

Choosing Lab Tests Wisely: A Patient Safety Approach

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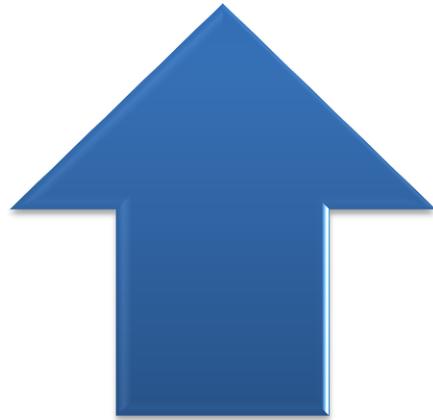
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- Collaborators (listed at the end)

We started with lab tests because
these represent:



2-5% of all
healthcare costs



70% of all
medical
decision-making

New York Times Editorial*

National *Choosing Wisely* Campaign:

Do You Need That Test?

If health care costs are ever to be brought under control, the nation's doctors will have to play a leading role in eliminating unnecessary treatments. By some estimates, hundreds of billions of dollars are wasted this way every year. So it is highly encouraging that nine major physicians' groups have identified 45 tests and procedures (five for each specialty that *are commonly used but have no proven benefit for many patients and sometimes cause more harm than good.*

Our goal –Patient Safety: Triple Aim

Right test: Cost-effective

Right time: Better care

Right patient: Better outcomes

**EXAMPLE 1: NON-GUIDELINES
CARDIAC MARKER USE**

Background

Clinical pathologist observation: non-guideline use of cardiac markers



Formation of study group



Gathering of preliminary data, analysis, discussion and interventions

Diagnosing a Heart Attack (AMI): Guidelines and the problem

- Guideline calls for one lab test – Troponin I (TnI) - preferred cardiac marker because it works best as the only lab test
- Two other lab tests (much older and used together) - CKMB and CKMB “index” (MBI) should be used only in very specific circumstances or when TnI not immediately available
 - May cause confusion and over-diagnosis of a heart attack
- *But increasing use of all three tests rather than just one test at WVUH*

