Orthopedics: The Forecast for the Next Five Years

7th Annual Orthopedic, Spine and Pain Management – Driven ASC Conference

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Clinical Advisor, Sg2

Steve Miff, PhD
Vice President, Sg2

June 12, 2009
Chicago, IL
Agenda

Orthopedics and Spine Landscape
Appetite for Technology
“Pre-Crisis” Forecast
Economic Reality
Drivers of Change
Musculoskeletal Medicine Is a Key Component of Health Care

- More than 1 in 4 Americans has a condition requiring medical attention.

- Annual direct and indirect costs for bone and joint health in the U.S. are $850 billion.

- MSK medicine is the leading cause of disability in the U.S.

- MSK costs consume 7.7% of the national gross domestic product.

- The demand will escalate in the next 10-20 years largely driven by aging population and sedentary lifestyles.

- Accounts for more than half of all chronic conditions in people over 50 years of age in developing countries.

The burden of musculoskeletal disease is significant.
Spine Care Demand is in the Spotlight

- As much as 80% of the population will experience back pain at some point in their lifetimes.
- Back pain is the third most expensive health problem in the US.
- Back symptoms are the leading cause of job-related disability.
- Patients with back pain incur 65% higher health care costs than individuals without back pain.
- Concerns regarding over treatment grow.

Source: Sg2 Analysis, 2008.
Ortho and Neuro Have Traditionally Been Lucrative Specialties for Providers

Key Service Lines For Hospital Revenue

- Cardiology
- Radiology
- Orthopedic Surgery
- Neurosciences
- Oncology

This is technology driven and needs to be properly managed
Agenda

Orthopedics and Spine Landscape

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There Is No Shortage of Orthopedic Technology

- **398**—orthopedic 510(k) devices approved in 2007
- **6**—original orthopedic PMAs, 34 orthopedic supplements in 2007
- **477**—orthopedic 510(k) devices approved in 2005
- **13**—orthopedic PMA amendments approved in 2005
- **33**—orthopedic PMAs approved between 2000 and 2005

In scientific knowledge and advancement, we are exceeding by 4 times the rate of change of the last 25 years.

PMA = premarket approval.
Growth in Spine Device Industry Rivals Hips and Knees


Price Increases Present an Unsustainable Trend

Implant Costs* and Reimbursement per Case

*Fusion implant costs include metals, bone graft, autograft, interbody fusion devices and BMP. DRG = diagnosis-related groups.
Are Hospitals Profitable in Orthopedics?

Medicare Cases
Sg2U Participants, 2008

6/12 profitable

Non-Medicare Cases
Sg2U Participants, 2008

9/12 profitable

Source: Sg2 Analysis, 2008.
Consolidation Creates Strong Supplier Power

<table>
<thead>
<tr>
<th>Company</th>
<th>Hips</th>
<th>Knees</th>
<th>Spine</th>
<th>Trauma</th>
<th>Sales ($M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stryker</td>
<td>22.5%</td>
<td>20.6%</td>
<td>7.2%</td>
<td>15.7%</td>
<td>5,331</td>
</tr>
<tr>
<td>Zimmer</td>
<td>28.1%</td>
<td>29.5%</td>
<td>2.9%</td>
<td>5.0%</td>
<td>4,191</td>
</tr>
<tr>
<td>J&amp;J DePuy</td>
<td>22.2%</td>
<td>21.9%</td>
<td>13.3%</td>
<td>5.5%</td>
<td>3,727</td>
</tr>
<tr>
<td>Biomet</td>
<td>10.4%</td>
<td>12.0%</td>
<td>2.9%</td>
<td>5.4%</td>
<td>2,372</td>
</tr>
<tr>
<td>Smith &amp; Nephew</td>
<td>12.0%</td>
<td>13.0%</td>
<td>1.1%</td>
<td>10.1%</td>
<td>1,491</td>
</tr>
<tr>
<td>Wright Medical</td>
<td>3.0%</td>
<td>1.9%</td>
<td>–</td>
<td>–</td>
<td>399</td>
</tr>
<tr>
<td>Synthes</td>
<td>–</td>
<td>–</td>
<td>11.1%</td>
<td>45.8%</td>
<td>2,720</td>
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<tr>
<td>Medtronic</td>
<td>–</td>
<td>–</td>
<td>51.3%</td>
<td>–</td>
<td>3,636</td>
</tr>
<tr>
<td>NuVasive</td>
<td>–</td>
<td>–</td>
<td>2.9%</td>
<td>–</td>
<td>204</td>
</tr>
<tr>
<td>Other</td>
<td>1.8%</td>
<td>1.2%</td>
<td>7.3%</td>
<td>12.5%</td>
<td></td>
</tr>
<tr>
<td>US Market Size (M)</td>
<td>$4,885</td>
<td>$6,058</td>
<td>$7,082</td>
<td>$4,016</td>
<td></td>
</tr>
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</table>

