How Can Research Findings be Translated into Reduced Maternal Morbidity and Mortality?

Elliott Main, MD

Medical Director, California Maternal Quality Care Collaborative (CMQCC)

Clinical Professor, Dept. of Obstetrics and Gynecology, Stanford University

Chair, California Pregnancy Associated Review Committee (PAMR)

Director of Quality Assurance and Implementation, AIM (Alliance for Innovation on Maternal Health -- HRSA / ACOG)

October 20, 2021

Infant Mortality

- Definition: Death under 1 year of age
- Data Required: Death certificate only
- US Rate: 565 per 100,000 births
- No judgements
- Only a few major causes
- Impacted by maternal comorbidities and social determinants

Maternal Mortality

- Definition: Death during or after pregnancy related to the pregnancy
- Data Required: Death and Birth certificates and Medical Records (plus)
- US Rate: 17-23 per 100,000 births
- Multiple judgements: Was she pregnant? Was the death related to the pregnancy?
- Many causes, each rare, each with many underlying causes
- Heavily impacted by comorbidities and social determinants

Data Sources: CDC

Maternal Mortality and Severe Maternal Morbidity

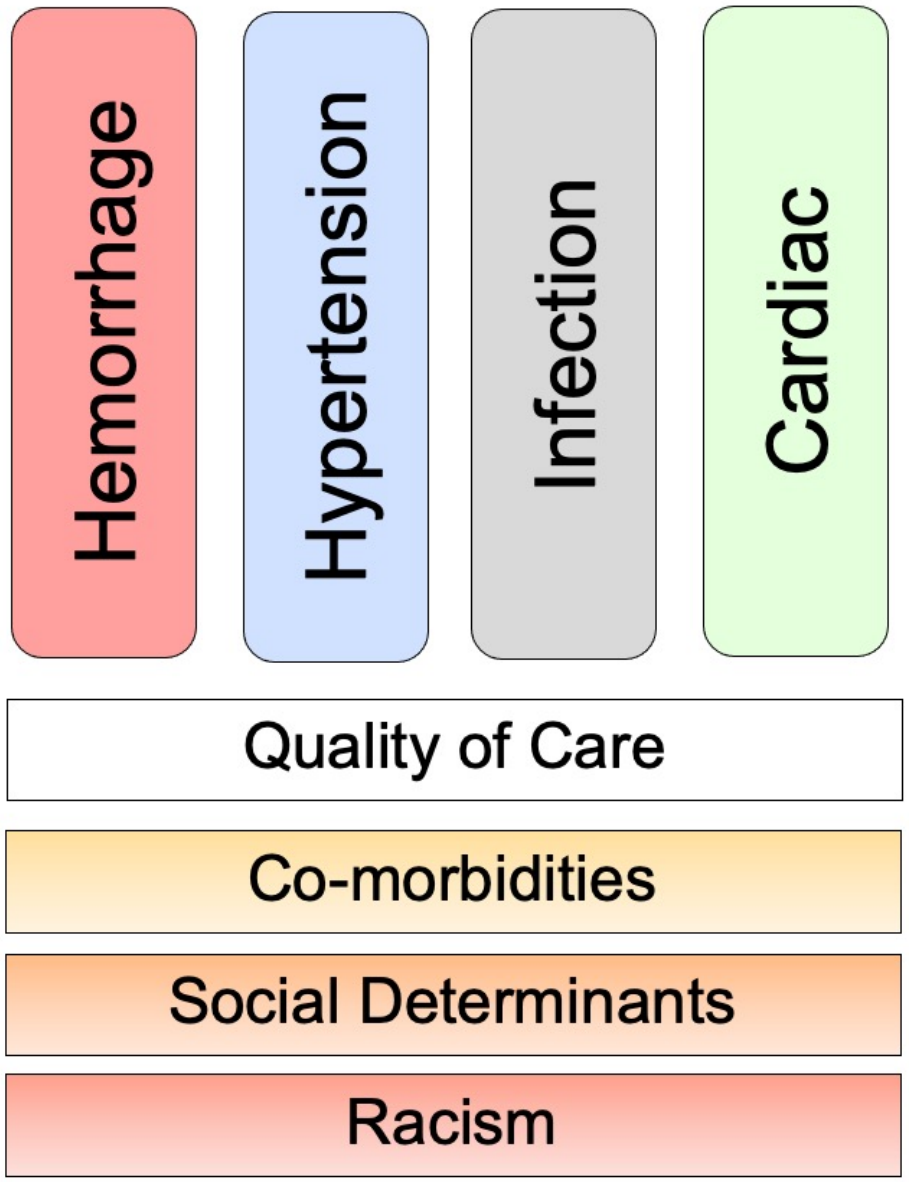
(Rates are per number of live births)	Maternal Mortality (US rate=17/100,000)		Severe Maternal Morbidity (US Rate = 180/10,000; 1.8%)	
Cause	Proportion of Deaths	Actual Rate per 100,000	Proportion of SMM	Actual Rate per 10,000; (%)
Thromboembolism	10-15%	~1-2	2%	3-4 (0.03%)
Infection	10-15%	~1-2	5%	9 (0.09%)
Hemorrhage	10-15%	~1-2	45%	80 (0.80%)
Preeclampsia	10-15%	~1-2	30%	54 (0.54%)
Cardiac Disease	25-30%	~3-5	10%	18 (0.18%)

Each Cause has Multiple Underlying Causes

- Hemorrhage
  - Uterine atony
  - Placenta Accreta
  - Ectopic
  - Surgical injury
  - Preeclampsia
  - Uncorrected anemia
- Cardiac Disease
  - Congenital Heart Disease
  - Acquired Heart Disease
  - Cardiomyopathy
    - Peripartum
    - Hypertensive
    - Methamphetamine related
  - Arrythmias

While each cause will have some over-arching approaches, each underlying driver will additionally require its own specific strategies

Role of Contributing Factors for Maternal Mortality and SMM



Each cause is embedded onto layers of contributing factors. The "thickness" of each layer varies for each cause and even each instance.

