The Endocarditis Team: Let’s Make It Work!

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Objectives

• Review endocarditis practice guidelines recommending
  - Evaluation and management of patients with complicated endocarditis in reference centre
  - Access to surgical facilities and qualified surgeons
  - Presence of a multidisciplinary endocarditis team

• Review experiences of endocarditis teams

• Examine how to improve optimize team skills and performance

• Explore impact on patients and team members
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Infectious Disease Consult

- 56 year old diabetic hypertensive farmer with progressive dyspnea, weight gain for 1.5 years
  - History of Hodgkin’s disease, splenectomy and mantle radiation 40 years earlier
  - History of venous thrombosis and pulmonary embolus
  - Diagnosed with rheumatoid arthritis 1 year earlier
    - Rx etanercept, methotrexate, prednisone
- Admitted for further evaluation of constrictive pericarditis
- Febrile to 39 degrees C on the night of admission
Findings

• Exam:
  - venous prominence over upper chest wall, JVD, systolic murmur, pedal edema

• Lab:
  - WBC 17,350, hemoglobin 9.9 g/dl, hematocrit 30.9%, platelets 193,000
  - WSR 106 mm/hr, C-reactive protein 10.6 mg/dl
  - Pyuria present, urine culture: >100K CFU E coli
  - Blood cultures: no growth
Transesophageal Echocardiogram

- “linear highly mobile echodensity at least 1.6cm in length attached to the atrial side of the tricuspid valve which could represent a vegetation or possibly fibrinous strands or thrombus”
- “atrial mobile mass at the anterior mitral leaflet measuring 1.8 cm x 0.8 cm which could represent a vegetation (infectious or non-infectious), or possibly a tumor or a mobile calcification in this post-radiation setting”
- “findings consistent with prior diagnosis of constrictive pericarditis include a non-collapsing dilated IVC, 35% variation in trans-tricuspid flows, 26% variation in pulmonary vein flows, abnormal septal bounce”
Diagnostic Testing

- Blood cultures no growth at five days
- Bartonella and Coxiella serologies negative
- Blood for Whipple’s PCR positive
- Surgical indications
Consult to Cardiac Surgery

“There was a 1 cm lesion on the posterior tricuspid valve leaflet. This was excised preserving the leaflet and chordae.”

“ There was a large vegetation on the anterior mitral leaflet as well as several smaller ones…A 29 mm Magna mitral valve was implanted with pledgets on the ventricular side.”
Specimen Processing

- Cultures
- Histopathology
- Sequencing
Mitral Valve

Foamy macrophages (Hematoxylin and Eosin)

Macrophages filled with organisms (Periodic acid-Schiff)

Courtesy Carmela D. Tan, M.D. & Rene E. Rodriguez, M.D.
Pericardium

Thick & fibrotic pericardium (Hematoxylin and Eosin)

Intra- and extra-cellular bacilli (Periodic acid-Schiff)

Courtesy Carmela D. Tan, M.D. & Rene E. Rodriguez, M.D.
Further Results and Clinical Course

PCR of the mitral valve, tricuspid valve vegetation and pericardium: *Tropheryma whipplei*

- Methotrexate discontinued and prednisone tapered
- PICC line inserted for OPAT
- Sulfamethoxazole/trimethoprim used for chronic suppression
- Doing well 7 years post op
Team Approach: What’s Old is New

Home Intravenous Antibiotic Therapy: A Team Approach

SUSAN J. REIM, M.D., and ALLAN J. WEINSTEIN, M.D., Cleveland, Ohio

Prolonged hospitalization for therapy of some infections may be economically and emotionally costly to patients. A multidisciplinary team was organized at the Cleveland Clinic Hospital to coordinate the selection, education, and follow-up of patients receiving parenteral antibiotic therapy at home. Forty-eight patients were trained to mix and administer antibiotics and to care for the intravenous access device. Most patients had infections of the bones, joints, or soft tissue and received an average of 19 days of therapy at home. Beta-lactam antibiotic agents were administered to most patients and were well tolerated. The infection was eradicated in 87% of patients. The average saving in cost for each course of the drug was $5726.

Cleveland Clinic Endocarditis Team

- Four sub-specialized ID physicians
- Valvular endocarditis
  - Approximately 200 cases/yr
  - 55% NVE, 45% PVE
  - 72% undergo valve surgery
- Endovascular infections and CV ICU consults
- 777 consults in 2018
Distribution of Microorganisms

- **S. aureus**: 28%
- **Viridans strep**: 17%
- **Enterococcus**: 15%
- **CoNS**: 13%
- **Other strep**: 7%
- **No ID**: 5%
- **GPB**: 5%
- **Polymic**: 2%
- **HACEK**: 2%
- **Other**: 3%
- **Fungus**: 3%
- **Polymicrobial**: 2%
- **Other**: 3%
Academic Activities

Infective endocarditis: An atlas of disease progression for describing, staging, coding, and understanding the pathology

Gösta B. Pettersson, MD, PhD, a Syed T. Hussain, MD, a Nabin K. Shrestha, MD, b Steven Gordon, MD, b Thomas G. Fraser, MD, b Khalid S. Ibrahim, MD, PhD, a and Eugene H. Blackstone, MD a,c

The Journal of Thoracic and Cardiovascular Surgery • Volume 147, Number 4 2014
Colleagues Stimulate Creative Links

