Applying Baldrige National Quality Program Methodology to Achieve Medical Physics Performance Excellence

E.S. Sternick & B. H. Curran
Malcolm Baldrige National Quality Improvement Act

- 1987 Federal law to advance business competitiveness and economic growth
- Created the Baldrige National Quality Program (BNQP)
- Administered by the National Institute of Standards and Technology (NIST)
- Directed at first to commercial organizations; categories for health care, education and non-profits added later
Baldrige Quality Awards

- Recognize outstanding organizational performance
- Board of Examiners evaluates and scores entries and provides detailed feedback to applicants
- Awards presented at an annual public ceremony by the President of the U.S.
Baldrige National Quality Program Award Entries

K.J. Goonan, J.A. Muzikowski, P.K. Stoltz, ASQ Press, 2009
Core Values of High Performing Health Care Organizations

- Visionary Leadership
- Managing for Innovation
- Management by Fact
- Focus on Results
- Focus on the Future
- Learning
- Agility
- Systems Perspective

Washington Crossing the Delaware
December 25, 1776
Core Values of High Performing Health Care Organizations

- Patient-Focused Excellence
- Valuing Staff & Partners
- Public Responsibility

Washington Visiting His Sick and Injured Troops
The Path to Performance Excellence

Stage 0
"Reaction"
Regulatory and external compliance only

Stage 1
"Projects"
Project mentality, characterized by various tactical improvement activities

Stage 2
"Traction"
Alignment of projects to strategy; Focus on leadership and management processes

Stage 3
"Integration"
Clear linkage of process management and improvement to operational results

Stage 4
"Sustain"
Continued improvement as methodologies are embedded into the organization’s culture

- OR Give up on the process when managed as a delegated project
- OR Decline, as the organization loses discipline and changes course

K.J. Goonan, J.A. Muzikowski, P.K. Stoltz, ASQ Press, 2009
The Pursuit of Performance Excellence

“Never doubt that a small group of thoughtful, committed citizens can change the world. Indeed, it is the only thing that ever has”

Margaret Mead (1901-1978)
Superman

Wonder Woman
Qualified Medical Physicists

“The American Association of Physicists in Medicine regards board certification in the appropriate medical subfield as the appropriate qualification for the designation of Qualified Medical Physicist.”
Achieving Performance Excellence

“Give Us the Tools and We Will Finish the Job”

Winston Churchill (1874-1965)
Baldrige National Quality Program

- Provides a broad array of self-assessment tools to measure and improve health care organizational performance
Medical Physics Criteria For Performance Excellence

- Focus on Results
- Non-prescriptive & Adaptive
- Integrate Key Health Care Themes
- Support a Systems Perspective
- Geared to Goal-Based Self-Assessment
Medical Physics Criteria Goals

- To improve organizational practices, capabilities and results
- To facilitate communication and sharing of best practices information
- To assist the understanding and measurement of performance
- To guide organizational planning
Medical Physics
Criteria Approaches

- Team-based self assessment for program evaluation and development
- Profile of strengths and Opportunities For Improvement (OFIs) generated
- Ordered examination of operations and trends and objective means of benchmarking performance against regulatory and professional society guidelines (e.g. NRC, ACR, ASTRO, AAPM, PQRI, JCAHO, etc.)
First Step: Organizational Profile

- Documents the work environment, important relationships and challenges
- Sets the stage for seven Category Assessment studies that follow

**Profile**

- Core Purpose
- Mission
- Vision
- Values

**Leadership Triad**

1. Leadership
2. Strategic Planning
3. Focus on Patients other Customers and Markets

**Results Triad**

4. Measurement, Analysis, and Knowledge Management
5. Workforce Focus
6. Process Management
7. Results
Radiotherapy Process Flow

1. Image acquisition (CT, PET, MRI)
2. Treatment Planning system
3. Plan verification
4. Record and Verify
5. Linear accelerator
   Patient treatment

Siochi et al.: Journal of Applied Clinical Medical Physics, Vol. 10, No. 4, Fall 2009
Organizational Profile: Core Purpose

What do we do?

The essential clinical responsibility of the Medical Physics Team is to assure the safe and effective delivery of radiation in support of patient care to achieve a prescribed therapeutic outcome. We develop, perform and/or supervise the appropriate procedures necessary to attain this goal.
Organizational Profile: Mission

What are we trying to accomplish?