How Does Racism Lead to Maternal Mortality?

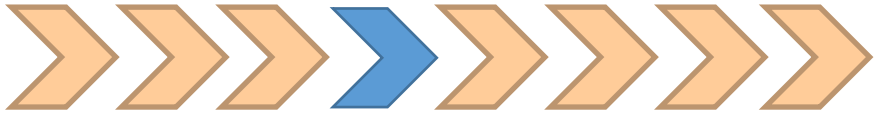
- Lack of trust in doctors and hospitals
- Recurring theme: "Denial, Delay and Dismissal"
- Implicit and explicit bias
- Weathering from Toxic Stress
- Exposure to erosive social determinants (esp. community and personal violence)

Clinical research to Clinical practice--Lost in Translation?

Lenfant C. N Engl J Med. 2003 Aug 28;349(9):868-74.

National consensus guideline

Average of 17 years!!



"Lost in Translation…"

Integrated into Clinical Practice

We must identify strategies to shorten the timeline for adoption of Evidence Based Practices (EBP)

Improvement Journey…

Start with An Evidence Based Practice (EBP)

Efficacy = Does your EBP work in controlled research settings? (e.g. an RCT)

Effectiveness = Does your EBP work in the real world?

Your patient population?
Your care environment?
All hospitals? All patients?

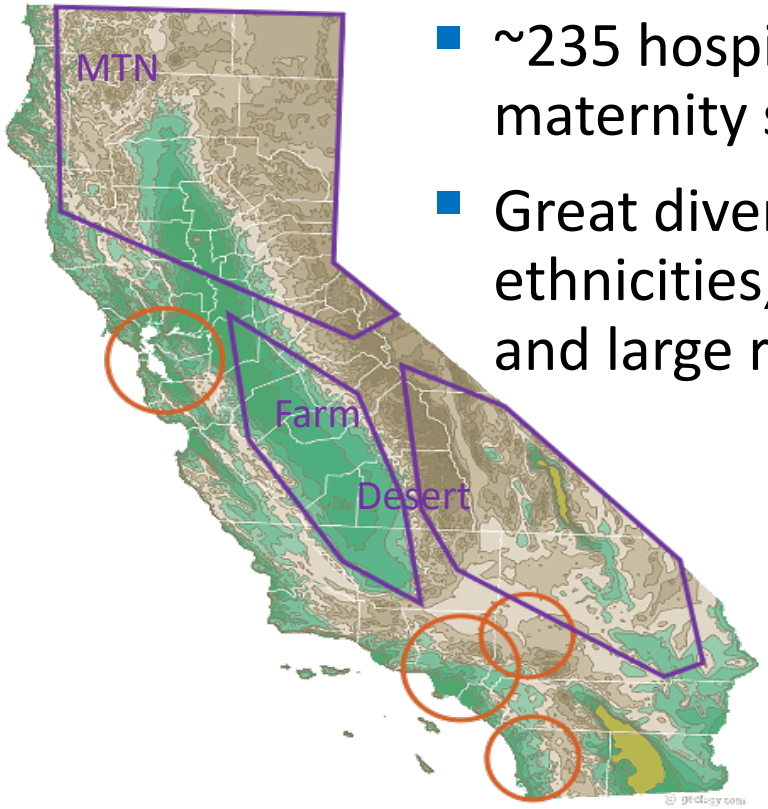
scale up an EBP to have population impact?

Quality Improvement = How can we change outcomes in my hospital?

California Background

- Population: 40 million
- 450-500k annual births (12% of all US births) all in a single administrative unit
- ~235 hospitals with maternity services
- Great diversity: races, ethnicities, urban centers and large rural areas

Rural Areas



California Maternal Quality Care Collaborative

- Multi-stakeholder collaborative founded in 2006
- Launched with funding from California Department of Public Health to address rise in maternal mortality
- Maternal Mortality Reviews to Action:
  - Quality Improvement Toolkits
  - Large-scale QI Change Collaboratives
  - Partner with everyone
  - Maternal Data Center

CMQCC Mission: End preventable morbidity, mortality and racial disparities in maternity care

CMQCC's Active Stakeholders/ Partners

State Agencies

- CA Department of Public Health, MCAH
- Regional Perinatal Programs of California
- DHCS: Medi-Cal
- Office of Vital Records
- Office of Statewide Health Planning and Development
- Covered California

Membership Associations

- Hospital Quality Institute
- California Hospital Association
- Pacific Business Group on Health
- Integrated Healthcare Association

Key Medical and Nursing Leaders

- UC, Kaiser (N&S), Sutter, Sharp, Dignity Health, Scripps, Providence, Public hospitals

Professional Groups (California sections of national organizations)

- American College of Obstetrics and Gynecology
- Association of Women's Health, Obstetric and Neonatal Nurses
- American College of Nurse Midwives
- American Academy of Family Physicians

