Value-Based Health Care Delivery: Implications for Neurosurgeons

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Challenges Facing Neurosurgery

• Anticipated U.S. shortage of neurosurgeons

• Scrutiny of spine surgery

• Justifying the cost of technological advancements

• High cost of care for many less common conditions
Solving the Health Care Problem

- The core issue in health care is **value for patients**

\[
\text{Value} = \frac{\text{Health outcomes that matter to patients}}{\text{Costs of delivering the outcomes}}
\]

- Delivering high and improving value is the **fundamental purpose** of health care
- Value is the only goal that can **unite the interests** of all system participants
- Improving value is the **only real solution** versus further cost shifting, restricting services, or dramatically reducing the compensation of health care professionals
Principles of Value-Based Health Care Delivery

Value = \frac{\text{Health outcomes that matter to patients}}{\text{Costs of delivering the outcomes}}

• Value is measured for the care of a patient’s medical condition over the complete cycle of care
  – Outcomes are the full set of health results for a patient’s complete over the care cycle
  – Costs are the total costs of care for a patient’s condition over the care cycle
Creating a Value-Based Health Care Delivery System

The Strategic Agenda

1. Organize care into Integrated Practice Units (IPUs) around patient medical conditions
   - For primary and preventive care, organize to serve distinct patient segments
2. Measure outcomes and costs for every patient
3. Move to bundled payments for care cycles
4. Integrate care delivery systems
5. Expand geographic reach and serve populations
6. Build an enabling information technology platform
1. Organize Care Around Patient Medical Conditions
Migraine Care in Germany

Existing Model:
Organize by Specialty and Discrete Service

1. Organize Care Around Patient Medical Conditions

Migraine Care in Germany

**Existing Model:**
Organize by Specialty and Discrete Service

**New Model:**
Organize into Integrated Practice Units (IPUs)

What is a Medical Condition?

**Specialty Care**
- A medical condition is an interrelated set of patient medical circumstances best addressed in an integrated way
  - Defined from the patient’s perspective
  - Involving multiple specialties and services
  - Including common co-occurring conditions and complications

*Examples:* diabetes, breast cancer, knee osteoarthritis

**Primary/Preventive Care**
- The corresponding unit of value creation is defined patient segments with similar preventive, diagnostic, and primary treatment needs (e.g. healthy adults, patients with complex chronic conditions, frail elderly)

- The medical condition / patient segment is the proper unit of value creation and value measurement in health care delivery

# The Care Delivery Value Chain
## Acute Knee-Osteoarthritis Requiring Replacement

<table>
<thead>
<tr>
<th>Care Delivery</th>
<th>Informing and Engaging</th>
<th>Measuring</th>
<th>Accessing</th>
<th>Monitoring/Preventing</th>
<th>Diagnosing</th>
<th>Preparing</th>
<th>Intervening</th>
<th>Recovering/Rehabbing</th>
<th>Monitoring/Managing</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Monitor</strong></td>
<td>• Conduct PCP exam</td>
<td>• Performed and evaluated MRI and x-ray</td>
<td>• Specialty office</td>
<td>• Specialty office</td>
<td>• Imaging facility</td>
<td>• Pre-op evaluation center</td>
<td>• Operating room</td>
<td>• Nursing facility</td>
<td>• Consult regularly with patient</td>
</tr>
<tr>
<td><strong>Prevent</strong></td>
<td>• Refer to specialists, if necessary</td>
<td>• Review history and imaging</td>
<td>• PCP office</td>
<td>• Specialist office</td>
<td>• Imaging facility</td>
<td>• Pre-op evaluation center</td>
<td>• Recovery room</td>
<td>• Rehab facility</td>
<td>• Prescribe prophylactic antibiotics when needed</td>
</tr>
<tr>
<td><strong>Prescribe anti-inflammatory medicines</strong></td>
<td>• Conduct home assessment</td>
<td>• Baseline health status</td>
<td>• Specialty office</td>
<td>• Operating room</td>
<td>• Operating room</td>
<td>• Orthopedic floor at hospital or specialty surgery center</td>
<td>• Complications</td>
<td>• Ability to return to normal activities</td>
<td>• SET long-term exercise plan</td>
</tr>
<tr>
<td><strong>Recommend exercise regimen</strong></td>
<td>• Monitor weight loss</td>
<td>• Blood loss</td>
<td>• Operating room</td>
<td>• Operating room</td>
<td>• Operating room</td>
<td>• PT clinic</td>
<td>• Inpatient length of stay</td>
<td>• Missed work</td>
<td>• Revision joint, if necessary</td>
</tr>
<tr>
<td><strong>Set weight loss targets</strong></td>
<td>• Overall health</td>
<td>• Joint-specific symptoms and function</td>
<td>• PCP office</td>
<td>• Specialty office</td>
<td>• Imaging facility</td>
<td>• Home</td>
<td>• Ability to return to normal activities</td>
<td>• Overall health</td>
<td></td>
</tr>
</tbody>
</table>