# Technology Innovation Creates Challenging Economics

## Established Technology

<table>
<thead>
<tr>
<th>Implant Type</th>
<th>Cost</th>
<th>Device Cost Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyethylene-on-Metal Hip Implants</td>
<td>$4,624</td>
<td>54% higher</td>
</tr>
<tr>
<td>Metal-on-Metal Hip Implants</td>
<td>$6,031</td>
<td>76% higher</td>
</tr>
<tr>
<td>Cemented Total Knee Implants</td>
<td>$5,139</td>
<td>36% higher</td>
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</table>

## Emerging Technology

<table>
<thead>
<tr>
<th>Implant Type</th>
<th>Cost</th>
<th>Device Cost Increase</th>
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</thead>
<tbody>
<tr>
<td>Ceramic-on-Ceramic Hip Implants</td>
<td>$7,125</td>
<td>$4,624</td>
</tr>
<tr>
<td>Hip Resurfacing Implant</td>
<td>$10,625</td>
<td>$7,500</td>
</tr>
<tr>
<td>Bicompartmental Knee Implant</td>
<td>$7,000</td>
<td>$2,861</td>
</tr>
<tr>
<td>Computer-Assisted MIS Knee Arthroplasty</td>
<td>$150,000 to $250,000</td>
<td>$150,000 to $250,000</td>
</tr>
</tbody>
</table>

But Who Picks? Who Pays?

Physicians choose implants based on their preference.

Device manufacturers supply implants.

Facilities pay manufacturers.

Medicare/health plans pay hospitals.

Image printed with permission of Toshiba America Medical Systems.
ASC = ambulatory surgery center.
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Orthopedics and Spine Landscape
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“Pre-Crisis” Forecast
Economic Reality
Drivers of Change
Nationally, Orthopedic Growth Creates Potential Opportunities

Inpatient Orthopedics Distribution
US Market, 2008
Total Volume: 3.2 Million

Outpatient Orthopedic Procedures
US Market, 2008
Total Volume: 39.7 Million

IP = inpatient; OP = outpatient.
Sources: Impact of Change® v7.0; NIS; Sg2 Analysis, 2008.
Inpatient Orthopedic Procedures Will Experience Significant Growth

Inpatient Surgical Orthopedics Growth Forecast US Market, 2008–2018

Note: Numbers do not add up to 100% due to rounding.
Sources: Impact of Change® v7.0; Sg2 Analysis, 2008.
Joint Replacement and Spine Care Drive Inpatient Orthopedics Volumes

Inpatient Orthopedics Distribution
US Market, 2008
Total Volume: 3.2 Million

- Spine 27%
- Primary Joint 31%
- Fracture 17%
- Other* 29%
- Upper Extremity 3%
- Revision Joint 3%

Inpatient Orthopedics Growth Forecast, US Market, 2008–2018

- Total 26%
- Primary Joint 49%
- Revision Joint 58%
- Fracture 18%
- Spine 19%
- Other* 19%
- Upper Extremity 19%
- Other Knee 19%

