



**Joint PASCAR, PAFCIC, SHS, & WHF
African Congress 2017**

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Pacemaker Re-Use: *an option in Africa?*



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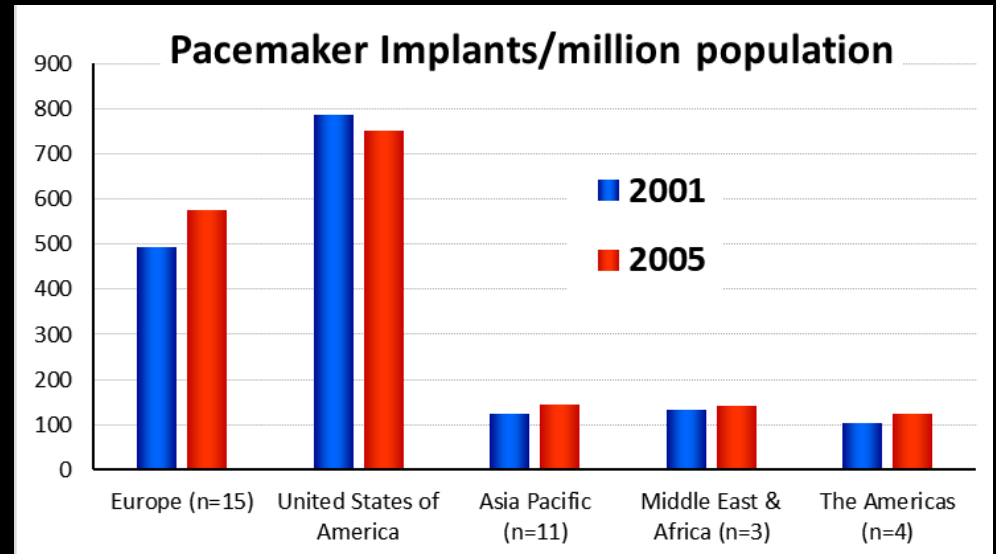
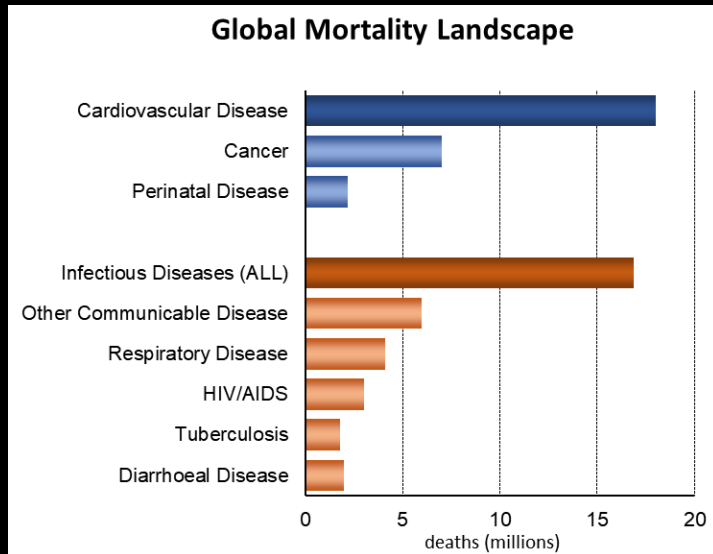
University of East Anglia, Norwich, UK

PASCAR pacemaker taskforce member

Pace4Life: medical director

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

Global Mortality: CV burden



Mendis S. *J Hypertension*. 2007;25:1578

Mond HG. *PACE* 2008;31:1202

- 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

PASCAR

Tanzania:

