New Math: Taking on Overdiagnosis Waste and Harm

Stewards of Precious Resources

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These presenters have nothing to disclose
Goal

• This session will discuss the “new math” needed to reduce overdiagnosis, overtreatment, harm, and the billions of dollars spent on wasted resources. We will focus on absolute risk reduction, the numbers needed to treat (NNT) patients without harm, patient-oriented endpoints that matter, publication bias, and advocacy.
  – Participants will leverage key learnings from MemorialCare and their own experience to formulate a strategic initiative that advances this issue in support of the Triple Aim and responsible stewardship for our future.
Session Objectives

1. Understand the **difference between absolute and relative risk reduction** and the **numbers needed to treat or harm**, as well as the relationship between **NNT** and value versus waste.

2. Describe the **impact of publication bias** on evidence-based medicine evaluations.

3. Identify **clinical decision support tools** to alert practitioners to overdiagnosis and overtreatment and **develop a strategic focus** and tools to reduce resulting harm and waste.
What/Where is MemorialCare?
Southern California

**Total Assets**
- Annual Revenues: $2.2 billion
- Bond Rating: AA- stable
- Total Assets: $3.1 billion

**Hospitals**
- Patient Discharges: 67,000
- Patient Days: 265,000
- ER Visits: 213,000
- Births: 13,500
- Surgeries – IP/OP: 34,000

**Ambulatory Access**
- “At Risk” Lives/ACOs: 250,000
- Seaside Health Plan: 33,500
- Medical Group Visits: 600,000
- Ambulatory Surgeries: 44,000

**Workforce**
- Employees: 11,300
- Affiliated Physicians: 2,900 (80% in solo or small group)
- Employed Physicians: 230 (Medical Group/Foundation)
- Residents: 165 (Year 1-7)
Strategic Focus & Evolution

1996
Physician Society: 1,861 physician members commit to Evidence Based Medicine

2003
Electronic Medical Record: Epic selected

2005
Bold Goals for Quality and Safety: 76,214 patients’ lives touched through mortality and harm reduction; preventative care

2006
Epic Electronic Medical Record: >95% physician order entry and over 300 evidence based order sets embedded in EMR

2007
Gallup Employee Engagement: Four time Gallup Great Work Place international award winner

2008
LEAN Management system: 1,600 steps eliminated; $85.6M expense reduced

2009
Patient Portal: MyChart 84,000; Next MD 151,000

2010
The Good Life - In Balance Chronic Condition Management: 87% employee retention in chronic condition management program for 3 years. Participant HbA1c reduced 1.3 and BP reduced 36/18

2011
MemorialCare Medical Foundation: 350 Primary Care Physicians from South Bay to San Clemente, 2,100 contracted specialists, 183,750 members

2012
Seaside Health Plan: Plan to Plan model for Medical and small employers, 25,450 members

2012
Crimson Clinical Advantage: $73M of over-utilization eliminated, 0.4 days saved from LOS, 21,500 bed days avoided and clinical outcomes improved

2013
Ambulatory Surgery Center & Ambulatory Imaging divisions created: Surgeries and imaging studies performed in free standing centers at 60% lower cost

2014
Anthem Blue Cross ACO: 24,000 lives

2014
Vivity: Joint venture between 7 leading health systems and Anthem Blue Cross

2014
Bar Coded Medication Administration: System wide rollout, 97% immediate adoption

2014
Commitment to Direct to Employer Strategy

2015
Over Diagnosis and Choosing Wisely: 104 “do not do” alerts activated in Epic
Memorial Care’s safety
Bold Goals

• Reduce **mortality**
  → **Severe sepsis** mortality by >70%

• Achieve “**perfect care**”
  → **Core Measure** sets – all diagnoses/bundles to > 95%
  → **Medication Reconciliation** metrics: all 3 - 90%

• Reduce **harm to Zero Zone**
  → **Hospital acquired infections** (HAI)
    • Achieve 100% **hand hygiene** compliance
  → **Hospital acquired pressure ulcers** (HAPU)
  → **Patient falls** with injury
  → **Harm Across the Board** by > 80%