Public, Consumer and Community Groups

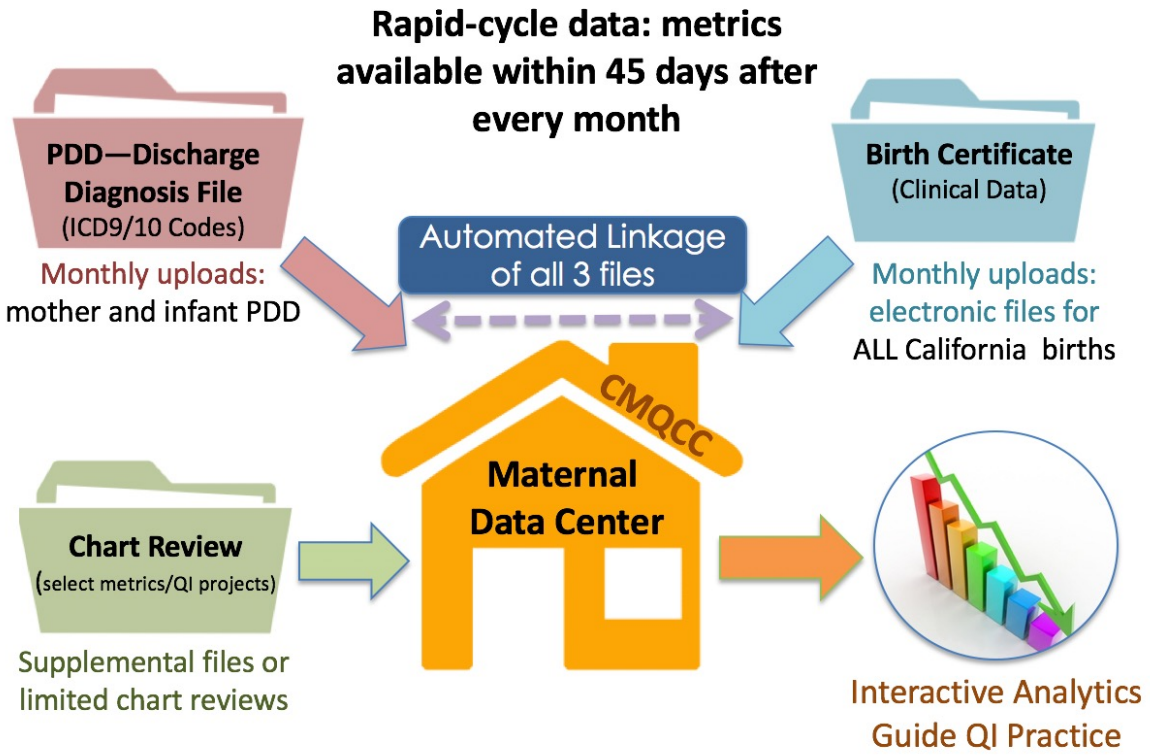
- Consumers' Union
- March of Dimes
- California HealthCare Foundation
- Cal Hospital Compare
- Amniotic Fluid Embolism Foundation

