

**VECKAN 2015**

# The Reliable Design of Obstetric and Gynecologic Care

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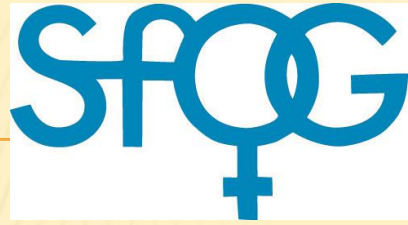
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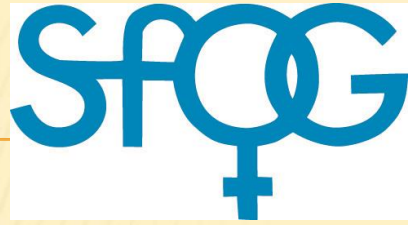
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- ✕ Disclosure of interests:

- + Dr. Cherouny has no conflicts of interest to declare



# VECKAN 2015

- ✕ But First...
- ✕ Why am I here?

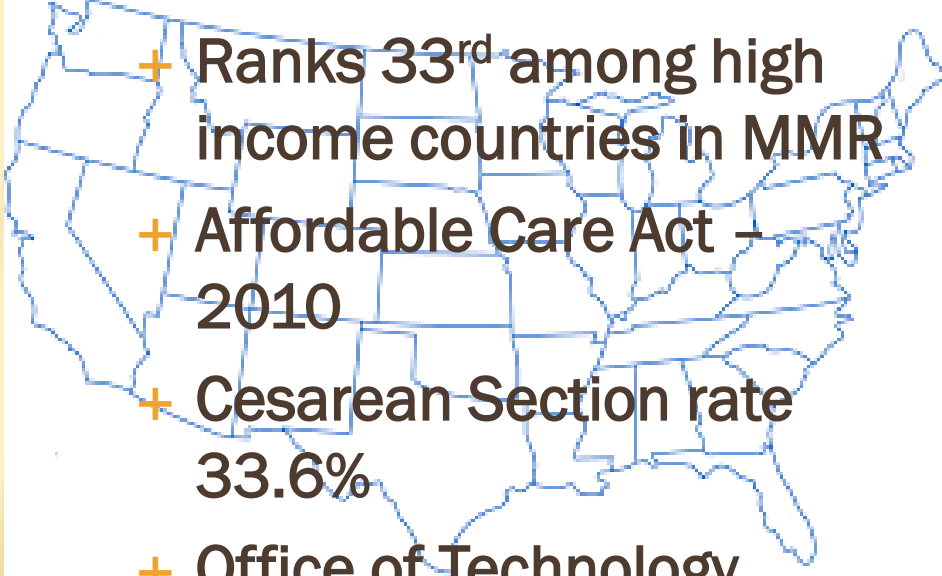


## VECKAN 2015

### × Sweden

- + Best place to deliver a baby and have an infant
- + National Health Insurance-1954
- + Cesarean Section rate 17.6%
- + Swedish Council on Technology Assessment in Healthcare (1987)