- 50million 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

Dr Reuben Mutagaywa

Pacing in Africa: challenges

Lack of pacing facilities

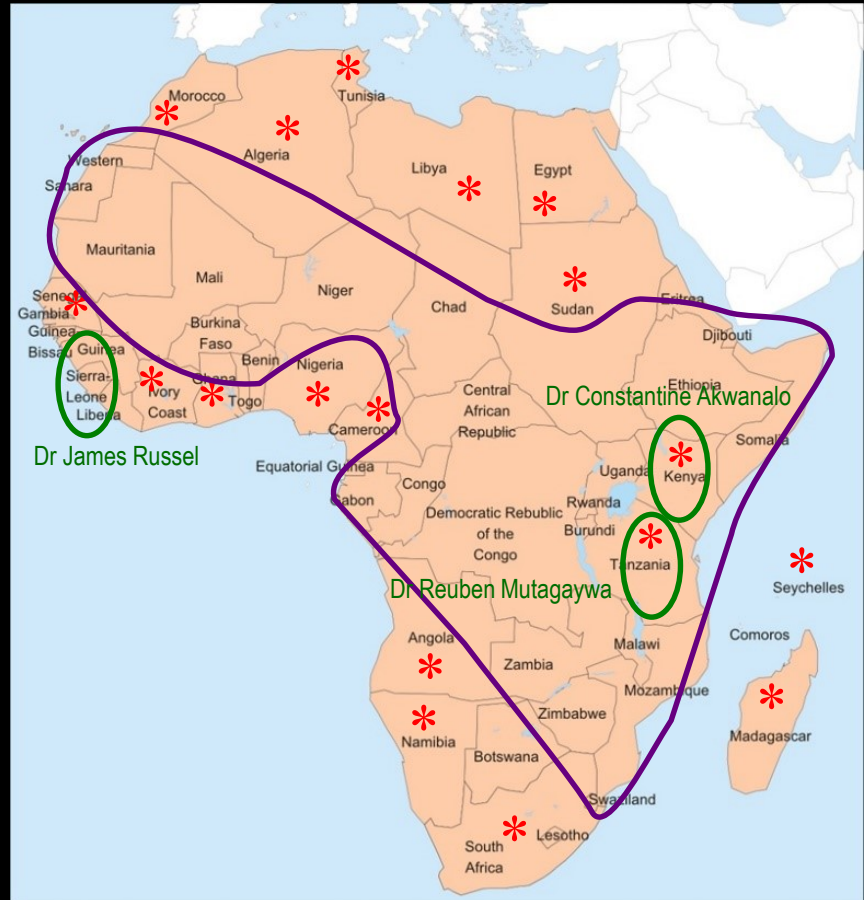
- 24/56 countries: EP service
- 16 countries: active service
- 5 countries: no service at all

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

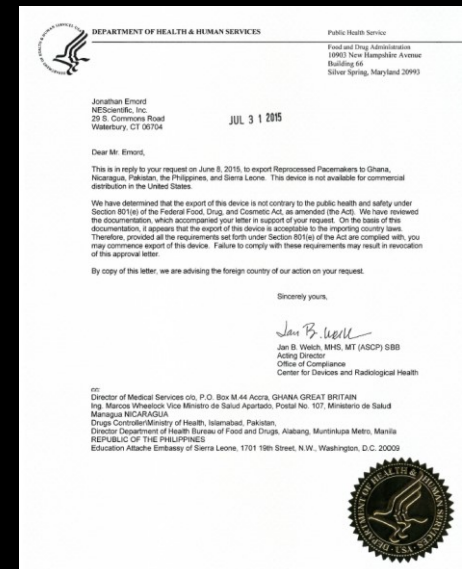
Meticulous protocol



Dr Thomas Crawford
Dr Kevin Weatherwax
Professor Kim Eagle
University of Michigan