Health Plans

- Commercial and Managed Medi-Cal Plans

Implementation Tools for Change at Scale

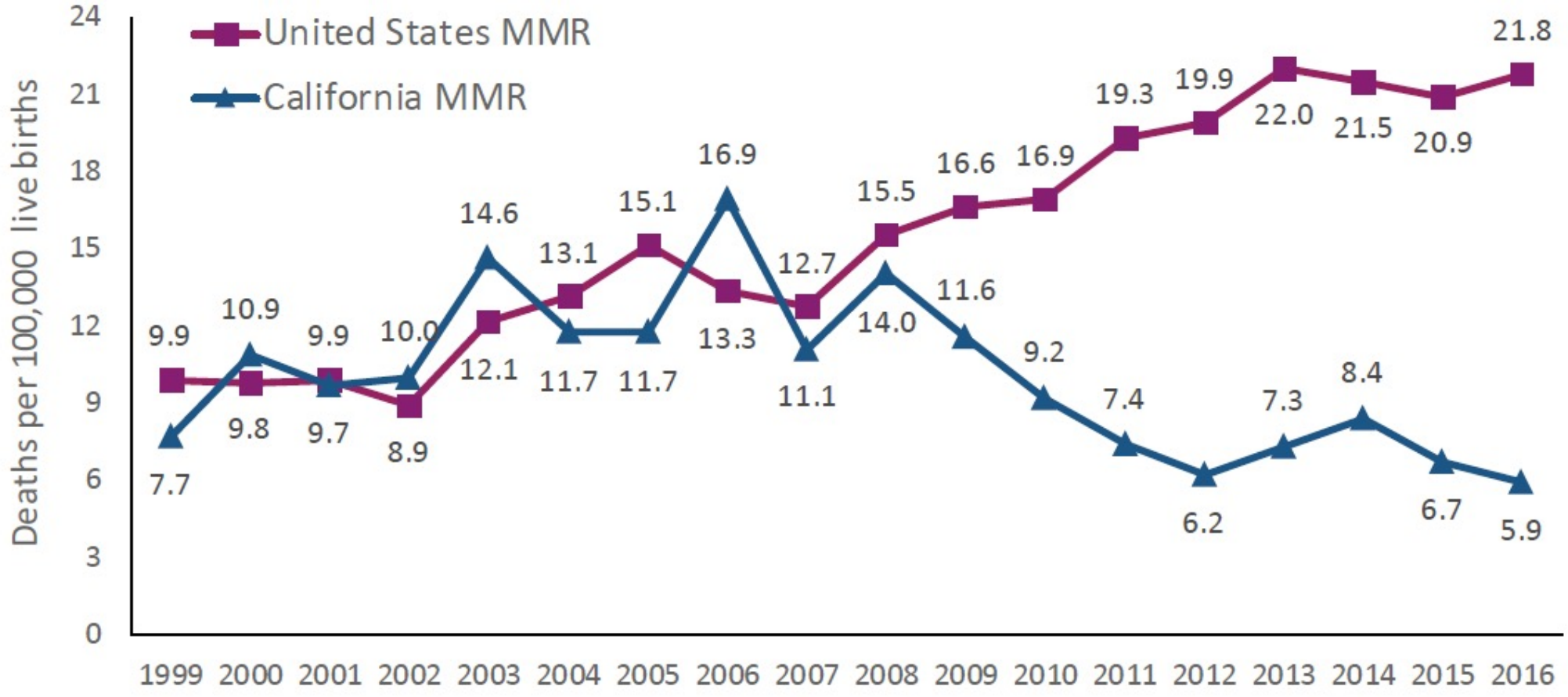
CMQCC Maternal Data Center



- Low-burden, Low-cost, High-value Comprehensive and Rapid availability

- CMQCC QI Toolkits
  - Hemorrhage, Hypertension, Sepsis, Cardiac Disease, Prevention of Cesarean Birth
- National Safety Bundles (AIM)
  - Hemorrhage, Hypertension, Prevention of Cesarean Birth
  - Cardiac Disease and Sepsis coming soon
- Large-scale QI Collaboratives
  - Shared learning, data-driven
  - 40-130 hospitals at at time

Figure 1: Maternal Mortality Ratio in U.S. and California, 1999-2016



CA-PMSS Surveillance Report: Pregnancy-Related Deaths in California, 2008-2016. Sacramento: California Department of Public Health, Maternal, Child and Adolescent Health Division. 2021.

Reduction in Severe Maternal Morbidity From Obstetric Hemorrhage With a Large (99) Hospital Quality Collaborative (~300,000 patients)

Developed the "Mentor Model" using physician/nurse teams that coach 6-9 hospitals within a large IHI Breakthru Style QI Collaborative

California Hospitals with CMQCC Rapid-Cycle Maternal Data Center	Hospitals (N)	**Baseline SMM-HEM Rate (per 100 HEM cases)**	**Post Intervention SMM-HEM Rate (per 100 HEM cases)**	**Percent Reduction in SMM-HEM**	Significance (p value)
Hospitals in CMQCC CPMS Collaborative*	99	**22.7**	**18.0**	**20.8%**	<0.0001
---Without Prior HEM Collaborative Experience*	74	**22.7**	**19.2**	**15.4%**	<0.0001
---With Prior HEM Collaborative Experience*	25	**22.7**	**16.2**	**28.6%**	<0.0001
Comparison Group: Hospitals not in Collaborative and no prior CMQCC HEM Collaborative Experience	48	**28.6**	**28.2**	**1.2%**	0.7713

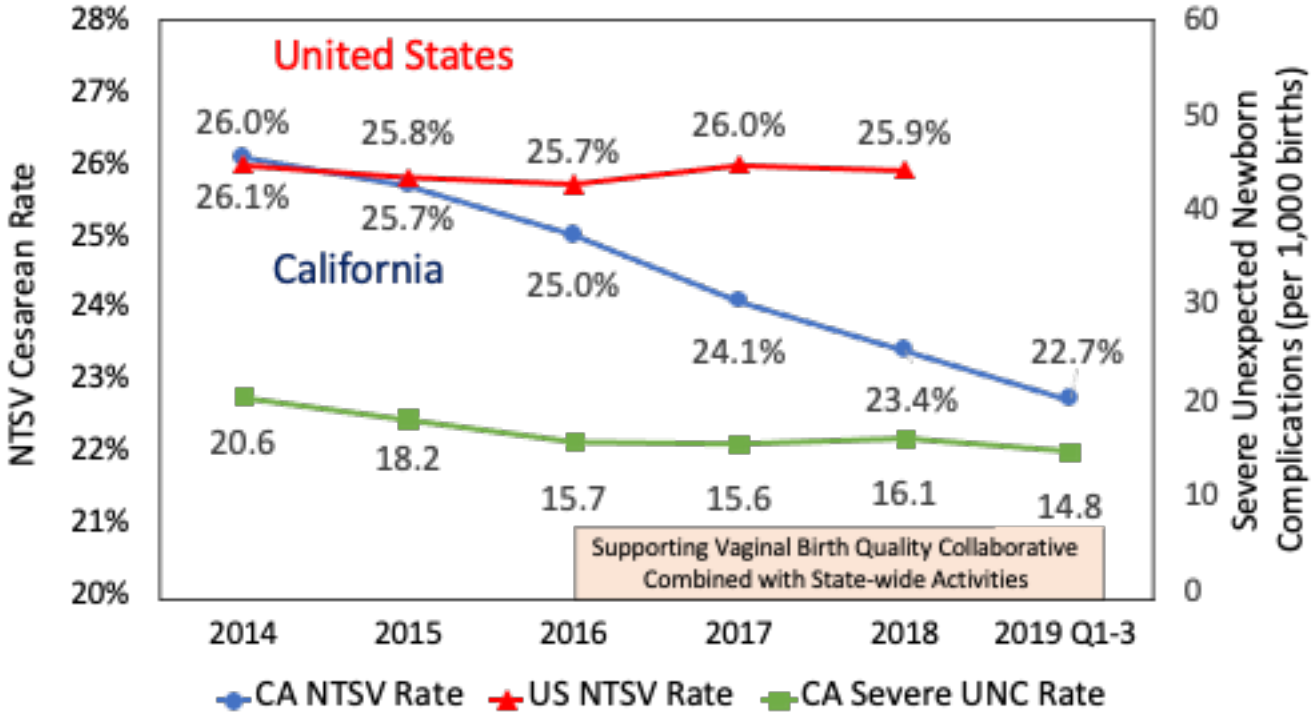
Main EK, Cape V, Abreo A, Vasher J, Woods A, Carpenter A, Gould JB. Reduction of severe maternal morbidity from hemorrhage using a state perinatal quality collaborative. Am J Obstet Gynecol. March 2017

