Starting an Interventional Echo Program

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So you want to be a structural echo lab?
But…

Centre for
Heart Valve Innovation
St. Paul's Hospital, Vancouver

Or ‘The never ending journey…’

Key considerations and general principles

Building relationships: identify allies and collaborators

The interventional cardiologist is your friend and ally

Being a large volume center helps

Focus helps (not every device in every valve)

Education (at every level)

Focus on quality helps (TTE, TEE)

The Multidisciplinary Team rules

Who pays? Resources and $$

Obstacles and Frustrations

Impacts and Overview

Organization, where does the echo lab fit?

In the Echo Lab:

- Sonographer and echocardiographers:
- Education and Learning
- Productivity and workflow

The multidisciplinary team

- The echocardiographer adds value ++

The Cath Lab:

- Technical facility
- Communication

Higher level:

- Promotion
- Culture
- Remuneration

Relationships: allies and collaborators

Head sonographer and her team

Interventional/structural HD cardiology

The Heart team

Industry

Outcomes researchers

Managers, administrators and ‘bean counters’

The Echo Lab and the Structural TTE Scan

Demands a high level of technical facility for sonographers

All the usual, done well plus…

Specialized views (SAX mitral plane, col compare, X-plane)

Focus on valve structure

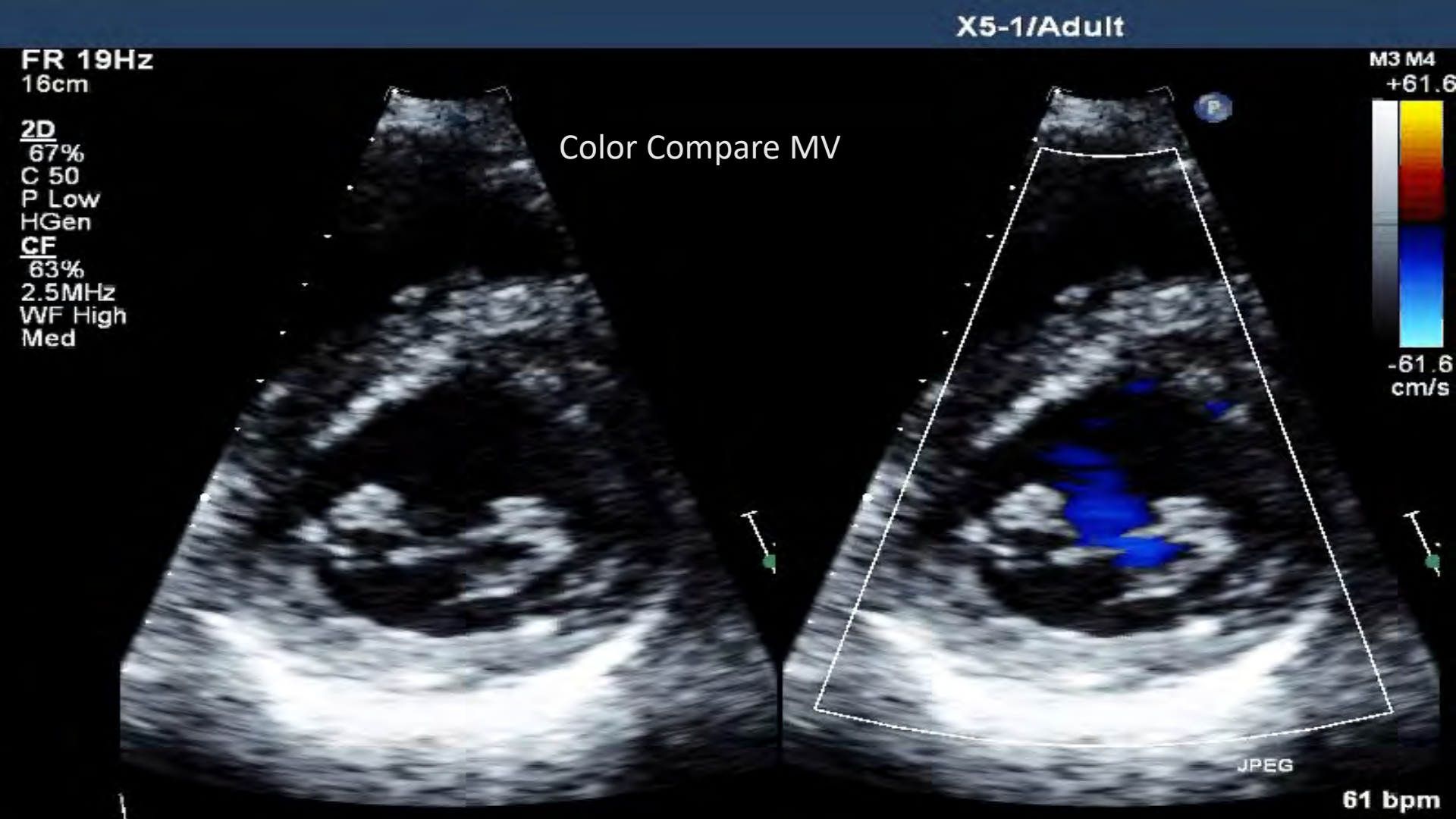
MR, AR, TR Quantification (pulmonary and hepatic veins, VC, PISA)

Careful volumetric assessment (biplane MOD, 3D)

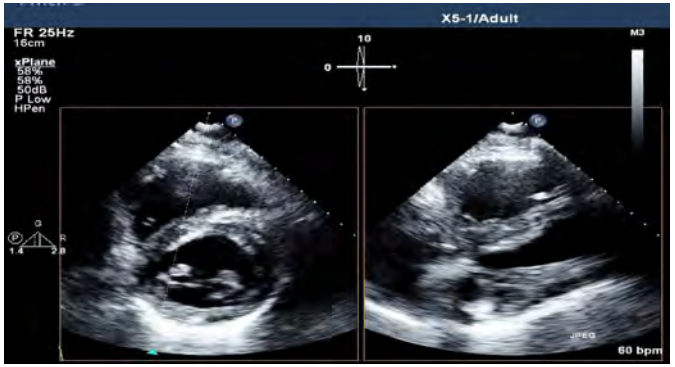
- grading of regurgitation, regurgitation volume
- consequences of valvular regurgitation

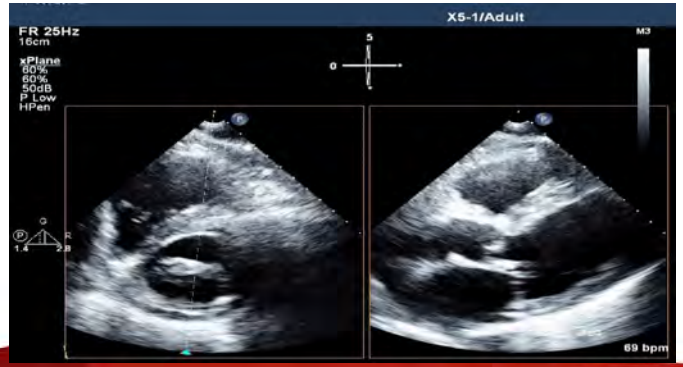
3-D imaging (LV, RV, MV TV structure, PPM leads)

