Quality in Healthcare:
Do you get what you pay

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Critical Care Canada, November 15, 2011
“Flat-of-the-Curve” Theory
In Each Period Spending (Quantity of Care) is Pushed Well Beyond the Point Where Spending is Productive

Kaestner R: 2010
Dartmouth’s View of the World: Unexplained Variation

Figure 1: Hypothetical Spending and Outcome Measures by Hospitals

A hollow dot represents a hospital that invests most heavily in cost effective treatments.

Fisher and Skinner, HSR 2010, Commentary on Silber, Kaestner et al, HSR 2010
Differing Views of the World

Figure 1: Hypothetical Spending and Outcome Measures by Hospitals

Fisher and Skinner, HSR 2010, adapted by Silber
Reasons for the “flat of the

• The world may be flat: Dartmouth is Right
• The world is not flat, but only appears flat:
  – Reverse Causality: Sicker patients cost more and have worse outcomes
  – Inadequate severity adjustment
“Dartmouth Aggressiveness”

- We use the term to refer to those aggressiveness measures as defined by the Dartmouth Atlas.
- The Dartmouth Aggressiveness measures are based on end-of-life care, but are not intended to be just a measure of end of life (EOL) expenditure. Instead, the measure “Dartmouth Aggressiveness” uses EOL expenditure to describe the
The Cost Conundrum

What a Texas town can teach us about health care.

by Atul Gawande

JUNE 1, 2009

It is spring in McAllen, Texas. The morning sun is warm. The streets are lined with palm trees and pickup trucks. McAllen is in Hidalgo County, which has the lowest household income in the country, but it’s a border town, and a thriving foreign-trade zone has kept the unemployment rate below ten per cent. McAllen calls itself the Square Dance Capital of the World. “Lonesome Dove” was set around here.

McAllen has another distinction.
“In a 2003 study, another Dartmouth team, led by the internist Elliott Fisher, examined the treatment received by a million elderly Americans diagnosed with colon or rectal cancer, a hip fracture, or a heart attack. They found that patients in higher-spending regions received sixty per cent more care than elsewhere. They got more frequent tests and procedures, more visits with specialists, and more frequent admission to hospitals. Yet they did no better than other patients, whether this was measured in terms of survival, their ability to function, or satisfaction with the care they received. If anything, they seemed to do worse.

That’s because nothing in medicine is without risks. Complications can arise from hospital stays, medications, procedures, and tests, and when these things are of marginal value the harm can be greater than the benefits.”
Too much treatment?
Aggressive medical care can lead to more pain with no gain

For many consumers, good health care means seeing as many specialists as possible. It may also mean undergoing rounds of tests and, if a serious illness is diagnosed, prolonged hospital stays and extensive treatment.

Though the idea that more health care is better seems to make sense, recent research has shown that none of the above necessarily helps you live better or longer. In fact, too much medical care might shorten your life.

Those findings grew out of the 2008 Dartmouth Atlas of Health Care study and almost three decades of
Implications

• If Dartmouth Aggressiveness increases complication and mortality rates, then aggressiveness is undesirable and VERY wasteful (as it is more expensive to be aggressive).

• Hence, there is a potential PAINLESS solution to our society’s health care cost crisis. Stop being aggressive. Save lives and money.
WE ASK

• Is increased Dartmouth Aggressiveness associated with more complications?
• Is increased Dartmouth Aggressiveness associated with worse outcomes of death and failure-to-rescue?
• How expensive are the benefits (if any) of aggressiveness?
Aggressiveness and Surgical

• Population: All Medicare patients in the US (between 2000–2005) undergoing
  – General Surgery (N=1,673,917)
  – Orthopedic Surgery (N=2,507,312)
  – Vascular Surgery (N=376,986)
Define Aggressiveness

• The hospital specific Dartmouth Atlas inpatient spending figure—an aggregate measure of aggressiveness.
• The measure is hospital specific—this is not the observed hospital spending on an individual patient at an individual hospital.
• We will also report on Dartmouth total
The Dartmouth Atlas of Health Care 2008 constructed measures of a hospital’s intensity of resource use during the last two years of life for all decedents with nine chronic illnesses:

- Malignant Cancer/Leukemia
- Congestive Heart Failure
- Chronic Pulmonary Disease
- Dementia
- Diabetes with End Organ Damage
- Peripheral Vascular Disease
- Chronic Renal Failure
- Severe Chronic Liver Disease
- Coronary Artery Disease

The EOL measures were calculated for the period 2001 to 2005.
The Model

• We utilized adjustment models that were similar to those we previously published (see Volpp 2007a,b JAMA, Silber et al. Medical Care 2007, Archives of Surgery 2009).

