Next Generation Pan-Vascular Suite: Optimizing patient management and outcomes

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Disclosures

- **Speaker:** Cook Medical, WL Gore, BD (Bard), Abbott, Getinge, Penumbra
- **Consultant:** Boston Scientific, BD, Avanos
- **Investor:** Integrity, Cagent, Brightwater
We have come a long way..
As imaging techniques became more advanced, equipment moved to a dedicated controlled environment.
These environments were mainly developed to serve the equipment, not the clinical workflow.
As equipment became more complex, Imaging suites have become less effective, less ergonomic & less safe.
How can we improve the interventional work environment?

- Radiation Dose Management
- Usability & Efficiency
- Positioning & geometry
Creating the ultimate interventional work environment

Radiation Dose Management

Clarity: Hardware and Software Advancements
The importance of radiation dose reduction
Clarity IQ: Hardware and Software Advancements
Low-dose angiographic imaging technology

The Effect of a New Angiographic Imaging Technology on Radiation Dose in Visceral Embolization Procedures

Frederic Baumann, MD1,2, Constantino Peña, MD1, Roman Kloeckner, MD2,3, Barry T. Katzen, MD1, Ripal Gandhi, MD1, and James B. Benenati, MD1

Mean radiation dose reduced by 39.4% for visceral embolization
The Dose Reduction with the Clarity system has been well documented. (>18 peer reviewed publications)

• In iliac DSA, ClarityIQ technology reduces patient dose by **83%** while maintaining equivalent image quality, compared to an Allura Xper system.
  • M.J.L. van Strijen, et al.¹ JVIR 2015

• in EVAR procedures, Clarity IQ technology reduces patient dose by **56%** and in AIOD by **76%** compared to Allura Xper.
  • R. F van den Haak et al.² EJVES 2015

• In TACE procedures for hepatocellular carcinoma, Clarity IQ technology reduces patient dose by **50.3%** while maintaining image quality.
  • R. F van den Haak et al.²
Creating the ultimate interventional work environment

Usability & Efficiency

Azurion Platform: Workflow and efficiency solutions
Azurion IGT Platform

- Simplified & Intuitive User Interface
  Standardized between CV systems and other imaging modalities
- Complete Flexibility to Monitor displays and Inputs
- Simplified Tableside Controls
- Touch screen module (TSM) improved usability and more features
- Two Parallel Workspots:
Protocols, Manuals, applications built-in
Azurion IGT Platform

- Procedure cards: standardized but customized case information to increase consistency and maximize physician time
- Reducing the need to walk out of the room;
Reduction in Procedure Time

**Study Detail**
- 775 procedures
- 12 x-ray techs
- 6 physicians
- independent
- 3rd party verification
- p-values < 0.01

**In-Lab Patient Time per Procedure**

<table>
<thead>
<tr>
<th>Before Azurion</th>
<th>In-Lab Patient Preparation Time</th>
<th>Procedure Time</th>
<th>In-Lab Post Procedure Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>After Azurion</td>
<td>In-Lab Patient Preparation Time</td>
<td>Procedure Time</td>
<td>In-Lab Post Procedure Time</td>
</tr>
</tbody>
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12% Reduction
17% Reduction
28% Reduction
System Usability Scale measurement

Industry standard: 68
Azurion score @ MCVI: 85
Creating the ultimate interventional work environment

Positioning & geometry
Present Limitations and Future Requirements
Primary Role as well as Ergonomics Critical


Occupational health hazards in the interventional laboratory: time for a safer environment.

Society of Interventional Radiology: Occupational Back and Neck Pain and the Interventional Radiologist

Robert G. Dixon, MD, Vishal Khatani, MD, John D. Statler, MD, Eric M. Walser, MD, Mehran Midia, MD, FRCP, Donald L. Miller, MD, Gabriel Bartal, MD, Jeremy D. Collins, MD, Kathleen A. Gross, MSN, BS, RN-BC, CRN, Michael S. Stecker, MD, and Boris Nikolic, MD, MBA, for the Society of Interventional Radiology Safety and Health Committee

The occupational effects of interventional cardiology: results from the WIN for Safety survey.

<table>
<thead>
<tr>
<th>Author</th>
<th>Survey Details</th>
<th>Findings</th>
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<tbody>
<tr>
<td>Ross et al.</td>
<td>Survey of interventional cardiologists (852 surveys, 385 responses),</td>
<td>Increased spine problems in interventionists (75% incidence) vs orthopedists and rheumatologists</td>
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<tr>
<td></td>
<td>orthopedists (577 surveys, 131 responses), and rheumatologists (978 surveys,</td>
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<td></td>
<td>198 responses)</td>
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<td>Goldstein et al.</td>
<td>Survey of 1600 interventional cardiologists (424 responses)</td>
<td>Prevalence of orthopedic complaints: spine, 42%; hip, knee, ankle, 28%; spine problem limited work in one-third</td>
</tr>
<tr>
<td>Machan</td>
<td>Survey of interventional radiologists (308 responses)</td>
<td>60% reported spine complaints; spine problems limited work in 25%</td>
</tr>
<tr>
<td>Moore et al.</td>
<td>Survey of 608 radiologists (236 responses)</td>
<td>50% prevalence of back pain</td>
</tr>
</tbody>
</table>
Solution: Create the Ideal Geometry

- Allow access to the patient from any approach
- Limit the obtrusiveness of the detector system to the work environment
- Ability to image whole patient: “head to toe and arm to arm”
- Ability to maximize the use of multiple disciplines around the workspace
- Create an environment that everyone in the room can “see what’s going on” and is actively engaged
- Minimal footprint even “off the floor”
- Easy and Intuitive for the operator the move detector system
FlexArm
FlexArm Movement
Combined Case
Combined Cardiac Cases
Radial Approach
FlexArm Study at MCVI

Study design

- 200 interventional procedures included
  - Pilot - 40 cases (April – October 2017)
  - Final study - 160 cases (March – July 2018)
- Questionnaires for the staff after every case
- Logging data from systems
  - FlexArm system: 80 cases
  - Standard system: 76 cases

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<thead>
<tr>
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<th>FlexArm System</th>
<th>Standard System</th>
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</thead>
<tbody>
<tr>
<td>Cardiology</td>
<td>50 pts</td>
<td>50 pts</td>
</tr>
<tr>
<td>Radiology</td>
<td>50 pts</td>
<td>50 pts</td>
</tr>
</tbody>
</table>
Moving C-arm instead of table is perceived beneficial in complex endovascular/cardiac procedures:

- Less risk of pulling tubes/lines
- Less risk of losing catheter/wire position or access
- Less need to move equipment (interface devices, shielding, etc.) around table
- Less effort required to image the ROI

System logging data showed reduction in amount and total distance of table movements per procedure.
Upper extremity access

Lateral system movement facilitates imaging off-center anatomy
Increased use of upper extremity access in room with FlexArm

System logging data:
Each dot represents a single irradiation event.
Physician ergonomics

- Reduction in perceived physical discomfort during interventions
- Less need to work in ergonomically suboptimal positions

How often during the procedure did you have to work in an ergonomically suboptimal position?

- Never: 24.2% room 8, 6.1% room 9
- Rarely: 50.0% room 8, 37.7% room 9
- Sometimes: 21.8% room 8, 30.7% room 9
- Often: 22.8% room 8, 3.2% room 9
- Always: 0.8% room 8, 2.6% room 9
The Ultimate Interventional work environment?

- Radiation
- Clarity IQ
- Usability & Efficiency
- Positioning & geometry
- FlexArm

Azurion
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