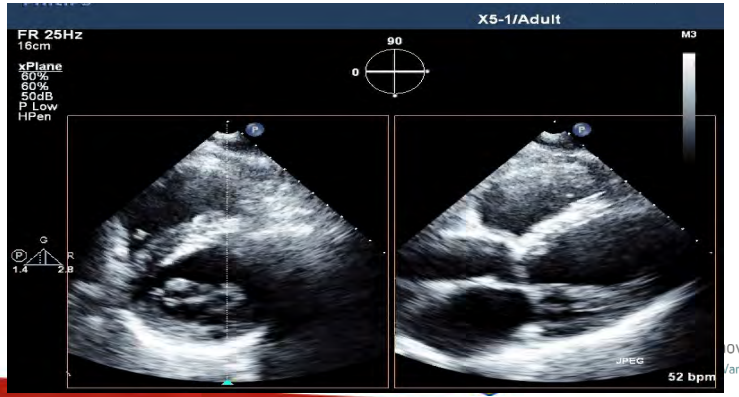
Post procedural assessment (often challenging)


X5-1/Adult
FR 19Hz
16cm
2D
67%
C 50
P Low
HGen
CF
63%
2.5MHz
WF High
Med
Color Compare MV
M3 M4
+61.6
-61.6
cm/s
JPEG
61 bpm

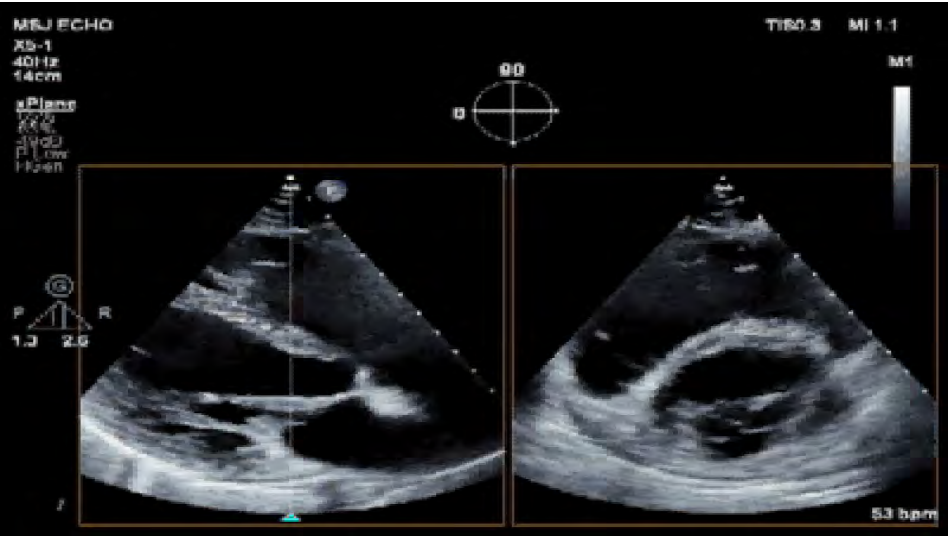
Segmenting the MV with X-plane

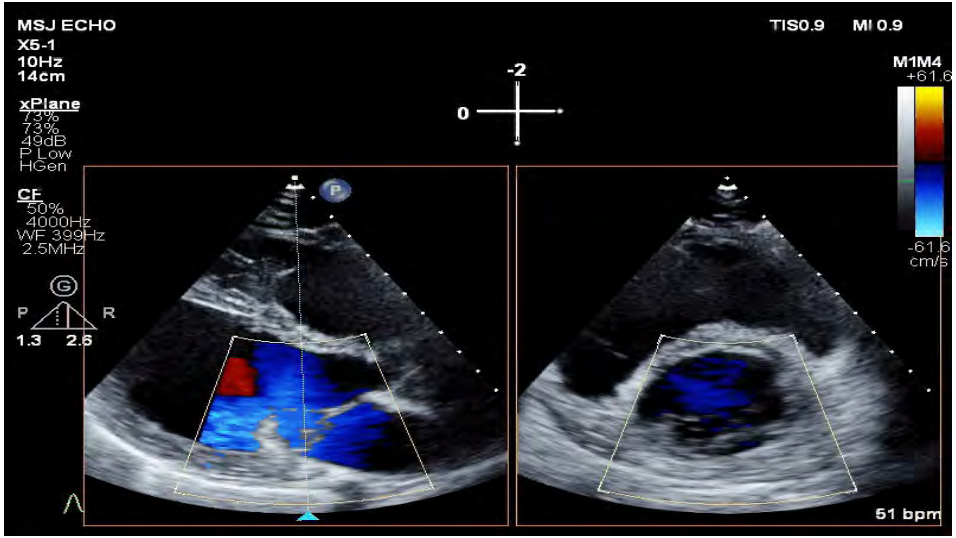






MR localization





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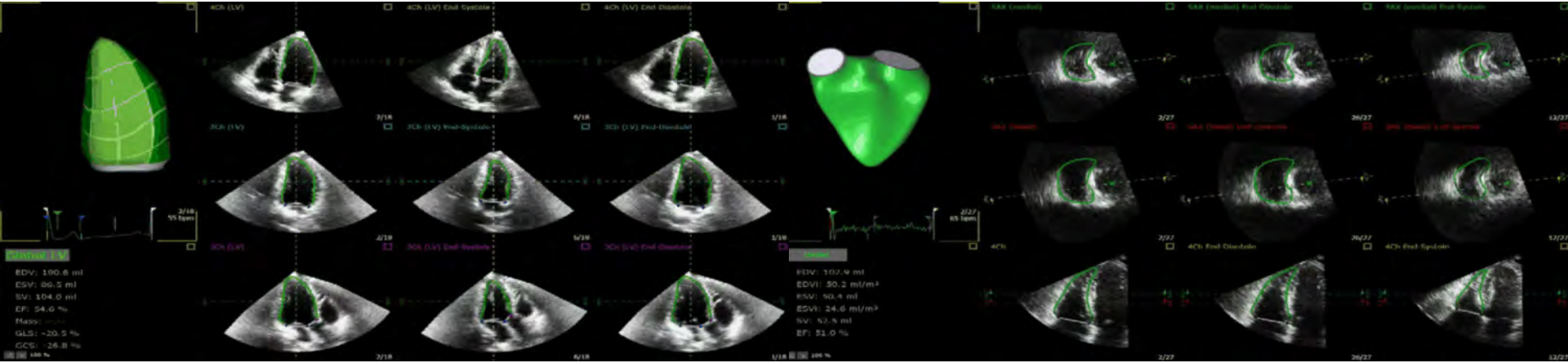
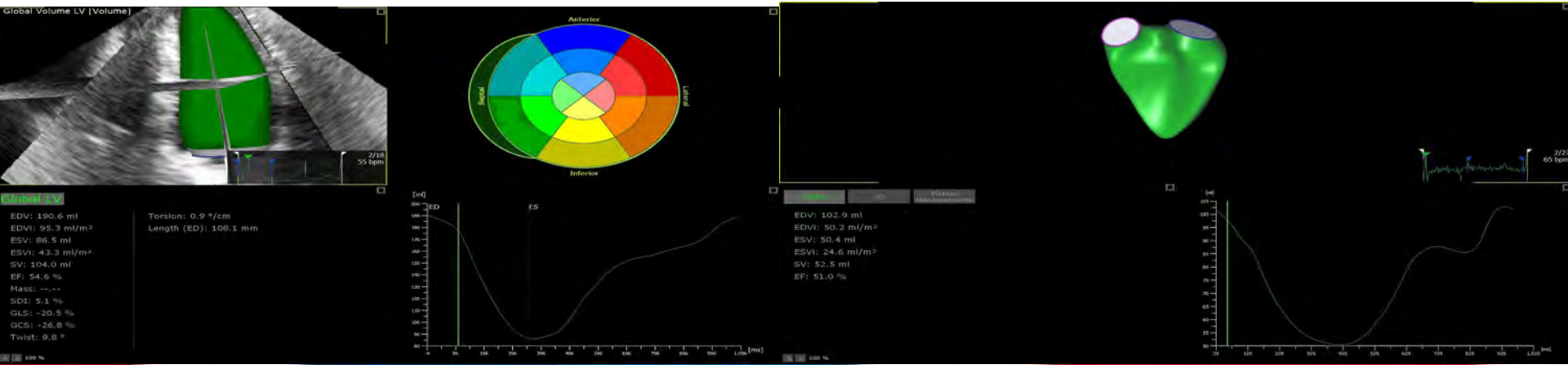
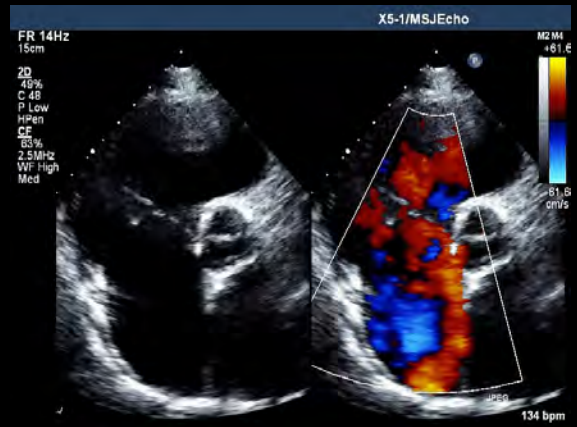