CMQCC Collaborative to Reduce Primary Cesarean Birth

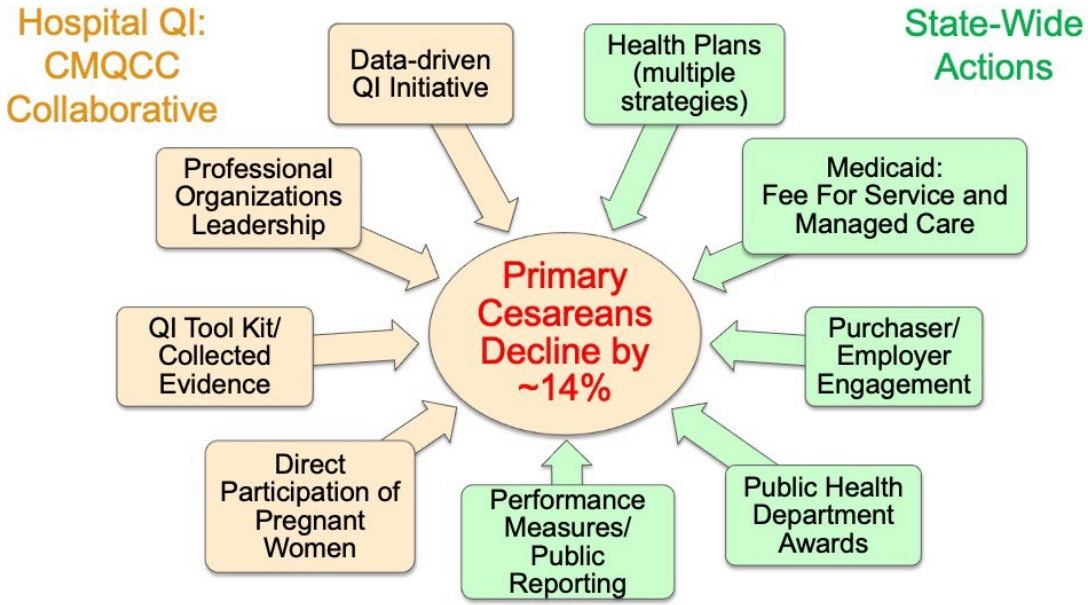
- Cesareans drives rates of transfusions and other SMM complications (even more for every subsequent birth)
- Cesarean Rates have risen >50% over the last 15 years without benefit for either baby or mother
  - Now we an epidemic of women with prior cesarean births
- Hospitals have very large variation in care (rates ranging from 15% to 55%) and historically resistant to change
  - No one has substantially lowered the CS rate in a large population
- There is significant disparity: Black women have 6%-point higher rates than White or Hispanic women
- We undertook a 2-year QI collaborative touching every CA hospital

