Improving outcomes in endocarditis with the help of Value-Based Healthcare and IMPARTS

Jonathan Breeze, Maggie Gunning, Gavin Hardman (KCH) and Faith Matcham (KCL)
• What is Endocarditis?

• The concept of Value-Based Healthcare

• The role of IMPARTS

• The project so far....
What is Endocarditis?

- A rare but serious, potentially fatal cardiac disease
- Can affect anyone, but more prevalent in men, and those who have had previous valve replacements.
- Incidence = 2-6:100,000
- 1 year mortality = 20%

- Inflammation of the inner lining of the heart
- Usually involves the heart valves
- Vegetations (masses of sticky cells) appear in a response to infection

- It is the Cinderella of cardiac disease......
What is Endocarditis?
Diagnosis

- Clinical Presentation
  - fever
  - malaise/fatigue
  - murmur
  - minor/major embolic events
  - minor haemorrhagic events
- Echocardiogram
- Blood cultures
Diagnosis

• Often begins as a flulike illness with a dry cough, body aches, and fatigue, which follows a subacute or chronic course.

• Most patients, especially younger ones, do not seek medical advice until fatigue or fever becomes unbearable or they suffer a major complication, such as an embolic event or heart failure.
Diagnosis
Duke Criteria

1) Major criteria

1-Positive blood culture:
- Typical microorganism for IE from two separate blood cultures
- Or Persistently positive blood culture, defined as recovery of a microorganism consistent with IE from: Blood cultures drawn more than 12 hr apart
- Or All of three or a majority of four or more separate blood cultures, with first and last drawn at least 1 hr apart

2-Positive echocardiogram:
- Oscillating intracardiac mass, on valve or supporting structures, or in the path of regurgitated jets, or on implanted material, in the absence of an alternative anatomical explanation,
- Or Abscess
- Or New partial dehiscence of prosthetic valve,
- Or New valvular regurgitation (increase or change in preexisting murmur not sufficient)

2) Minor criteria

1. Predisposition:
   - Predisposing heart condition or intravenous drug use
2. Fever 38.0°C (100.4°F)
3. Vascular phenomena:
   - major arterial emboli, septic pulmonary infarcts, mycotic aneurysm, intracranial hemorrhage, conjunctival hemorrhages, Janeway’s lesions
4. Immunological phenomena: glomerulonephritis, Osler’s nodes, Roth’s spots, rheumatoid factor
5. Microbiological evidence: positive blood culture but not meeting major criterion as noted previously.
6. Serologic evidence of active infection with organism consistent with IE
7. Echocardiogram: consistent with IE but not meeting major criterion

Diagnosis of IE:

**Definite:**
1. Two major criteria
2. One major + three minor criteria
3. Five minor criteria

**Possible**
1. One major + one minor criteria
2. Three minor criteria.

**Rejected:**
1. Firm alternative diagnosis for manifestations of endocarditis
2. Or sustained resolution of manifestation of IE with antibiotic therapy for 4 days or less,
3. Or No pathological evidence of IE at surgery or autopsy, after antibiotic therapy for 4 days or less.
Treatment

- Strong IV Antibiotics
- Sometimes surgery
- A loooooooooonnnnnnnngggggg hospitalisation
Why Cinderella?

- 5-6 week hospitalisation, sometimes just for IV abs.
- Patients may be independent.
- Not that exciting/glamorous for nurses.
- Significant proportion of patients are IV Drug users
What were we doing?

- We don’t really know!
- Lack of endocarditis data
- Lack of comprehensive care
- Lack of clear pathways

- Then.............. VBHC came along!
Value Based Healthcare: the Porter equation

The Value equation defines a shared purpose for healthcare.

\[
\text{Outcomes (patient-led)} \quad \text{Costs (pathway-wide)} = \text{Value (Condition-level)}
\]

1. Make Value your goal
2. Routinely report Value
3. Amend reimbursement
4. Restructure organisations

Our teams are endocarditis, hepatitis B & stroke
Aims of the Value Based Healthcare project

Bringing together patient-centred value information for improvement

Most of us want the best for patients, but we often lack information about the things that matter most.