4Ch (LV)
4Ch (LV) End Systole
4Ch (LV) End Diastole
3Ch (LV)
3Ch (LV) End-Systole
3Ch (LV) End-Diastole
3Ch (LV)
3Ch (LV) End-Systole
3Ch (LV) End-Diastole
Global LV
EDV: 190.6 ml
ESV: 86.5 ml
SV: 104.0 ml
EF: 54.6 %
Mass: --
GLS: -20.5 %
GCS: -26.8 %
EDV: 102.9 ml
EDVI: 50.2 ml/m²
ESV: 50.4 ml
ESVI: 24.6 ml/m²
SV: 52.5 ml
EF: 51.0 %
4Ch
4Ch End-Diastole
4Ch End-Systole


Global Volume LV [Volume]
Anterior
Septal
Lateral
Inferior
Global LV
EDV: 190.6 ml
EDVI: 95.3 ml/m²
ESV: 86.5 ml
ESVI: 43.3 ml/m²
SV: 104.0 ml
EF: 54.6 %
Mass: --,--
SDI: 5.1 %
GLS: -20.5 %
GCS: -26.8 %
Twist: 9.8 °
Torsion: 0.9 °/cm
Length (ED): 108.1 mm
ED
ES
EDV: 102.9 ml
EDVI: 50.2 ml/m²
ESV: 50.4 ml
ESVI: 24.6 ml/m²
SV: 52.5 ml
EF: 51.0 %

The tricuspid valve in 3D



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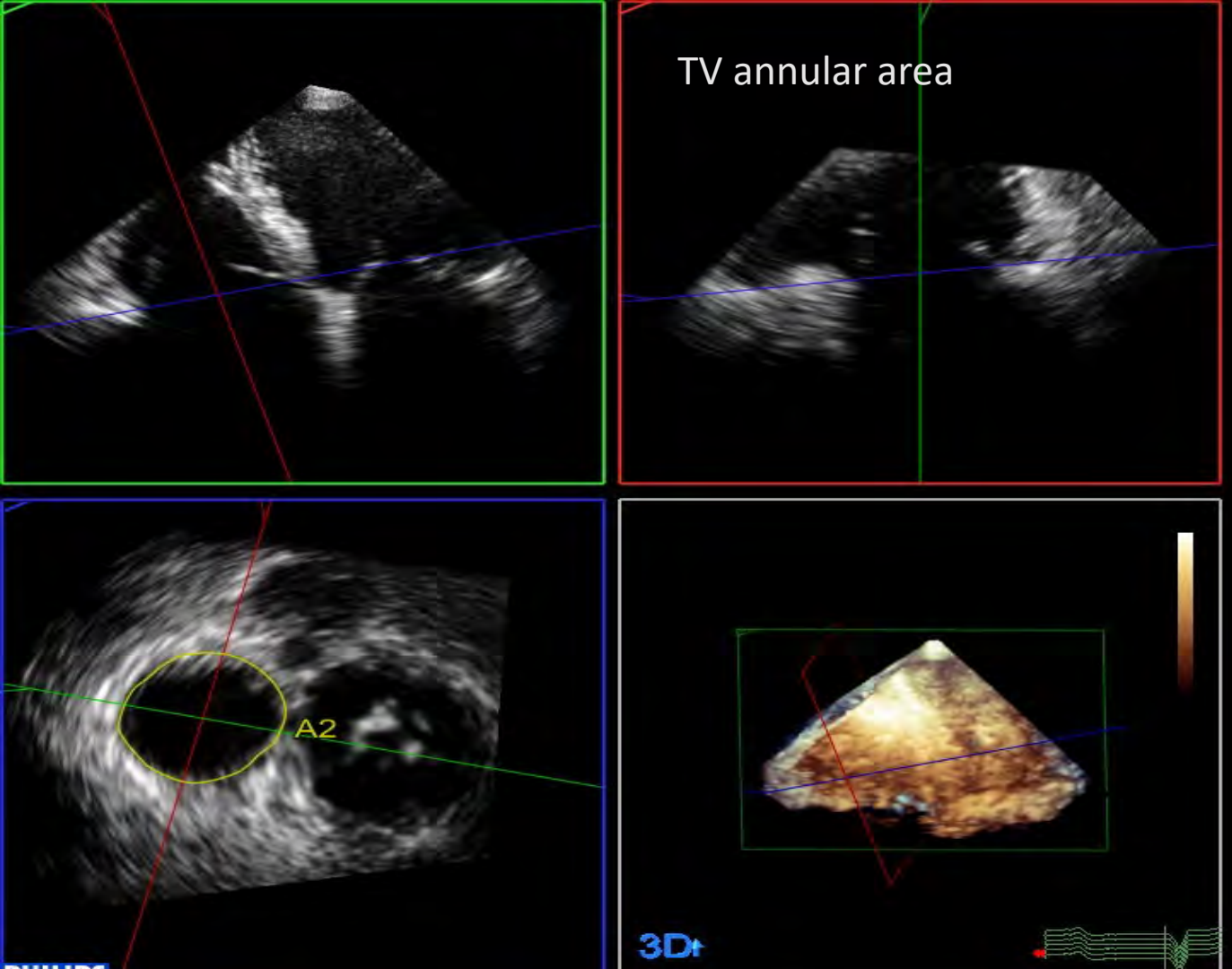
TV annular area
A2
3D
Area(s)
A1
Area 17.73 cm²
Circ 15.15 cm
A2
Area 18.22 cm²
Circ 15.24 cm