• The combined model included 30 covariates, 34 interaction terms and 183 procedures. Individual models for general surgery, orthopedic surgery and vascular surgery were also constructed.
Outcome Measures

• Complications: one of 42 events that reflect events occurring after hospitalization and surgery
• Death (30 days from admission)
• Failure-to-Rescue (the probability of death given a complication)
Results
COMPLICATIONS
## Dartmouth Aggressiveness (in $10,000 units) and its Association with Complications in Combined Surgery

<table>
<thead>
<tr>
<th>Patient Characteristics</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>P-Value</th>
<th>Number of Patients</th>
<th>Rate</th>
<th>C-Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.01</td>
<td>(1.00-1.02)</td>
<td>p=0.058</td>
<td>4,469,047</td>
<td>43.52%</td>
<td>0.785</td>
</tr>
<tr>
<td>Pt and Hosp Characteristics</td>
<td>1.01</td>
<td>(1.00-1.03)</td>
<td>p=0.051</td>
<td>4,465,736</td>
<td>43.52%</td>
<td>0.785</td>
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<tr>
<td>Pt, Hosp Char &amp; Region</td>
<td>1.01</td>
<td>(1.00-1.03)</td>
<td>p=0.091</td>
<td>4,465,736</td>
<td>43.52%</td>
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<td>Pt, Hosp Char &amp; Hospital (RE Model)</td>
<td>1.01</td>
<td>(1.00-1.03)</td>
<td>p=0.066</td>
<td>4,465,736</td>
<td>43.52%</td>
<td>0.794</td>
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</tbody>
</table>

Hospital Adjustments include RB ratio, NTB ratio, N-Mix ratio, Technology and Size. Regions are the ten Medicare Regions. RE Model refers to Random Effects model using SAS GLIMMIX.

Silber et al. HSR 2010
30-DAY MORTALITY
Dartmouth Aggressiveness (in $10,000 units) and its Association with Mortality in Combined Surgery

<table>
<thead>
<tr>
<th></th>
<th>Odds Ratio</th>
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<th>Number of Patients</th>
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<td>4.27%</td>
<td>0.865</td>
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<td>Pt and Hosp Characteristics</td>
<td>0.94</td>
<td>(0.92-0.95)</td>
<td>p&lt;0.0001</td>
<td>4,465,736</td>
<td>4.27%</td>
<td>0.865</td>
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<tr>
<td>Pt, Hosp Char &amp; Region</td>
<td>0.93</td>
<td>(0.91-0.95)</td>
<td>p&lt;0.0001</td>
<td>4,465,736</td>
<td>4.26%</td>
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<td>Pt, Hosp Char &amp; Hospital (RE Model)</td>
<td>0.94</td>
<td>(0.93-0.95)</td>
<td>p&lt;0.0001</td>
<td>4,465,736</td>
<td>4.27%</td>
<td>0.866</td>
</tr>
</tbody>
</table>

Hospital Adjustments include RB ratio, NTB ratio, N-Mix ratio, Technology and Size Regions are the ten Medicare Regions. RE Model refers to Random Effects model using SAS GLIMMIX.

Silber et al. HSR 2010
FAILURE-TO-RESCUE
Dartmouth Aggressiveness (in $10,000 units) and its Association with Failure-to-Rescue in Combined

<table>
<thead>
<tr>
<th></th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>P-Value</th>
<th>Number of Patients</th>
<th>Rate</th>
<th>C-Statistic</th>
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<tr>
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<td></td>
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<tr>
<td>Patient Characteristics</td>
<td>0.92</td>
<td>(0.90-0.94)</td>
<td>&lt;0.0001</td>
<td>1,945,101</td>
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<td>0.789</td>
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<td>Pt and Hosp Characteristics</td>
<td>0.93</td>
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<td>1,943,638</td>
<td>9.80%</td>
<td>0.790</td>
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<td>Pt, Hosp Char &amp; Region</td>
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<td>(0.90-0.94)</td>
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<td>1,943,638</td>
<td>9.80%</td>
<td>0.789</td>
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<tr>
<td>Pt, Hosp Char &amp; Hospital (RE Model)</td>
<td>0.93</td>
<td>(0.92-0.94)</td>
<td>&lt;0.0001</td>
<td>1,943,638</td>
<td>9.80%</td>
<td>0.795</td>
</tr>
</tbody>
</table>

Hospital Adjustments include RB ratio, NTB ratio, N-Mix ratio, Technology and Size Regions are the ten Medicare Regions. RE Model refers to Random Effects model using SAS GLIMMIX.

