Why collect perfusion data in Europe?

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European Perfusion Registry
Disclaimer

I declare having no conflicts of interest.
Outline

“Why?” is the perfect preparation

Conditions for a good database

Potential results

European Perfusion Registry
“Why collect data?”

Good starting point to design a database

Need for careful consideration and planning

Quality Improvement

  delivered care
  patient outcome
Steps to be taken

International Registry

Individual improvement

(how can I decrease my transfusion rate?)
Steps to be taken

QI steps

- identify an opportunity for improvement
- prioritize opportunities
- organize a team
- flowchart current process
- standardize the process
- identify key quality characteristics
- develop operational definitions


**FIGURE 1.3.** Process improvement flowchart.
Keys to Performance Improvement

Scientific Evidence + Context = Action = Improvement

Adapted from: Qual Saf Health Care 2007;16:2–3
(Used with kind permission, Tim Dickinson)
Two more things...

...before you start

Data ➔ information to answer your question

The database is not the purpose, the database should serve your purpose

Think ➔ act
Two more things...

...before you start

Process of collecting and editing data should have:
  highest level of automation and accuracy
  highest possible representative value
  least amount of labour in submitting, acquiring, collecting and processing data

Think ➔ act
What can we get out of this?

NNECDSG: regional consortium of cardiac centers that collects data from PCI-, CABG-, and valve procedures

members include cardiothoracic surgeons, interventional cardiologists, operating room and cardiac ICU nurses, anesthesiologists, perfusionists, administrators, and scientists

database from all disciplines

www.nnecdsg.org
Use the code 888 for unknown

**NNECDSG PERFUSION REGISTRY**

<table>
<thead>
<tr>
<th>Use Addressograph if possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Name:</td>
</tr>
<tr>
<td>Last name:</td>
</tr>
<tr>
<td>DOB:</td>
</tr>
<tr>
<td>Medical record number:</td>
</tr>
</tbody>
</table>

### Cardioplegia Methods
- **Aortic cross clamp**
  - (0=yes, cardioplegia; 1=yes, with ischemia or fibr arrest; 2=no XC)
- **Type of CPS**
  - (1=1:1; 2=2:1; 3=4:1; 4=8:1; 5=crystalloid; 6=comb; 7=none; 8=microplegia)
- **Induction dose**
  - (1=standard CPS; 2=Buckberg CPS)
- **Induction CPS temp**
  - (0=28C; 1=28-34C; 2=35C)
- **Maintenance CPS temp**
  - (0=28C; 1=28-34C; 2=35C)
- **Routing**
  - (0=antegrad; 1=retrograd; 2=both)
- **Timing of dose**
  - (longest interval, in minutes; use "999" for continuous CPS)
- **Proximal technique**
  - (0=with AoXC off; 1=with AoXC on; 2=combination; 3=Non-CABG; 4=IMA(s) only)
- **"Hot shot" used**
  - (0=no; 1=yes, standard CPS; 2=yes, Buckberg CPS; 3=yes, blood only; 4=yes, combination)
- **Total volume used of**
  - (cardioplegia, inc. bld only (in mls))

### Fluid volumes and blood products
- **Static circuit volume**
  - (in ml)
- **Asanguineous prime vol**
  - (in ml)
- **Total priming vol**
  - (in ml)
- **Blood prime?**
  - (number of units of PRBC’s)
- **Pre-bypass sequestration used?**
  - (estimated number of ml)
- **Ultra-filtration used?**
  - (number of ml removed)
- **Pre-bypass fluid total**
  - (in ml)
- **Fluids added on bypass**
  - (in ml)
- **RAP technique used?**
  - (volume in ml 0=not used)

### Details of Perfusion
- **Core temperature (°C): fill in all that apply**
  - (artrial flow, °C)
- **Highest blood temperature**
  - (arterial flow, °C)
- **Last serum K+ on CPB**
  - (last value prior to initial weaning from CPB)
- **Total heparin**
  - (USP units, inc. prime)
- **Reperfusion time**
  - (minutes)
- **Ventricular activity during XC**
  - (0=no; 1=yes)
- **Type of Pump**
  - (0=Roller, 1=Centrifugal)
- **Oxyenator type**
  - (0=hollow-fiber; 1=sheet; 2=other)
- **Coated circuit**
  - (0=no; 1=partial; 2=all but canula; 3=Tip-to-tip)
- **If yes, Type of coating**
  - (1=X, 2=CODE, 3=SMAReT; 4=Carmida, 5=Trilium, 6=Durato II, 7=Sorin Minessy, 8=Sorin; 9=combination)
- **Cardiotomy sucker used**
  - (0=no; 1=yes, with cell saver; 2=yes, without cell saver)
- **pH Management**
  - (0=alpha stat, 1=pH stat; 2=both)
- **Arterial cannulation**
  - (0=orta; 1=femoral; 2=axillary; 66=other)
- **Filter pore size: Art. Cardio VenRes.**
  - (state size)
- **Venous cannulation**
  - (0=right atrium; 1=bicaval; 2=femoral; 3=jugular; 4=SVC; 66=other)
- **Venous return**
  - (0=orta; 1=femoral; 2=axillary; 66=other)
- **VAD**
  - (2=dy venous w/VAD; 3=KAV; 4=other)

