Improving Cancer Diagnosis and Care: Patient Access to Oncologic Imaging and Pathology Expertise and Technologies
Imaging Prostate Cancer 2018

Clinical Care vs. Clinical Research

MRI – T2WI & DWI

MRI - Radiomics

68Ga-PSMA MRI/PET

HP13C MRSI

Early
18.6 s

Late
57.3 s

Pyr

PyrH

Lac
Phase I Study: GDC-0810 (ER antagonist) Targeted Imaging $^{18}$F-FES PET/CT

$^{18}$F-FES PET/CT used as a *biomarker of ER suppression* during Phase I dose escalation trial showed ER downregulation with >90% decrease in SUV for **BRD = 600mg/day** – dose chosen for Phase II trial

**BRD**

**MTD**

Wang Clin Cancer Res. 2017
Theranostics: Molecular Imaging & Therapy

Metastatic NET - Targeting Somatostatin receptors

Before therapy

After Lutetium-177 (177Lu) DOTA-TATE

Imaging (68Ga) DOTA-TATE

Therapy (177Lu) DOTA-TATE

Hricak H: Beyond Imaging-Radiology of Tomorrow; Radiology 2018
Automated Longitudinal Quantification of Tumor Burden

Tumor response measurements in clinical trials & treatment follow up.

Technology is available, but it is not evenly nor widely distributed!!!
### Top Contributing Factors

<table>
<thead>
<tr>
<th>FACTOR</th>
<th>% CASES*</th>
</tr>
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<tbody>
<tr>
<td>Clinical Judgment</td>
<td>67%</td>
</tr>
<tr>
<td>Communication</td>
<td>23%</td>
</tr>
<tr>
<td>Technical</td>
<td>22%</td>
</tr>
<tr>
<td>Administrative</td>
<td>16%</td>
</tr>
<tr>
<td>Clinical Systems</td>
<td>16%</td>
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</tbody>
</table>

### Top Clinical Judgment Factors
- Misinterpretation of dx studies: 48% (639)

### Procedure

<table>
<thead>
<tr>
<th>PROCEDURE</th>
<th>% CASES</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT scan (Abdomen, Head, Chest)</td>
<td>18%</td>
</tr>
<tr>
<td>Diagnostic radiography (CXR / Ortho)</td>
<td>13%</td>
</tr>
<tr>
<td>Mammography</td>
<td>10%</td>
</tr>
<tr>
<td>MRI (Magnetic Resonance Imaging)</td>
<td>10%</td>
</tr>
<tr>
<td>Diagnostic ultrasound</td>
<td>3%</td>
</tr>
</tbody>
</table>

**D Siegal, et al: The role of radiology in diagnostic error: a medical malpractice claims review; Diagnosis 2017**

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**Additional Clinical Judgment Factors Include:**
- Failure to appreciate / reconcile relevant sign/symptom/test result
- Narrow dx focus—failure to establish differential diagnosis
The complexity of cancer diagnosis and treatment requires a multidisciplinary approach - integrative teams of pathologists, radiologists, oncologists, primary care physicians, and biomedical informaticians.

Requirements for quality improvement include:
- Culture (constructive not punitive)
- Infrastructure (data systems and analysts)
- Leadership (clinical and operational)
- Engagement (appropriate metrics)
- Bandwidth (overwhelming extramural, non-patient-care requirements)

Governance: Formal interdisciplinary governance structure within an organization is critical to set standards and monitor progress.

Measurement: Measure outcomes frequently, and modify plans accordingly.
Improving Cancer Diagnosis and Care
Session 1: Patient Access to Diagnostic Expertise in Oncology