CMQCC Collaborative to Reduce Primary Cesarean Birth

First Birth Low-Risk Cesarean Rate



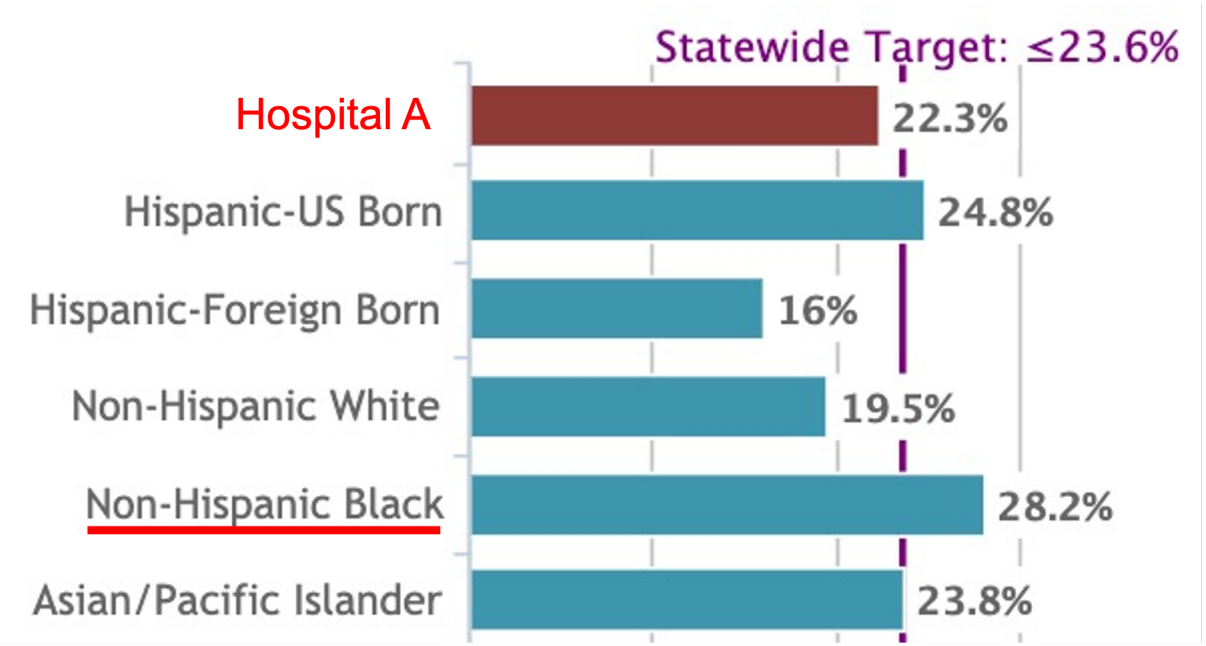
State-wide Initiative Activities



- Hospital level variation is dramatic for all OB metrics
- In 2014, hospital variation was extreme: 14% to 70%
- In 2020, variation still present but much more limited

Rosenstein MG, Chang S-C, Sakowski C, Markow C, Teleki S, Lang L, Logan J, Cape V, Main EK. Hospital Quality Improvement Interventions and Statewide Policy Initiatives and Rates of Nulliparous Term Singleton Vertex Cesarean Deliveries in California. JAMA 2021. Apr 27;325(16):1631-1639.

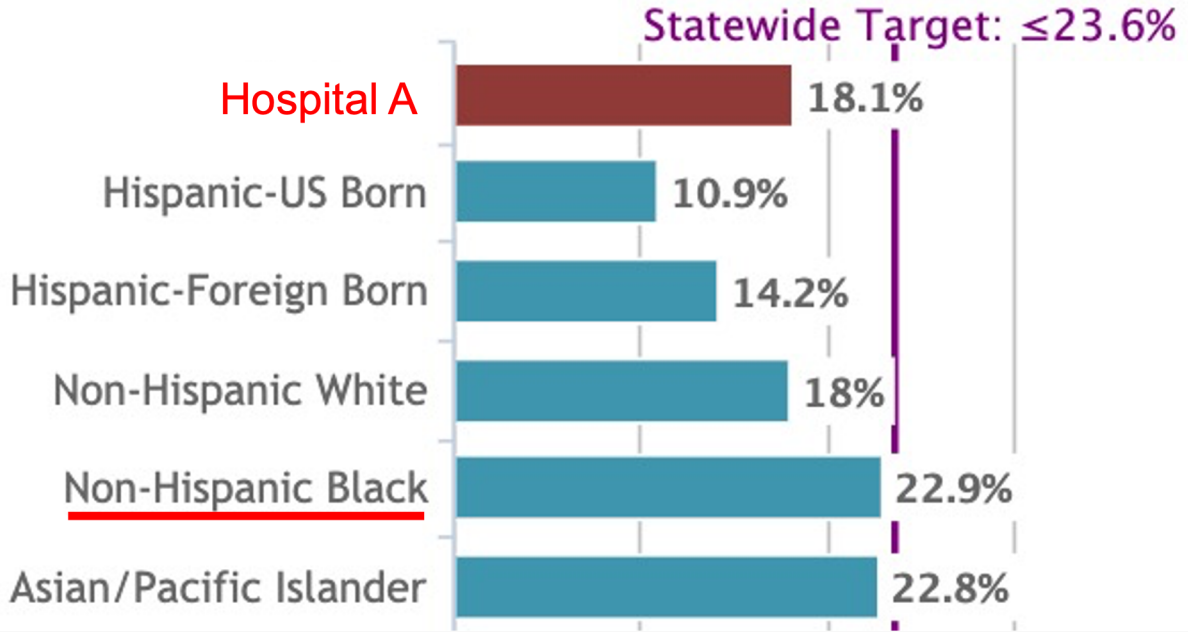
Importance of Stratification of Outcomes by Race: NTSV CS



NTSV Cesarean Birth Rate

*Healthy People 2030 Target Rate

Year--2017



NTSV Cesarean Birth Rate

*Healthy People 2030 Target Rate

6 Mos--2020

Screen shots from the CMQCC Maternal Data Center

Observations

- Hospital and Provider feedback can be very powerful
  - Particularly when combined with transparency or incentives
- Care decisions that have high subjectivity provide significant opportunity for bias (explicit and implicit)
  - Labor management; Care for OB emergencies
  - Providing more structure (protocols, measures) reduces subjectivity and bias
- The more “Change Levers” that can be pulled at once, the greater the effect

New Standards for Perinatal Safety

August 21, 2019

Provision of Care, Treatment, and Services (PC) Chapter

PC.06.01.01

Reduce the likelihood of harm related to maternal hemorrhage.

Element(s) of Performance for PC.06.01.01

1. **Complete an assessment using an evidence-based tool for determining maternal hemorrhage risk on admission to labor and delivery and on admission to postpartum. (See also PC.01.02.01, EPs 1 and 2; PC.01.02.03, EP 3; RC.02.01.01, EP 2)**

2. **Develop written evidence-based procedures for stage-based management of pregnant and postpartum patients who experience maternal hemorrhage that include the following:**
   - The use of an evidence-based tool that includes an algorithm for identification and treatment of hemorrhage
   - The use of an evidence-based set of emergency response medications that are immediately available on the obstetric unit
   - Required response team members and their roles in the event of severe hemorrhage
   - How the response team and procedures are activated
   - Blood bank plan and response for emergency release of blood products and how to initiate the hospital's massive transfusion procedures
   - Guidance on when to consult additional experts and consider transfer to a higher level of care
   - Guidance on how to communicate with patients and families during and after the event
   - Criteria for when a team debrief is required immediately after a case of severe hemorrhage
   Note: The written procedures should be developed by a multidisciplinary team that includes representation from obstetrics, anesthesiology, nursing, laboratory, and blood bank.