• Promote **Population Health**
  → **NTSV C-Section** rate to < 15%
  → **Medical Foundation** goals to top 10th percentile
    • Screening - breast and colorectal; diabetes care HbA1c < 8, generic prescribing rate, childhood immunizations (combo 10)
“HAB”
Harm Across the Board

*Hospital Engagement Network* definition includes Warfarin with INR > 6, Early Elective Delivery, Fall with Injury, Pressure Ulcer 2+, ICU Catheter Associated UTIs and Central Line Blood Stream Infections, Surgical Site Infections, Ventilator Pneumonias, and Pediatric Harm
Physicians as Partners
The power of the Physician Society

**Responsibilities**
- Professional association. Board level.
- Committed to development and utilization of evidence-based/best practice medicine
  - Lead development of best practice
  - Implement best practice guidelines at the bedside / visit-side
  - Leadership of physician informatics and outcomes

**20 Years of Innovation**
- Over 300 Best Practice guidelines
- Best Practice Teams, multidisciplinary

<table>
<thead>
<tr>
<th>Ambulatory</th>
<th>Neonatal</th>
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<tbody>
<tr>
<td>Antibiotic Stewardship</td>
<td>Orthopedics</td>
</tr>
<tr>
<td>Blood Use</td>
<td>Palliative Care</td>
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<tr>
<td>Cardiac</td>
<td>Pediatrics</td>
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<td>Colorectal</td>
<td>Pulmonary/Critical Care</td>
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<td>Diabetes</td>
<td>Stroke</td>
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<td>Emergency Medicine</td>
<td>Women’s Health</td>
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<td>Imaging</td>
<td>Wound Care</td>
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</table>
Physician Society
CY2016 Strategic Plan

**A. Support evolution of new payment models**

**B. Readiness for Physician Value-Based Payment**

**A. Develop new communication models for internal campaigns, education and initiatives**

**A. Lead focus on Overdiagnosis 
Overtreatment 2.0**

**B. Build awareness of red pill, blue pill transparency**

**C. Achieve Medication Reconciliation 90%**

**A. Integrate onboarding process for membership**

**B. Sponsor refinements to CVO services**

**C. Foster Crimson Clinical Advantage – use case expansion, add Bold Goals, beta-test dashboards**

**A. Foster engagement of “younger” physicians in new and existing areas of leadership**

**B. Support expansion of clinical Integration**

**C. Activate EMR Optimization**

**A. Support evolution of new payment models**

**B. Readiness for Physician Value-Based Payment**

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**Mission**
To improve the health and well being of individuals, families and our communities.

**Vision**
Exceptional People. Extraordinary Care. Every Time.

**Values**
MemorialCare IABCs
I - Integrity
A - Accountability
B - Best Practices
C - Compassion
S - Synergy
Berwick and Hackbarth estimate annual cost of overtreatment to U.S. healthcare system is between $148 and $226 billion – but this doesn’t include Overdiagnosis

“…the waste that comes from subjecting patients to care that, according to sound science and the patients’ own preferences, cannot possibly help them—Care rooted in outmoded habits, supply-driven behaviors, and ignoring science.”
First, a Patient Story
Our message today

- Best Practice is what we stand for
- Much of medicine is good for patients
- Some of medicine leads to overdiagnosis
- New math needed to figure out the difference
- Awareness is the key imperative
What is “Overdiagnosis”? 

- **Overdiagnosis:**
  - The diagnosis of a condition or abnormality which will, if left alone, never cause symptoms, complications, or shortened life.

- **Overtreatment**
  - By definition, treatment cannot possibly help patients who are overdiagnosed.
  - The only potential outcomes of treatment are either no effect or adverse effects, and increased cost to the patient and healthcare system.