*Note: Other includes Amputation, Arthroscopy, Foot, Fracture – Medical, Orthopedics – Other medical, Orthopedics- Other surgical, and Other Knee.
Sources: Impact of Change® v7.0; NHDS; Sg2 Analysis, 2008.
Outpatient Growth Varies by Orthopedic Subspecialty

Outpatient Orthopedic Procedures*
US Market, 2008
Total Volume: 39.7 Million

Outpatient Orthopedic Growth Forecast, US Market, 2008–2018

*Numbers do not add up to 100% due to rounding. †CSS = casting, strapping and splinting.
Sources: Impact of Change® v7.0; Pharmetrics; HCUP; CMS; CDC; Sg2 Analysis, 2008.
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Orthopedics and Spine Landscape
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Economic Reality
Drivers of Change
# The Myth: Health Care Is a Recession-Proof Industry

Conventional wisdom holds that health care is a “recession-proof” industry, somehow immune to economic cycles.

<table>
<thead>
<tr>
<th>Assumption</th>
<th>Reality</th>
</tr>
</thead>
<tbody>
<tr>
<td>People always get sick, in good economic times and bad.</td>
<td>- People can and do defer health care in difficult economic times.</td>
</tr>
<tr>
<td></td>
<td>- Primary, preventive and elective services are usually the first to be delayed or dropped.</td>
</tr>
<tr>
<td>People don’t pay for health care, so a downturn shouldn’t affect demand.</td>
<td>- Employers pay the majority of the bill, but increasingly employees do as well.</td>
</tr>
<tr>
<td></td>
<td>- Premiums, deductibles and co-payments have been rising for the past few years.</td>
</tr>
<tr>
<td>The government will always be there.</td>
<td>- State revenues and expenditures are affected by economic downturns, which in turn affects Medicaid spending.</td>
</tr>
<tr>
<td></td>
<td>- CMS will increasingly resort to cost controls to reduce Medicare spending.</td>
</tr>
</tbody>
</table>

CMS = Centers for Medicare & Medicaid Services.
Reality: The Economy Affects Providers Through Many Channels

Corporate Profits
- As profits fall, companies reduce their workforce and scale back health benefits.

Consumer Confidence
- Consumers hold back on primary and discretionary care, thus reducing utilization.

Industry Structure
- An increase in part-time and service occupations is often associated with reduced benefits.

Unemployment
- Job losses lead to increased Medicaid enrollment and the number of uninsured, increasing hospital bad debt.

Equity/Debt Markets
- Difficulties accessing capital constrain the ability of hospitals to finance new projects.

Tax Revenue
- Pressure will increase to cut Medicare and Medicaid spending on hospital services.
Recessions Pack a One-Two Punch on Health Care

Punch 1
- Cost of capital/access to capital
- Nonoperating (investment) income
- Discretionary service volumes

Punch 2
- Discretionary service volumes (cont’d)
- Bad debt
- Medicaid eligibility/payment rates
- Charitable giving

Health care is a lagging indicator of the economy.

2007 2008 2009
2010
Economic Pressures Slow Demand for Physician Visits

Reduction in Health Care Utilization, 2008

22% of Americans Cut Back on Physician Office Visits

National Consumer Surveys
- 29% report that a household member put off or postponed getting needed care.
- 24% skipped a recommended medical test or treatment—up from 17% in 2005.
- 23% did not fill a prescription.

Inpatient Volumes Began Falling Midyear 2008

Year-Over-Year Change in Inpatient Admissions—US Hospitals

Source: Citigroup, 2008.
ED Visits Up, Outpatient Surgeries Down

**Emergency Department Visits (% Change)**

- Q2 2007
- Q3 2007
- Q4 2007
- Q1 2008
- Q2 2008
- Q3 2008

**Outpatient Surgeries (% Change)**

- Q2 2007
- Q3 2007
- Q4 2007
- Q1 2008
- Q2 2008
- Q3 2008

ED = emergency department.