We are committed to providing high quality physics and dosimetry services, innovative scientific advances and teaching programs that support the clinical, research and educational objectives of the Department of Radiation Oncology, the Hospital and the Medical School.
Organizational Profile: Vision

Where are we headed and how do we want to be viewed?

The exceptional quality and significance of the clinical, research and educational programs we offer will generate widespread acknowledgment among our professional peers and important stakeholders that we are a Center of Medical Physics Performance Excellence.
Organizational Profile:

Values

What is truly important to us?

- **Excellence** – We strive for excellence, delivering the best possible medical physics services in an environment that attracts and retains outstanding professionals
- **Customer Focus** – We work diligently to satisfy our customers including patients, physicians, therapists, nurses, administrators, clerical staff and other stakeholders
- **Innovation** – We are constantly looking for ways to improve the quality of our services by supporting innovation, embracing change and encouraging the development of new ideas and knowledge
Organizational Profile: Values (Continued)

What is truly important to us?

- **Teamwork** – We strive to create a supportive, enjoyable working atmosphere where our collective energy and intelligence enable us to succeed at our highest potential, both individually and as a team.
- **Compassion** – We earn trust through the courtesy, sensitivity and respect we demonstrate to our patients and co-workers.
- **Integrity** – We are truthful, equitable and open in all our relationships.
Organizational Profile: Relationships & Productivity

- Medical Physics organizational structure and reporting relationships
  - Are they appropriate to anticipate and meet the expectations and support of a wide-ranging constituency?

- Productivity measurement and revenue generation
  - Are clinical operations cost-effective?
Organizational Structure

- To whom does the Chief Medical Physicist report directly?
- Do the dosimetrists report directly to the medical physicists?
- Do the medical physicists have a formal role in the facility’s budget processes?
- What medical physics services are provided?
### Staffing

<table>
<thead>
<tr>
<th>Position</th>
<th># FTE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical Physicists</td>
<td></td>
</tr>
<tr>
<td>Dosimetrists</td>
<td></td>
</tr>
<tr>
<td>Physics Assistants</td>
<td></td>
</tr>
<tr>
<td>Medical Physics Residents</td>
<td></td>
</tr>
</tbody>
</table>
## Medical Physics Clinical Services

<table>
<thead>
<tr>
<th>Service</th>
<th>Annual Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Beam Therapy</td>
<td></td>
</tr>
<tr>
<td>Brachytherapy</td>
<td></td>
</tr>
<tr>
<td>Radiopharmaceutical Therapy</td>
<td></td>
</tr>
<tr>
<td>Intraoperative Radiotherapy</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
</tr>
</tbody>
</table>
# Other Medical Physics Services

<table>
<thead>
<tr>
<th>Service</th>
<th>% Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radiation Safety</td>
<td></td>
</tr>
<tr>
<td>Computer Support</td>
<td></td>
</tr>
<tr>
<td>Administration</td>
<td></td>
</tr>
<tr>
<td>Research</td>
<td></td>
</tr>
<tr>
<td>Teaching</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Description</td>
</tr>
<tr>
<td>-----------------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>Linear Accelerator(s)</td>
<td></td>
</tr>
<tr>
<td>Simulator(s)</td>
<td></td>
</tr>
<tr>
<td>Brachytherapy Equipment (LDR &amp; HDR)</td>
<td></td>
</tr>
<tr>
<td>Stereotactic Radiosurgery Equipment</td>
<td></td>
</tr>
<tr>
<td>Treatment Planning System(s)</td>
<td></td>
</tr>
<tr>
<td>Physics Instrumentation</td>
<td></td>
</tr>
</tbody>
</table>
Medical Physics Productivity

<table>
<thead>
<tr>
<th>Medical Physics CPT Codes</th>
<th>CPT Procedures Previous Period</th>
<th>CPT Procedures Current Period</th>
<th>Gross Revenue Previous Period</th>
<th>Gross Revenue Current Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>20+ Billing Code$</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>77295 etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Projected Annual CPT Procedures**
- **Projected Annual Gross Revenue**

For every 100 treated radiation oncology patients:
- Facility Total Gross Revenue ~ $4 million
- Medical Physics Gross Revenue ~ $1.5 million
Category 1: Leadership

- Describe how its Leaders guide and sustain the Medical Physics Team
Category 1: Leadership

- Evidence that Medical Physics leaders demonstrate:
  - Commitment – Dedication to promoting the Department’s Core Purpose, Mission, Vision and Values
  - Professional Conduct and Ethics – Emphasis on legal and ethical practices
  - Patient Safety – Creation and endorsement of a culture of patient safety
  - Communication and Engagement – Encouragement of an open communications approach with coworkers, patients and other stakeholders
  - Action Orientation – A focus on action and results to accomplish the Department’s objectives and attain its vision
Leadership

Nelson Mandela equated a great leader with a shepherd:

“He stays behind the flock, letting the most nimble go out ahead, whereupon the others follow, not realizing that all along they are being directed from behind.”