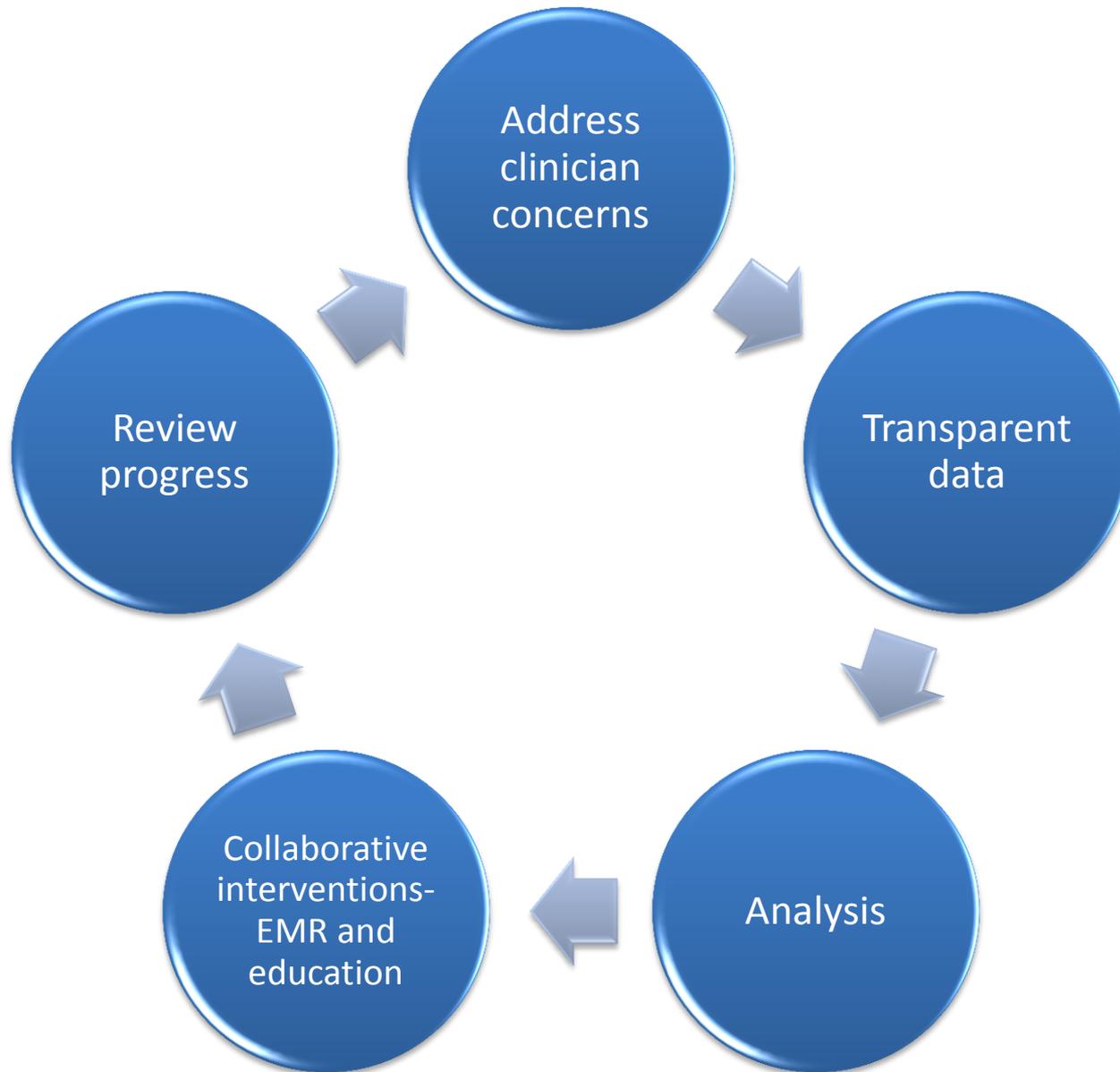
Individual Tests Performed (5/1/2011 – 7/31/2011)	# Results (%)
Tnl	10,272 (38.1%)
CKMB	8,411 (31.2%)
MBI	7,986 (29.6%)
<i>Total</i>	26,992 (100%)
Order SET	# Orders (%)
Tnl + CKMB + MBI	7,164 (64.1%)
Tnl only	2,462 (22.0%)
CKMB + MBI	840 (7.5%)
Tnl + CKMB	332 (3.0%)
Tnl + CK	305 (2.7%)
CKMB only	76 (0.7)
<i>Total</i>	11, 179 (100%)

We have met the enemy and they are us: Epic order set for Chest pain r/o MI - **80% of all orders from the Emergency Department**

▼ LABS ASAP

- CBC/DIFF
ASAP, ONE TIME, System Default
- ELECTROLYTES
ASAP, ONE TIME, System Default
- BUN
ASAP, ONE TIME, System Default
- CREATININE
ASAP, ONE TIME, System Default
- GLUCOSE, NON FASTING
ASAP, ONE TIME, System Default
- CPK (CK)
Timed, EVERY 6 HOURS for 2 occurrences, System Default
- CK ISOENZYMES ONLY
Timed, EVERY 6 HOURS for 2 occurrences, System Default
- TROPONIN I
Timed, EVERY 6 HOURS for 2 occurrences, System Default
- PT/INR
ASAP, ONE TIME, System Default
- PTT (PARTIAL THROMBOPLASTIN TIME)
ASAP, ONE TIME, System Default

Our choice



Address clinician concerns

Concern: missing an acute MI (medical and medical-legal): “Our patients are different”

Investigate: Data on discordant cardiac markers : Tnl(-) and CK-MB(+)

Review: patient outcomes in our data

	CKMB or MBI Elevated	CKMB and MBI Normal	Total
TnI Elevated	1,001	1,708	2,709
TnI Normal	60	4,725	4,785
Total	1,062	6,433	7,494

What our truth table says

- 0.8% of redundant tests had the theoretical possibility of finding a heart attack that the Troponin missed.
- However, out of 7494 orders that included CK/CKMB, the CK/CKMB detected **ZERO** heart attacks in patients with negative troponin.
- And the problem is still worse than that, because.....

