Perspectives on HCT Program Challenges in a Changing Reimbursement Environment

“The good, the bad, and the ugly”

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• February 27, 2014
THE GOOD
Provider Principles

- Primary goal is the direct delivery of care to patients.
- The patient is the center of our attention.
- All new technologies/therapies that improve outcomes should be available to our patients.
- Ability to deliver care is subject to multiple factors.
Cancer in the US, 1990-2008
Survival Rising, Mortality Decreasing

Data from the National Cancer Institute on estimated number of cancer survivors and age-adjusted cancer deaths per 100,000 people.
Biotechnology Medicines in Development—by Product Category

- Antisense: 23
- Cell Therapy: 64
- Gene Therapy: 50
- Growth Factors: 10
- Interferons: 20
- Monoclonal Antibodies (mAb): 300
- Recombinant Hormones/Proteins: 78
- RNA Interference: 13
- Vaccines: 298
- Other: 45
Biotechnology Medicines in Development—by Therapeutic Category

- Autoimmune Disorders: 69
- Blood Disorders: 32
- Cancer/Related Conditions: 352
- Cardiovascular Disease: 59
- Diabetes/Related Conditions: 24
- Digestive Disorders: 27
- Eye Conditions: 20
- Genetic Disorders: 19
- Growth Disorders: 5
- HIV Infection: 39
- Infectious Diseases: 188
- Musculoskeletal Disorders: 22
- Neurologic Disorders: 44
- Respiratory Disorders: 40
- Skin Disorders: 28
- Transplantation: 18
- Other Diseases: 36

Note: Some medicines are listed in more than one category.
Novel Therapeutic Interventions
Chimeric Antigen Receptor- T cells

CAR-T

2\textsuperscript{nd} generation CAR signaling

3\textsuperscript{rd} generation CAR signaling
RegenMed and Key Therapeutic Areas

RM treatments have the potential to dramatically shift the cost curve for conditions that are more prevalent in an aging population.

Major Areas of Need:

- **Cardiovascular Disease** ➔ Myocardial Infarction, Congestive Heart Failure, Vascular Disease / Critical Limb Ischemia
- **Hematopoietic Conditions** ➔ Oncology/GVHD, Inherited Genetic Deficiencies
- **Inflammatory & Immune Disease** ➔ Diabetes, IBD, RA, Lupus & others
- **Neurological Injury & Disease** ➔ Stroke, TBI, Parkinson’s, Multiple Sclerosis, Cerebral Palsy, Orphan Neurological Conditions, Spinal Cord Injury
- **Ocular Disease** ➔ Age-related Macular, Stargardt’s Macular Dystrophy, Retinitis Pigmentosum, Glaucoma, Corneal Transplants
- **Orthopedic Conditions** ➔ Trauma, Age-related Degeneration
- **Pulmonary Disease** ➔ COPD, ARDS
- **Renal Disease**
### RegenMed and Key Therapeutic Areas: Statistics

+ *The potential savings from regenerative medicine treatments for the United States in terms of reducing the direct costs associated with chronic diseases have been estimated at approximately $250 billion a year.*

<table>
<thead>
<tr>
<th>Condition</th>
<th>Afflicted (U.S.)</th>
<th>Direct Costs (U.S.)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cardiovascular Disease</strong></td>
<td>100 million</td>
<td>$316 billion</td>
</tr>
<tr>
<td><strong>Diabetes</strong></td>
<td>25 million</td>
<td>$175 billion</td>
</tr>
<tr>
<td><strong>Stroke</strong></td>
<td>795 thousand</td>
<td>$73 billion</td>
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<tr>
<td><strong>Alzheimer’s Disease</strong></td>
<td>35.6 million</td>
<td>$200 billion</td>
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<tr>
<td><strong>Age-related Macular Degeneration</strong></td>
<td>1.8 million</td>
<td>$255 billion</td>
</tr>
<tr>
<td><strong>Parkinson’s Disease</strong></td>
<td>1 million</td>
<td>$23 billion</td>
</tr>
<tr>
<td><strong>Spinal Cord Injury</strong></td>
<td>275 thousand</td>
<td>$40.5 billion</td>
</tr>
<tr>
<td><strong>Peripheral Arterial Disease (PAD)</strong></td>
<td>10 million</td>
<td>$4.4 billion</td>
</tr>
</tbody>
</table>

*Source: ARM Annual Report*
Now it gets scary.............
THE BAD

• What do others see?
• Macro vs micro views- Good vs Bad
  – All in the eyes of the beholder
Unsustainable Rising Costs

Projected spending on health care as a percentage of Gross Domestic Product

Source: Congressional Budget Office, 2008

Hughes & Associates, Ltd.
Total Pharmaceutical Spending Per Capita In Seven Countries, 2000 and 2010.

