Device Therapy: the future is now.

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Disclosure:
Mariell Jessup MD

University of Pennsylvania

- **Speakers Bureau:** NONE
- **Advisory Board:** NONE
- **Honorarium:** NONE
Device
dɪˈvʌɪs
noun
a thing made or adapted for a particular purpose, especially a piece of mechanical or electronic equipment.

synonyms: implement, gadget, utensil, tool, appliance, piece of equipment, apparatus, piece of apparatus, piece of hardware, instrument, machine, mechanism, contrivance, contraption, invention, convenience, amenity.
Heart Failure Device Therapy

- Implanted electrical devices: ICD, CRT
- Mechanical circulatory support devices
  - Short term versus durable devices
- Valvular closure or replacement devices
- Monitoring devices
- Stimulation HF devices
- Personal wearable devices.
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ACC/AHA/ESC 2006 guidelines for management of patients with ventricular arrhythmias and the prevention of sudden cardiac death
Secondary Prevention

- ICD therapy is indicated in patients who are survivors of cardiac arrest due to VF or hemodynamically unstable sustained VT after evaluation to define the cause of the event and to exclude any completely reversible causes.
- ICD therapy is indicated in patients with structural heart disease and spontaneous sustained VT, whether hemodynamically stable or unstable.
- ICD therapy is indicated in patients with clinically relevant, hemodynamically significant sustained VT or VF induced at electrophysiologic study.
Primary Prevention

- ICD therapy is indicated in patients with LVEF <35% due to prior MI who are at least 40 days post-MI and are NYHA functional Class II or III.
- ICD therapy is indicated in patients with nonischemic DCM who have an LVEF ≤35% and who are NYHA Class II or III.
- ICD therapy is indicated in patients with LV dysfunction due to prior MI who are at least 40 days post-MI, have an LVEF <30%, and are NYHA functional Class I.
- ICD therapy is indicated in patients with nonsustained VT due to prior MI, LVEF <40%, and inducible sustained VT at electrophysiologic study.

2008 ACC/AHA/HRS Guidelines for Device-Based Therapy
### 2012 ACCF/AHA/HRS Focused Update Incorporated Into the ACCF/AHA/HRS 2008 Guidelines for Device-Based Therapy of Cardiac Rhythm Abnormalities

A Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society

### 2013 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy

<table>
<thead>
<tr>
<th>Therapy</th>
<th>All studies</th>
<th>NYHA III or IV HF</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overall mortality (%)</td>
<td>Probability of best treatment</td>
</tr>
<tr>
<td>Medical</td>
<td>14.0</td>
<td>0</td>
</tr>
<tr>
<td>CRT</td>
<td>10.3</td>
<td>0.14</td>
</tr>
<tr>
<td>ICD</td>
<td>10.6</td>
<td>0.10</td>
</tr>
<tr>
<td>CRT + ICD</td>
<td>9.1</td>
<td>0.75</td>
</tr>
</tbody>
</table>
Implantable cardioverter defibrillator (and CRT-D) cost-effectiveness (dollars per life-year saved), for the major randomized implantable cardioverter defibrillator studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Cost-effectiveness ($   )</th>
</tr>
</thead>
<tbody>
<tr>
<td>MADIT</td>
<td>25 000</td>
</tr>
<tr>
<td>MUSTT</td>
<td>24 500</td>
</tr>
<tr>
<td>MADIT II</td>
<td>39 000</td>
</tr>
<tr>
<td>DEFINITE</td>
<td>36 800</td>
</tr>
<tr>
<td>COMPANION (CRT-D)</td>
<td>36 500</td>
</tr>
<tr>
<td>SCD-HeFT</td>
<td>50 700</td>
</tr>
</tbody>
</table>

ICD and CRT-D implant rates: 2005-2007
17% reduction in mortality.
**2013 ESC Guidelines on cardiac pacing and cardiac resynchronization therapy**

The Task Force on cardiac pacing and resynchronization therapy of the European Society of Cardiology (ESC). Developed in collaboration with the European Heart Rhythm Association (EHRA).

**Clinical guidance to the choice of CRT-P or CRT-D in primary prevention**

<table>
<thead>
<tr>
<th>Factors favouring CRT-P</th>
<th>Factors favouring CRT-D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advanced heart failure</td>
<td>Life expectancy &gt;1 year</td>
</tr>
<tr>
<td>Severe renal insufficiency or dialysis</td>
<td>Stable heart failure, NYHA II</td>
</tr>
<tr>
<td>Other major co-morbidities</td>
<td>Ischaemic heart disease (low and intermediate MADIT risk score)</td>
</tr>
<tr>
<td>Frailty</td>
<td>Lack of comorbidities</td>
</tr>
<tr>
<td>Cachexia</td>
<td></td>
</tr>
</tbody>
</table>
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Sick patient