The Joint Commission Standards now include the key elements of Hemorrhage and Hypertension National Safety Bundles

For use in hospital itation!

Medicare Hospital Inpatient Quality Reporting (IQR) Program

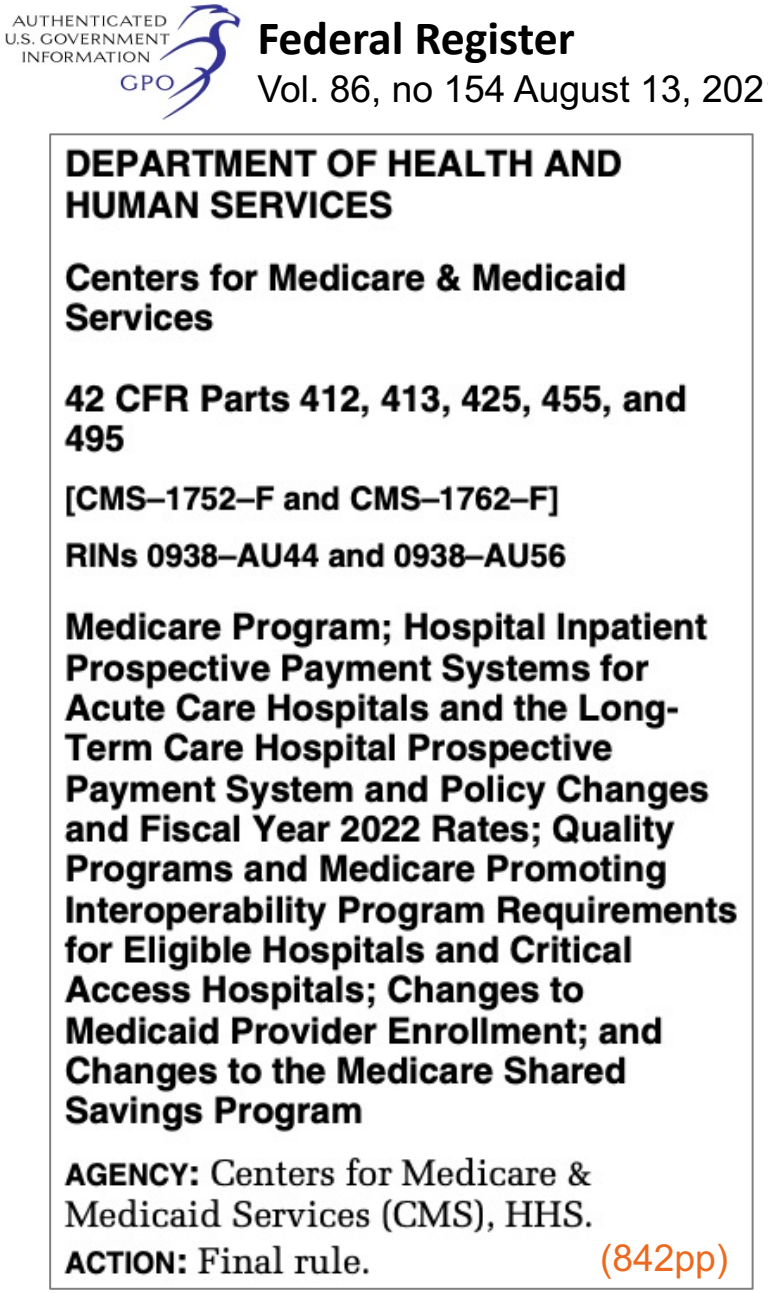
Maternal Morbidity Structural Measure (New)

- **Part 1:** Does your hospital or health system participate in a Statewide and/or National Perinatal Quality Improvement Collaborative Program aimed at improving maternal outcomes during inpatient labor, delivery and post-partum care?

  Examples of Statewide or National Perinatal QI collaboratives include the California Maternal Quality Care Collaborative and the Alliance for Innovation on Maternal Health (AIM).

- **Part 2:** Has hospital implemented patient safety practices or bundles related to maternal morbidity to address complications, including, but not limited to, hemorrhage, severe hypertension/preeclampsia or sepsis?

§ Reporting beginning with 2021 Q4 (due May 16, 2022)



AUTHENTICATED U.S. GOVERNMENT INFORMATION GPO

Federal Register
Vol. 86, no 154 August 13, 2021

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Centers for Medicare & Medicaid Services

42 CFR Parts 412, 413, 425, 455, and 495

[CMS–1752–F and CMS–1762–F]

RINs 0938–AU44 and 0938–AU56

Medicare Program; Hospital Inpatient Prospective Payment Systems for Acute Care Hospitals and the Long-Term Care Hospital Prospective Payment System and Policy Changes and Fiscal Year 2022 Rates; Quality Programs and Medicare Promoting Interoperability Program Requirements for Eligible Hospitals and Critical Access Hospitals; Changes to Medicaid Provider Enrollment; and Changes to the Medicare Shared Savings Program

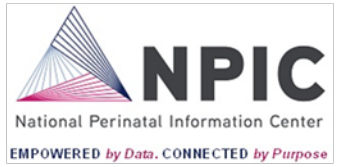
AGENCY: Centers for Medicare & Medicaid Services (CMS), HHS.