**Conditions that are frequently overdiagnosed or overtreated:**
- Hypertension
- Hypercholesterolemia (elevated cholesterol)
- Prediabetes
- Prostate cancer
- Thyroid cancer
- ...and many more
How to Overdiagnose

1. Change the rules

<table>
<thead>
<tr>
<th>Condition/Threshold</th>
<th>Old Definition</th>
<th>New Definition</th>
<th>New Cases</th>
<th>Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes – Fasting glucose 140 → 126</td>
<td>11,697,000</td>
<td>13,378,000</td>
<td>1,681,000</td>
<td>14%</td>
</tr>
<tr>
<td>Hypertension SBP 160 → 140 DBP 100 → 90</td>
<td>38,690,000</td>
<td>52,180,000</td>
<td>13,490,000</td>
<td>33%</td>
</tr>
<tr>
<td>Hyperlipidemia Cholesterol 240 → 200</td>
<td>49,480,000</td>
<td>92,127,000</td>
<td>42,647,000</td>
<td>86%</td>
</tr>
<tr>
<td>Osteoporosis in Women T Score 2.5 → 2.0</td>
<td>8,010,000</td>
<td>14,791,000</td>
<td>6,781,000</td>
<td>85%</td>
</tr>
<tr>
<td>Prediabetes</td>
<td>0</td>
<td>52,000,000</td>
<td>52,000,000</td>
<td>∞</td>
</tr>
</tbody>
</table>

2. Improve technologies to see more
3. Look harder
4. Stumble onto incidental findings
Example: Hypertension

- Traditional level for diagnosis: BP > 140/90
- Who benefits most from treatment?

<table>
<thead>
<tr>
<th>Diastolic BP Level</th>
<th>NNT to prevent a complication* over 5 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Severe: DBP 115-129</td>
<td>1.4</td>
</tr>
<tr>
<td>Moderate: DBP 105-114</td>
<td>4</td>
</tr>
<tr>
<td>Mild: DBP 90-104</td>
<td>11</td>
</tr>
<tr>
<td>Very Mild: DBP 90-100</td>
<td>18</td>
</tr>
<tr>
<td>BP 140/90-159/99</td>
<td>100**</td>
</tr>
</tbody>
</table>

- Death, stroke, MI, heart failure, kidney failure, hospitalization
- ** Stroke, MI, heart failure, cardiovascular death
Example: Prostate Cancer

• Traditional diagnosis:
  - Elevated PSA or abnormal digital rectal exam → Biopsy (a really fun procedure) → Diagnosis

• Traditional treatment:
  - Radical prostatectomy (robotic, if you’re lucky), vs. radiation therapy → high risk of incontinence and long-term erectile dysfunction

• Ways to diagnose more prostate cancer:
  - Take more biopsies (6 vs. 12 vs. 24)
  - Redefine the level at which PSA is abnormal
How Much Does Diagnosing Prostate Cancer Matter?

New Diagnoses and Deaths from Prostate Cancer in the United States: 1975–2005

From “Overdiagnosed”, H. Gilbert Welch, MD, with permission
How Much Does Diagnosing Prostate Cancer Matter?

New Diagnoses and Deaths from Prostate Cancer in the United States: 1975–2005

From “Overdiagnosed”, H. Gilbert Welch, MD, with permission
Prostate Cancer Early Detection

by PSA testing and palpation of the prostate gland

Numbers are for men aged 50 years and older, not participating vs. participating in early detection for 11 years

1000 men without early detection:

- Men who died from prostate cancer: 7
- Men who died from any cause: 210
- Men who experienced a biopsy and a false alarm: –
- Men who were diagnosed and treated for prostate cancer unnecessarily: –
- Remaining men: 790

1000 men with early detection:

- Men who died from prostate cancer: 7
- Men who died from any cause: 210
- Men who experienced a biopsy and a false alarm: 160
- Men who were diagnosed and treated for prostate cancer unnecessarily: 20
- Remaining men: 610

Source: Ilic et al. (2013) Cochrane Database of Systematic Reviews, Art. No.:CD004720.
Prostate Cancer Screening