SPH ECHO
X5-1
21Hz
14cm
2D
64%
C 51
P Low
HGen
CF
50%
4000Hz
WF 399Hz
2.5MHz
P
R
1.3
2.6
TIS1.0
MI 0.9
M3
X2
63 bp
SPH ECHO
X5-1
62Hz
12cm
3D Zoom
2D / 3D
% 78 / 52
C 50 / 41
HGen
Delay 0ms
3D Beats 4
TIS0.4
MI 0.9
M3
73 bpm
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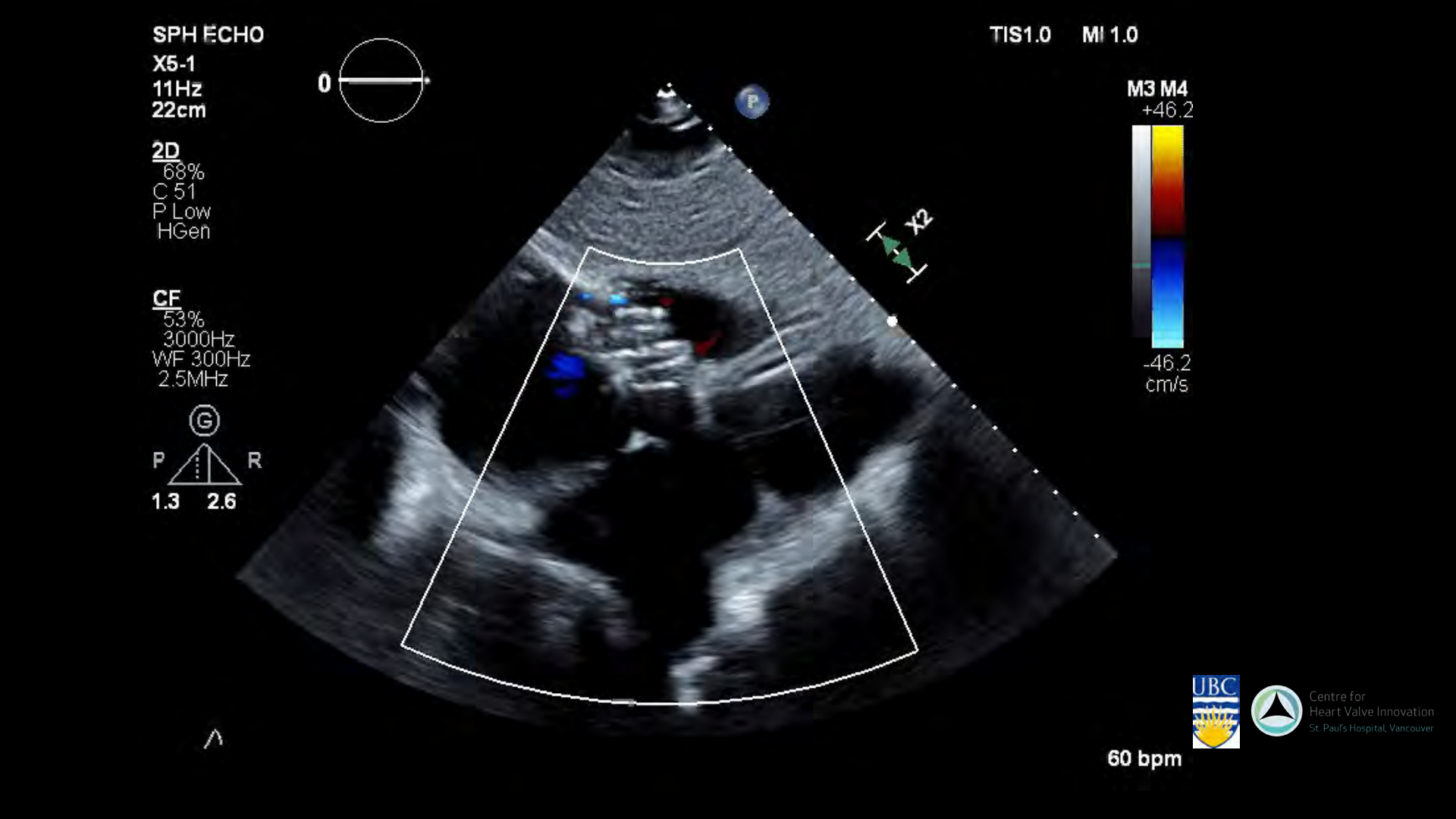
SPH ECHO
X5-1
11Hz
22cm
2D
68%
C 51
P Low
HGen
CF
53%
3000Hz
WF 300Hz
2.5MHz
P
R
1.3
2.6
TIS1.0
MI 1.0
M3 M4
+46.2
-46.2
cm/s
X2
60 bpm
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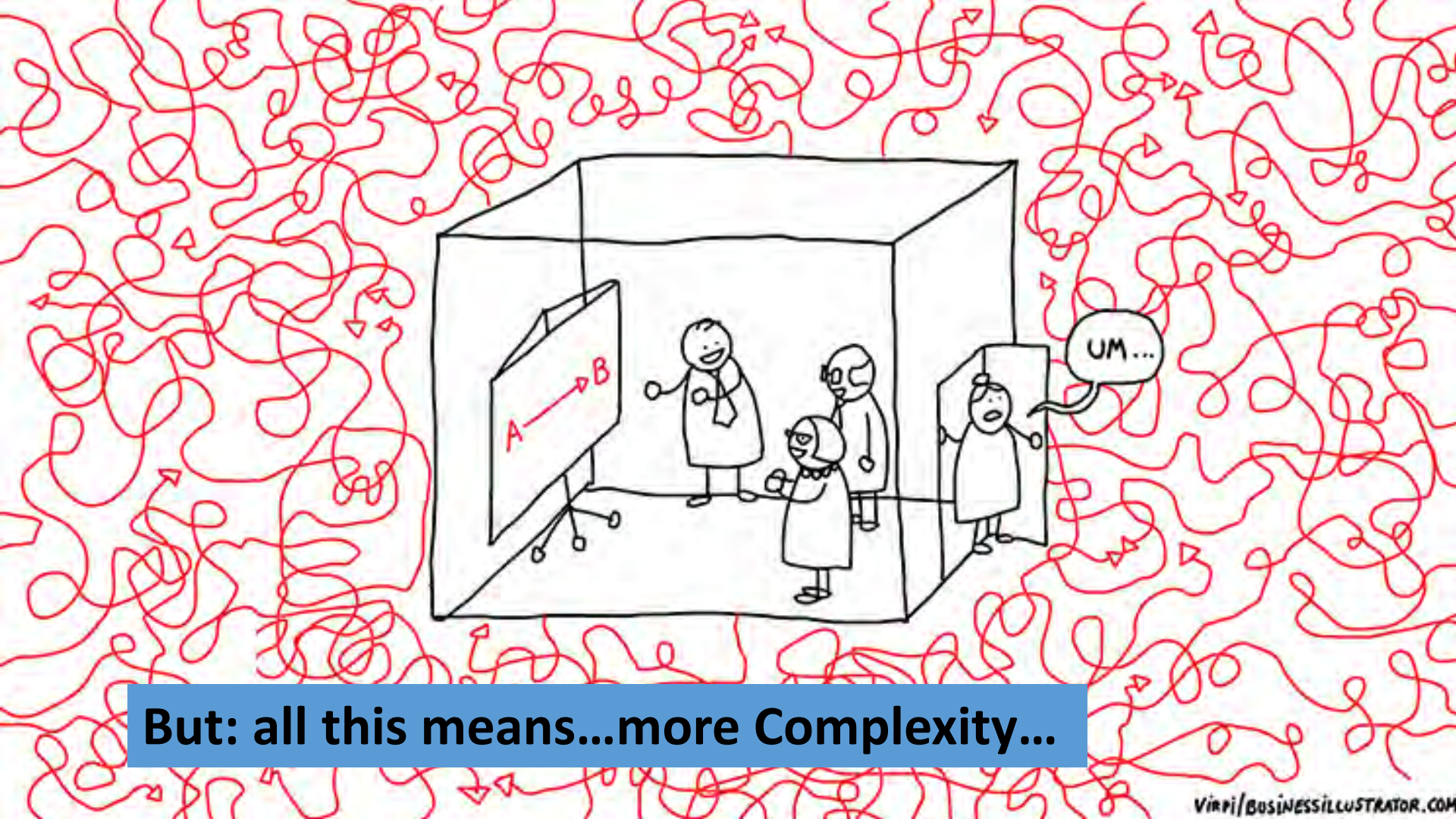


But: all this means…more Complexity…

Sonographer empowerment, understanding, commitment

Education and familiarity

Scanning time per study, post processing

Workflow and productivity

Complex industry sponsored protocols

Working echo lab vs. research facility; are ‘they’ out of touch?