Nelson Mandela (1918 - )
Leading for Innovation

- Leaders must ensure their organizations are willing to innovate
- Leaders must build the organizational capabilities necessary for engaging in the innovation process

Willingness to Innovate

- Building community
  - “...creating a world to which people want to belong”
  - People are valued for who they are and have an opportunity to contribute to something larger than themselves
  - Have a common purpose and shared values

Organizational Capabilities

- Creative abrasion
  - Ability to generate ideas through discourse and debate

- Creative agility
  - Ability to test and refine ideas through quick pursuit

- Creative resolution
  - Ability to make decisions in an integrative manner

Category 2: Strategic Planning

- Valid and reliable definition of a set of decisions and actions that contribute to the creation and realization of plans for achieving defined objectives
  - SWOT (Strengths, Weaknesses, Opportunities, Threats) Analysis
  - Option Evaluation
  - Objectives Selection
  - Implementation
  - Evaluation
Category 2: Strategic Planning (cont.)

- **SWOT Analysis** – A synopsis of internal capabilities and the potential impact of external environmental factors
- **Option Evaluation** – Scrutiny of various alternative strategies that are consistent with available resources and the environment as determined by the SWOT Analysis
- **Objectives Selection** – Identification of the most desirable options that are consistent with the Department’s mission
- **Implementation** – Allocation of necessary personnel, equipment and financial resources and deployment of accompanying action plans to achieve defined strategic objectives
- **Evaluation** – Development and assessment of performance indicators that track progress to the defined strategic objectives
SWOT Analysis

- **SWOT** Analysis is a well-established management planning tool that has been employed advantageously by diverse industries, including health care, for many years. It is a useful system also for providing medical physicists with a structured, systematic approach to strategic planning.
SWOT Process

- **SWOT** Analysis can be regarded as a form of “brainstorming” that begins with the definition of a desired end state or outcome.

- During the discussion that follows, a comprehensive matrix is created that summarizes the **S**trengths, **W**eaknesses, **O**pportunities and **T**hreats impacting the Medical Physics Team.

- If the objective appears to be reasonably obtainable following the analysis, the **SWOT** reflections can be further harnessed to create a set of strategies that will move the implementation stage forward effectively by utilizing **S**trengths, confronting **W**eaknesses, taking advantage of **O**pportunities and minimizing **T**hreats.
SWOT Components

- **Strengths** - Organizational characteristics that contribute positively to achieving the defined objective.
- **Weaknesses** – Organizational characteristics that are detrimental to achieving the defined objective.
- **Opportunities** – External factors that will assist with achieving the defined objective.
- **Threats** – External factors that could hinder the achievement of the defined objective.
Environmental Factors

- **Strengths** and **Weaknesses** are viewed as being internal to the organization, while **Opportunities** and **Threats** often relate to external factors.
<table>
<thead>
<tr>
<th>SWOT Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strengths</strong> (Internal Environment)</td>
</tr>
<tr>
<td>- What do we excel at?</td>
</tr>
<tr>
<td>- What resources do we have?</td>
</tr>
<tr>
<td>- What do others view as our strengths?</td>
</tr>
<tr>
<td><strong>Weaknesses</strong> (Internal Environment)</td>
</tr>
<tr>
<td>- What resources are we lacking?</td>
</tr>
<tr>
<td>- What services require improvement?</td>
</tr>
<tr>
<td>- What do others view as our weaknesses?</td>
</tr>
<tr>
<td><strong>Opportunities</strong> (External Factors)</td>
</tr>
<tr>
<td>- What new technology is being considered?</td>
</tr>
<tr>
<td>- What institutional resources will be available?</td>
</tr>
<tr>
<td>- What are the Department’s broader strategic goals?</td>
</tr>
<tr>
<td><strong>Threats</strong> (External Factors)</td>
</tr>
<tr>
<td>- What institutional resistance might impede us?</td>
</tr>
<tr>
<td>- What competition for resources do we face?</td>
</tr>
<tr>
<td>- What will restrict our ability to recruit and retain required well-qualified staff?</td>
</tr>
</tbody>
</table>
Medical Physics Excellence Criteria Framework