### × USA

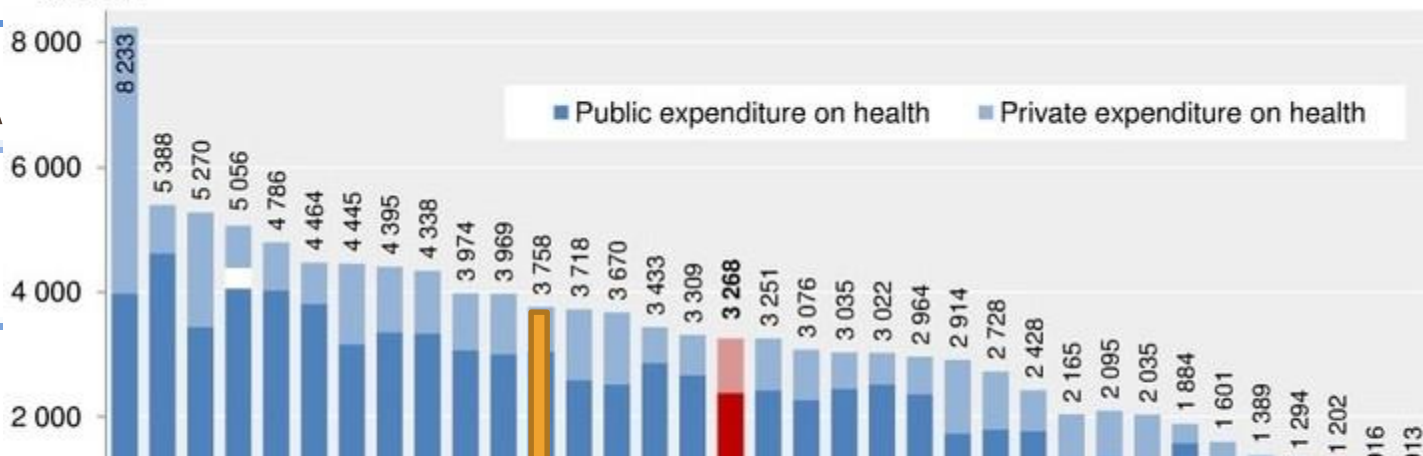
- 
- + Ranks 33<sup>rd</sup> among high income countries in MMR
  - + Affordable Care Act – 2010
  - + Cesarean Section rate 33.6%
  - + Office of Technology Assessment (abolished-1996)



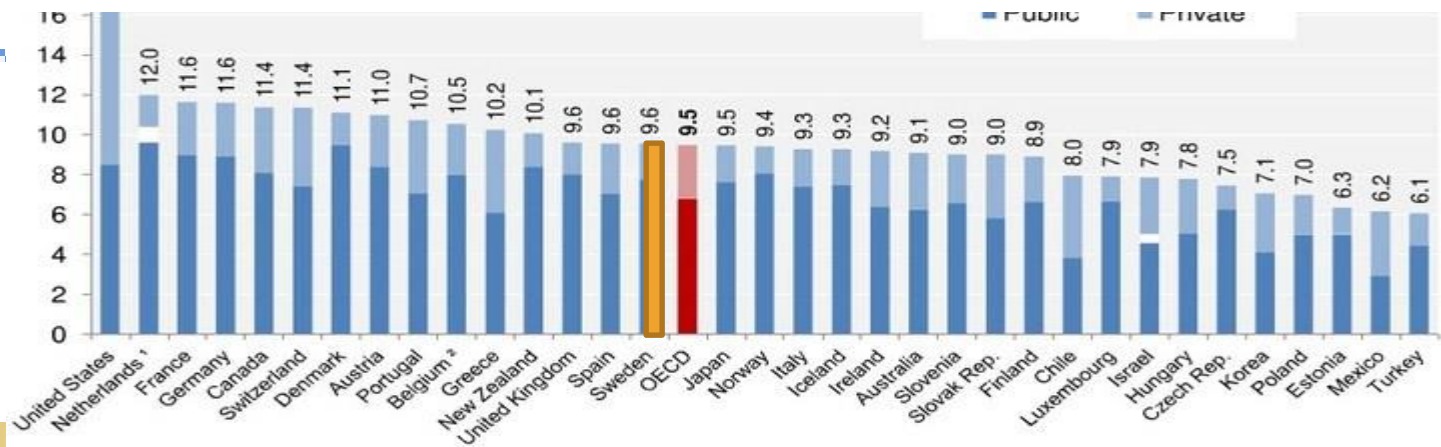
Total health expenditure per capita, public and private, 2010 (or nearest year)

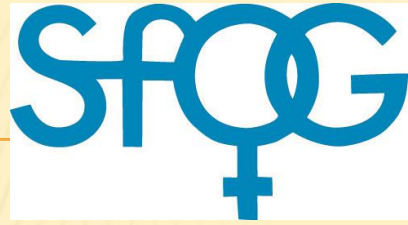
USD PPP

✕ USA



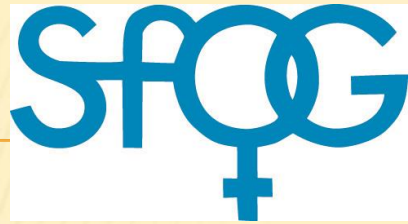
\$2,800,000,000,000





# VECKAN 2015

- ✕ But First...
- ✕ Why am I here?