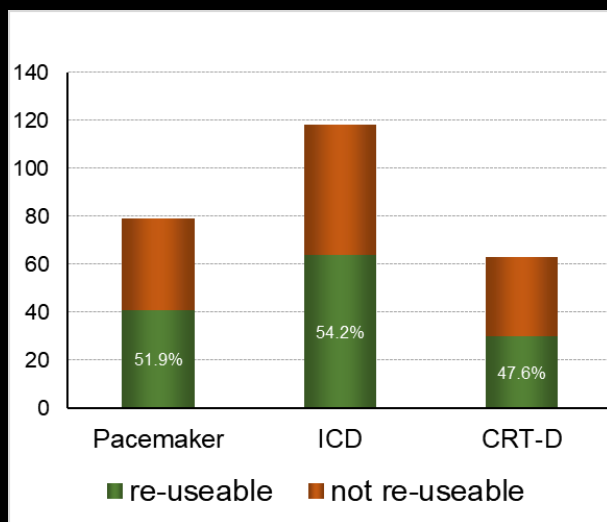
FDA export licence



Pacemaker Re-use: sources

Planned explants

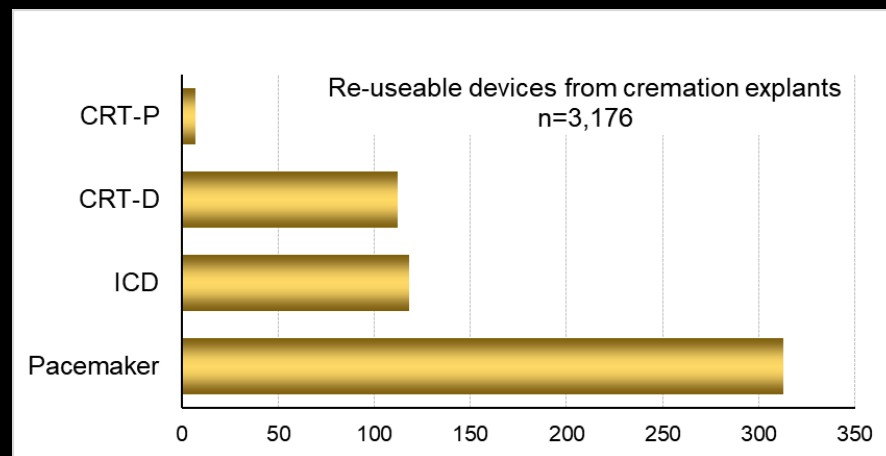
- Single center 4yr experience:
- 300 explants: **Not** ERI
30% (infection), 30% (upgrade)
 - Not on advisory
 - No mechanical failure
 - >4yrs battery life remaining



Post-Mortem explants

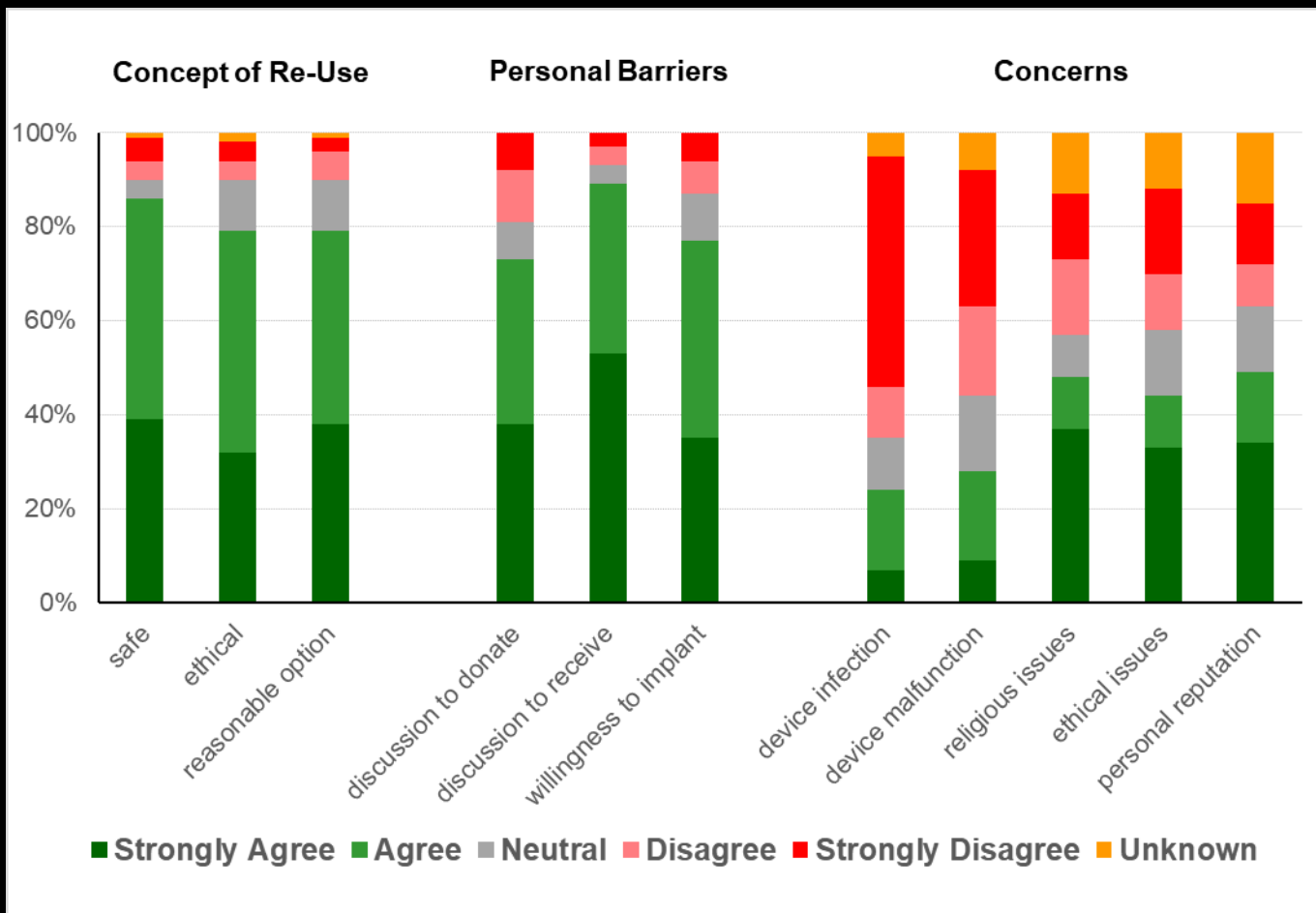
- 40% of pacemaker recipients >80yrs
- Median survival after ppm implant: 7yrs
- High cremation rates (>60%)
 - Burial costs: >\$10,000 + annual up-keep