Source: Sg2 Interviews and Analysis of 15 Diverse Hospitals and Health Systems, 2009.
Elective Orthopedic Procedure Volumes Will Decline in 2009

Orthopedic Volumes—Change in Discharges, 2008–2009

- Revision TJR: -3%
- Primary TJR: -21%
- Other Surgical: -4%
- Medical (Other): -4%
- Medical (Fracture): 0%
- Hand/Upper Extremity: -18%
- Fracture (Other): -15%
- Fracture (Hip/Femur): -2%
- Foot: -17%
- Amputation: 0%
- Overall: -13%

TJR = total joint replacement.
Sources: Nationwide Inpatient Sample, 2008; Sg2 Economic Impact Calculator, 2008.
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   Providing Value – *The New Metric*
Where Is the System Going Next?

1983 to 2000
Reimbursement

2000 to 2008
Payment

2008 to 2016
Purchasing Based on Outcomes

Photo: comstock.com; ©iStockphoto.com/Kaye Veazey/Tom McNemar.
Competition on “Value” Will Increase: Focus on Quality and Cost

- All patients will ask 2 questions before traveling for care:
  - How much does it cost?
  - What is the quality of care?

Value = Quality/Cost

Source: Sg2 Analysis, 2008.
The Evolution of Medicare Pay for Performance: Value-Based Purchasing

Pay for Performance v2.0
Transforming CMS from a passive payer to an active purchaser of high-quality, efficient care

RHQDAPU = Reporting Hospital Quality Data for Annual Payment Update; HHS = US Department of Health and Human Services; VBP = value-based purchasing; FY = fiscal year.

Additional Measures
- Outcomes
- Patient safety
- Care coordination
- Emergency care
- Efficiency

Performance Areas Where Gaps Are Identified

<table>
<thead>
<tr>
<th>Year</th>
<th>Pay for Reporting</th>
<th>Value-Based Purchasing</th>
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<tbody>
<tr>
<td>2006</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
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<td></td>
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<tr>
<td>2011</td>
<td></td>
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<tr>
<td>2012 and Beyond</td>
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</table>

Source: Medicare Hospital Value-Based Purchasing Plan. Senate Finance Committee Roundtable, March 6, 2008.
2009: CMS Pays Less for Hospital-Acquired Conditions and Never Events

CMS will pay the lower DRG if the following conditions were not present on admission, or presence on admission cannot be determined based on documented clinical judgment.

### FY 2008 HACs
- Foreign object retained after surgery
- Air embolism
- Blood incompatibility
- Severe pressure ulcers
- Falls and trauma
- Catheter-associated UTI
- Vascular catheter-associated infection

### FY 2009 HAC Additions
- Manifestations of poor blood sugar control
- Surgical site infections
  - Spinal fusions (lumbar/cervical)
  - Shoulder and elbow fusions and repairs
- Deep vein thrombosis and pulmonary embolism
  - Total hip and total knee replacement

*Following CABG, certain orthopedic procedures and bariatric surgery for obesity.

DRG = diagnosis-related group; FY = fiscal year; UTI = urinary tract infection;

CABG = coronary artery bypass graft.
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    A Call For Transparency  – Balancing Quality, Value and Cost
Transparency Creates Opportunities and Challenges

Don’t wait for others to profile you: Take control of your data.
Outcomes and Costs Are Becoming More Transparent