Redundant markers: Triple-Fail (annual estimates x4)

43 patients admitted or observed
Missed AMIs with negative Tnl - 0
6 month f/u – NO AMI mortality

Not cost effective

Unnecessary (negative)
stress tests – 4

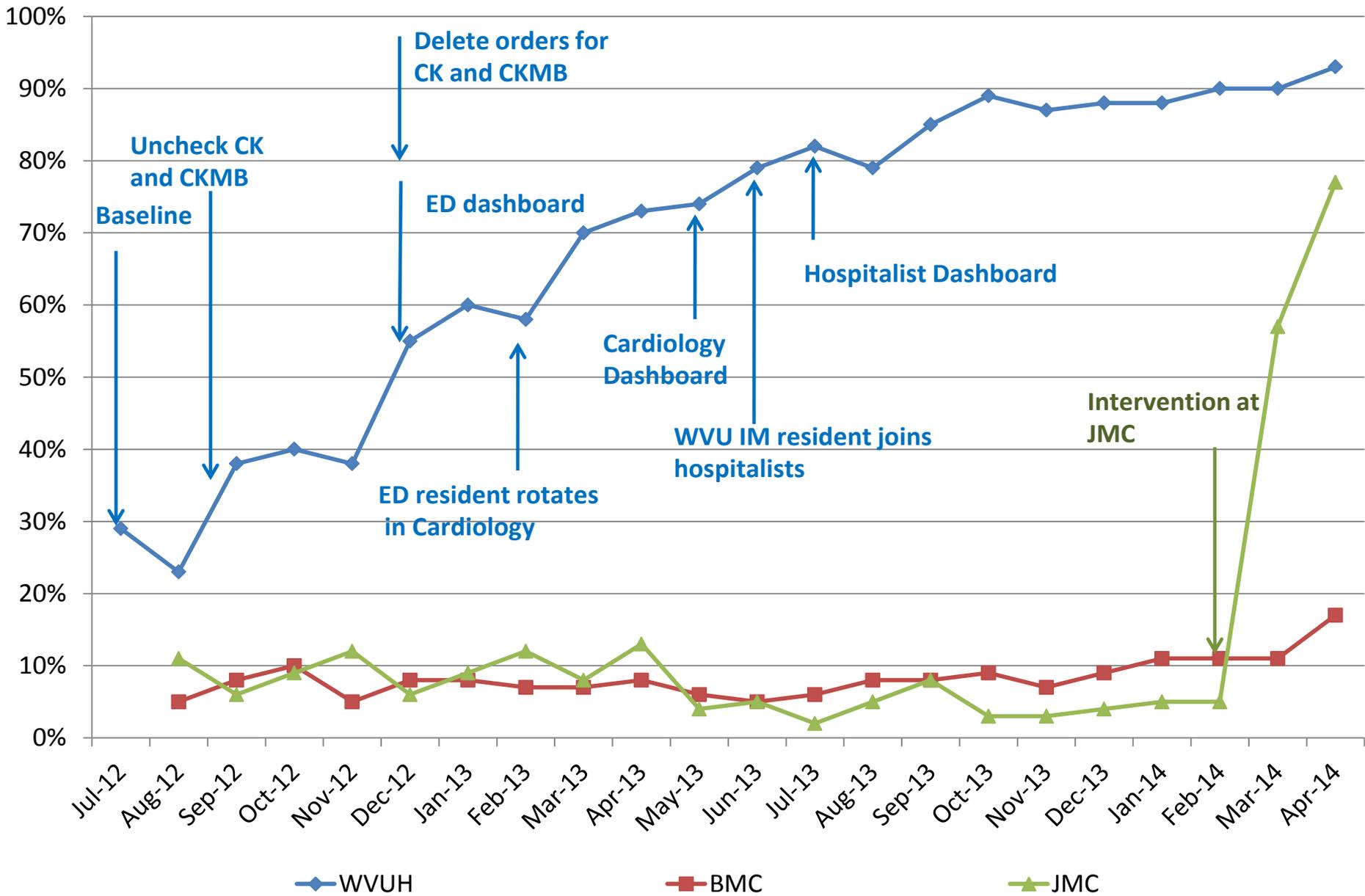
Unnecessary (negative)
cardiac catheterization – 1

