Resuscitation research

Why bother?

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Conflict of interest statement

- Research Professor at Curtin University (WA)
- Adjunct Research Professor Monash University (Vic) and UWA (WA)
- Director of the Australian Resuscitation Outcomes Consortium (Aus-ROC)
- Salary support from St John Ambulance Western Australia
- ILCOR ‘Education, Implementation & Teams Taskforce member
- Executive Committee Member Australian Resuscitation Council
- Treasurer: Australian Resuscitation Council (WA)
Aim

- In <15 minutes...

...to convince you that research is important?!!
“Common sense is not so common.”

- Voltaire
What is evidence-based medicine?

“Evidence-based medicine is the integration of best research evidence with clinical expertise and patient values”

Dave Sackett
Alternatives to EBM

- Eminence based medicine
- Vehemence based medicine
- Eloquence based medicine
- Providence based medicine
- Diffidence based medicine
- Nervous based medicine
- Confidence based medicine

Fig 1: Study designs
RCTs = best study design to determine efficacy of an intervention ie ‘can this intervention work?’

Why?
RCTs minimise bias
- Prospective design
- Random allocation
- Double blinding (where possible)
- Everything the same except for the intervention (ideally)

Source: http://cancerdundee.wordpress.com/weekly-quizz/levels-of-evidence/
Randomised Controlled Trial

Source: Suny Downstate Medical Centre: http://library.downstate.edu/EBM2/2200.htm

**CONCLUSIONS**

- As with many interventions intended to prevent ill health, the effectiveness of parachutes has not been subjected to rigorous evaluation by using **randomised controlled trials**.

- We think that everyone might benefit if the most radical protagonists of evidence based medicine organised and participated in a **double blind, randomised, placebo controlled, crossover trial of the parachute**.
<table>
<thead>
<tr>
<th>Question</th>
<th>Step 1 (Level 1*)</th>
<th>Step 2 (Level 2*)</th>
<th>Step 3 (Level 3*)</th>
<th>Step 4 (Level 4*)</th>
<th>Step 5 (Level 5)</th>
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</thead>
<tbody>
<tr>
<td>How common is the problem?</td>
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<td></td>
<td>Local and current random sample surveys (or censuses)</td>
<td>Systematic review of surveys that allow matching to local circumstances**</td>
<td>Local non-random sample**</td>
<td>Case-series**</td>
<td>n/a</td>
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<tr>
<td>Is this diagnostic or monitoring test accurate?</td>
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<tr>
<td>(Diagnosis)</td>
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<td></td>
<td>Systematic review of cross sectional studies with consistently applied reference standard and blinding</td>
<td>Individual cross sectional studies with consistently applied reference standard and blinding</td>
<td>Non-consecutive studies, or studies without consistently applied reference standards**</td>
<td>Case-control studies, or &quot;poor or non-independent reference standard&quot;**</td>
<td>Mechanism-based reasoning</td>
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<tr>
<td>What will happen if we do not add a therapy?</td>
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<td>(Prognosis)</td>
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<td>Systematic review of inception cohort studies</td>
<td>Inception cohort studies</td>
<td>Cohort study or control arm of randomized trial*</td>
<td>Case-series or case-control studies, or poor quality prognostic cohort study**</td>
<td>n/a</td>
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<tr>
<td>Does this intervention help?</td>
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<tr>
<td>(Treatment Benefits)</td>
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<td>Systematic review of randomized trials or n-of-1 trials or observational study with dramatic effect</td>
<td>Randomized trial or observational study with dramatic effect</td>
<td>Non-randomized controlled cohort/follow-up study**</td>
<td>Case-series, case-control studies, or historically controlled studies**</td>
<td>Mechanism-based reasoning</td>
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<td>What are the COMMON harms?</td>
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<tr>
<td>(Treatment Harms)</td>
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<td>Systematic review of randomized trials, systematic review of nested case-control studies, n-of-1 trial with the patient you are raising the question about, or observational study with dramatic effect</td>
<td>Individual randomized trial or (exceptionally) observational study with dramatic effect</td>
<td>Non-randomized controlled cohort/follow-up study (post-marketing surveillance) provided there are sufficient numbers to rule out a common harm. (For long-term harms the duration of follow-up must be sufficient.)**</td>
<td>Case-series, case-control, or historically controlled studies**</td>
<td>Mechanism-based reasoning</td>
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<tr>
<td>What are the RARE harms?</td>
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<td>(Treatment Harms)</td>
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<td></td>
<td>Systematic review of randomized trials or n-of-1 trial</td>
<td>Randomized trial or (exceptionally) observational study with dramatic effect</td>
<td>Randomized trial or (exceptionally) observational study with dramatic effect</td>
<td>Non-randomized controlled cohort/follow-up study**</td>
<td>Case-series, case-control, or historically controlled studies**</td>
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<td>Is this (early detection) test worthwhile?</td>
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<td>(Screening)</td>
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<tr>
<td></td>
<td>Systematic review of randomized trials</td>
<td>Randomized trial</td>
<td>Non-randomized controlled cohort/follow-up study**</td>
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<td>Mechanism-based reasoning</td>
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</table>
The Tony Smith “levels of evidence”