### INFORMING AND ENGAGING
- Importance of exercise, weight reduction, proper nutrition
- Prognosis (short-and long-term outcomes)
- Drawbacks and benefits of surgery
- Setting expectations
- Importance of nutrition, weight loss, vaccinations
- Home preparation
- Expectations for recovery
- Importance of rehab
- Post-surgery risk factors
- Importance of rehab adherence
- Longitudinal care plan
- Importance of exercise, maintaining healthy weight

### MEASURING
- Joint-specific symptoms and function (e.g., WOMAC scale)
- Overall health (e.g., SF-12 scale)
- Loss of cartilage
- Change in subchondral bone
- Joint-specific symptoms and function
- Overall health
- Baseline health status
- Fitness for surgery (e.g., ASA score)
- Blood loss
- Operative time
- Complications
- Infections
- Joint-specific symptoms and function
- Inpatient length of stay
- Ability to return to normal activities
- Joint-specific symptoms and function
- Weight gain or loss
- Missed work
- Overall health

### ACCESSING
- PCP office
- Health club
- Physical therapy clinic
- Specialty office
- Imaging facility
- Pre-op evaluation center
- Operating room
- Recovery room
- Orthopedic floor at hospital or specialty surgery center
- Nursing facility
- Rehab facility
- PT clinic
- Home
- Primary care office
- Health club

### MONITORING/PREVENTING
- Imaging
- Overall Prep
- Anesthesia
- Surgical Procedure
- Pain Management
- Physical Therapy
- Surgical
- Medical
- Living
- Physical therapy
- Monitor and managing

### DIAGNOSING
- Conduct home assessment
- Monitor weight loss
- Administer anesthesia (general, epidural, or regional)
- Determine approach (e.g., minimally invasive)
- Insert device
- Cement joint
- Prescribe preemptive multimodal pain meds
- Monitor coagulation
- Provide daily living support (showering, dressing)
- Track risk indicators (fever, swelling, other)
- Daily or twice daily PT sessions

### PREPARING
- Conduct physical exam
- Recommend physical exam
- Recommend treatment plan (surgery or other options)
- Run blood labs
- Conduct pre-op physical exam
- Monitor and managing

### INTERVENING
- Conduct pre-op evaluation
- Run blood labs
- Conduct pre-op physical exam
- Monitor and managing

### RECOVERING/REHABBING
- Monitor and managing
- Monitor and managing
- Monitor and managing
- Monitor and managing

### MONITORING/MANAGING
- Conduct PCP exam
- Refer to specialists, if necessary
- Prescribe anti-inflammatory medicines
- Recommend exercise regimen
- Set weight loss targets
- Conduct home assessment
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- Consult regularly with patient
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- Set long-term exercise plan
- Revision joint, if necessary
Integrating Across the Care Cycle
An Orthopedic Surgeon Teaches A Course to Physical Therapists
About Rehabilitation After Shoulder Surgery
Attributes of an Integrated Practice Unit (IPU)

1. Organized around a medical condition or set of closely related conditions (or around defined patient segments for primary care)
2. Care is delivered by a dedicated, multidisciplinary team who devote a significant portion of their time to the medical condition
3. Providers on the team see themselves as part of a common organizational unit
4. The team takes responsibility for the full cycle of care for the condition
   - Encompassing outpatient, inpatient, and rehabilitative care, as well as supporting services (such as nutrition, social work, and behavioral health)
5. Patient education, engagement, follow-up, and secondary prevention are integrated into care
6. The IPU has a single administrative and scheduling structure
7. Much of care is co-located in one or more dedicated sites
8. A physician team captain or a clinical care manager (or both) oversees each patient’s care process
9. The team measures outcomes, costs, and processes for each patient using a common measurement platform
10. The providers on the team meet formally and informally on a regular basis to discuss patients, processes, and results
11. Joint accountability is accepted for outcomes and costs
• Volume and experience will have an even greater impact on value in an IPU structure than in the current system
# The Role of Volume in Value Creation
## Fragmentation of Hospital Services in Sweden