What did this cost? Getting to Transparent data on lab costs

- What to use (options):
 - Cost to the lab
 - Cost to the “system”
 - Charges versus reimbursement
 - Inpatient versus outpatient
 - DRGs versus fee-for-service
 - Medicare versus commercial insurers
- Bottom line:
 - Medicare reimbursement (did not include clinical costs) as “high-end” and cost to “system”
 - List price of reagents as “low-end” estimates and cost to lab
- Not on the bottom line:
 - Cost of unnecessary procedures, morbidity and social costs of unnecessary tests and procedures

Category	Determination	Total Costs
Redundant or discordant CKMB testing	7,498 tests @ \$16.25/test	\$121,843
Redundant or discordant CK testing with MBI calculation	7,163 tests @ \$9.17/test	\$65,685
Duplicate Tnl testing	11 tests @ \$13.85/test	\$152
CKMB testing without CK	76 tests @ \$16.25/test	\$1,235
	<i>Total for quarter</i>	<i>\$188,915</i>
Estimated <u>ANNUALIZED</u> test savings (to “system”)	58,992	\$755,660
Total <u>ANNUALIZED</u> savings reagent costs (to hospital)	58,644 tests @ \$5.53	\$324,301

% Guideline order sets by intervention hospital with controls



External Validity: UHC CK-MB Metrics

	Q4 2012	Q1 2013	Q2 2013	Q3 2013	Q4 2013	Q1 2014
WVU Metric	26.35	14.34	8.24	4.36	3.74	3.95
Mean Metric	14.6	14.8	13.5	12.29	11.49	10.65
SD Metric	1.4	1.5	1.6			
WVU Rank	56 of 66	33 of 65	26 of 57	22 of 61	22 of 65	17 of 51

Current outcomes and conclusions

- Goal 75% compliance – **achieved >90% compliance**
(Note: Goal cannot be zero for important reasons related to comorbidities).

Does not include

- ***cost of unnecessary follow-up testing and hospitalization or***
- patient satisfaction (multiple “draws”) or
- patient morbidity and social costs (days lost from work, etc.) from unnecessary tests and procedures

Better outcomes: Triple-aim achieved: Cost-effective, care-effective, outcome-effective

**EXAMPLE #2: UNNECESSARY
CERVICAL CANCER SURGERIES**

http://www.choosing-wisely-master-list_lq.pdf/

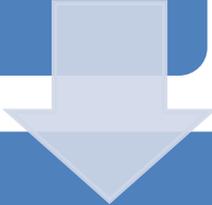
- Don't treat patients who have mild dysplasia of less than two years in duration.
 - Mild dysplasia does not require treatment in average risk women.
 - Most women with “CIN 1” on biopsy have a transient HPV infection
 - Will usually clear in less than 12 months

Observation: many LEEPs with no/LSIL only – association with HPV testing?

Observation of many LEEPs for minimal/no disease

A light blue downward-pointing arrow indicating the flow from the first step to the second.

Data Review with one OB/Gyn

A light blue downward-pointing arrow indicating the flow from the second step to the third.