Costs of Cancer Care

U. S. National cancer care expenditures were an estimated $124.6 billion in 2010.

With 18.1 million Ca survivors in 2020, (projected 30% more than 2010) $157 billion in 2010 dollars
Figure LC01: Estimates of national expenditures for cancer care in 2010 (in billions of dollars) by cancer site

- Female Breast: 16.50
- Colorectal: 14.14
- Lymphoma: 12.14
- Lung: 12.12
- Prostate: 11.85
- Leukemia: 5.44
- Ovary: 5.12
- Brain: 4.47
- Bladder: 3.98
- Kidney: 3.80
- Head and Neck: 3.64
- Uterus: 2.62
- Melanoma: 2.36
- Pancreas: 2.27
- Stomach: 1.82
- Cervix: 1.55
- Esophagus: 1.33
- All Other Sites: 19.42

Expenditures (billion)

Cancer Prevalence and Cost of Care Projections: http://costprojections.cancer.gov/
Cost estimates expressed in 2010 dollars using CMS cost adjusters and adjusted for out-of-pocket expenditures, including co-payments and deductibles.
Estimates for the population younger than 65 were developed using ratios of cost in the younger than 65 and older 65 populations from studies conducted in managed care populations.
Figure LCO3: Estimates of the proportion of national expenditures for cancer care in 2010 by cancer site and phase of care

Cancer Prevalence and Cost of Care Projections: http://costprojections.cancer.gov/
Cost estimates expressed in 2010 dollars using CMS cost adjusters and adjusted for out-of-pocket expenditures, including co-payments and deductibles.
Estimates for the population younger than 65 were developed using ratios of cost in the younger than 65 and older 65 populations from studies conducted in managed care populations.
Evidence-Based Health System Design for Medicaid
State CCO Charge / Assumptions

• Transforming care will allow maintenance/ expansion of Medicaid program at no increased cost and decrease in trend

• Transformation means (at least):
  – Integration of physical and behavioral health, plus dental
  – Spread of “health homes” to all
  – Integration of medical with community services
  – Focus on those who use most resources
# Care Oregon OHP Data combined MCHD, Legacy, OHSU – Top 10 Specialties by Total Paid, 10/11-6/12

## All

<table>
<thead>
<tr>
<th>Provider Specialty</th>
<th>Mbrs</th>
<th>Visits</th>
<th>Total Paid</th>
<th>% of Total Paid</th>
<th>% Adult</th>
<th>% Child</th>
<th>Avg Visits Per Mbr</th>
<th>Avg Paid Per Mbr</th>
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</thead>
<tbody>
<tr>
<td>EMERGENCY MEDICINE</td>
<td>13,497</td>
<td>25,582</td>
<td>$2,563,173</td>
<td>16.8%</td>
<td>73.3%</td>
<td>26.7%</td>
<td>1.9</td>
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<tr>
<td>OBSTETRICS AND GYNECOLOGY</td>
<td>2,786</td>
<td>8,377</td>
<td>$1,856,052</td>
<td>12.2%</td>
<td>95.3%</td>
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<td>$666</td>
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<tr>
<td>DIAGNOSTIC RADIOLOGY</td>
<td>14,365</td>
<td>32,857</td>
<td>$1,277,649</td>
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<td>86.0%</td>
<td>14.0%</td>
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<td>ANESTHESIOLOGY</td>
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<td>$1,173,434</td>
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<td>72.0%</td>
<td>28.1%</td>
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<tr>
<td>ONCOLOGY</td>
<td>205</td>
<td>779</td>
<td>$696,979</td>
<td>4.6%</td>
<td>100.0%</td>
<td>0.0%</td>
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<td>HEMATOLOGY AND ONCOLOGY</td>
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<td>1,244</td>
<td>$482,060</td>
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<td>5.1</td>
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<td>GENERAL SURGERY</td>
<td>1,094</td>
<td>2,716</td>
<td>$480,676</td>
<td>3.2%</td>
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<td>2,301</td>
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<td>GASTROENTEROLOGY</td>
<td>1,563</td>
<td>3,059</td>
<td>$377,070</td>
<td>2.5%</td>
<td>98.6%</td>
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## Adults 19+