<table>
<thead>
<tr>
<th>DRG</th>
<th>Number of admitting providers</th>
<th>Average percent of total national admissions</th>
<th>Average admissions/provider/ year</th>
<th>Average admissions/provider/ week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knee procedure</td>
<td>68</td>
<td>1.5%</td>
<td>55</td>
<td>1</td>
</tr>
<tr>
<td>Diabetes age &gt; 35</td>
<td>80</td>
<td>1.3%</td>
<td>96</td>
<td>2</td>
</tr>
<tr>
<td>Kidney failure</td>
<td>80</td>
<td>1.3%</td>
<td>97</td>
<td>2</td>
</tr>
<tr>
<td>Multiple sclerosis and cerebellar ataxia</td>
<td>78</td>
<td>1.3%</td>
<td>28</td>
<td>1</td>
</tr>
<tr>
<td>Inflammatory bowel disease</td>
<td>73</td>
<td>1.4%</td>
<td>66</td>
<td>1</td>
</tr>
<tr>
<td>Implantation of cardiac pacemaker</td>
<td>51</td>
<td>2.0%</td>
<td>124</td>
<td>2</td>
</tr>
<tr>
<td>Splenectomy age &gt; 17</td>
<td>37</td>
<td>2.6%</td>
<td>3</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Cleft lip &amp; palate repair</td>
<td>7</td>
<td>14.2%</td>
<td>83</td>
<td>2</td>
</tr>
<tr>
<td>Heart transplant</td>
<td>6</td>
<td>16.6%</td>
<td>12</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>

2. Measure Outcomes and Costs for Every Patient

The Measurement Landscape

- **Patient Initial Conditions**
- **Processes**
  - Protocols/Guidelines
- **Patient Experience/Engagement**
  - E.g. PSA, Gleason score, surgical margin
- **Indicators**
  - E.g. PSA, Gleason score, surgical margin
- **Structure**
  - E.g. Staff certification, facilities standards
- **(Health) Outcomes**
Principles of Outcome Measurement

1. Outcomes should be measured by **medical condition** or **primary care patient segment**
   - *Not* by specialty, procedure or intervention

2. Outcomes should reflect the **full cycle of care** for the condition

3. Outcomes are **always multi-dimensional** and should include the health results **most relevant to patients**

4. Measurement must include **initial conditions/risk factors** to assess improvement and allow for risk adjustment

5. Outcome measures should be **standardized** to enable comparison and learning
The Outcome Measures Hierarchy

Tier 1
Health Status Achieved or Retained
Survival

Tier 2
Process of Recovery
Time to recovery and return to normal activities
Degree of health/recovery

- Achieved clinical status
- Achieved functional status
- Care-related pain/discomfort
- Errors and Complications
- Reintervention/readmission

Tier 3
Sustainability of Health
Sustainability of health/recovery and nature of recurrences
- Long-term clinical status
- Long-term functional status

Sustainability of Health
Long-term consequences of therapy (e.g., care-induced illnesses)

Source: NEJM Dec 2010
Measuring Multiple Outcomes
Prostate Cancer Care in Germany

- 5 year disease specific survival

<table>
<thead>
<tr>
<th></th>
<th>Average hospital</th>
<th>Best hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>94%</td>
<td>95%</td>
<td></td>
</tr>
</tbody>
</table>

Source: ICHOM

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Measuring Multiple Outcomes
Prostate Cancer Care in Germany

- **5 year disease specific survival**
  - Average hospital: 94%
  - Best hospital: 95%

- **Severe erectile dysfunction after one year**
  - Average hospital: 75.5%
  - Best hospital: 17.4%

- **Incontinence after one year**
  - Average hospital: 43.3%
  - Best hospital: 9.2%