www.nnecds.org
Reduce the use of Red Blood Cell Transfusions

Scope of the Problem: Red blood cell (RBC) transfusion has been associated with higher in-hospital mortality following cardiac surgery. In a recent study by the NNECDSG we observed a 16% decrease in long-term survival for patients exposed to even a small amount of allogeneic RBCs (1 to 2 units). This adverse impact on in-hospital mortality and survival was not explained by differences in patient and disease characteristics. With this growing evidence and wide variation of use of RBCs by NNECDSG centers (26.2% to 77.5%), the NNECDSG has undertaken efforts to optimize RBC conservation and to reduce unwarranted RBC transfusions.

Goal: Our goal is to develop efforts to optimize pre-surgical hemoglobin levels, minimize blood loss, and avoid allogeneic transfusions. Centers will implement strategies to reduce their red blood cell use to <20% of elective and urgent cases.
Strategies:
1. Develop a systematic and multidisciplinary approach to blood conservation and management.
   - Educate staff about the negative consequences of red blood cell transfusion
   - Reduce number of blood draws. For blood draws use pediatric tubes or point of care testing modalities.
   - Avoid hemodilution: size perfusion pumps to the size of the patient
   - Use normovolemic hemodilution whenever possible
   - RAP (retrograde autologous prime)
   - Consider anti-fibrinolytics in selected patients (e.g. tranexamic acid)
   - Meticulous surgical hemostasis
   - Tolerate lower hematocrits during pre-, intra- and post-operative care
   - Use intraoperative cell salvage for all patients and optimize salvage efficiency
   - Institute specific blood-transfusion algorithms
   - Selective use of intravenous iron and limited use of ESA for perioperative management of anemia

Activities:
1. In 2007 five centers implemented blood conservation programs. Specifically, Eastern Maine Medical Center, Maine Medical Center, Central Maine Medical Center, Portsmouth Regional Hospital, Catholic Medical Center.
2. In 2007, 6 of 8 medical centers have reduced the use of RBC transfusion in their elective and urgent patients. (Data from Cardiac Surgery June 2008 Report)

Progress:
1. To continue implementing strategies to reduce overall transfusion rates to <20% among elective and urgent patients.
### Table 1. Regional CPB practice characteristics across eight institutions in Northern New England (2004–2005).

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Region (min, max)</th>
</tr>
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<tbody>
<tr>
<td><strong>pH Management:</strong> The clinical team should manage adult patients undergoing moderate hypothermic CPB with alpha-stat pH management (Class I, Level A)</td>
<td></td>
</tr>
<tr>
<td>Patients who received alpha-stat pH management (%)</td>
<td>100.0 (100.0, 100.0)</td>
</tr>
<tr>
<td><strong>Avoidance of Hyperthermia:</strong> Limiting arterial line temperature to 37°C may be useful for avoiding cerebral hyperthermia (Class IIa, Level B). *Coupled temperature ports for all oxygenation should be checked for accuracy and calibrated</td>
<td></td>
</tr>
<tr>
<td>Patients with blood temperature ≤37°C (%)</td>
<td>23.4 (15.8, 32.2)</td>
</tr>
<tr>
<td><strong>Minimizing Return of Pericardial Suction Blood:</strong> direct reinfusion to the CPB circuit of unprocessed blood exposed to pericardial and mediastinal surfaces should be avoided (Class I, Level B). Blood cell processing and filtration may be considered to decrease the deleterious effects of reinfused shed blood (Class IIb, Level B)</td>
<td></td>
</tr>
<tr>
<td>No cardiotomy sucker (%)</td>
<td>23.7 (0.7, 93.6)</td>
</tr>
<tr>
<td>Cardiotomy sucker with Cell Saver (%)</td>
<td>62.7 (6.4, 99.3)</td>
</tr>
<tr>
<td>Cardiotomy sucker without Cell Saver (%)</td>
<td>13.6 (0.0, 61.8)</td>
</tr>
<tr>
<td><strong>Aortic Assessment:</strong> in patients undergoing CPB at increased risk of adverse neurologic events, strong consideration should be given to intraoperative TEE or epiaortic ultrasound scanning of the aorta</td>
<td></td>
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<tr>
<td>1. to detect nonpalpable plaque (Class I, Level B)</td>
<td></td>
</tr>
<tr>
<td>2. for reduction of cerebral emboli (Class IIa, Level B)</td>
<td></td>
</tr>
<tr>
<td>Not done (%)</td>
<td>27.5 (0.3, 97.5)</td>
</tr>
<tr>
<td>TEE (%)</td>
<td>40.2 (1.2, 98.9)</td>
</tr>
<tr>
<td>Epiaortic ultrasound (%)</td>
<td>5.5 (0.0, 41.2)</td>
</tr>
<tr>
<td>Palpation (%)</td>
<td>26.8 (0.0, 96.3)</td>
</tr>
<tr>
<td><strong>Arterial Filtration:</strong> arterial line filters should be incorporated in the CPB circuit to minimize the embolic load delivered to the patient (Class I, Level A)</td>
<td></td>
</tr>
<tr>
<td>Arterial line filter used (%)</td>
<td>100.0 (100.0, 100.0)</td>
</tr>
<tr>
<td><strong>Maintenance of Euglycemia:</strong> the clinical team should maintain perioperative blood glucose concentration within an institution’s normal clinical range in all patients including non-diabetics (Class I, Level B)</td>
<td></td>
</tr>
<tr>
<td>Patients with highest glucose ≤200 mg/dL.*</td>
<td>55.1 (3.2, 79.6)</td>
</tr>
<tr>
<td>Patients with last glucose ≤200 mg/dL.* (%)</td>
<td>80.8 (50.0, 97.9)</td>
</tr>
</tbody>
</table>
What can we get out of this?