We each see, and focus on, different things. This:
- Divides us
- Leaves out the patient
- Inhibits improvement

Value data brings together outcomes and costs. It:
- Unites our concerns
- Is patient-focused
- Gives a shared picture for improvement
Defining outcomes

For Porter, measuring quality is measuring ‘the health outcomes achieved that matter to patients’.¹

<table>
<thead>
<tr>
<th>Evidence reviews</th>
<th>Focus groups</th>
<th>Surveys</th>
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</thead>
</table>

Clinical Working Groups

The process of working with patients changes our minds and those of our clinical teams. ‘VBHC empowers both the clinical team and the patient to prioritise care from a patient perspective’.²

- Conversations with patients about their priorities
- Changing knowledge about patient priorities
- Increasing belief in process
- ‘It’s like […] my eyes are opened’³

¹ Michael Porter & Thomas H Lee. The Strategy that Will Fix Health Care. HBR, October 2013. ² Consultant, clinical working group member. ³ Consultant / VBHC workstream clinical lead.
Developing value based service improvement ideas

<table>
<thead>
<tr>
<th>Clinical group</th>
<th>Value data learning</th>
<th>Improvement ideas</th>
<th>Intended consequence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endocarditis</td>
<td>Highly variable time to treatment</td>
<td>Closer working with surgical team</td>
<td>Earlier awareness of new patients across MDT</td>
</tr>
<tr>
<td></td>
<td>Length of stay – not treatment expenses – drives cost</td>
<td>Quicker MDT assessment of referred patients</td>
<td>Quicker care decisions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use of alternative care settings</td>
<td>Earlier discharge</td>
</tr>
<tr>
<td>Hepatitis B</td>
<td>Lower complexity patients do not return for follow-up</td>
<td>Virtual clinic model for lower complexity patients</td>
<td>More flexible access to care for patients</td>
</tr>
<tr>
<td></td>
<td>Patients feel under-informed about condition</td>
<td>Tailored information for different patient groups</td>
<td>Improved understanding of condition</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Outcomes dashboards for data on individual patients</td>
<td>Increased awareness of personal health state</td>
</tr>
<tr>
<td>Stroke</td>
<td>Link between swallow screening and pneumonia onset</td>
<td>Adopt earlier swallow screening; improve recording of results</td>
<td>Earlier detection of at risk patients</td>
</tr>
<tr>
<td></td>
<td>Highly variable HASU length of stay</td>
<td>Understand sources of variation in length of stay</td>
<td>More standardised care pathways</td>
</tr>
</tbody>
</table>

**Length of stay**

![Length of stay chart](image)

- **X-axis**: Time period (3 month intervals)
- **Y-axis**: Median length of stay

Medians of length of stay at 3rd, 4th, 1st, 2nd quarters of:
- 2011: 30, 30, 30, 30
- 2012: 40, 40, 40, 40
- 2013: 50, 50, 20, 20
- 2014: 20, 20, 20, 20
What’s Changed?

• Endocarditis MDT
  - Consultant Cardiologist
  - Consultant Microbiologist
  - Consultant Cardiothoracic Surgeon
  - Endocarditis specialist nurse

• Weekly ward rounds
• Weekly board rounds
• Weekly MDM
• Routine follow-up in MDT Clinic

• And, the introduction of IMPARTS........
IMPARTS
Integrating Mental and Physical Healthcare: Research, Training and Services

Faith Matcham
IMPARTS Aim

• To facilitate services to improve the mental healthcare of patients presenting in physical healthcare settings at Guy’s, St Thomas’ and King’s College Hospitals
**Informatics**
- Routine collection of patient-reported outcomes with advice on care & referral

**Care pathways**
- Development of mental health care pathways for patients identified via screening

**Training**
- Training in mental health skills with ongoing supervision from a mental health specialist

**Self-help**
- Portfolio of bespoke self-help materials, tailored to specific physical conditions
• A web-based screening interface to improve detection and management common mental health problems in a diverse range of physically ill populations

  - patient-reported mental and physical health outcome measurement
  - embedded in routine clinical practice
  - informs patient care and referral in real-time

> IMPARTS flags up any psychological issues to address
Flexible menu of questionnaires which can be matched to the needs of the service.