Device explant mandated (explosion risk)



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?



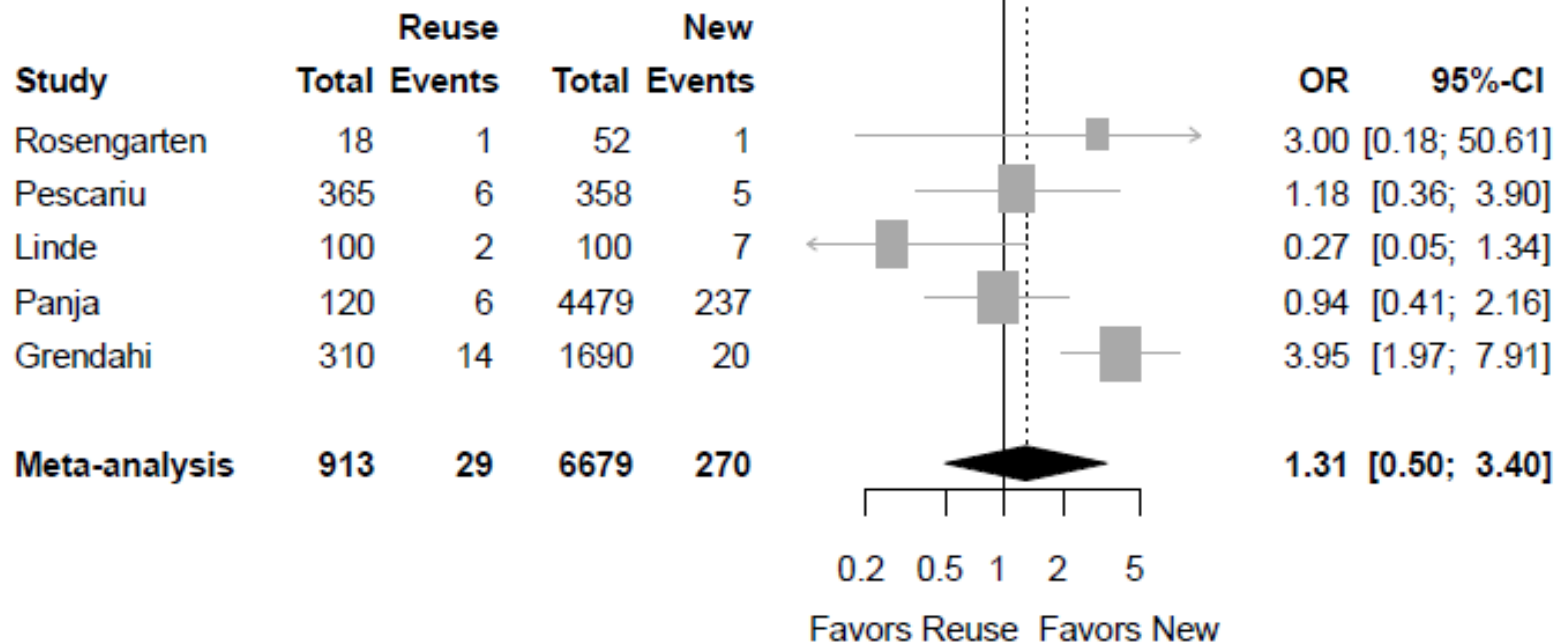
Pacemaker Re-use: registry data

Study	Country	Year of Study Completion	No. of Pacemakers Reused		Complications Related to Device Reuse	
					Infection	Device Failure
Balachander ²⁹	India	1988	140	6 y	2	None
Pescariu et al ⁷	Romania	2001	365	35±21 mo	6	None
Linde et al ⁶	Sweden	1996	100	32±11 mo	2	Idiopathic ventricular tachycardia (n=1)
Panja et al ³⁰	India	1992	120	7.5±5.6 y	6	...
Kruse ²⁶	Sweden	1985	487	...	1	Premature battery depletion (n=1) and set screw abnormality (n=1)
Kovacs et al ³¹	Hungary	1980	28	...	None	None
Cooperman et al ³²	Israel	1984	78	...	None	None
Mond et al ³³	Australia	1978	83	...	1	None
Amikam et al ³⁴	Israel	1982	132	5 y	3	None
Havia et al ³⁵	Sweden/Finland	1974	50	22 mo	1	None
Grendahl ⁵	Norway	1993	310	...	14	Technical error (n=4)