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<th>Provider Specialty</th>
<th>Mbrs</th>
<th>Visits</th>
<th>Adult Total Paid</th>
<th>% of Adult Paid</th>
<th>Avg Visits Per Mbr</th>
<th>Avg Paid Per Mbr</th>
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<tr>
<td>EMERGENCY MEDICINE</td>
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<td>OBSTETRICS AND GYNECOLOGY</td>
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<td>ANESTHESIOLOGY</td>
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<td>3,908</td>
<td>$844,318</td>
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<td>774</td>
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<td>GENERAL SURGERY</td>
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<td>2,520</td>
<td>$416,454</td>
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<td>GASTROENTEROLOGY</td>
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<td>$371,852</td>
<td>3.1%</td>
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<td>CARDIOLOGY</td>
<td>2,744</td>
<td>6,590</td>
<td>$338,582</td>
<td>2.8%</td>
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<tr>
<td>OPHTHALMOLOGY</td>
<td>1,768</td>
<td>3,249</td>
<td>$324,298</td>
<td>2.7%</td>
<td>1.8</td>
<td>$183</td>
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The Story of Tx
NMDP Tx Needs Analysis for USA

• By applying the optimal transplant rate to the U.S. population, the need for allogeneic (related and unrelated) transplant is **18,000 per year**.

• Related – 5,500 per year

• Unrelated – 12,500 per year
  • 2011 = ~5,000 per year
  • 2005 = ~2,500 per year
Growth in Cost & Volume

- **2005-11**: 108% increase in **billed charges** (allo)*
  - 7,300 total transplants
- **2003-2007** – BMT has highest percentage growth in costs (84.9%) & total hospital days (51.3%) of any hospital procedure (AHRQ HCUP)
- **2011**: Estimated 20,000 Transplants per year in U.S.
  - ~$8-10 Billion spent on BMT (charges)

*Data courtesy of Milliman Cost of Transplant Reports, 2005-2011
BMT: Future Costs

- **Near Future**: Increased volume, increased cost
  - More patients becoming eligible: age, co-morbidities, cord blood and haplo (half-matched)
  - More expensive regimens – preparative, GHVD prophylaxis, medications
  - New technology – cell expansion

- **Long-term**: Complications will decrease as treatment options and patient mgmt improves

- **New indications**: Regenerative and cellular therapy opportunities
THE UGLY

How much should we do?
How do we choose what we do?
Do we get paid enough for what we do?
Shift in Payor Mix:
High-Margin Contracts to Govt. Payors
Governmental Payers: Centers for Medicaid and Medicare Services
Medicare Coverage - Facilities

Inpatient Prospective Payment System
  • Diagnosis-Related Codes: **Incident of care**
  • Average resources used to treat Medicare patients
  • Hospital based professional coders
    – 9 diagnostic codes; 5 treatment codes

Outpatient Prospective Payment System
  • Ambulatory Payment Classifications
    – **Daily charges**
  • YOU HAVE TO KNOW- reimbursement differs between in and outpt
Medicaid

• Tx not a mandatory covered service for adults
  – State discretion; OR with no tx services 1997-2004
  – All states provided some level of tx coverage in 2012

• However, many patients rely on Medicaid for access
  – *Medicaid paid for 3,064 transplants (16% of total) in the US in 2010*
  – Covers as many as 61% of the HCT inpatient stays in Hawaii, with as few as 6% in Massachusetts
Medicare Inpatient Payment Rates:
Improvement, but still far from paying costs.

<table>
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<tr>
<th>MS-DRG</th>
<th>MS-DRG Title</th>
<th>FY 2013 Relative Weights</th>
<th>FY 2013 National Pmt Rate</th>
<th>FY 2012 Relative Weights</th>
<th>FY 2012 National Pmt Rate</th>
<th>FY 2011 Relative Weights</th>
<th>FY 2011 National Pmt Rate</th>
<th>FY 2010 Relative Weights</th>
<th>FY 2010 National Pmt Rate</th>
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<tbody>
<tr>
<td>009</td>
<td>BONE MARROW TRANSPLANT</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>6.5419</td>
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<td>014</td>
<td>ALLOGENEIC BONE MARROW TRANSPLANT</td>
<td>10.5255</td>
<td>$60,777</td>
<td>10.2792</td>
<td>$57,884</td>
<td>11.5947</td>
<td>$64,746</td>
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<td>015</td>
<td>AUTOLOGOUS BONE MARROW TRANSPLANT</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>5.9504</td>
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<tr>
<td>017</td>
<td>AUTOLOGOUS BONE MARROW TRANSPLANT W/O CC/MCC</td>
<td>4.5817</td>
<td>$26,456</td>
<td>4.3224</td>
<td>$24,340</td>
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No discrimination of cord blood as unique allogeneic stem cell product
2013 Medicare Payment Rates

