



Recommendations for Standards of Monitoring and Alarms During Cardiopulmonary Bypass

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Background...

- Lack of acceptable monitoring and safety standards
- Discrepancy of monitoring standards during periods on and off Cardiopulmonary Bypass
- Requirement for practice regulation
- Desire to improve patient safety and care standards
- College of Perfusion National assessment



Background...

- Society of Perfusionist – education and examinations
- College of Perfusionists – hold national register, accredit units for training.



Starting Point...

- Survey current clinical practice
- Review survey data
- Review other reference material
- Convene a multi-disciplinary working party
 - Perfusionists
 - Anaesthetists and Surgeons



Postal survey...

- Sent to the Principal Clinical Perfusionist at 53 NHS centres in the United Kingdom & Ireland
- Initial response was poor
- Repeat questionnaires sent to non-responders
- Final response rate was 43% (23/53)



Survey Results Summary...

Activated Clotting Time

23/23

- Arterial Line Pressure 23/23
- Level Sensor (With Pump Cut Out) 22/23 (11)
- Bubble Sensor (With Pump Cut Out) 19/23 (9)

- Arterial Blood Gases (Offline) 22/23
- Arterial Oxygen Tension (Continuous) 18/23
- Venous Oxygen Saturation (Continuous) 16/23
- Fresh Gas Oxygen Content (Continuous) 14/23

- Haematocrit 11/23
- Trans-Membrane Pressure Gradient 7/23
- Trans-Filter Pressure Gradient 6/23
- Exhaust Gas Agent 6/23
- Exhaust Gas Capnography 5/23



Other Reference Material...

- Publication by Cockroft (1992)
- Publication by Weatherall & Sherry (2000)
- SCPSGBI Standards of Practice
- AmSect Guidelines for Perfusion Practice
- Association of Anaesthetists G.B & I
- U.K Department of Health Guidelines
- COSHH



Document Development...

- Multi-Disciplinary Committee Meetings
 - Not plain sailing!
- Peer Review
- Draft Document Circulation
- Membership Consultation



Timescale...

- Introduction (2001)
- Implementation (By 2004)
- Review (2005, happened 2007)

“Only an accredited Clinical Perfusion Scientist registered with the College of Clinical Perfusion Scientists of Great Britain & Ireland can undertake or supervise the conduct of Cardiopulmonary Bypass. A named and accredited Clinical Perfusion Scientist not distracted by other clinical commitments, in close proximity and freely available **must** supervise a trainee undertaking a Cardiopulmonary Bypass procedure.”



Statement...

“The recommended monitors and alarms that should be used during Cardiopulmonary Bypass are considered by the Society of Clinical Perfusion Scientists of Great Britain & Ireland, the Association of Cardiothoracic Anaesthetists & the Society of Cardiothoracic Surgeons of Great Britain & Ireland to be the minimal monitoring requirements during Cardiopulmonary Bypass. All centres undertaking cardiac surgery involving Cradiopulmonary Bypass should plan to institute these standards of monitoring and alarms by the 1st January 2004.”



Definitions...

- **Near Patient Facility**
 - Within or in close proximity to cardiac theatre
- **On Site Facility**
 - On the hospital site



General Recommendations...

- Calibration and Maintenance
- Display Visibility



Clinical Parameters...

- Electrocardiograph (ECG)
- Systemic Arterial Pressure
- Central Venous Pressure
- Core Body Temperature
- Urine Output
- Pulse Oximetry
- Expired Carbon Dioxide Tension/Concentration



Bypass Circuit Monitoring...

- Venous Oxygen Saturation
- Arterial Oxygen Tension or Saturation
- Fresh Gas Flow Continuity
- Fresh Gas Oxygen Content
- Blood Flow Rate
- Arterial Line Pressure
- Cardioplegia Delivery Line Pressure
- Blood Temperature
- Water Temperature (Heater/Cooler Unit)
- Activated Clotting Time
- Filtrate Volume



Near Patient and On Site Testing.

- Blood Gases
- Red Cell Concentration (Hb or Hct)
- Serum Potassium
- Blood Sugar
- Clotting Studies
- Serum Calcium
- Serum Lactate
- Serum Magnesium



Safety Devices...

- Mains power failure alarm
- Bubble detector
- Low level alarm
- Anaesthetic gas-scavenging apparatus
- Out of range temperature alarm



Problems...

- Disagreements
 - Best fit
- Trade disagreements



Conclusion...

- Reduced risk
- Increased awareness and safety
- Reviewed and updated in 2007
- College of Perfusion assessed all NHS cardiac centres – all now comply!!
- Those that didn't comply, document forced hospital to purchase equipment



FOR YOUR ATTENTION