60 minutes scans?

Wait time impact (SHD scan vs. undifferentiated CHF scan)

ARTICLE IN PRESS

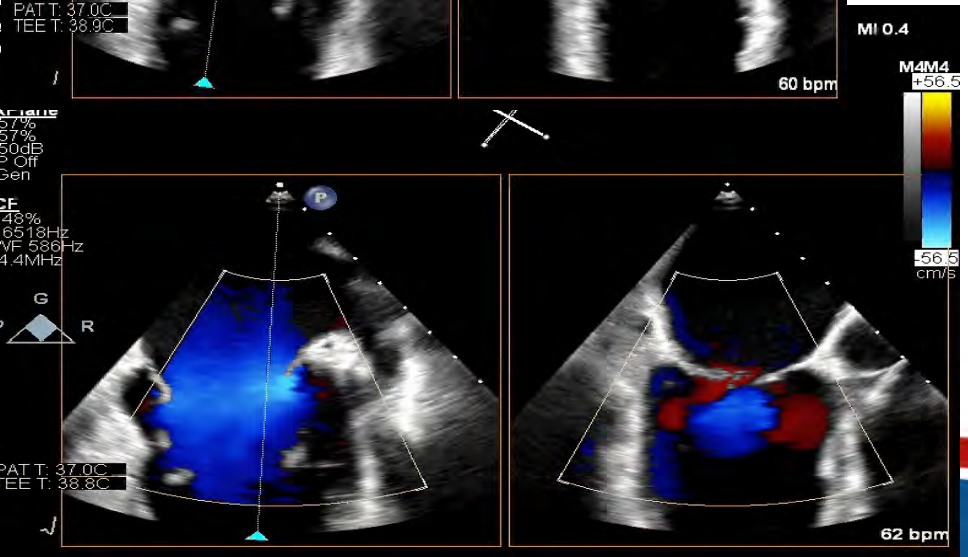
GUIDELINES AND STANDARDS

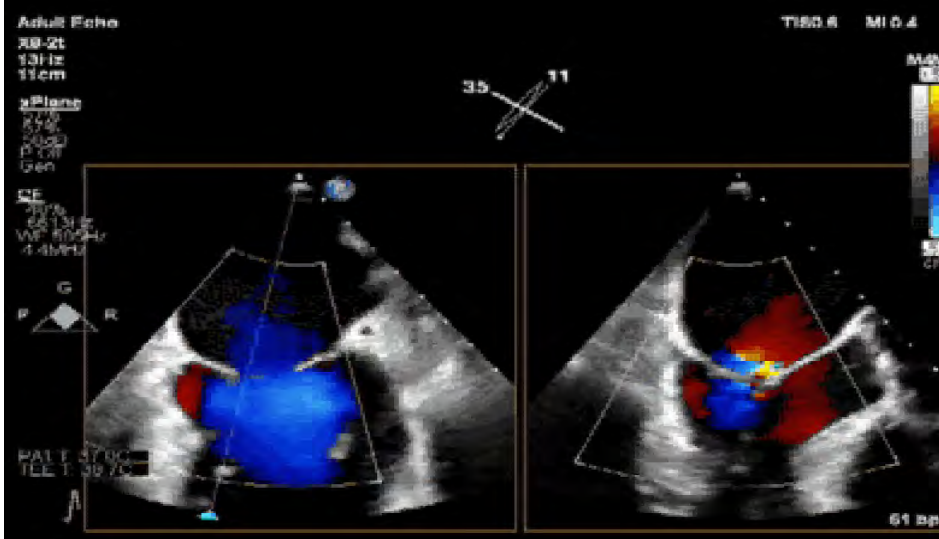
Recommended Standards for the Performance of Transesophageal Echocardiographic Screening for Structural Heart Intervention: From the American Society of Echocardiography

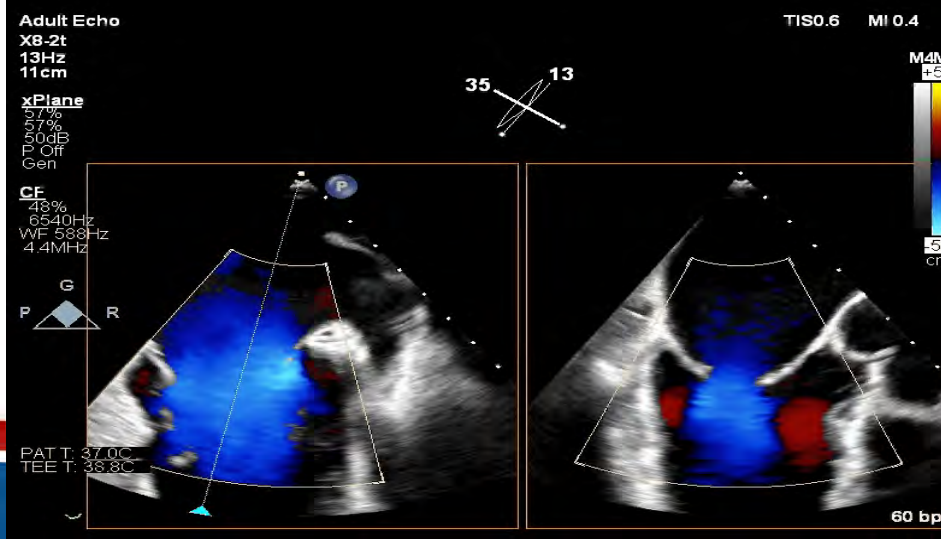
Rebecca T. Hahn, MD, FASE (Chair), Muhamed Saric, MD, PhD, FASE (Co-Chair), Francesco Fulvio Faletra, MD, Ruchira Garg, MD, FASE, Linda D. Gillam, MD, MPH, FASE, Kenneth Horton, ACS, RCS, FASE, Omar K. Khalique, MD, FASE, Stephen H. Little, MD, FASE, G. Burkhard Mackensen, MD, PhD, FASE, Jae Oh, MD, FASE, Nishath Quader, MD, FASE, Lucy Safi, DO, FASE, Gregory M. Scalia, MBBS, FASE, and Roberto M. Lang, MD, FASE, *New York, New York; Lugano, Switzerland; Los Angeles, California; Morristown, New Jersey; Murray, Utah; Houston, Texas; Seattle Washington; Rochester, Minnesota; St. Louis, Missouri; Hackensack, New Jersey; Brisbane, Australia; and Chicago, Illinois*

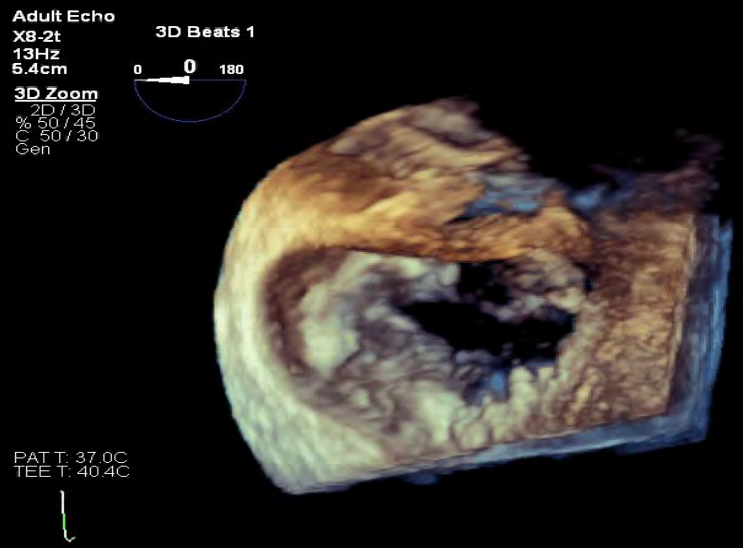
Keywords: Transesophageal echocardiography, Structural heart disease