- Allogeneic Base HCT Payments
  - Inpatient - $60,777
  - Outpatient - $2,878 (APC 112)
- New 2 midnight rule → impact on RIC tx procedures
  - Observation status offers outpatient reimbursement
    - Patient has financial risk
    - Typing, search/procurement costs might not be reimbursed
      - Average S&P costs reported by the TCs: $48,000
      - Double UCB tx S & P may approach $100K
- Average cost estimates for allo transplant episodes range from $137,000 (Majhail 2009); long term costs are amplified but have coverage under Cx of Tx codes.
Hypothetical situations

Allo HSCT for recurrent hi risk CLL

• Chemotherapy options are available
• “New kid on block”: Ibrutinib at ~$11K / month in cost
• 3 yrs = $396K minimum with persistent risk of eventual relapse
• Reimbursed by Medicare; outpt drug administration; anticipate mandatory need for Medicare part D as well as supplemental plan

Alternatives:
• Allo tx without GVHD
  – T cell depletion strategies
  -CAR-T- single application with sustained persistence of remission (NEJM, 2013)
CAR-T cell applications

1st generation CAR (MOv19-z)

2nd generation CAR (MOv19-BBz)

In vivo tumor killing

T cell persistence in vivo

Peripheral blood CD3+ T cell counts (cells/ml)
Clinical trial overview

Gene transfer 8-11 days

4. Infuse transduced T cells to eradicate CD19 tumor

Native TCR 19z1 CAR

Lymphodepleting chemotherapy

Autologous Blood Collection  
Infusion of T Cells

Antibody-Coated Beads  
Cells  
Activation Expansion  
Bead Removal and Formulation  
Product

Gene transfer

8-11 days
Will Medicare cover costs?

<table>
<thead>
<tr>
<th>CPT/HCPCS</th>
<th>Description</th>
<th>2011 Final APC</th>
<th>2010 Final Payment Rate</th>
<th>2011 Final Payment Rate</th>
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<tr>
<td>38210</td>
<td>T-cell depletion of harvest</td>
<td>0393</td>
<td>$390.10</td>
<td>$418.39</td>
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</table>
Cost of Goods & Manufacturing

- Recipient apheresis 3-5K
- Transport of product 0.5K
- T cell expansion/ viral transduction 30-50K?
- Cryopreservation
- Testing 5K
- Shipping – liquid Nitrogen 0.5-1K
- Treatment site: thawing, QC, admin 2-3K

- Totals: 40-60K? More?
CAR-T

• Personalized medicine: autologous products
• Each patient is source of their own “drug”
• Can their be developed a universal allogeneic donor, CAR-T targeting CD19 expressing cells?
  – Would decrease COGsM
  – Theoretical risks to pt; might need further molecular modifications to eliminate in vivo
    • “Suicide gene technologies”
    • Adds safety; adds cost
Reimbursement strategies

• Evaluation of costs of intervention over lifetime expenditures
  – Gene therapy and autologous CD34 selection strategies with subsequent transplant for nonmalignant diseases (thalassemia; sickle cell)

• Incident of care reimbursement
  – Case rate/ bundled payments
  – Discourages pay now/ save later strategies
“Bone marrow or stem cell transplants

- Billing and payments: We will review Medicare payments made to hospitals for bone marrow or stem cell transplants to determine whether Medicare payments were paid in accordance with federal rules and regulations. Context – bone marrow or PBSC transplant is a process that includes mobilization, harvesting, and transplant of bone marrow, or PBSC and the administration of high-dose chemotherapy or radiotherapy prior to the actual HCT. When bone marrow or PBSCT is covered, all necessary steps are included in coverage. Transplantations are covered under Medicare, only for specific diagnoses. Procedure codes must be accompanied with a diagnosis codes that meet specified coverage criteria. Prior OIG reviews have identified hospitals that have incorrectly billed for bone marrow or stem cell transplants.”

• “payments for immune suppressive drug claims with KX modifiers “
• “payments for outpatient drugs and administration of the drugs- context: prior OIG reviews have identified certain drugs, particularly chemotherapy drugs, as vulnerable to incorrect coding.”
So how do “we” pay for care?
Clear or Stormy?