A Systems Perspective

Organizational Profile: Environment, Relationships, and Challenges

1. Leadership
2. Strategic Planning
3. Focus on Patients, Other Customers, and Markets
4. Measurement, Analysis, and Knowledge Management
5. Workforce Focus
6. Process Management
7. Results

Leadership Triad
Results Triad

3 Focus on Patients Other Customers And Markets

1 Leadership
2 Strategic Planning
5 Workforce Focus
6 Process Management
7 Results
Category 3: Customer Focus

- Evaluation of “customer” relationship management (patients, families, physicians, medical physicists, dosimetrists, radiation therapists, nurses, administrators, clerical staff, other stakeholders)
  - Identification of customers and customer groups that directly and indirectly impact operations
  - Determination of differing requirements, needs and expectations of various customers
  - Mechanisms to ensure performance feedback from customers to enable process improvement
  - Efficacy of information exchange mechanisms to ensure key stakeholders are kept fully informed about operations and resource requirements
Medical Physics Excellence Criteria Framework
A Systems Perspective

Organizational Profile:
Environment, Relationships, and Challenges

Leadership Triad
1 Leadership
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Results Triad
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6 Process Management

Measurement, Analysis and Knowledge Management
4
Category 4: Measurement, Analysis, and Knowledge Management

- Documentation of policies and procedures that relate to the accuracy, integrity of and reliability of equipment performance and the confidentiality of patient-related data.
- Documentation of policies and procedures to ensure that computer hardware and software systems are reliable, secure and current with Department requirements.
Goal: To encourage organizational commitment by enabling the Medical Physics Staff to develop and utilize its full potential
Workforce Focus

- How the Medical Physics program engages, manages and develops staff to utilize its full potential in alignment with the mission, vision, strategy and action plans
- Ability to assess the Medical Physics workforce capability and needs, and build an environment leading to high performance
Key Factors

5 Workforce Focus

Staff Commitment

- Enrichment
- Development
- Assessment
- Capability
- Environment
Staff Commitment

- How do you determine key factors that effect staff satisfaction?
- How do you foster:
  - Cooperation and skill sharing?
  - Effective information flow?
  - Individual goal setting and empowerment?
  - Innovation?
Key Factor - Enrichment

Staff Commitment

- Enrichment
- Development
- Assessment
- Capability
- Environment
Enrichment

- How do you promote an organizational culture to accomplish:
  - Cooperation, effective communication and skill sharing?
  - Effective information flow with co-workers and administrators?
  - Individual goal setting, empowerment and initiative?
  - Innovation?
  - Ability to benefit from diverse cultures and thinking?
Enrichment (Cont.)

- How do you support and reward high performance work:
  - Compensation and other rewards, recognition and incentives?
  - A performance management system that focuses on achievement of individual and team-developed action plans?
Key Factor - Development

Staff Commitment

- Enrichment
- Development
- Assessment
- Capability
- Environment
How do you determine staff learning and development needs that address:

- Certification and credentialing requirements?
- Core competencies, strategic challenges and achievement of action plans both short and long term?
- Technological change and innovation?
- Transfer of knowledge from departing or retiring staff?
- Reinforcement of new knowledge or skills on the job?
How do you determine individual staff learning and development needs that address:

- Personal leadership and career progression opportunities by education, training, coaching, mentoring and work-related experience?
- Improved knowledge of broader departmental and institutional goals?
- Ethical professional practices?
Key Factor - Assessment

Staff Commitment

- Enrichment
- Development
- Assessment
- Capability
- Environment
Assessment

What are your formal and informal assessment methods and measures to determine staff satisfaction such as:

- Staff retention?
- Absenteeism?
- Grievances?
- Productivity?
Capability

How do you:

- Assess staff skills, competencies and staffing levels?
- Develop strategies to recruit, hire, place and retain new staff?
- Manage and organize to:
  - Capitalize on core competencies?
  - Exceed performance expectations?
  - Address strategic challenges?
  - Modify operations in response to changing service needs?
Key Factor - Environment

Staff Commitment

Enrichment Development Assessment Capability Environment
Environment

How do you:

- Assess and improve workplace facilities for productivity, comfort and safety?
- Plan for both space and support needs to address new strategic challenges?
- Ensure that space and support services are sufficient to accommodate staff at varying medical physics demand levels?
Category 6: Process Management