Disc Surgery at Hospitals Within 40 Miles of Chicago, July 2006

<table>
<thead>
<tr>
<th>Institution</th>
<th>Overall Rank</th>
<th>Volumes/Year</th>
<th>Complications</th>
<th>ALOS</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>Neurologic &amp; Orthopedic</td>
<td>1st</td>
<td>9th</td>
<td>1st</td>
<td>2nd</td>
<td>10th</td>
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<tr>
<td>Loyola University</td>
<td>2nd</td>
<td>4th</td>
<td>2nd</td>
<td>6th</td>
<td>1st</td>
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<tr>
<td>Northwest Community</td>
<td>3rd</td>
<td>10th</td>
<td>3rd</td>
<td>8th</td>
<td>1st</td>
</tr>
<tr>
<td>Good Samaritan</td>
<td>4th</td>
<td>7th</td>
<td>4th</td>
<td>10th</td>
<td>6th</td>
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<tr>
<td>Evanston</td>
<td>5th</td>
<td>3rd</td>
<td>5th</td>
<td>8th</td>
<td>6th</td>
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<td>Northwestern Memorial</td>
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<tr>
<td>Elmhurst Memorial</td>
<td>7th</td>
<td>5th</td>
<td>7th</td>
<td>4th</td>
<td>5th</td>
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<tr>
<td>Hinsdale</td>
<td>8th</td>
<td>2nd</td>
<td>8th</td>
<td>1st</td>
<td>1st</td>
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<tr>
<td>Rush-Presbyterian-St. Lukes</td>
<td>9th</td>
<td>6th</td>
<td>9th</td>
<td>3rd</td>
<td>6th</td>
</tr>
<tr>
<td>Edwards</td>
<td>10th</td>
<td>8th</td>
<td>10th</td>
<td>5th</td>
<td>1st</td>
</tr>
</tbody>
</table>

Source: BlueCross BlueShield of Illinois, 2006.
## Price Information Is Becoming More Common

Spectrum Health, Michigan
Cost and Payment for Spine Procedures, 2008

<table>
<thead>
<tr>
<th>Spinal Fusion, Cervical</th>
<th>Cost and Payment</th>
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</thead>
<tbody>
<tr>
<td>Cost</td>
<td>$13,950</td>
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<tr>
<td>Medicare Avg Payment</td>
<td>$12,828.61</td>
</tr>
<tr>
<td>Medicaid Avg Payment</td>
<td>$8,082.03</td>
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<tr>
<td>Private Insurance Avg Payment</td>
<td>$11,464.27</td>
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<table>
<thead>
<tr>
<th>Spine MRI, Cervical w/ out Contrast</th>
<th>Cost and Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost: Spectrum Health IP</td>
<td>$1,130.59</td>
</tr>
<tr>
<td>Cost: OP Facility</td>
<td>$983.13</td>
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<tr>
<td>Medicare Avg Payment</td>
<td>$346.55</td>
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<tr>
<td>Medicaid Avg Payment</td>
<td>$209.21</td>
</tr>
<tr>
<td>Private Insurance Avg Payment</td>
<td>$792.28</td>
</tr>
</tbody>
</table>

What’s Included:
- Spectrum Health equipment fees, staff time and supplies

What’s NOT Included:
- Physicians’ fees, such as those for your surgeon, anesthesiologist, pathologist or radiologist

Avg = average; MRI = magnetic resonance imaging; IP = inpatient; OP = outpatient.
Sources: Spectrum Health, 2008; Sg2 Analysis, 2008.
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  Physician-Industry Relationships – *Under Fire*
Medical Device Industry’s Practices Are Under Attack

A “whistle-blower” reported that the Tennessee division of Medtronic had provided kickbacks to doctors, including payments and other services; US Department of Justice (DoJ) subpoenaed the company.

2003

5 major orthopedic device manufacturers were subpoenaed by the DoJ regarding consulting relationships with physicians; Medtronic is the only in-class member excluded.

2004

A voluntary new code of ethics was adapted by AdvaMed.

2005

Medtronic reformed its ethics code and claimed the reasoning was unrelated to the subpoena; it imposed strict sanctions, limiting meals, travel and lodging inducements, and prohibited resort locations.

3 major cardiac device manufacturers were subpoenaed by the DoJ regarding consulting relationships with physicians.

Sg2 Analysis, 2008.
The Beginning of New “Relationships”

In 2007, the New Jersey US Attorney’s investigation into improper consulting agreements with orthopedic surgeons settled with Deferred Prosecution Agreements for Biomet, DePuy, Smith & Nephew and Zimmer, and a Non-Prosecution Agreement for Stryker.

