Medical Physics 3.0
Re-Envisioning the Role of Medical Physics in Modern Medicine
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From inaugural 9 to 27

MP3.0
AAPM Adhoc (2016)
Committee of 27
4 videos
16 national events
5 international events
5 magazine articles
6 journal articles
Outline

• Rationale
• The essence of MP3.0
• The activities and plans ahead

Rationale

Overarching need and presuppositions

Medicine: Discerning and intervening in the health state of the patient with sufficient accuracy, precision, and safety for definitive clinical outcome.

Healthcare is an activity that is based on the particularities of the techniques – techniques are valued to the extent they benefit the patient.

Possible?
Reality check 1:
Clinical practice
Heterogeneous and Complex
• Varying technologies
• Varying technical parameters
• Varying patients
• Varying human operators
• Competing interests
Variability in the quality of care

Reality check 2:
There is a cost
Most people will experience at least one diagnostic error in lifetime
Improving Diagnosis in Healthcare, NAM 2015
• 10% of patient deaths
• 6-17% hospital adverse events
• Leading type of paid medical malpractice
• Claims twice as likely to result in death
Variability in the quality of care harms patients
Define, grow, express, and practice sustainable innovative precision care through clinical application of physical sciences

Secure the future of our profession

Physics for Every Patient

Why precision care needs medical physicists?
1. Our historical grounding: Roentgen
2. Our unique skillset and perspective
3. Our ethical mandate
   Optimum care needs purposeful contribution of medical physics

Medical Physics Progression

1.0
- Equipment
- Specifications
- Quality check
- Presumption
- Compliance
- Physics in Medicine

3.0
- Operation
- Performance
- Consistency
- Actual utility
- Excellence
- Physics for Medicine
- Physics of Medicine
Practices of MP3.0 Physicist

- **Evidence-based practice**: Practice informed by science
- **Precision practice**: Personalization of care in quantitative terms
- **Experimental practice**: Skepticism, focus on actual utility as opposed to presumed utility
- **Quality practice**: Doing more than just the minimum, compliance vs excellence
- **Value-based practice**: Scrutiny on safety, performance, consistency, stewardship, efficiency, ethics

Does that apply to me?

- The clinic
- The academy
- The industry
- The government
- Research organizations
- Professional organizations
- ...

Multiple practice settings, one overarching goal ...

Advancing Human Health

- Education
- Clinical Service
- Research and Development
- Culture
1. **SOUL**: Realizing who we are (or ought to be)
   - **Science**-oriented (in discovery AND application)
     - **Scholarship**: evidence-based, methodical pursuit
       - critical thinking, curiosity
     - **Quantitation**: measurement, numerical orientation
       - medicine scientifically approachable when quantified
     - **Innovation**: agency of advancement
       - better understanding, practice solutions, care delivery, technological solutions, education, regulations, …
1. SOUL
Realizing who we are (or ought to be)

2. Service-oriented (towards ultimate clinical use)
   - Care: customer mindset
   - Personalization: personalized and cohorized care
   - Optimization: care maximized per intervention
   - Consistency: managing variability across diverse technologies and patient factor

3. Multi-vision (in incorporating science in context)
   - Dual-vision: Myopic AND systemic visions
   - Dual-calling: Scholar AND healthcare provider

2. SKILL
Extending the Competencies

1. Hard skills (Positioning the physicist to be competent)
   - Be the scientist “in the room”
   - Focus on actual utility and quality of service
   - Master the latest science in MP proper
   - Master the edge of MP proper: process engineering, optimization, bio-informatics, data science and AI, radiomics
   - Integrate prospective and retrospective science in practice
2. SKILL
Extending the Competencies

2. Soft skills (Positioning the physicist to be confident)

<table>
<thead>
<tr>
<th>Dealing with</th>
<th>Intelligence in</th>
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<tbody>
<tr>
<td>Self</td>
<td>Vision</td>
</tr>
<tr>
<td>People</td>
<td>Love</td>
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<tr>
<td>Projects</td>
<td>Action</td>
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<tr>
<td>Finances</td>
<td>Honesty</td>
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<tr>
<td>Constraints, voids (ethics, regulations, …)</td>
<td>Stewardship of Pain</td>
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</tbody>
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3. REALITY
Developing Sustainable Models of 3.0 Practice

- Gain ability to articulate our essential and contextual value proposition
- Devise and use pragmatic resources, smart tools for “busy clinical people”
- Automation and tracking tools
4. CULTURE
Changing the Expectations from Medical Physics
• Seek meaning beyond checklists, enthusiasm beyond duty, curiosity beyond “answers”
• Devise pathways for translation of science to practice
• Own the quantification of value in value-based care
• Update the regulatory expectations

5. EDGE
Extending the Boundaries of Medical Physics
• Identify and encourage clinical growth where care can be excelled with physics contribution
• Claim and advance the profession beyond radiation medicine
  – bio-statistics, photonics, pathology, dentistry, surgery, 3D printing, virtual reality, nano-medicine, radiogenomics…

Activities and plans ahead
“Smarts” initiative

1. Smart regulations
2. Smart tools
3. Smart practitioners
4. Smart practice
5. Smart advocacy
6. Smart grassrooting
7. Smart expansion

MP3.0 for YOU

• Join MP3.0
• Be an ambassador for MP3.0
• Take part in MP3.0 Workshop (Fall 2020)
  – 3 day event to demonstrate the components and successful implementation of MP3.0 practice in
    • In imaging
    • In therapy
    • Beyond radiation medicine