- Evaluation of the design and implementation of work systems that provide value to patients, colleagues, and other stakeholders
  - Quality Management Program
  - Key performance indicators
  - Work process system identification, design, implementation, management and improvement
  - Emergency workplace preparedness (e.g. radiological terrorism)
Medical Physics Excellence Criteria Framework

A Systems Perspective

Organizational Profile:
Environment, Relationships, and Challenges

1. Leadership
2. Strategic Planning
3. Focus on Patients, other Customers, and Markets
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7. Results

Leadership Triad

Results Triad
Category 7: Results

- Evaluation of outcomes
  - Patient-focused results
  - Other stakeholder-focused results
  - Financial and marketplace performance results
  - Workforce-focused performance results
  - Process effectiveness results
  - Leadership results
Scoring

Process

Methodology
- A - Approach
- D - Deployment
- L - Learning
- I - Integration

Results

Outputs & Outcomes
- L - Levels
- E
- T - Trends
- C - Comparisons
- I - Integration
Process Score

- **Approach**
  - Methods used, their appropriateness, effectiveness, repeatability and reliability

- **Deployment**
  - Extent to which approach is applied consistently for use for all work units

- **Learning**
  - Encouraging new breakthroughs and sharing refinements and innovations with other work groups

- **Integration**
  - Extent to which important requirements addressed, performance indicators included and results support organization-wide goals
### Process Scoring: Categories 1-6

<table>
<thead>
<tr>
<th>Score (%)</th>
<th>Process</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 5</td>
<td>Anecdotal</td>
<td>Reacting to Problems</td>
</tr>
<tr>
<td>10 - 25</td>
<td>Beginnings</td>
<td>General Improvement</td>
</tr>
<tr>
<td>30 - 45</td>
<td>Effective</td>
<td>Systematic Improvement</td>
</tr>
<tr>
<td>50 - 65</td>
<td>More Effective</td>
<td>Learning and Strategic Improvement</td>
</tr>
<tr>
<td>70 - 85</td>
<td>Highly Effective</td>
<td>Organizational Analysis and Innovation</td>
</tr>
<tr>
<td>90 - 100</td>
<td>Fully Effective</td>
<td></td>
</tr>
</tbody>
</table>
Results Score (Let’s See)

- Levels
  - Current level of performance
- Trends
  - Rate and breadth of improvement
- Comparisons
  - Performance relative to competitors, benchmarks or peers
- Integration
  - Extent to which important performance requirements are addressed and support organization-wide goals
# Results Scoring: Category 7

<table>
<thead>
<tr>
<th>Score (%)</th>
<th>Results</th>
</tr>
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<tbody>
<tr>
<td>0 - 5</td>
<td>Not Reported or Poor Results</td>
</tr>
<tr>
<td>10 - 25</td>
<td>Few Results Reported</td>
</tr>
<tr>
<td>30 - 45</td>
<td>Good Performance for Some Areas</td>
</tr>
<tr>
<td>50 - 65</td>
<td>Good Performance for Most Areas</td>
</tr>
<tr>
<td>70 - 85</td>
<td>Good to Excellent Performance for Most Areas</td>
</tr>
<tr>
<td>90 - 100</td>
<td>Excellent Performance for Most Areas</td>
</tr>
</tbody>
</table>
Total Possible Point Scores

1. Leadership (120 pts.)
2. Strategic Planning (85 pts.)
3. Customer Focus (85 pts.)
4. Measurement, Analysis and Knowledge Management (90 pts.)
5. Workforce Focus (85 pts.)
6. Process Management (85 pts.)
7. Results (450 pts.)
“In the long run, men hit only what they aim at. Therefore, they had better aim at something high.”

“What you get by achieving your goals is not as important as what you become by achieving your goals.”

Henry David Thoreau
1817 – 1862
Physics “Phood”
For Thought

“You’ve got protons, neutrons, and...
Wait—aren’t croutons those little bread cubes
found in salads?”

\[ x^2 = 10^2 \sqrt{y} \left( \frac{C^2 x w}{w} \right) \]

\[ (x_{m0}) \rightarrow \left( \begin{array}{c} U \end{array} \right) \]

\[ -y^2 = w \]

\[ S_m + s_{10} \]

\[ x_0 = 10^2 m s (\div v) \]

\[ x = \sqrt{10^4 v} \]

\[ x \approx 1000, 5x(\div 1000 v) \]

ESS BHC

THANK YOU