PDUC: Perfusion Downunder Collaboration

Australasian collaboration of cardiac centers that collects perfusion data from cardiac procedures in a more automated manner

Data is matched with cardiothoracic surgery registry for validation
Figure 1. Data entry workflow for the database. Step 1: Click the “create new record” button to enter the patient’s demographic data. Step 2: Click the “clinical forms” button to access the data entry forms for each category. Step 3: Clinical, perfusion, procedural, and postoperative outcomes data may be entered through forms. The clinical form is shown. Step 4: Electronic data are transferred from the electronic data management system or the heart lung machine into the database.
**Figure 4.** Box plot of blood glucose values comparing diabetic and nondiabetic patients, preoperatively and minimum and maximum values during CPB. ND, nondiabetic; D, diabetic. Displayed values indicate median and range.

**Figure 5.** Box plot of activated clotting times. ACTbase, before heparinization; ACT1st, 1st on CPB; ACTmin, minimum on CPB; ACTmax, maximum on CPB; ACTlast, postreversal of heparin. Displayed values indicate median and range.
Developing a Benchmarking Process in Perfusion: A Report of the Perfusion Downunder Collaboration

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Michael McDonald, Dip Perf, CCP (Aust);‡ Timothy W. Willcox, Dip Perf, CCP (Aust);§
Alan F. Merry, FANZCA¶ for the Perfusion Downunder Collaboration

Benchmarking: measurement process to identify standards of excellence in practice, where one’s performance is then compared to those standards
Table 4. Arterial outlet temperature benchmark calculation.

<table>
<thead>
<tr>
<th>Site</th>
<th>x (%)</th>
<th>d</th>
<th>APF</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>101 (24.2)</td>
<td>417</td>
<td>.243</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>197 (15.5)</td>
<td>1273</td>
<td>.156</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>96 (20.5)</td>
<td>469</td>
<td>.206</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>1959 (93.6)</td>
<td>2093</td>
<td>.936</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>798 (93.1)</td>
<td>857</td>
<td>.930</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>113 (43.1)</td>
<td>262</td>
<td>.432</td>
<td>4</td>
</tr>
<tr>
<td>7</td>
<td>60 (100)</td>
<td>60</td>
<td>.984</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>11 (32.4)</td>
<td>34</td>
<td>.333</td>
<td>5</td>
</tr>
</tbody>
</table>

Benchmark calculation: \(\frac{(60 + 1959)}{(60 + 2093)} = 93.8\%\)

\(x\) is the number of procedures in which the quality indicator, arterial outlet temperature \(\leq 37^\circ\text{C}\), occurs, \(d\) is the number of eligible procedures at each site, \(\text{APF}\) is the adjusted performance factor, and rank is the ranking of performance from best to worst for the QI based upon the APF. The benchmark calculation combined sites 4 and 7.
European Perfusion Registry?

Slow process (education-reluctance-no incentive)

Tie-in with EACTS QuIP - Adult Cardiac Surgery Database (Perfusion Network Group)

Dataset from literature, existing databases, consensus, KQC’s

Practice survey

QI project(s) - tools
Take Home Message

Careful planning and consideration - WHY?

Database should serve your purpose

Ease of collection / processing

Results - Outcomes - Patients

European Registry/QI?
Thank you