Pacemaker Re-Use: 
an option in Africa?

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Conflicts of Interest: St Jude Medical/Abbott, Servier, Bristol Myers Squibb, Pfizer, Novartis, Astra Zeneca
Global Mortality: CV burden

- 250,000 people in Sub-Saharan Africa may die a sudden cardiac death each year
- <1% of Sub-Saharan Africans have access to pacing therapy

Tanzania:
- 50 million population (expect 25,000 implants/year); only one implanting centre
- 2016: 200 pts with heart block referred for permanent pacemaker
- 35 devices implanted (17.5%); 32/35 pts: health insurance cover
Lack of pacing facilities
- 24/56 countries: EP service
- 16 countries: active service
- 5 countries: no service at all

Lack of trained personnel
- Training fellowships: South Africa
- Workshops: Sudan → perpetuate training

Access to devices
- $2,570: basic VVIR device
- $2/day: daily income in some countries
- Time-expired devices:
  - Legalities and commercial interests
  - Industry goodwill
- Re-used devices: 6 countries
Pacing Devices: re-use

- Blood transfusions
- Heart, Kidney, Cornea, Face: transplants
- Bovine and Swine prosthetic valves
- Pig insulin, leeches/maggots for wound care

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Pacemaker Re-use: sources

Planned explants

- Single center 4yr experience:
- 300 explants: Not ERI
  30% (infection), 30% (upgrade)
  - Not on advisory
  - No mechanical failure
  - >4yrs battery life remaining

Post-Mortem explants

- 40% of pacemaker recipients >80yrs
- Median survival after ppm implant: 7yrs
- High cremation rates (>60%)
  - Burial costs: >$10,000 + annual up-keep

Device explant mandated (explosion risk)

Gakenheimer L. PACE 2014;37:569

Baman TS. Heart Rhythm 2012;9:211
Pacemaker Re-Use: SHS views

- SHS annual meeting Jan 2017; Medani, Sudan: audience questionnaire
- 141 responses: 55% (♂), 55%: 20-30yrs, 5% >50yrs, 90% Urban setting, 30% AHP
Pacemaker Re-Use: SHS views

Would you be willing to implant a re-used pacemaker in a member of your own family?
Pacemaker Re-use: registry data

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Year of Study Completion</th>
<th>No. of Pacemakers Reused</th>
<th>Complications Related to Device Reuse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Balachander</td>
<td>India</td>
<td>1988</td>
<td>140</td>
<td>Infection: 2</td>
</tr>
<tr>
<td>Pescariu et al</td>
<td>Romania</td>
<td>2001</td>
<td>365</td>
<td>Device Failure: None</td>
</tr>
<tr>
<td>Linde et al</td>
<td>Sweden</td>
<td>1986</td>
<td>100</td>
<td>Infection: 2, Idiopathic ventricular tachycardia (n=1)</td>
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<tr>
<td>Panja et al</td>
<td>India</td>
<td>1992</td>
<td>120</td>
<td>Device Failure: None</td>
</tr>
<tr>
<td>Kruse et al</td>
<td>Sweden</td>
<td>1985</td>
<td>487</td>
<td>Device Failure: None</td>
</tr>
<tr>
<td>Kovacs et al</td>
<td>Hungary</td>
<td>1980</td>
<td>28</td>
<td>Device Failure: None</td>
</tr>
<tr>
<td>Cooperman et al</td>
<td>Israel</td>
<td>1984</td>
<td>78</td>
<td>Device Failure: None</td>
</tr>
<tr>
<td>Mond et al</td>
<td>Australia</td>
<td>1978</td>
<td>83</td>
<td>Device Failure: None</td>
</tr>
<tr>
<td>Amikam et al</td>
<td>Israel</td>
<td>1982</td>
<td>132</td>
<td>Device Failure: None</td>
</tr>
<tr>
<td>Havia et al</td>
<td>Sweden/Finland</td>
<td>1974</td>
<td>50</td>
<td>Device Failure: None</td>
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<tr>
<td>Grendahal</td>
<td>Norway</td>
<td>1993</td>
<td>310</td>
<td>Infection: 1, Technical error (n=4)</td>
</tr>
<tr>
<td>Costa et al</td>
<td>Brazil</td>
<td>1982</td>
<td>22</td>
<td>Electromagnetic inhibition (n=1) and spontaneous reprogramming (n=1)</td>
</tr>
<tr>
<td>Rosengarten et al</td>
<td>Canada</td>
<td>1987</td>
<td>18</td>
<td>Infection: 1, Technical error (n=1)</td>
</tr>
<tr>
<td>Sedney et al</td>
<td>Holland</td>
<td>1983</td>
<td>214</td>
<td>Infection: 1</td>
</tr>
<tr>
<td>Aren et al</td>
<td>Sweden</td>
<td>1979</td>
<td>19</td>
<td>Device Failure: None</td>
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<tr>
<td>Furgilio et al</td>
<td>Italy</td>
<td>1978</td>
<td>87</td>
<td>Device Failure: None</td>
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<tr>
<td>Namboodiri et al</td>
<td>India</td>
<td>2001</td>
<td>5</td>
<td>Device Failure: None</td>
</tr>
<tr>
<td>Baman et al</td>
<td>Philippines</td>
<td>2008</td>
<td>12</td>
<td>Device Failure: None</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>2270</td>
<td>Infection: 40</td>
</tr>
</tbody>
</table>

*Denotes mean±SD duration of follow-up.
Pacemaker Re-use: meta-analysis

Infection

No evidence to suggest higher infection risk with re-used pacemakers

Pacemaker Re-use: meta-analysis

Electrical malfunction

Small, but significant risk of device malfunction: (~5 events/≥2,000 cases): almost all set screw/device header issues

Baman TS. *Circ Arrhy EP* 2011;3:318
Re-Pace Africa: where are we now?

**Pacemaker Task Force**
- TC every 3 months
- HRS (Chicago): symposia

**Project My Heart Your Heart**
- Reprocessing protocols
- FDA approval
- RCT: new v re-used devices
- Devices ready for shipment

**Pacing Fellowships & Workshops**
- X3 fellows
- PG certification
- Beacon sites: spread knowledge

**On-Line Support**
- Daily manned helpdesk (WhatsApp)
- UK cardiac physiologists and cardiologists
- Educational forum
- Swift Medical: wound care app

**Project Grants**
- THET grant submission (£50,000/12 months)
- Stipulated country: Tanzania
- Funding for x3 training workshops,
- Support TCS: Public Health projects
- Establish a re-use “Beacon site”: train others
Re-Pace Africa: we need you

- **Enthusiastic Centres**
  - Multi-Disciplinary engagement
  - Long-term vision
  - Willingness to lead, learn and teach

- **Health Ministry Support**
  - Bureaucratic processes
  - Legal waivers
  - Funding: basic infra-structure and staff

- **Willingness to participate in RCT**
  - Academic opportunity
  - Robust patient follow-up
  - Detailed documentation

- **On-Line Forums**
  - Raise awareness
  - Mutual learning
  - Sharing of experiences

- **Fund Raising**
  - Project grants
  - Charitable organisations
  - Develop local services
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Dr Thomas Crawford (Michigan)
Mr Kevin Weatherwax (Michigan)

Mr Balasundaram Lavan (London)

questions?
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