Source: ICHOM
ICHOM Strategic Agenda

• Define internationally recognized **Standard Sets of outcomes** and risk factors for the most burdensome medical conditions

• Drive adoption of Standard Sets by sharing **data collection best practices** and certifying supporting technologies

• Create **global communities** for each medical condition focused on outcome comparison, learning, and improvement

**Mission:**
To transform health care by empowering clinicians worldwide to measure and compare their patients’ outcomes and to learn from each other how to improve.
ICHOM Low Back Pain Standard Outcome Set

**Tier 1**

**Health Status**
Achieved or Retained

- **Survival**
  - Operative mortality
  - 30 Day Mortality

- **Degree of health/recovery**
  - Health-related quality of life
  - Back and leg pain

**Tier 2**

**Process of Recovery**

- **Time to recovery and return to normal activities**
  - Disability
  - Work status

- **Disutility of the care or treatment process**
  - Deep wound infection
  - Pulmonary embolus
  - Nerve Root Injury
  - Wrong site procedure
  - Dural tear

**Tier 3**

**Sustainability of Health**

- **Sustainability of health/recovery and nature of recurrences**
  - Rehospitalization
  - Reoperation

- **Long-term consequences of therapy (e.g., care-induced illnesses)**
  - Continuous analgesic use
Measuring the Cost of Care Delivery: Principles

• Cost is the actual expense of patient care, not the charge billed or collected

• Cost should be measured around the patient, not just the department or provider organization

• Cost should be aggregated over the full cycle of care for the patient’s medical condition

• Cost depends on the actual use of resources involved in a patient’s care process (personnel, facilities, supplies)

• “Overhead” costs should be associated with the patient facing resources which drive their usage

Mapping Resource Utilization
MD Anderson Cancer Center – New Patient Visit

**Registration and Verification**
- Receptionist, Patient Access Specialist, Interpreter

**Intake**
- Nurse, Receptionist
- Assess patient paperwork; place patient in room RN

**Clinician Visit**
- MD, mid-level provider, medical assistant, patient service coordinator, RN
  - Initiate patient workup; review patient history; conduct physical exam MLP
  - Discuss plan of care RN

**Plan of Care Discussion**
- RN/LVN, MD, mid-level provider, patient service coordinator
  - Review plan of care; introduce team; review schedule for return visit RN

**Plan of Care Scheduling**
- Patient Service Coordinator
  - Schedule tests and consults; communicate schedule to patient PSC

**Flowchart Details**
- Patient arrives
- Check in patient; communicate arrival RCPT
- Verify patient information; complete consent forms FAS
- Interpreters needed? RCPT
- Add language translation time for each process INT, RCPT
- Laryngoscopy needed? Y
- Perform laryngoscopy MD, MA, PSC
- N
- Y
- 90%
- Y
- 10
- 10
- 10
- Changes to Plan of Care?
- Y
- Notify patient of changes RN
- 5-10%
- 30
- 10
- N
- 90-95%
- N
- 10%
- Scheduled for same day? PSC
- Y
- Patient discharged
- 90%
- 10
- Enter next process

**Decision Point**
- Time (minutes)

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Major Cost Reduction Opportunities in Health Care

- Reduce **process variation** that lowers efficiency and raises inventory without improving outcomes
- Eliminate **low- or non-value added** services or tests
  - Sometimes driven by protocols or to justify billing
- Rationalize redundant **administrative** and **scheduling** units
- **Improve utilization** of expensive physicians, staff, clinical space, and facilities by reducing duplication and service fragmentation
- Minimize use of **physician and skilled staff** time for less skilled activities
- Move routine or uncomplicated services out of **highly-resourced** facilities
- **Reduce cycle times** across the care cycle
- Process steps that **optimize total care cycle cost** versus minimizing investments in the costs of individual services
- Increase **cost awareness** in clinical teams
- Many cost reduction opportunities will actually **improve outcomes**
3. Move to Bundled Payments for Care Cycles

Bundled Price
- A single price covering the **full care cycle for an acute medical condition**
- Time-based reimbursement for overall care of a **chronic condition**
- Time-based reimbursement for **primary/preventive care** for a **defined patient segment**
Bundled Payment in Practice
Hip and Knee Replacement in Stockholm, Sweden

