Irregular Pressure Trigger
   b. Verify Proper Timing
   c. ECG Detected
   d. IAB not Filled
   e. Manual Fill IAB
All Operation Modes
a. Augmentation Below Limit Set
b. Prolonged time in Standby
c. Maintenance Required Code # _________________
d. No Patient Status Available
e. Low Helium
f. Low Battery
g. Low Battery [EXT] (CS100i only)
h. Heart Rate Low

2. Status Messages
AUTO Operation Mode
a. Function Unavailable in the AUTO Operation Mode

Semi-Auto and Manual Operation Modes
a. Automatic Operation Mode is Disabled
b. Gas Loss and Catheter Alarms Disabled
c. Auto R-Wave Deflate
d. R-Wave Deflate

All Operation Modes
a. System Trainer
b. System Test OK
c. Autofilling
d. Leak Testing Safety Disk
e. Slow Gas Alarm is off
f. Battery in Use
g. Battery in Use [EXT] (CS100i only)

3. Prompt Messages
a. Unplug Disk Outlet
b. Plug Disk Outlet
c. Manual Fill IAB

C. Patient Conditions
1. Atrial Fibrillation
2. Ectopics
3. Cardiac Arrest
4. Cardioversion/Defibrillation

D. Changing Helium Tank

E. Safety Disk Leak Test

F. Manual Fill

G. Manual Timing

H. Manual Inflate/Deflate
IV. Transport Considerations

A. Purpose of Transport Program

B. Planning the Transport Program
   1. Retrieval vs. Referral
   2. Coordinator of Transport Team

C. Transport Team
   1. Physician
   2. Nurse, IABP Technician

D. Transport Program Considerations
   1. Team Leader
   2. Liabilities
   3. Communication and Response Procedure
   4. Consent Form and Patient Chart
   5. Family Education
   6. Patient Management during Transport

E. Vehicle Used for Transport
   1. Ambulance
      a. power supply
      b. equipment on board
      c. ramp
      d. response time
   2. Aircraft
      a. power supply
      b. equipment on board

F. Equipment Considerations
   1. IABP Supplies
   2. Drugs
   3. Infusion Pumps
   4. Respiratory Care

G. Post Transport Considerations
   1. Equipment Check
   2. Follow-up
Name: __________________________  Date __________________

Hospital policy and procedures review:  Date ___________ Initials ______
Basic Intra-aortic balloon pump course:  Date ___________ Initials ______
Technical Seminar / Advanced Troubleshooting:  Date(s) __________/________ Initials ______
Challenge Exam (if applicable):  Date __________ Score: __________ ( P / F )

Directions for Instructor: Place your initials next to the skills the participant is able to perform. Leave blank the skills requiring repeat performance. Clarify learning needs if necessary in the comment section. The “Clinical Setting” column is an optional checklist for use by a preceptor or resource person for reinforcement of skills acquired on system trainer.