Benefit and Major Harms of PSA screening 1000 men

- **Benefit:** 0-1 avoid CaP Death
- **Harm Tx:** 1 in 3000 die
- **Harm Tx:** 3 have serious harms: blood clot, MI
- **Harm Tx:** 35 develop ED or UI
- **Harm Biopsy:** 36 have Pain, Bleeding, Infection
  2 hospitalized, rare death
Why NNTMatters

• We’re talking not just about NNT to benefit (NNTB), but also NNT to harm (NNTH – unwanted effects of treatment)
  – We are becoming responsible for providing for the health of an entire population, with finite resources
  – The wise stewardship of those resources requires using them in the most effective manner
  – And not causing undue harm
How Medical Literature Overinflates Benefits

From the Pre-Work:

• **RRR**: Relative Risk Reduction – the relative reduction in adverse outcome with a given treatment

• Odds Ratio (OR) and Risk Ratio (RR): fractional relationship of an exposure to an outcome

• **ARR**: The absolute reduction in likelihood of the adverse outcome

• **NNT**: How many patients you have to treat to achieve the desired outcome, or to avoid the undesired outcome/harm (NNTB, NNTH)

• **POEMs**: Patient-Oriented Endpoints that Matter

<table>
<thead>
<tr>
<th>Assume: Mortality in Control Group</th>
<th>Mortality in Treatment Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>4%</td>
<td>1%</td>
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</table>

RRR = \( \frac{4\%-1\%}{4\%} \) = 75%

OR: \( 0.2424 \)

RR: \( 0.25 \)

ARR = \( 4\% - 1\% \) = 3%

NNT = \( \frac{1}{ARR} \) = 33.3

Will diagnosis/treatment help me avoid suffering or death?
The CAPiTA Trial

What ACIP approved:

- PCV-13 should be given to all adults ≥ 65 years of age
- If patient is PPSV-23-naïve, they should be given PCV-13 first, followed one year later by PPSV-23
- If they have had PPSV-23, PCV-13 should be administered no sooner than 6-12 months after PPSV-23

Based on CAPiTA Trial

- Basis for FDA approval for adults ≥ 65 y.o.
- Study done in The Netherlands
- 84,492 patients randomized to PCV-13 or no PCV-13, then followed for development of vaccine-type CAP (VT-CAP) or VT-IPD

**IMPORTANT:** Prior pneumococcal vaccination was an exclusion criterion, so no patients had both PPSV-23 and PCV-13
Example, for VT-CAP:

- Mean follow-up 3.97 years
- Cases of VT-CAP:
  - Active treatment (vaccinated) 49/42240 (0.12%)
  - Placebo 90/42256 (0.21%)
- Relative Risk Reduction (reported) 45.56%
- Absolute Risk Reduction 0.097%
- NNTB was 1,030 – never reported in article

Cases of Death:

- Active treatment (vaccinated) 2999/42237 (7.1%)
- Placebo 3000/42255 (7.1%)

- No difference between groups
  - Mortality was exactly the same
  - despite control group having no pneumococcal vaccination
  - Benefits are strictly theoretical based on enhanced immune response with PCV-13 for pneumococcal strains shared with PPSV-23
High Cholesterol: What is “High”?

- No clear threshold level at which elevated LDL cholesterol is associated with increased risk of heart disease
  - Impact of lowering total cholesterol upper normal from 240 to 200 was to label 42,647,000 new “patients” with hyperlipidemia
  - HOPE-3 Trial: Treatment of mildly elevated LDL cholesterol (average 128) with Crestor (rosuva statin) 10 mg
GLOBAL RESEARCH SEES STATIN BENEFITS IN LOWER RISK PATIENTS

Statin-only patients were about 25 percent less likely to have fatal or nonfatal heart-related problems than those given dummy pills. Those in the combined drug group fared slightly better and the researchers credit the statin for the benefit.
More facts:
- 53/1000 died despite Crestor
- 11 had strokes despite Crestor
- 45 had heart attacks despite Crestor