- **Components** of OrthoChoice bundle

  - Pre-op evaluation
  - Lab tests
  - All Radiology
  - Surgery & related admissions
  - Prosthesis
  - Drugs
  - Inpatient rehab, up to 6 days
  - All physician and staff fees and costs
  - 1 follow-up visit within 3 months
  - Responsible for complications and any additional surgery to the joint within 2 years
  - If post-op deep infection requiring antibiotics occurs, guarantee extends to 5 years

- Initially applied to all **relatively healthy patients** (i.e. ASA scores of 1 or 2)
- The same **referral process** from PCPs is utilized as the traditional system
- **Mandatory reporting** by providers to the joint registry plus supplementary reporting
- Bundle applies to **all** qualifying patients. Provider participation is **voluntary**, but all providers opted in

- The Stockholm bundled price for a knee or hip replacement is about **US $8,000**
Elements of a Value-Based Bundle

- **Condition** based, not specialty, procedure or episode based

- **Risk** adjusted, or covering a **defined patient group** in terms of complexity - 80/20 rule

- Contingent on **outcomes**, including care guarantees

- Payment based on the **cost of efficient and effective care**, not past charges

- Specified **limits of responsibility** for unrelated care needs, and **stop loss** provisions to mitigate against outliers

- A level of **price stability**
Spine Surgery Bundle in Sweden

**BASE BUNDLE**

**Adjustments**
- Age
- Gender

**PERFORMANCE PAYMENT**
(10% of base)

**Criteria**
- Patient reported change in pain (VAS) one year after surgery
- 10 year average predicted change in pain as measured in *Swespine*, The National Swedish Spine Register
4. Integrate Care Delivery Systems
Children’s Hospital of Philadelphia Care Network

The Children’s Hospital of Philadelphia®

Network Hospitals:
- CHOP Newborn Care
- CHOP Pediatric Care
- CHOP Newborn & Pediatric Care

Wholly-Owned Outpatient Units:
- Pediatric & Adolescent Primary Care
- Pediatric & Adolescent Specialty Care Center
- Pediatric & Adolescent Specialty Care Center & Surgery Center
- Pediatric & Adolescent Specialty Care Center & Home Care
Four Levels of Provider System Integration

1. **Define the overall scope of services** where the provider organization can achieve high value

2. **Concentrate volume by condition** in fewer locations

3. Choose the **right location for each service** based on medical condition, acuity level, resource intensity, cost level and need for convenience

   E.g., shift routine surgeries out of tertiary hospitals to smaller, more specialized facilities

4. Integrate care **across appropriate locations** through IPUs
5. Expand Geographic Reach
MD Anderson Regional Cancer Care Centers

- St. Luke’s Woodlands Hospital
- CHRISTUS St. Catherine Hospital
-CHRISTUS St. John’s Hospital
-MD Anderson Main Campus
-St. Luke’s Sugar Land Hospital

St. Luke’s Woodlands Hospital
CHRISTUS St. Catherine Hospital
CHRISTUS St. John’s Hospital
MD Anderson Main Campus
St. Luke’s Sugar Land Hospital
6. Build an Enabling Integrated IT Platform

Utilize information technology to enable restructuring of care delivery and measuring results, rather than treating it as a solution itself.

- Combine all types of data (e.g. notes, images) for each patient
- Common data definitions
- Data encompasses the full care cycle, including care by referring entities
- Allow access and communication among all involved parties, including patients
- Templates for medical conditions to enhance the user interface
- “Structured” data vs. free text
- Architecture that allows easy extraction of outcome measures, process measures, and activity-based cost measures for each patient and medical condition
- Interoperability standards enabling communication among different provider (and payor) organizations
Eight Questions for Neurosurgeons in a Value Based System

1. What **medical conditions** are you involved in?

2. What is **your role(s)** in the cycle of care?

3. Are you part of an **IPU**? Who else should be on the team?

4. How can you better **integrate** yourself into the care cycle and team?

5. What are the **outcomes** that matter to patients for each condition (not just for the surgery)?

6. What is the **actual cost of the care cycle** for each condition, including equipment and technology? Can you justify the cost in terms of outcomes?

7. How can you focus your practice and **consolidate volume** in condition(s) where you participate?

8. How could you **affiliate** with other organizations or providers to expand your reach and volume in your areas of expertise?