Chronic support

Unclear situation

Temporary support

Durable VADs
  pulsatile
  non-pulsatile

1. Support circulation
2. Oxygenate patient

Choice dictated by clinical status:

temporary support
ECMO
Clinical outcome of mechanical circulatory support for refractory cardiogenic shock in the current era

Hiroo Takayama, MD, PhD, Lauren Truby, BS, Michael Koekort, MD, Nir Uriel, MD, Paolo Colombo, MD, Donna M. Mancini, MD, FACC, Ulrich P. Jorde, MD, and Yoshifumi Naka, MD, PhD

Refractory Cardiogenic Shock (n=90)

- exclude post-Tx or post cardiotomy

BRIDGE TO DECISION DEVICE

- Short-term VAD (n=44)
  preferred choice
- VA ECMO (n=46)
  for unknown neurological status, severe hemodynamical instability, or severe coagulopathy

DESTINATIONS

- Exchange to implantable VAD (n=23)
- Explant for myocardial recovery (n=16)
- Heart transplantation 10% (n=9)
- Death 47% (n=42)

~ ½ of the patients who need an MCSD for shock survive, and ~ ½ of these survivors require an implantable VAD.

Ongoing CPR is predictive of in-hospital mortality.
VADs are getting better, but heart transplant is still the gold standard.
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Mitral Clip
we conclude the non-inferiority of the MitraClip as a treatment for severe, symptomatic MR, in comparison to conventional valvular surgery. Despite a higher risk profile in the MitraClip patients, the clinical outcomes were comparable although surgery was more effective in reducing MR in the early post procedure period.
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Wireless pulmonary artery haemodynamic monitoring in chronic heart failure: a randomised controlled trial

William T Abraham, Philip B Adamson, Robert C Bourge, Mark F Aaron, Maria Rosa Costanzo, Lynne W Stevenson, Warren Strickland, Suresh Neelagaru, Nirav Raval, Steven Krueger, Stanislav Weiner, David Shavelle, Bradley Jeffries, Jay S Yadav, for the CHAMPION Trial Study Group*

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# Phrenic Nerve Stimulation for the Treatment of Central Sleep Apnea

William T. Abraham, MD,* Dariusz Jagielski, MD,† Olaf Oldenburg, MD,‡ Ralph Augustini, MD,* Steven Krueger, MD,§ Adam Kolodziej, MD,‖ Klaus-Jürgen Gutleben, MD,¶ Rami Khayat, MD,‖ Andrew Merliss, MD,§ Manya R. Harsch, MS,¶ Richard G. Holcomb, PhD,§ Shahrokh Javaheri, MD,** Piotr Ponikowski, MD, PhD,††† on behalf of the remedē Pilot Study Investigators

*J Am Coll Cardiol HF 2015;3:360-9

## Effects on Sleep Parameters at 6 Months With the remedē System (n = 44)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Baseline</th>
<th>3 Months</th>
<th>6 Months</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHI, episodes/h of sleep</td>
<td>49.4 ± 14.9</td>
<td>22.8 ± 13.6</td>
<td>23.3 ± 13.3</td>
<td>≤0.0001*</td>
</tr>
<tr>
<td>CAI, episodes/hr of sleep</td>
<td>28.1 ± 14.7</td>
<td>5.0 ± 8.8</td>
<td>4.5 ± 7.2</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>OAI, episodes/hr of sleep</td>
<td>3.0 ± 2.8</td>
<td>3.9 ± 4.8</td>
<td>3.8 ± 5.2</td>
<td>0.0223†</td>
</tr>
<tr>
<td>MAI, episodes/h of sleep</td>
<td>3.0 ± 3.7</td>
<td>0.3 ± 0.6</td>
<td>0.6 ± 1.5</td>
<td>&lt;0.0002*</td>
</tr>
<tr>
<td>HI, episodes/h of sleep</td>
<td>15.4 ± 12.4</td>
<td>13.5 ± 9.0</td>
<td>14.4 ± 8.3</td>
<td>0.0179†</td>
</tr>
<tr>
<td>ODI4, episodes/hr of sleep</td>
<td>46.0 ± 18.8</td>
<td>22.0 ± 13.8</td>
<td>22.9 ± 13.3</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Arousal index, episodes/h of sleep</td>
<td>35.5 ± 18.4</td>
<td>23.4 ± 10.9</td>
<td>24.7 ± 12.3</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>Sleep efficiency, %</td>
<td>69.3 ± 16.8</td>
<td>76.9 ± 15.6</td>
<td>81.4 ± 12.5</td>
<td>&lt;0.0001*</td>
</tr>
<tr>
<td>REM sleep, %</td>
<td>11.2 ± 6.3</td>
<td>16.2 ± 8.1</td>
<td>17.4 ± 6.9</td>
<td>&lt;0.0001*</td>
</tr>
</tbody>
</table>
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Further understanding of information shared by the public in this forum could suggest new approaches for improving resuscitation related education.
6 famous rhetorical devices used by Winston Churchill
Thank You