Silber et al. HSR 2010
Are the Benefits Durable?
Stability of Benefits

• What good is saving lives with more aggressiveness if patients die more rapidly after discharge in more aggressive versus less aggressive hospitals?
• Let us ask directly: Is there a difference in mortality CONDITIONAL on surviving 30 days between the more and less aggressive hospitals?
• If no difference, then benefits of
Table 4: Testing for Durable Effects from Aggressiveness

<table>
<thead>
<tr>
<th>Outcome Measure</th>
<th>Model Adjustments</th>
<th>Full Model</th>
<th>365-Day Mortality Conditional on Surviving 30, 60, and 90 Days$\dagger$</th>
<th>365-Day Mortality Conditional on Surviving 30, 60, and 90 Days$\dagger$</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Odds Ratio</td>
<td>95% CI</td>
<td>p-Value</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>30-day mortality</td>
<td>P$^*$</td>
<td>0.934</td>
<td>(0.919, 0.949)</td>
<td>&lt;.0001</td>
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<tr>
<td></td>
<td>P, H, R$^\dagger$</td>
<td>0.937</td>
<td>(0.919, 0.955)</td>
<td>&lt;.0001</td>
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<tr>
<td>60-day mortality</td>
<td>P</td>
<td>0.958</td>
<td>(0.947, 0.969)</td>
<td>&lt;.0001</td>
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<tr>
<td></td>
<td>P, H, R</td>
<td>0.959</td>
<td>(0.947, 0.972)</td>
<td>&lt;.0001</td>
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<tr>
<td>90-day mortality</td>
<td>P</td>
<td>0.969</td>
<td>(0.959, 0.979)</td>
<td>&lt;.0001</td>
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<tr>
<td></td>
<td>P, H, R</td>
<td>0.971</td>
<td>(0.960, 0.981)</td>
<td>&lt;.0001</td>
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<tr>
<td>365-day mortality</td>
<td>P</td>
<td>0.987</td>
<td>(0.979, 0.995)</td>
<td>.0011</td>
</tr>
<tr>
<td></td>
<td>P, H, R</td>
<td>0.990</td>
<td>(0.980, 0.999)</td>
<td>.0312</td>
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</tbody>
</table>

Notes: Presented below are the logistic regression adjusted odds ratios of 30, 60, 90, and 365-day mortality associated with a U.S.$10,000 increase in aggressive treatment style showing a significant reduction in the odds of dying for all models. To test whether the decline in the odds ratio associated with aggressiveness was durable, we also asked whether 365-day mortality was a function of aggressiveness conditional on surviving 30, 60, or 90 days from the index admission (see right-hand side of table). The results show no association between aggressive treatment style and 365-day mortality conditional on patient survival beyond 30 days. The early benefit of going to a more aggressive hospital appears to be durable.

*P denotes model with patient characteristics identical to model in Table 1.

$P, H, R$ denotes model with patients and hospital characteristics and region identical to Table 1.

The 365-day mortality conditional on surviving 30 days is computed by fitting a 365-day mortality model without including those patients who die before 30 days. 365-day mortality conditional on 60- and 90-day survival was calculated in a parallel manner.
Implications Regarding

• Unlike suggestions by the Dartmouth group, Atul Gawandi and Consumer Reports, aggressiveness:
  – Has no association with surgical complications
  – Is associated with decreased 30–day mortality after surgery
  – Is associated with decreased failure to rescue
Differing Views of the World

Figure 1: Hypothetical Spending and Outcome Measures by Hospitals

Fisher and Skinner, HSR 2010, adapted by Silber
CONCLUSIONS

• From a Policy Perspective: It makes a world of difference to suggest that aggressiveness buys no improvement in health or is detrimental versus the alternative statement: on average, aggressiveness is beneficial.

• While reducing or eliminating care that is wasteful is always a good thing, we should not delude ourselves into believing that substantial cuts in medical expenditures will not have deleterious effects on quality.
THE END