For Every 1000 Treated

987 No Benefit
13 Benefit
= 1.3% Helped

(x) = HOPE-3 data

Eric Topol @EricTopol Apr 3
A hard look at statins for primary prevention: 2 most recent & summary of all trials... can't we do better than this?
## Answers to Pre-Work

**The IMPROVE-IT Trial**


<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
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<tbody>
<tr>
<td>What is the <strong>ARR</strong> for the primary endpoint?</td>
<td></td>
</tr>
<tr>
<td>Do the <strong>Abstract's Conclusions</strong> over-generalize the results?</td>
<td></td>
</tr>
<tr>
<td>Assuming a monthly cost of $290 for simvastatin+ezetimibe vs. $8 for simvastatin, what is the <strong>cost per primary endpoint avoided</strong>?</td>
<td></td>
</tr>
<tr>
<td>What is the <strong>impact</strong> of generalizing the results of this trial on the cost per avoided event?</td>
<td></td>
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</table>
# How most studies are presented vs POEMs

**POEMs: Patient-Oriented Endpoints that Matter**

<table>
<thead>
<tr>
<th>Surrogate Measure</th>
<th>Measures that Matter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood pressure lowering →</td>
<td>Heart attack, Heart Failure, Stroke, Kidney Failure, Death</td>
</tr>
<tr>
<td>LDL Cholesterol Lowering →</td>
<td>Heart attack, Stroke, Death</td>
</tr>
<tr>
<td>Blood Sugar or HbA1c →</td>
<td>Heart Attack, Kidney Failure, Vision loss, Limb loss, Death</td>
</tr>
</tbody>
</table>
How most studies are presented

• Pulling the wool over our eyes
  – Relative Risk Reduction
  – Odds Ratio
  – Risk Ratio
  – Relative Risk Ratio

• What truly matters: NNTB, NNTH, POEMs, and $/POEM

• Key to achieving the Triple Aim

• The ethics of NNTB/NNTH
Root of the Problem

• We can’t tell in advance which patients will benefit
• So we default to treating many to benefit a few
• Overdiagnosis/Overtreatment increases as we lower the treatment threshold
• Overdiagnosis/Overtreatment diminishes as precision in diagnosis and prognostication improve
The Promise of Precision Medicine
The Promise of Precision Medicine

Consider...

- What are the incentives to become more precise in our diagnosis and treatment?
- Is it those who profit from diagnostic technologies and from treatments?
  - Pharmaceutical manufacturers?
  - Device and testing manufacturers?
  - Providers in a Fee-for-Service system?
- No... so what can we do?
- Can we look to Evidence-Based Medicine to help?
But Wait! There’s More…

• We seek to treat patients on the basis of Evidence-Based, Best Practice Medicine

• But…
  – Our Evidence-Based Medicine isn’t pure and untarnished
Publication Bias: What is Likely to Get Published?

• 2010 Study of 5 different subject areas:
  - Industry sponsored trials – 85% positive
  - Government-funded trials – 50% positive

• 2007 study of statin studies
  - Industry-sponsored trials 20x more likely to be in favor of the test drug

• Two 2003 systematic reviews of publication bias
  - Industry-sponsored trials 4x more likely to produce positive results
Publication Bias

• “Negative data goes missing, for all treatments, in all areas of science
  – The regulators and professional bodies we would reasonably expect to stamp out such practices have failed us.”

• Publication bias – in which negative results “go missing” – is endemic throughout the whole of medicine
  – Researchers are free to bury negative results with impunity
  – Exposes patients to untold harm
  – Wastes many billions of dollars
Do Systematic Reviews Help?

• What happens to these results when trials with negative results go unpublished?
  - The literature becomes distorted, and we are systematically misled
  - Ineffective, less effective or possibly downright dangerous treatments appear more effective than they are - Tamiflu
  - We can never really know how much information is being hidden from us
Where does the bias arise?