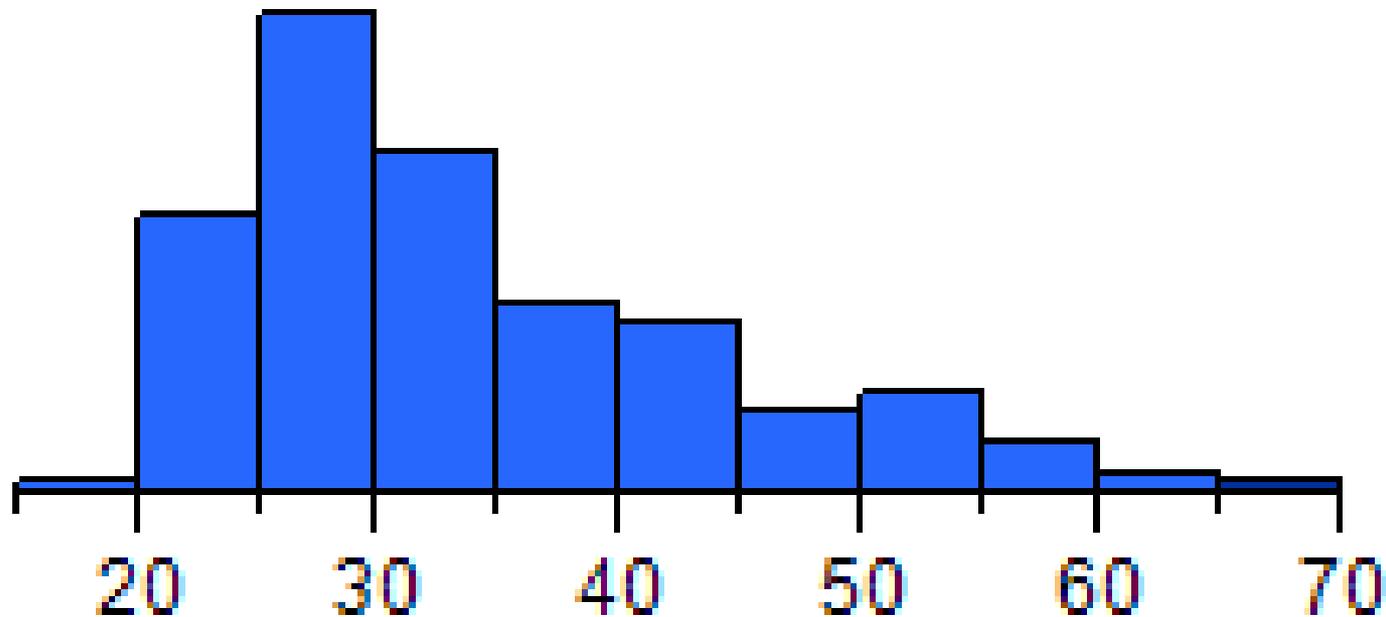
Presentation to OB/Gyn faculty

Unnecessary surgeries to prevent cervical cancer, summary:

- The guidelines are very complicated
- Surgeons were doing procedures (surgery) that could cause complications, including a compromise in fertility of young women, not based on guidelines (based on perceived risk factors, or misunderstanding, or patient preference)
- The following detail shows failure of all non-Guideline interventions.

Indication for LEEP	HSIL on LEEP	No HSIL on LEEP	Total
Biopsy %	139 67%	76 33%	215
Persistent LSIL \geq 24 months %	4 25%	12 75%	16
HSIL Pap %	2 13%	13 87%	15
Persistent LSIL < 24 months	0	7	7
ECC	0	9	9
CIN 1-2 biopsy	0	6	6
Colposcopy	0	14	14
ASC-H Pap (14) or AGC NOS Pap (2)	0	16	16
Atypical endometrial cells on Pap	0	2	2
Patient preference	0	2	2
Risk factors	0	24	24
Total	145	181	326

Age Distribution



Range 19-65

Mean age: 33.1 years

Median age: 31 years

25th percentile: 25 years

75th percentile: 38 years

Potential risks

- $\frac{3}{4}$ LEEPs in reproductive age women
- Harms:
 - Several patients needed additional procedures for excessive granulation tissue
 - Estimates (from Danish registry) of increased risk of preterm labor is 1 per 38 patients with a LEEP
 - Model ~7 cases of preterm labor overall and ~2 in group without appropriate guidelines
 - In those with no or possible indications
 - 2 cases of “LEEP of cervix complicating pregnancy”
 - 1 pre-term delivery (35 weeks) with comorbid conditions