- **Level one** – randomised trials that support my own opinion
- **Level two** – expert opinions that support my own opinion
- **Level three** – all other forms of evidence that support my own opinion
- **Level four** – any form of evidence that does not support my own opinion
- **Level five** – uninformed opinion of morons
So what is the best research study design?

Answer.....
The one that best addresses the research question!
The Utstein Formula for Survival in Resuscitation

“Strategies to improve OHCA survival”? 

1. Work out ‘what works’ = **research**
2. Implement ‘what works’ = **translation**

...for each link in the chain of survival
Recognition of OHCA
Call ‘000’
Dispatch accuracy

Bystander CPR rates
‘Dispatch-assisted CPR’

AED access and use
First responder BLS

Paramedic clinical care
- CPR quality
- ALS protocols

Post-resuscitation care
- O₂
- CO₂
- temperature
- prognostication
CAA Member Service's Research Register

Overview of the Research Section:

Within this section you can search the CAA Research by:

Either Name,

Search by a prefix ie 'B' list all titles beginning with B

search by the State entity.

STATE SEARCH

Research Home
Queensland
NSW
ACT
Victoria
Tasmania
Northern Territory
South Australia
Western Australia
New Zealand
PNG
The ‘RINSE’ Study
Paramedic Cooling During CPR using a Rapid Infusion of Cold Normal Saline: A Randomized Trial (#1010613)
ORIGINAL RESEARCH ARTICLE

Induction of Therapeutic Hypothermia During Out-of-Hospital Cardiac Arrest Using a Rapid Infusion of Cold Saline

The RINSE Trial (Rapid Infusion of Cold Normal Saline)

BACKGROUND: Patients successfully resuscitated by paramedics from out-of-hospital cardiac arrest often have severe neurologic injury. Laboratory and observational clinical reports have suggested that induction of therapeutic hypothermia during cardiopulmonary resuscitation (CPR) may improve neurologic outcomes. One technique for induction of mild therapeutic hypothermia during CPR is a rapid infusion of large-volume cold crystalloid fluid.

METHODS: In this multicenter randomized, controlled trial we assigned adults with out-of-hospital cardiac arrest undergoing CPR to either a rapid intravenous infusion of up to 2 L of cold saline or standard care. The primary outcome measure was survival at hospital discharge; secondary end points included return of a spontaneous circulation. The trial was closed early (at 48% recruitment target) due to changes in temperature management at major receiving hospitals.