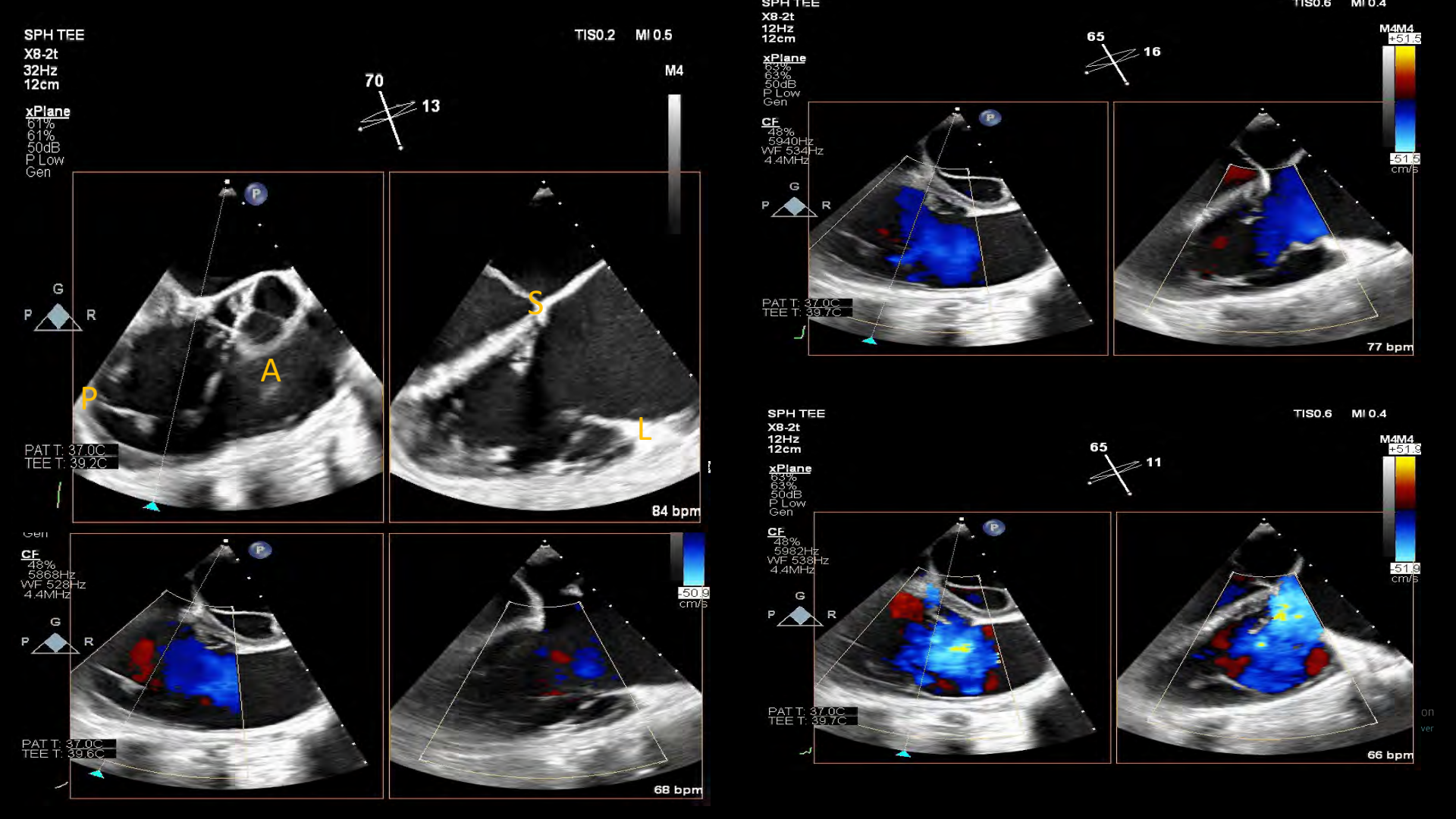

Adult Echo
X8-2t
32Hz
11cm
xPlane
55%
55%
50dB
P Off
Gen
TIS0.2
MI 0.5
M4
35
8
G
P
R
PAT T: 37.0C
TEE T: 38.9C
60 bpm


MI 0.4
M4M4
+56.5
-56.5
cm/s
48%
6518Hz
WF 586Hz
4.4MHz
G
P
R
PAT T: 37.0C
TEE T: 38.8C
62 bpm

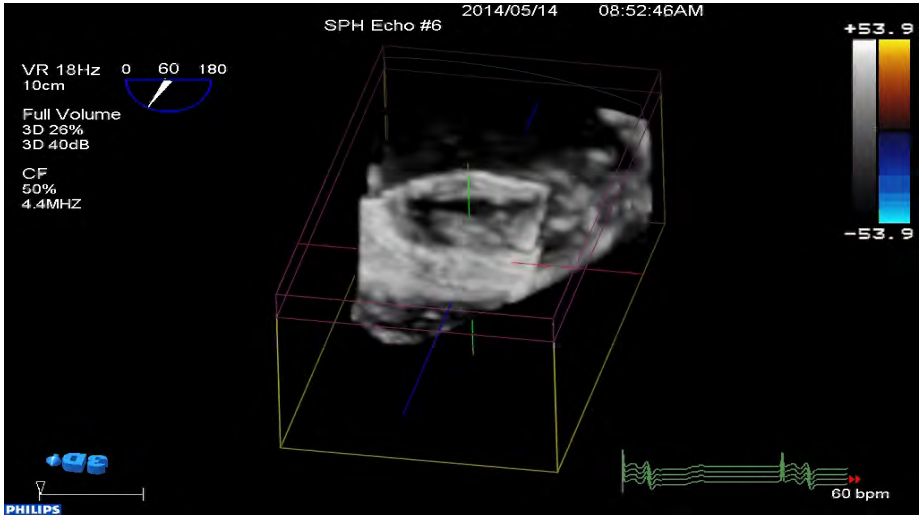

Adult Echo
X8-2t
13Hz
11cm
xPlane
57%
57%
50dB
P Off
Gen
CF
48%
6540Hz
WF 588Hz
4.4MHz
35
11
G
P
R
61 bp

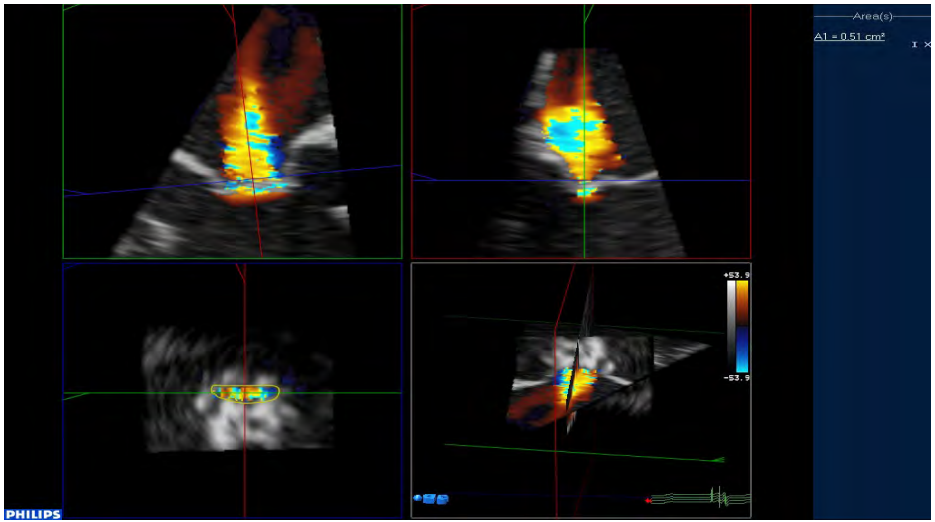

Adult Echo
X8-2t
13Hz
11cm
xPlane
57%
57%
50dB
P Off
Gen
CF
48%
6540Hz
WF 588Hz
4.4MHz
TIS0.6
MI 0.4
35
13
G
P
R
PAT T: 37.0C
TEE T: 38.8C
60 bp