Picture of the M87 Black Hole

PET scan of a patient with infective endocarditis
<table>
<thead>
<tr>
<th>Principle</th>
<th>Definition</th>
<th>Impact on Clinician Well-Being</th>
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<tbody>
<tr>
<td>Shared Goals</td>
<td>The team establishes shared goals that can be clearly articulated, understood, and supported by all members [a]</td>
<td>Role clarity has been associated with improved clinician well-being [b]</td>
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<tr>
<td>Clear Roles</td>
<td>Clear expectations for each team member's functions, responsibilities, and accountabilities to optimize team efficiency and effectiveness [a]</td>
<td>A fully staffed team that is not over patient capacity is associated with decreased burnout [c]</td>
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<td>Mutual Trust (psychological safety)</td>
<td>Team members trust one another and feel safe enough within the team to admit a mistake, ask a question, offer new data, or try a new skill without fear of embarrassment or punishment [a]</td>
<td>A strong team climate promotes clinician well-being and member retention [d,e]</td>
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<td>Effective Communication</td>
<td>The team prioritizes and continuously refines its communications skills and has consistent channels for efficient, bidirectional communication [a]</td>
<td>Effective communication is associated with decreased clinician burnout [f]</td>
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<td>Measurable Processes and Outcomes</td>
<td>Reliable and ongoing assessment of team structure, function, and performance that is provided as actionable feedback to all team members to improve performance [a]</td>
<td>Emotional exhaustion is associated with low personal accomplishment, so reiteration of accomplishments could decrease burnout [h]</td>
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Association Between Physician Burnout and Patient Safety, Professionalism, and Patient Satisfaction
A Systematic Review and Meta-analysis

Maria Panagioti, PhD; Keith Geraghty, PhD; Judith Johnson, PhD; Anli Zhou, MD; Efharis Panagopoulou, PhD; Carolyn Chew-Graham, MD; David Peters, MD; Alexander Hodkinson, PhD; Ruth Riley, PhD; Aneez Esmail, MD, PhD

Team $\downarrow$ Burnout $\rightarrow$ Professionalism $\uparrow$, Safety $\uparrow$, Patient Satisfaction $\uparrow$

Integrative Framework of Teamwork, Clinician Occupational Well-Being, and Patient Safety

Teamwork (1)
Trends*: - Hypothesis: teamwork influences well-being and patient safety
Recommendations: - Investigation of dynamic aspects of teamwork over time - Multiple team membership (shared leadership)

Teamwork – Well-Being (A/B)
Trends*: - Design: surveys; interpersonal teamwork aspects, i.e., nurses’ attitudes towards teamwork - Measurement: nurse-physician relations (of NWI)[58]
Recommendations: - Surveying physicians/multiprofessional teams - Wider conception of teamwork, e.g., considering action, transition and interpersonal processes from a team perspective [136, 137]

Well-Being (2)
Trends*: - Key concept: Burnout - Measurement: MBI[59]
Recommendations: - Investigation of - Evolvement of acute & chronic work strain - Positive outcomes - Physiological stress measures

Well-Being – Patient Safety (D/E)
Trends*: - Hypothesis: Well-being influences patient safety - Design: surveys; clinician-rated patient safety - Sample: nurses or physicians
Recommendation: - Investigation of objective process & outcome safety measures - Consideration of reciprocal relationships between well-being and safety

Clinician well-being (2)

Teamwork (1)

Patient safety (3)
Trends*: - Design: 1/3 surveys; interpersonal aspects, i.e., nurses’ attitudes towards teamwork; 2/3 observational studies: action and transition team processes, nurses and physicians - Measurement: surgical NOTECHS[96] & related behavioral marker instruments
Recommendations: - Use of validated tools & multi-dimensional teamwork questionnaires

Recommendation: - Diverse assessments of patient safety: team performance, subjective ratings, medical errors, mortality, incident reporting, record reviews

Patient Safety (3)

## Resilience Traits of Physicians

<table>
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<tr>
<th>Job-Related Gratification</th>
<th>Habits and Practices</th>
<th>Attitudes</th>
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<tbody>
<tr>
<td>Physician-patient relationship</td>
<td>Interaction with colleagues (discussion of cases, treatments and outcomes, including errors)</td>
<td>Acceptance and realism</td>
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<td>Medical efficacy (healing)</td>
<td>Self-demarcation, maintenance of professional identity</td>
<td>Self-awareness</td>
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<td>Organization, establishment of routines</td>
<td>Ability to address challenges realistically, reject victimhood</td>
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<td>Professional development (continuing education, coaching, mentoring, counseling)</td>
<td>Appreciation of the good things</td>
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<td>Active nurturing of relationships with family and friends</td>
<td>Recognition that change may be necessary</td>
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<td>Cultivation of leisure-time activities and ritualized time-out periods</td>
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<td>Personal reflection, spiritual practices</td>
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The Endocarditis Team at Cleveland Clinic

Infectious Diseases: Tom Fraser, Steve Gordon, Nabin Shrestha
Cardiac Surgery: Gosta Petterson, Faisal Bakaeen, Shinya Unai
OPAT/Rehab/Long Term Care: Alice Kim, Carrie Gallagher, Angela Everett
Pathology: Carmela Tan, Rene Rodriguez
Cardiology: Brian Griffin, Rick Grimm
Microbiology: Gary Procop, Sandy Richter
Cardiac Radiology: Paul Schoenhagen
Cardiovascular Intensive Care Unit: Chidoze Udeh
Psychiatry/Addiction Medicine: David Streem, Leo Pozuelo
Housestaff and Fellows
Patients and Families

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Key Take-Aways

• ESC and AHA guidelines support formation of endocarditis teams

• Positive impact:
  - Patient outcomes
  - Systems
  - Team members