Costa et al ²⁷	Brazil	1982	22	16 mo	1	Electromagnetic inhibition (n=1) and spontaneous reprogramming (n=1)
Rosengarten et al ⁸	Canada	1987	18	29 mo	1	Set screw abnormality (n=2) and pectoral muscle inhibition (n=1)
Sedney et al ²⁸	Holland	1983	214	31.5 mo	1	Technical error (n=1)
Aren et al ³⁶	Sweden	1979	19	26 mo	None	None
Ferugilo et al ³⁷	Italy	1978	87	14 mo	1	None
Nambodiri et al ³⁸	India	2001	5	19.2 mo	None	None
Baman et al ²¹	Philippines	2008	12	4 mo	None	None
Total			2270	35±25 mo*	40	13

*Denotes mean±SD duration of follow-up.

Pacemaker Re-use: meta-analysis

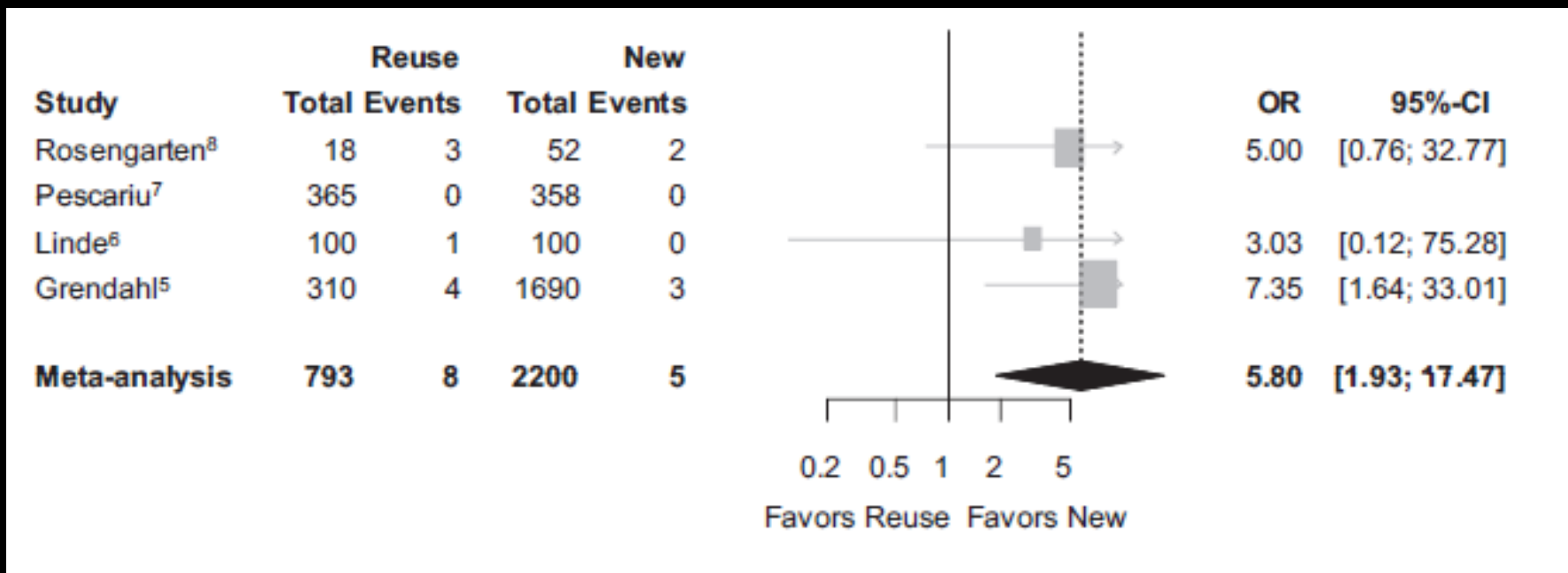
Infection



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

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

Acknowledgments



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Dr Thomas Crawford (Michigan)
Mr Kevin Weatherwax (Michigan)



Mr Balasundaram Lavan (London)

questions?



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