- **Cancer care is multi-disciplinary** but not all members of the care team have formal training in oncology.
- **All cancer patients** need access to a highly qualified workforce and accurate, timely diagnostic services.
- How do we make this expertise available outside specialized care settings?
- Through training? Through consultation? Through Cancer Consortia?
- Case volume, experience, and time available influence quality of care.
- **Lack of insurance**, cost sharing, pre-authorization schemes, and **self-referral prohibitions**, **narrow networks of providers** (often geographically dispersed) all add complexity and administrative burdens to care of patients, especially those least able to navigate barriers to care.
• Similar issues faced by pathology
• Should there be mandatory review of all new cancer diagnoses?
• Use of checklists for pathology sign out?
• Convergence of imaging and pathology on the horizon as pathology goes digital – Integrated Diagnostics
• Beware of dissemination of new technologies without an adequate evidence base & workforce training.
• Need for standardized display of meaningful data, data integration, timely communication of findings
Session 2A: Developing and Supporting a Workforce for High-Quality Oncology Diagnosis and Care: Education and Training

• Oncologic imaging needs to be fully integrated into the curriculum of our residency programs. - pursued through the APDR.

• A certificate of special competency in oncologic imaging should develop, based on achieving and demonstrating critical competencies. - pursued by the ACR

• Oncologic imaging may be added as a clinical practice area for ongoing longitudinal assessment (OLA), as part of MOC - ABR.

• Peer learning must be promoted throughout academic and community practices.

• Deputize radiologists as having oncologic expertise (fellowship training or CME ACR including it in the ‘RADLEARN’ tool.
Focus of pathology training on reporting standards, communication and quality standards

Standard AP/CP training needs to be augmented with mol dx. genomics, informatics within 4 yr residency

Peer learning is an important aspect of quality improvement

ABR transitioning to longitudinal life-long learning

Pathology moving to competency-based medical education
• It takes 5-14 years for new knowledge to disseminate into practice
• CDS: expert system to improve performance of a non-expert clinician, reduce unwarranted variations in care, improve experience of care of patients, improve accuracy and quality of care
• CDS needs to be Efficient, Evidence-based, Educate, Encourage/Enforce adoption of evidence
• Are current Health IT systems able to support CDS?
• Barriers to acceptance of CDS: physician acceptance, coding, interoperability, cost
• Pathology reports not formatted to support CDS
• Incentive: “gold card” on pre-authorization
Improving Cancer Diagnosis and Care

Session 3: Systems Approaches and Care Modes

• Diagnostic management teams at Vanderbilt provide standard testing, comprehensive report, integrated diagnosis, saves time/money and improves quality – a role model for Pathology.

• Project ECHO: telementoring is provider to provider; technology to deliver case-based learning, best practices, monitor outcomes. Move knowledge, not patients!

• Large employers paying for second opinions to reduce costs, improve outcomes.

• New oncology care models moving to value-based payment built on high quality clinical pathways.
• **Requirements for quality improvement** include:
  - Culture (constructive not punitive)
  - Change in MD behavior requires measurement and feedback to clinicians
  - Infrastructure (data systems and analysts)
  - Leadership (clinical and operational)
  - Engagement (appropriate metrics)
  - Bandwidth (overwhelming extramural, non-patient-care requirements)

• **Governance**: Formal interdisciplinary governance structure within an organization is critical to set standards and monitor progress.

• **Measurement**: Measure outcomes frequently, and modify plans accordingly
Session 3: Systems Approaches and Models of Care Delivery for Cancer Diagnosis

- **Centralize services** where high volume is a perquisite for quality
- Use **tele-mentoring** to build community capacity and relationships
- **Work with employers** to provide prevention, second opinions and aids to literacy and activation
- **Adapt payment** to scale proven approaches
Session 4: Computational Oncology and Integrated Diagnostics: Opportunities for New Technologies to Improve Diagnostic Information and Inform Cancer Care

- **Genomics, pathomics, and radiomics** will become increasingly relevant to cancer care before, during, and after diagnosis.
- **Data sharing** will enable the study of interrelationships between diagnosis, treatment, and outcomes at scale.
- **Interoperability standards** will help solve challenges of data aggregation, labeling, and diagnostic data quality.
- **Machine learning** will fundamentally change how cancer care is delivered, and will facilitate unified diagnostics and precision oncology.
Improving Cancer Diagnosis and Care
Session 5: Stakeholder Perspectives on the Path Forward

Potential Solutions

› Build a specialized workforce
  or
› Support a less specialized workforce, via CDS, AI, etc
  or
› Enable better access to specialized expertise
  or
› Some combination of the above 3

› How do we do it and how do we pay for it