SPH TEE
X8-2t
32Hz
12cm
xPlane
61%
61%
50dB
P Low
Gen
TIS0.2 MI 0.5
M4
70
13
G
P
R
A
P
S
L
PAT T: 37.0C
TEE T: 39.2C
84 bpm
CF
48%
5868Hz
WF 528Hz
4.4MHz
-50.9
cm/s
PAT T: 37.0C
TEE T: 39.6C
68 bpm
SPH TEE
X8-2t
12Hz
12cm
xPlane
63%
63%
50dB
P Low
Gen
TIS0.6 MI 0.4
M4M4
65
16
+51.5
-51.5
cm/s
CF
48%
5940Hz
WF 534Hz
4.4MHz
PAT T: 37.0C
TEE T: 39.7C
77 bpm
SPH TEE
X8-2t
12Hz
12cm
xPlane
63%
63%
50dB
P Low
Gen
TIS0.6 MI 0.4
M4M4
65
11
+51.9
-51.9
cm/s
CF
48%
5982Hz
WF 538Hz
4.4MHz
PAT T: 37.0C
TEE T: 39.7C
66 bpm

3-D Color Pre-Clip FMR





Vena Contracta area pre-clip 0.51

TEE ‘take homes’

Change the culture by educating the fellows

The same SHD imagers should do the diagnostic cases

‘State of Art’ equipment

SHD protocols available for reference

3D facility

Increased resource consumption (average time per case~20-30 minutes).

Patient risk (frail elderly, longer scan times).

The multidisciplinary team: dimensions

- Case selection and strategy
- Who to choose, who to turn down
- Clinical trials, industry, resource allocation
- Resources and funding
- Monitor outcomes

The ideal multi-disciplinary team

Leader

Nursing (frailty, clinical assessment)

Echocardiographer

CT and MRI

Heart Failure specialist

Cardiac Surgeon

Intervention and SHD

Trainees

Before…

After…

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In the Cath Lab/Hybrid OR 1

A partnership between Intervention and Echo

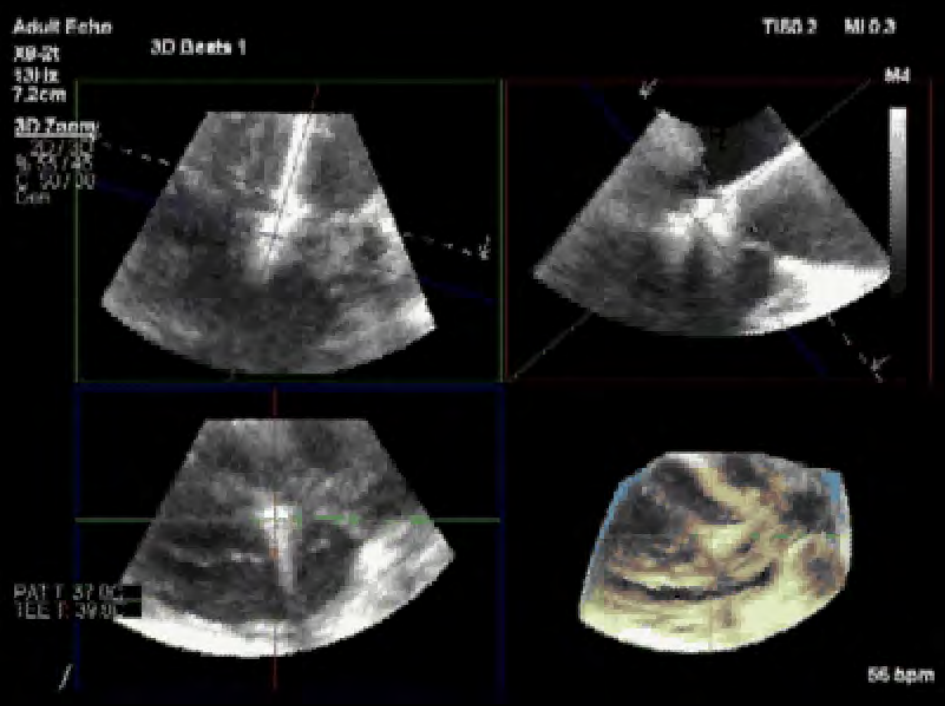
‘It’s my baby’ vs. ‘Share the pain’

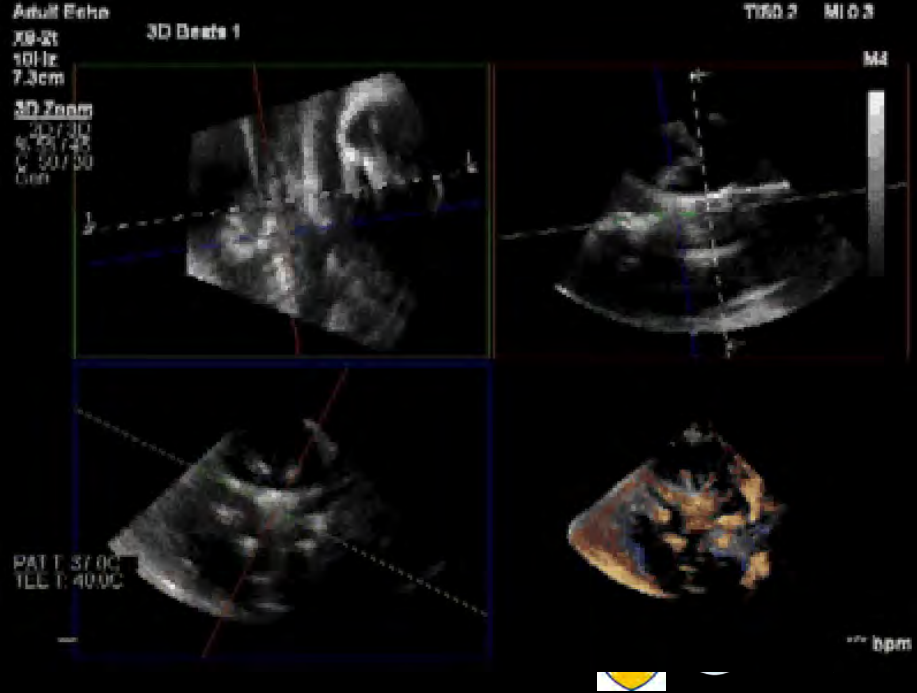
These are echo driven procedures

Closed loop communication

***Rapid* real time 3-D facility**

MPR Tricuspid Valve: Triclip and Evoque





In the Cath Lab/Hybrid OR 2

Familiarity with 3D ‘knobology’ (‘Multivue’)