- **Mental Health**
  - Depression
  - Anxiety
  - Distress

- **Health Behaviours**
  - Smoking
  - Substance Misuse
  - Medication adherence

- **Cognitions**
  - Illness perceptions

- **Quality-of-Life**
  - Disease-specific
  - Generic

- **Physical Symptoms**
  - Medication side-effects
  - Disability
  - Fatigue
  - Pain
  - Post-surgical complications
IMPARTS currently screens in 23 services across the three hospital sites:

**KCH**
- Antenatal
- Chronic Cough
- Cranioplasty
- Endocarditis
- Headache
- Jaw Pain
- Limb Reconstruction
- Liver Transition
- MS
- Neuroendocrine Tumour
- Physiotherapy
- Rheumatology
- Stroke

**Guy’s and St. Thomas’**
- Adult Congenital Heart Disease
- Dialysis
- INPUT Pain Management
- Intensive Care Follow-up
- Medical Dermatology
  - Eczema
  - Hidradenitis Suppurativa
  - Psoriasis
- Palliative Care
- Renal Transplant
- Teenage and Young Adult Cancer
## IMPARTS Screening

**OVER THE LAST 2 WEEKS**, how often have you been bothered by any of the following problems?

<table>
<thead>
<tr>
<th>Question</th>
<th>Not at all</th>
<th>Several days</th>
<th>More than half the days</th>
<th>Nearly every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1) Little interest or pleasure in doing things?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2) Feeling down, depressed, or hopeless?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3) Trouble falling or staying asleep, or sleeping too much?</td>
<td></td>
<td><img src="https://via.placeholder.com/15" alt="Checkmark" /></td>
<td><img src="https://via.placeholder.com/15" alt="Checkmark" /></td>
<td></td>
</tr>
<tr>
<td>4) Feeling tired or having little energy?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5) Poor appetite or overeating?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6) Feeling bad about yourself - or that you are a failure or have let yourself or your family down?</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>7) Trouble concentrating on things, such as reading the newspaper or watching television?</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>8) Moving or speaking so slowly that other people have noticed? Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9) Over the last two weeks have you had thoughts that you would be better off dead or of hurting yourself in some way?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10) You have indicated that you have some of the problems on this questionnaire. How difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?</td>
<td><img src="https://via.placeholder.com/15" alt="Checkmark" /></td>
<td><img src="https://via.placeholder.com/15" alt="Checkmark" /></td>
<td><img src="https://via.placeholder.com/15" alt="Checkmark" /></td>
<td></td>
</tr>
</tbody>
</table>

[Next >>](#)
### IMPARTS Referral Pathways

<table>
<thead>
<tr>
<th>PMI</th>
<th>Group</th>
<th>Type</th>
<th>Score</th>
<th>Description</th>
<th>Referral</th>
<th>Alert</th>
</tr>
</thead>
<tbody>
<tr>
<td>S696696</td>
<td>Endocarditis IP FollowUp</td>
<td>PHQ9</td>
<td>27 / 27</td>
<td>Probable Major Depression</td>
<td>Liaison Psychiatry (urgent)</td>
<td>Suicidal Thoughts</td>
</tr>
</tbody>
</table>

1. Little interest or pleasure in doing things?  
2. Feeling down, depressed, or hopeless?  
3. Trouble falling or staying asleep, or sleeping too much?  
4. Feeling tired or having little energy?  
5. Poor appetite or overseating?  
6. Feeling bad about yourself - or that you are a failure or have let yourself or your family down?  
7. Trouble concentrating on things, such as reading the newspaper or watching television?  
8. Moving or speaking so slowly that other people have noticed? Or the opposite - being so fidgety or restless that you have been moving around a lot more than usual?
Coping after Endocarditis