- Total of $311 million in penalties
- A new standard of conduct—5-year Corporate Integrity Agreement
- Federal oversight—18-month federal monitor appointed by DoJ

2006

Medtronic reaches $40 million settlement.

2007

2008

Neurosurgeon pleads guilty to anti-kickback claim and pays $1.5 million.

Sg2 Analysis, 2008.
The End Game is Transparency (and Less Money For Physicians)

The New Jersey US Attorney’s investigation expands to smaller device companies and physicians

- 2008
- 2009
- 2010

Comparative Effectiveness Funding

Physician Payment Sunshine Act Likely

Sg2 Analysis, 2008.
Traditional Alliances May Shift

Governmental Forces
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Provider Collaboration – *Alignment and Integration*
Physician Integration Is Reemerging

Degree of Integration


- Employment of radiologists, pathologists, anesthesiologists and emergency medicine specialists
- Integrated delivery systems acquire primary care provider practices.
- Many hospitals divest of primary care practices, refocus on core business.
- Growing interest in alignment and willingness to partner with physicians
- Employment of specialists will become more common.

Sg2 Analysis, 2008.
Hospital Ownership and Physician Employment Achieve Tight Alignment

**Degree of Alignment**

- **Independent**
  - Voluntary Medical Staff
  - Paying for Call
  - Relocation Support/Income Guarantee

- **Strategic Alliance**
  - Directorships
  - Access to Resources and Capital Investment
  - Gainsharing

- **Venture Arrangement**
  - Co-management
  - Under Arrangement

- **Employment**
  - Co-ownership
  - Physician-Owned Hospitals
  - Physician Employment or Foundation Model

**System Resources Required**

- **High**
- **Low**

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Bundled Payment Will Encourage Increased Provider Coordination

By 2020, CMS will encourage increased coordination among providers.

Payment bundled at $19,650

*2009 Medicare payment for MS-DRG 460.
What to Expect From the Government

- Health care will be on the 2009 agenda.
- Economic recession, credit crisis and war will remain top priorities for Congress.
- Policies likely to pass during the next term include:
  - SCHIP funding expansion
  - Physician payment fix
  - Legislation on physician-owned specialty hospitals
  - Comparative effectiveness funding
  - FDA and NIH funding increases
  - IT initiative
- Due to cost constraints, an incremental approach or phased-in approach to comprehensive reform is likely.

SCHIP = State Children's Health Insurance Program; FDA = US Food and Drug Administration; NIH = National Institutes of Health.
Device Manufacturers Are Impacted by the Recession

Stock Prices ($/Share)

Impacts

- Neuromusculoskeletal services are a large component of our health cares system.
- These service lines are technologically driven.
- The current economic landscape is constricting utilization for neuromusculoskeletal services.
- Transparency and the demand for value will reduce pricing power of ortho / neuro suppliers.
- Conflict of interest concerns regarding industry and physicians are being aggressively managed.
- The government is “encouraging” physician-hospital collaboration
- Most neuromusculoskeletal disorders are not reversible.

Many patients delaying treatment today will require treatment in the future.
Thank You

<table>
<thead>
<tr>
<th>John Cherf MD, MPH, MBA</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mobile</strong></td>
<td>312.339.4925</td>
</tr>
<tr>
<td><strong>Office</strong></td>
<td>773.250.1990 (direct)</td>
</tr>
<tr>
<td><strong>Clinic</strong></td>
<td>773.250.1000</td>
</tr>
<tr>
<td><strong>Email</strong></td>
<td><a href="mailto:jcherf@neuro-ortho.org">jcherf@neuro-ortho.org</a></td>
</tr>
<tr>
<td><strong>Web Site</strong></td>
<td><a href="http://www.JohnCherfMD.com">www.JohnCherfMD.com</a></td>
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<td><a href="http://www.Sg2.com">www.Sg2.com</a></td>
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