<table>
<thead>
<tr>
<th>Skills</th>
<th>System Trainer</th>
<th>Clinical Setting</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Set Up</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Establish Power: Main power switch &amp; IABP On/Off switch ⇒ ON</td>
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<tr>
<td>• Open helium tank and verify helium pressure</td>
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<td></td>
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<tr>
<td>• Establish ECG and Pressure connections</td>
<td></td>
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<tr>
<td><strong>Zero Transducer</strong></td>
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<tr>
<td>• Open the transducer</td>
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<td>• Press the zero pressure key for 2 seconds</td>
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<tr>
<td>• Close the transducer</td>
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<tr>
<td><strong>Confirm Operation Mode – Auto</strong></td>
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<tr>
<td><strong>Initiate Pumping</strong></td>
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<tr>
<td>• Attach IAB catheter &amp; appropriate extender to safety disk</td>
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<tr>
<td>• Press the Start key and observe the Auto Filling message</td>
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<tr>
<td>• Verify optimal diastolic augmentation</td>
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<tr>
<td>• If desired, IAB deflation can be fine tuned using the IAB deflation control.</td>
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<tr>
<td><strong>Verify Aug. Alarm</strong></td>
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<tr>
<td>• Verify Aug. Alarm setting is approximately 10mmHg less than the patient’s augmented diastolic pressure</td>
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<tr>
<td>• Adjust, if necessary by pressing Aug. Alarm key and using the up and down arrow keys, in the navigation circle, to change value displayed on the screen</td>
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<tr>
<td><strong>Assess hemodynamic benefits</strong></td>
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<tr>
<td>• Ensure optimal augmentation</td>
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<tr>
<td>• Ensure optimal afterload reduction</td>
<td></td>
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<tr>
<td><strong>Record pressures: assisted &amp; unassisted</strong></td>
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<td></td>
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<tr>
<td>• Press Print Strip key to record waveforms</td>
<td></td>
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<tr>
<td>• Use Printer Menu in User Preferences to change printer settings</td>
<td></td>
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<tr>
<td>Skills</td>
<td>System Trainer</td>
<td>Clinical Setting</td>
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<tr>
<td><strong>Auto Operation Mode</strong></td>
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<tr>
<td>• Describe ECG and pressure source selection</td>
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<tr>
<td>• Describe Trigger source selection</td>
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<tr>
<td>• Describe automatic timing and CardioSync 2 with R-Trac</td>
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<tr>
<td><strong>Semi-Auto Operation Mode</strong></td>
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<tr>
<td>• Describe ECG and pressure source selection</td>
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<tr>
<td>• Describe Trigger source selection</td>
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<tr>
<td>• Describe automatic timing and CardioSync 2 with R-Trac</td>
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<tr>
<td><strong>Troubleshooting</strong></td>
<td>System Trainer</td>
<td>Clinical Setting</td>
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<tr>
<td><strong>Demonstrates ability to identify variable trigger selection criteria and appropriate use of each trigger</strong></td>
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<tr>
<td>• Atrial Fibrillation</td>
<td></td>
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<tr>
<td>• Demand Ventricular Pacemaker, Rate 60</td>
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<td></td>
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<tr>
<td>• AV sequential pacemaker, demand mode</td>
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<td></td>
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<tr>
<td>• Unobtainable ECG signal, regular rhythm, BP 100/50</td>
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<tr>
<td>• Cardiac arrest with good chest compressions</td>
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<tr>
<td>• Sinus Tachycardia</td>
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<tr>
<td>• Sinus Rhythm with frequent PVC'S</td>
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<tr>
<td>• Fixed rate AV sequential pacemaker</td>
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<td></td>
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<tr>
<td>• Atrial pacemaker - 100% paced</td>
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<tr>
<td><strong>Evaluates situations that may cause an IAB catheter alarm and describes appropriate intervention</strong></td>
<td></td>
<td></td>
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<tr>
<td>• Kink in the catheter or tubing</td>
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<tr>
<td>• Patient sitting straight up in bed</td>
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<tr>
<td>• IAB has not exited the sheath</td>
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<tr>
<td><strong>Identifies and recommends appropriate action for potential loss of helium (“gas loss”)</strong></td>
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<tr>
<td>• Blood in the IAB catheter shuttle gas tubing</td>
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<tr>
<td>• IAB catheter disconnected from the console</td>
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<tr>
<td><strong>Discusses the following Alarm and Advisory Messages</strong></td>
<td></td>
<td></td>
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<tr>
<td>• Poor Signal Quality</td>
<td></td>
<td></td>
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<tr>
<td>• Poor Signal Persists</td>
<td></td>
<td></td>
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<tr>
<td>• No Pressure Source Available</td>
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<tr>
<td>• Unable to Update Timing</td>
<td></td>
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<tr>
<td>Skills</td>
<td>System Trainer</td>
<td>Clinical Setting</td>
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<tr>
<td>-----------------------------------------------------------------------</td>
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<tr>
<td>Discusses the hemodynamic relationship between the patient and IABP therapy in regards to diastolic augmentation</td>
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<tr>
<td>• Increased heart rate</td>
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<td>• Decrease in patient stroke volume</td>
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<tr>
<td>• Ectopy</td>
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<td>• Increase in patient BP</td>
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<tr>
<td>• Decreased SVR</td>
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<tr>
<td>Demonstrates appropriate intervention for the following errors in timing and verbalizes potential clinical implications</td>
<td></td>
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<tr>
<td>• Early inflation</td>
<td></td>
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<tr>
<td>• Late inflation</td>
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<tr>
<td>• Early deflation</td>
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<tr>
<td>• Late deflation</td>
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<tr>
<td>Portable Operation</td>
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<tr>
<td>• Initiates and terminates portable operation</td>
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<tr>
<td>• Identifies location of battery charge light</td>
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<tr>
<td>Interface (Slave) Cables (if applicable):</td>
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<tr>
<td>• Identifies location and use of ECG and/or pressure cables</td>
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<tr>
<td>• Describes proper use of ECG slave cable in the presence of pacemakers</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
REFERENCE LIST


Benchmark Counterpulsation Outcomes Registry 2005.


Ohman EM. Counterpulsation and thrombolysis together improve survival after cardiogenic shock – the TACTICS results. Presented at the 22nd Congress of European Society of Cardiology on August 27, 2000 in Amsterdam, the Netherlands.


BIBLIOGRAPHY

THEORY


INDICATIONS


George BS. Thrombolysis and intra-aortic balloon pumping following acute myocardial infarction - Experience in four TAMI studies. Cardiac Assists 1988 October;4(3).


COMPICATIONS


**INSERTION**


**PEDIATRICS**


**TRANSPORT**


**NURSING CARE**


Shoulders O. *Managing the challenge of IABP therapy*. Critical Care Nurse 1991 Feb;11(2):60-76.

PROGRAM AND SPEAKER EVALUATION

Theory & Techniques of IABC Therapy
Program Code 04

Please rate the program and speaker items by placing a mark in the appropriate column.

### Program Evaluation

<table>
<thead>
<tr>
<th>Program Evaluation</th>
<th>1 Poor</th>
<th>2 Fair</th>
<th>3 Good</th>
<th>4 Very Good</th>
<th>5 Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Program met the stated objectives</td>
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<td>2. Content covered topic adequately</td>
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<td>3. Overall quality of this program</td>
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<td>4. Overall quality of speaker(s)</td>
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<td>5. Quality of the program facilities</td>
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<td>6. Program met my personal objectives</td>
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<tr>
<td>7. I can incorporate program content into my practice</td>
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</table>

### Speaker Name:  

### Speaker Evaluation

<table>
<thead>
<tr>
<th>Speaker Evaluation</th>
<th>1 Poor</th>
<th>2 Fair</th>
<th>3 Good</th>
<th>4 Very Good</th>
<th>5 Excellent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Objectives – Stated learning objectives met</td>
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<tr>
<td>2. Audiovisual – Contributed to presentation</td>
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<tr>
<td>3. Content – Relevance of content to objectives</td>
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<tr>
<td>4. Presentation – Speaker qualified and held interest</td>
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<tr>
<td>5. Effectiveness – Speaker was organized and effective</td>
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<tr>
<td>6. Practice – Validated and/or changed practice</td>
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</tbody>
</table>

**Comments:**

**Participant Name:**  

49