Intervention and Effects

- Meeting with Ob/Gyn Faculty (9/26/2013)
 - “Our patients are different”
 - More individuals join the group
- Start collecting data on LEEPs status intervention (10/1/2013 +)

Result of intervention

Pre- or Post Intervention	# of LEEPs	# months	% compliant with guidelines	LEEPs per month
Pre	333	33	71%	11
Post	22	7	95%	3.3
Total	355	40		

Effect of intervention

- Reduction in LEEPs: 11 per month to 3 per month
 - There will be some, rare legitimate reasons to not follow guidelines, that is ok so long as we are monitoring
- Total # LEEPs not performed: 56
- Total cost of LEEPs (@~\$3,000 per LEEP):
\$168,000
- Total modeled pregnancy complications saved based on known rates (at least 1): ***Priceless***

Other ongoing interventions

- Reducing 'daily' CBCs and BMPs in hospitalized patients (Study Aim #2)
- Reducing unnecessary testing for *C. difficile*
- Improving cardiac marker usage (with CAMC, Marshall University and the WV School of Osteopathic Medicine) – we think this an important demonstration
- Discussing with state advocacy groups (**WVirginians for Affordable Healthcare**) and insurers
- Total annual healthcare savings due to our interventions to date: >\$1,000,000 with improved outcomes (4 interventions, 1 hospital, 1 year)

Expansion In Orders and Places?

- Advantages: Cost savings, improved care, convincing data (not theoretical), annual time frames, and teamwork all achievable and in WV patients' interest.
- Disadvantages/hurdles: the effort has technical components – real work, and there is no current business model for doing it. (Will grant demonstration supports lead to a stable business model?)

The team (so far): WVUH

- **Pathology (WVUH)**
 - Barbara Ducatman, MD*
 - Peter Perrotta, MD
 - Danyel Tacker, PhD
 - Melina Flanagan, MD, MPH
- **OB/Gyn**
 - Mahreen Hashmi, MD
 - Pam Courtney, WHNP-BC
- **Internal Medicine**
 - Mary Warden, MD
- **Cardiology/IM**
 - Conard Failing, MD
 - Brad Warden, MD
- **Biostatistics (School of Public Health)**
 - Dustin Long, PhD
- **ED**
 - Owen Lander, MD
- **Associate CMO/IM**
 - Ronald Pelligrino, MD
- **CMIO/IM**
 - Kevin Halbritter, MD
- **School of Public Health and IM**
 - Alan Ducatman, MD, MS (co-PI)*
- **Residents and fellows**
 - Kelly Pennington, MS II (PSF)
 - Hannah Lawther, MD
 - Morgan Darrow, MD
 - Matt Szarko, MD
- **Pathology Staff**
 - Ed Gray
 - Jim Martin
 - Dana Gray
 - Dwight Castrodale
- **West Virginia University Hospitals**
 - Rebekah Jones, PharmD
 - Aaron Yanuzo, PharmD
 - Michael Sweet, PharmD

The team (so far): state-wide partners

- **Berkeley/Jefferson Medical Center**
 - Jeff Stead, MD
 - Konrad C. Nau, MD
 - Lauren Cianciaruso, MD
 - Marney Treese, MD
 - Nisha Patel, MD
- **CAMC**
 - Mary Emmett, PhD, FACHE
 - Don Lilly, MD
 - Dan Foster, MD
- **West Virginians for Affordable Health Care (community partner)**
 - Perry Bryant
 - Renate Pore
- **Marshall University**
 - James B. Becker, MD
- **West Virginia School of Osteopathic Medicine**
 - Arnold Hassen, PhD



"I'm afraid you've had a paradigm shift."