RESULTS: A total of 1,196 patients were assigned to either therapeutic hypothermia during CPR (618 patients) or standard prehospital care (580 patients). Patients allocated to therapeutic hypothermia received a mean (SD) of 1,193 (647) mL of cold saline. For patients with an initial shockable cardiac rhythm, there was a decrease in the rate of return of a spontaneous circulation in patients who received cold saline compared with standard care (41.2% compared with 50.6%; P=0.03). Overall, 10.2% of patients allocated to therapeutic hypothermia during CPR were alive at hospital discharge compared with 11.4% who received standard care (P=0.71).

CONCLUSIONS: In adults with out-of-hospital cardiac arrest, induction of mild therapeutic hypothermia using a rapid infusion of large-volume, intravenous cold saline during CPR may decrease the rate of return of a spontaneous circulation in patients with an initial shockable rhythm and produced no trend toward improved outcomes at hospital discharge.

REDUCTION OF OXYGEN AFTER CARDIAC ARREST: The EXACT study

On behalf of the Australian Resuscitation Outcomes Consortium (Aus-ROC): A NHMRC Centre of Research Excellence

A. Research Proposal

AIM

We aim to conduct a Phase 3 multi-centre, randomised, controlled trial to determine whether reducing oxygen administration to target a normal level as soon as possible following successful resuscitation from out-of-hospital cardiac arrest (OHCA), compared to current practice of maintaining 100% oxygen, improves outcome at hospital discharge.

PRIMARY HYPOTHESIS TO BE TESTED

In patients who have been resuscitated from sudden OHCA, targeting an oxygen saturation of 94% by reducing the fraction of administered oxygen from 100% improves survival at hospital discharge.
The EXACT Phase 3 study (RCT)

- NHMRC funded for 2016-2019 ($1.8M)
- CIA = Prof Stephen Bernard
- 1,360 patients post cardiac arrest
- Melbourne, Adelaide, Perth
- Sample size based on 35% to 44% survival increase
- Paramedic randomisation, then continue allocation through ED ( +/- cath lab) through to ICU
Survival to hospital D/C for bystander-witnessed OHCA of presumed cardiac cause in VF/VT

So why does Seattle have the best OHCA survival rates??

- “We like to say that it takes a system to save a cardiac arrest victim…” said Dr Mickey Eisenberg, King County Emergency Medical Services Medical Director.

Seattle has been measuring and reporting OHCA outcomes since 1970 – ie for over 45 years!!

Australian and New Zealand OHCA Epistry

- Capture population of over 20 million people
  - Nearly 100% of Australia
  - 100% of New Zealand

- You can’t manage what you don’t measure!
The Utstein Formula for Survival in Resuscitation

The Evidence Practice Gap
The Prehospital Emergency Care - Centre of Research Excellence (PEC-CRE) will facilitate collaborative research projects and build capacity in emergency medical services (EMS) research.

This program of research is based on the prehospital patient journey: beginning with the emergency ‘000’ call and appropriate determination of patient priority; exploration of alternative pathways for non-urgent cases; investigation of the clinical effectiveness of paramedic-initiated clinical interventions; and development and validation of indicators of quality of care for use by Ambulance Services.
Prehospital Emergency Care
NHMRC Centre of Research Excellence 2017-2021
The right care, in the right place, at the right time

• 3 Full-time PhD scholarships
  ($33,313/year tax free for 3-years)
  • Monash University (EOI still open)
  • Flinders University (EOI still open)
  • Curtin University (already filled)

• Chief Investigators: Prof Peter Cameron, Prof Judith Finn, Prof Stephen Bernard, Prof Hugh Grantham, Prof Karen Smith,
  Prof Daniel Fatovich, A/Prof Glenn Arendts, A/Prof Janet Bray, Dr Dion Stub, Prof Gavin Perkins

• Associate Investigators: A/Prof Paul Bailey, Mr Deon Brink, Dr Cindy Hein, Dr Judy Lowthian, Dr Ziad Nehme, Dr Cathrin Parsch, Dr Tony Smith, Mr Michael Stephenson, Prof Just Stoelwinder, Dr Teresa Williams

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