ACTION: Final rule. (842pp)

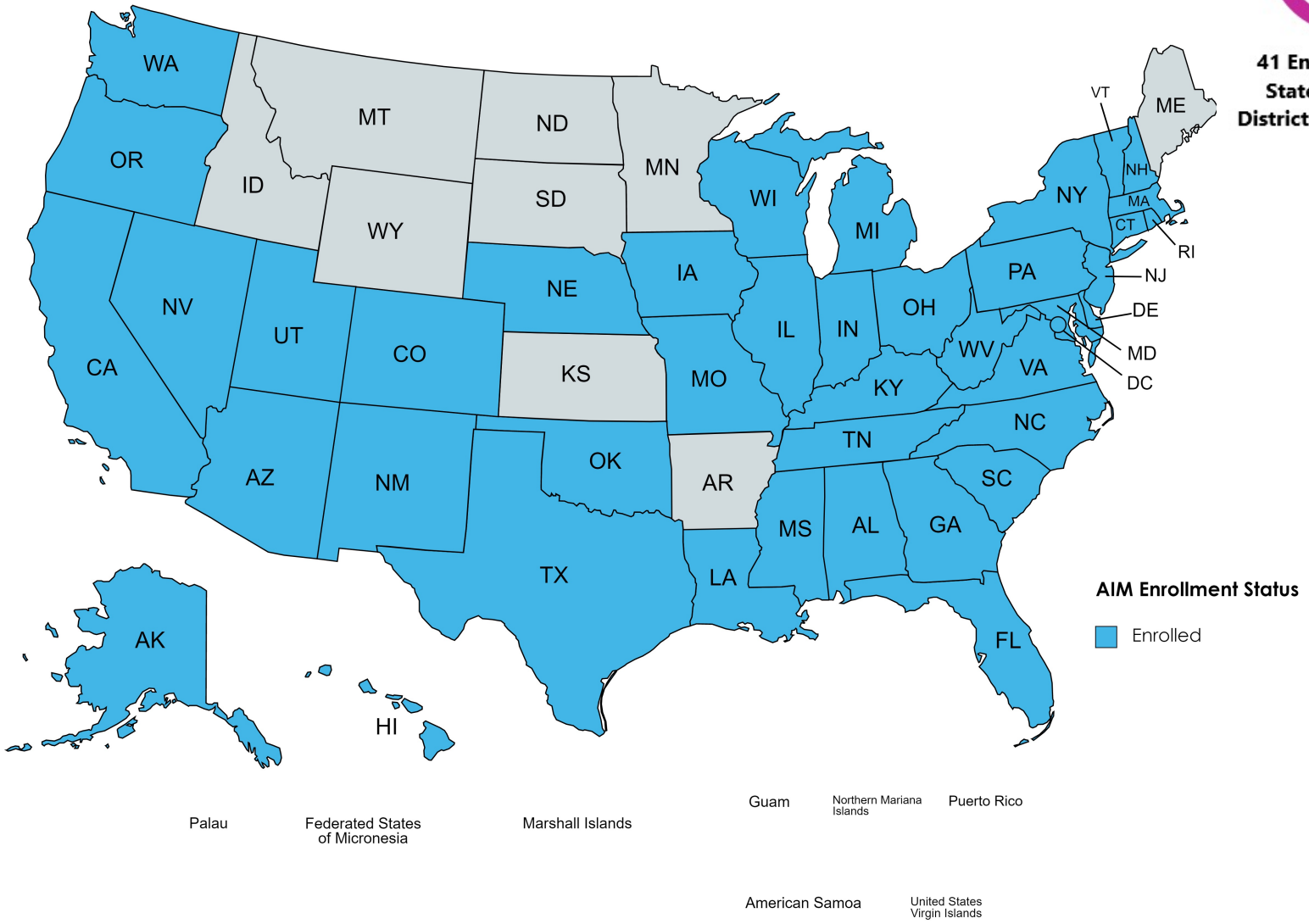
ALLIANCE FOR INNOVATION
ON MATERNAL HEALTH

- Funded by a cooperative agreement with the U.S. Department of Health and Human Services, Health Resources and Services Administration's Maternal and Child Health Bureau (HRSA MCHB) and American College of Obstetricians and Gynecologists (ACOG)
- A national, cross sector commitment to promote safe care for every U.S. birth and lowering the U.S. rates of preventable maternal mortality and morbidity
- Supporting state teams and health systems, AIM aligns national, state, and hospital level quality improvement efforts to improve overall maternal health outcomes

AIM Partners



Enrolled AIM States



42

41 Enrolled AIM States and the District of Columbia

1900

Approximate Number of AIM Engaged Birthing Facilities*

5

States with Planned AIM Enrollment in 2021

CDC: Funds 13 state PQCs and hopefully will be able to fund more this coming year

Keys for Improving Care “At Scale”

- Use public health surveillance data and patient stories to create “Burning Platform” for change and drive actions
- Mobilize a broad range of public, private and community partners to drive change together
- Create a system of rapid-cycle maternal-infant data to support and sustain QI projects
- Implement a series of data-driven large-scale quality improvement projects to change culture
- Pull all change levers at once, Hospital and External!
- Address Equity QI simultaneously with Clinical QI

Main EK, Markow C, Gould J. Addressing Maternal Mortality and Morbidity In California Through Public-Private Partnerships. Health Aff (Millwood). 2018 Sep;37(9):1484-1493.