A leaflet for people living with the effects of endocarditis

This leaflet is for people who have been diagnosed with endocarditis, who are receiving or have received medical treatment. As well as the physical effects of endocarditis, some people also find that the experience of illness, diagnosis and treatment can have an emotional impact. This leaflet provides some information about the ways people can be affected emotionally and what support is available.
Screening in Endocarditis

- Depression (PHQ-9)
- Anxiety (GAD-7)
- Smoking
- Alcohol Dependence (AUDIT)
- Illness Perceptions (BIPQ)
- Drug Misuse
- Endocarditis Symptom Severity
- Pain
Screening in Endocarditis

- 51 patients screened between 22\textsuperscript{nd} November 2013 and May 1\textsuperscript{st} 2015
- Each patient screened up to 6 times throughout inpatient stay
- Mean age = 52.8 years (SD=16.6)
- 70.6\% male

<table>
<thead>
<tr>
<th>Screening Encounter</th>
<th>Patient N.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>51</td>
</tr>
<tr>
<td>2</td>
<td>25</td>
</tr>
<tr>
<td>3</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>
Prevalence of comorbid psychological disorder (baseline)

- Depression
  - No Symptoms
  - Some Symptoms
  - Probable Disorder

- Anxiety
  - No Symptoms
  - Some Symptoms
  - Probable Disorder
<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>SD</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depression (0-27)</td>
<td>7.8</td>
<td>8.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Suicidal Ideation</td>
<td></td>
<td></td>
<td>3</td>
<td>5.9</td>
</tr>
<tr>
<td>Anxiety (0-21)</td>
<td>3.9</td>
<td>6.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Severe Anxiety</td>
<td></td>
<td></td>
<td>6</td>
<td>11.8</td>
</tr>
</tbody>
</table>
## Prevalence of substance misuse

<table>
<thead>
<tr>
<th>Category</th>
<th>M</th>
<th>SD</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current Smoker</td>
<td></td>
<td></td>
<td>7</td>
<td>14.6</td>
</tr>
<tr>
<td>Number of daily cigarettes</td>
<td>10.0</td>
<td>5.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alcohol Dependence</td>
<td></td>
<td></td>
<td>39</td>
<td>81.3</td>
</tr>
<tr>
<td>No dependence (AUDIT &lt;8)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hazardous drinking (AUDIT 8-15)</td>
<td></td>
<td></td>
<td>8</td>
<td>16.7</td>
</tr>
<tr>
<td>Harmful drinking (AUDIT 16-19)</td>
<td></td>
<td></td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>Alcohol dependence (AUDIT &gt;19)</td>
<td></td>
<td></td>
<td>1</td>
<td>2.1</td>
</tr>
<tr>
<td>Drug Dependence</td>
<td></td>
<td></td>
<td>3</td>
<td>5.9</td>
</tr>
</tbody>
</table>
Depression throughout inpatient stay

Mean Depression

Mean Anxiety
The IMPARTS Team

• Professor Matthew Hotopf (Project Lead)
• Dr. Lauren Rayner (Project Manager)
• Anna Simpson (Project Coordinator)
• Faith Matcham (Research Worker)

Email: imparts@kcl.ac.uk

@IMPARTSP

http://www.kcl.ac.uk/ioppn/depts/pm/research/imparts/index.aspx
The story so far

- Retrospective analysis of 32 patients with IE Jan 2011 – Dec 2011 (cohort 1), and 39 patients with IE from July-Dec 2014 (cohort 2)
The story so far

- Cohort 1
  - in-hospital mortality = 22%
  - average length of stay = 36 days
  - average cost = £33,319
The story so far

- Cohort 2:
  - In-hospital mortality = 8%
  - average length of stay = 32 days
  - average cost = £32,048
The story so far

- 15% of patients discharged to Medihome with weekly clinic follow-up
- Patient focus groups strongly support the role of the specialist nurse in inpatient care and during follow up.
Going forward

- Business case in place to continue the specialist nurse role and create IE MDT at PRUH.
- Strong data to present at national and international meetings, and to publish.
- Aim to disseminate findings nationwide and act as the national leader in this field.
Thank you