Familiarity with 3D valvular anatomy pathology

Familiarity with the device

Familiarity with fluoroscopic imaging

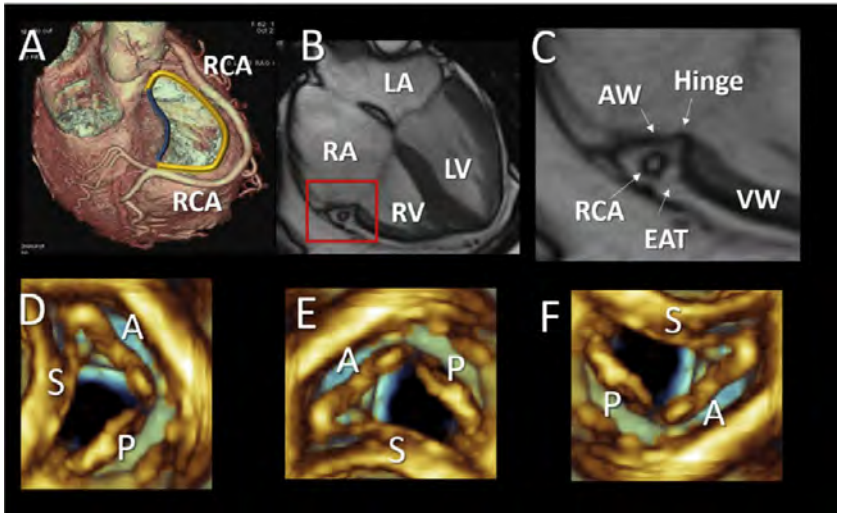
But…

Time consuming

Mentally and physically impacting

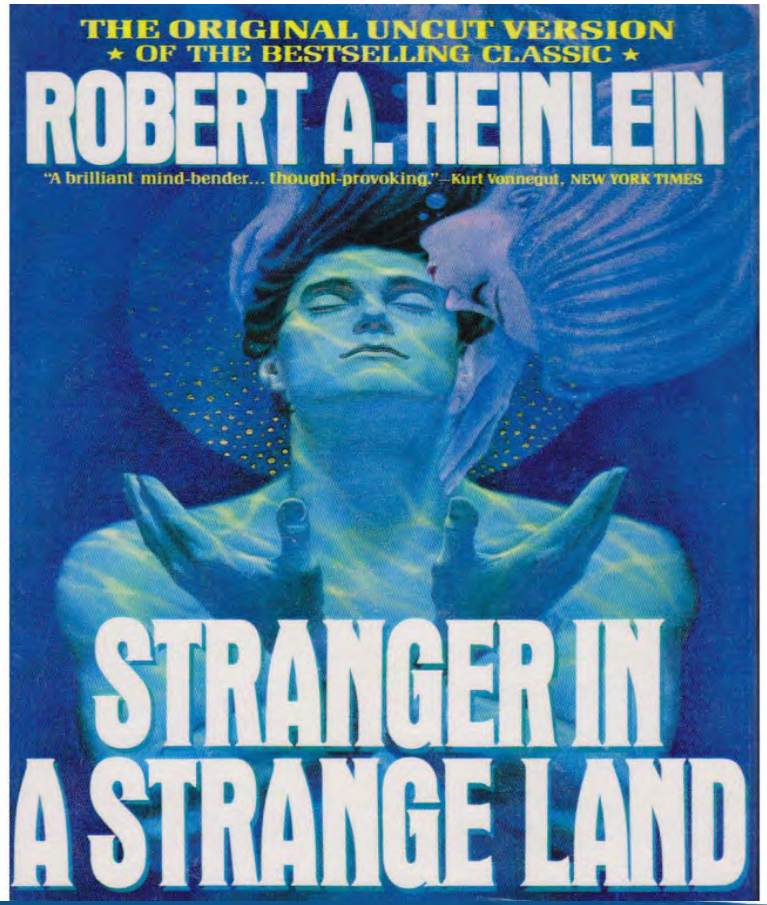
Poorly or (un)remunerated

Should there be a separate SHD echo team, with separate funding?



In the Cath Lab or Hybrid OR 3

- The echocardiographer is part of the Heart Team too
- And not an interloper…
- More than an imager (contributes to strategy, outcomes)
- Input to design, architecture
- Radiation protection, ergonomics, design



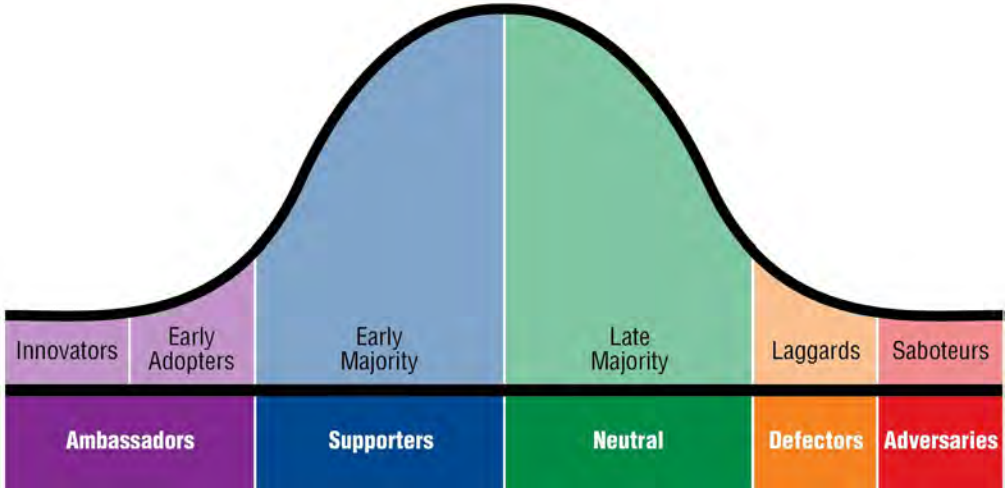
Life wasn't meant to be easy.

— Malcolm Fraser —

AZ QUOTES

Obstacles and Culture

- **Culture is the hardest thing to change…**
- **A structural echo program needs a new mindset**
- **The echocardiographers is a key component of the SHD team**
- **The potential for SHD interventions on patient outcomes is still not widely understood**
- **By Family Physicians, Internists, (even Cardiologists), leaders and managers…**
- **There is a need for belief and advocacy**



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Accession No: 001KQNQWT
1.9 m²
BP: 101/60 mmHg

Kiess
Unknown

e

ack LVEF = 56 %.
the aortic regurgitation.
1.8 cm² ; Vmax: 2.3 m/s; mean gradient: 14 mmHg.

ble for patients with severe valvular regurgitation and
linic.

m for review.

on indexed end diastolic volume. Normal systolic function.

on. Normal systolic function.

erior leaflet motion is restricted by the aortic regurgitation.

mild valve thickening. Mild aortic stenosis. Peak velocity:
alve area (VTI): 1.8 cm². Moderate valvular regurgitation,

Follow-up & Recommend

☐ Hypertensive heart disease
☐ TDE; suboptimal
☐ Congenital statement

Additional Summary Statements (to numbered summary)

*Alerts on repo

EDITABLE SUMMARY COMMENTS (to numbered summary section)

LV	
RV	
LA/RA	
MV	Percutaneous interventions are avalialble for patients with severe valvular regurgitation and high surgical risk. Refer to SPH TAVI Clinic.
TV	
AoV	
Ao	

The downside: resources

Consume echo capital and good will

Take away diagnostic TTE TEE slots and blow out wait times

Physically demanding, time consuming, radiation exposure

Lag between technology, science and funding

The health care arm of government, hospital administrators need convincing…

ASE American Society of Echocardiography
Sound Saves Lives

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IF YOU BUILD IT,
THEY WILL COME.

Resources: The hardest part

Fix the remuneration piece (both echo and intervention)

In the interim need to think creatively (but honestly) about billing

Understand the health economics and costs (you need help)

Reference outcome studies (Coapt) and cost comparisons with other drugs and interventions (QUALY $)

Ally with professional organizations

Identify and educate HC ‘players’ and powerbrokers

Lobbying at Provincial/State level

Bulk up. Groups are more powerful than individuals


Good Luck!