- **Study sponsors – Industry**
- **Researchers themselves – often don’t believe negative trials will be published, not worth the effort to submit for publication**
- **Huge financial inducements to editors for publishing positive industry papers**
Strategic Pyramid

- Market Differentiation & Growth
  - “The reward”
- Quality & Value
- Financial Resilience
  - “The results of our hard and focused work”
- Physicians As Partners
- Governance & Leadership
- People & Culture
  - “The absolute foundation of our success”
How to inform yourself:
www.theNNT.com

Blood Pressure Medicines for Five Years to Prevent Death, Heart Attacks, and Strokes
125 for prevented death

In Summary, for those who took anti-hypertensives:

**Benefits in NNT**
- 1 in 125 were helped (prevented death)
- 1 in 67 were helped (prevented stroke)
- 1 in 100 were helped (prevented heart attack*)

**Harms in NNH**
- 1 in 10 were harmed (medication side effects, stopping the drug)

*Fatal and non-fatal myocardial infarction and sudden or rapid cardiac death

**Source:**
- Snow V, et al. The evidence base for tight blood pressure control in the management of type 2
What would happen if health systems and academic institutions banded together with one voice to demand a change in publication standards for peer-reviewed medical journals?

- **Establish Key Requirements**: Every abstract and every results section of studies of treatment must include ARR, NNTB, and NNTH
  
  - How much better would that position providers and patients to understand the realistic potential benefits and harms of treatment being chosen?
What would happen if we developed a tool to facilitate understanding of NNTH/NNTB for our patients

• And included a discussion of those #s with every proposed treatment?

What about P4P measures?
• Currently no allowance for patients opting out of treatment on the basis of shared decision-making
• OverDx/OverTx now built into the economic drivers of healthcare - role for advocacy
Overdiagnosis Successes

Physician Society Roadmap

- **Physician Society endorsement and actions**
  - **Broad discussions** across physicians about Number Needed to Test or Treat to obtain benefit (NNTB)
  - **Advocacy** in Washington, California
  - Increasing **focus on “POEMs”**
    - Patient-Oriented Endpoints that Matter
  - **Changed mammography alerts to include NNT considerations and shared decision-making**
  - Implemented beta test of **Choosing Wisely analytics & alerts**
  - Leveraging our **data warehouse tools for utilization patterns, drilldown**
Overdiagnosis Roadmap
MemorialCare Physician Society

• Where to Next?
  – **Increase physician awareness** of the concept of Overdiagnosis & Overtreatment (Town Halls, Leadership Summit)
  – Provide **education on accurate interpretation of medical literature** (Best Practice website, rounds, newsletter, podcasts…)
  – Where possible, **build more alerts into EMR for inpatient and AEMR** (Choosing Wisely+)
  – Requiring **research to be published**

One-third of clinical trials never published in peer-reviewed journals, study finds

*Bloomberg News* (2/17, Spalding) reports that a study revealed that one-third of clinical trials conducted in the US “were never published in a peer-reviewed journal or in a government registry online.” Researchers looked at 4,347 clinical trials completed between October 2007 and September 2010 and found that “only 29 percent had results published within two years of finishing data collection, and 13 percent were posted on the government database [ClinicalTrials.gov](https://www.clinicaltrials.gov) within the same period, the study found.” The findings were published in the *BMJ*
Ongoing Focus

- **Broadly disseminating** the scientific rationale
- Overcoming **influence of Pharma**
- **Addressing the near religious belief that earlier and more screening is better**
- Improving the **comfort level of providers** to speak openly and honestly about potential harms of screening and treatment
  - Addressing the fear of medical malpractice
- Building **public awareness of the problem** of overdiagnosis without appearance of rationing care
- **Need for advocacy with organizations promulgating P4P measures**
Stewardship

The careful and responsible management of something entrusted in one’s care

We are Stewards of Precious Resources
Final thought:

“This work takes vision, clinical leadership and great partnerships. It’s about Will, Ideas & Execution. Please leave your ego at the door…”

Questions?

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