## VECKAN 2015

### ✖ Sweden

- + Cesarean Section rate hospital variability 12-25%
- + Explained vs unexplained variability
- + Ageing population
- + Equal access = Restricted access?
- + Long wait times





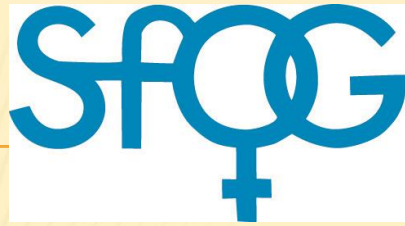
# WHAT IS RELIABLE DESIGN?

- ✗ "Every system is perfectly designed to get the results it gets".

Paul Batalden, M.D.

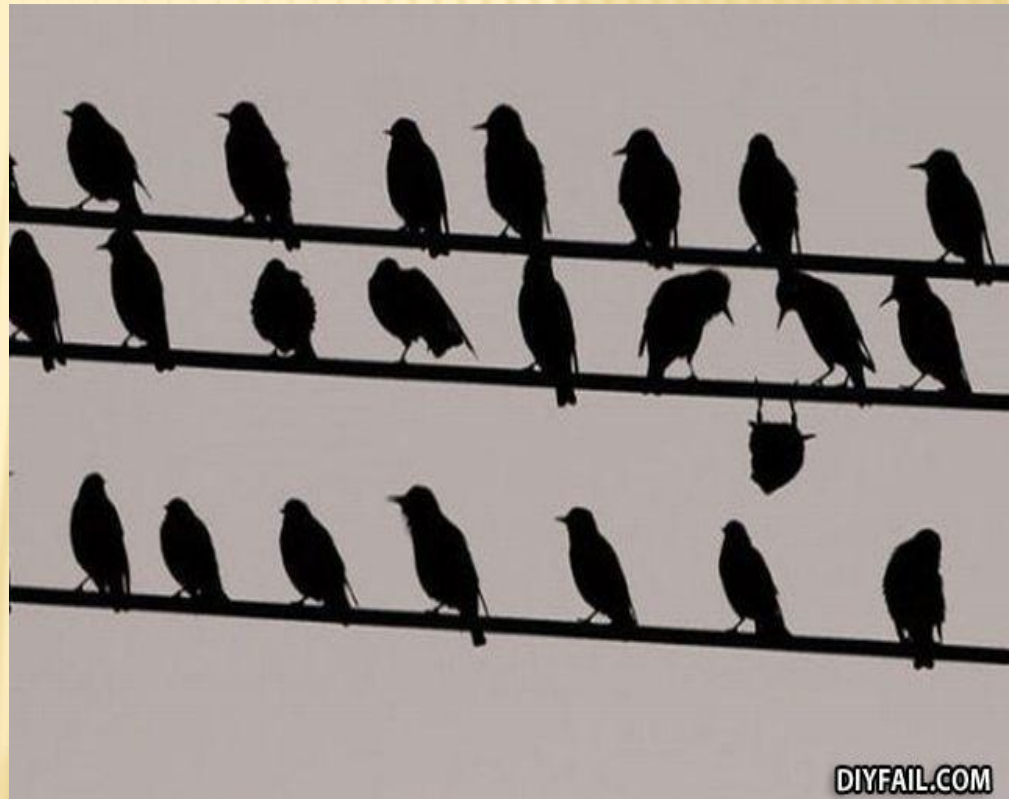
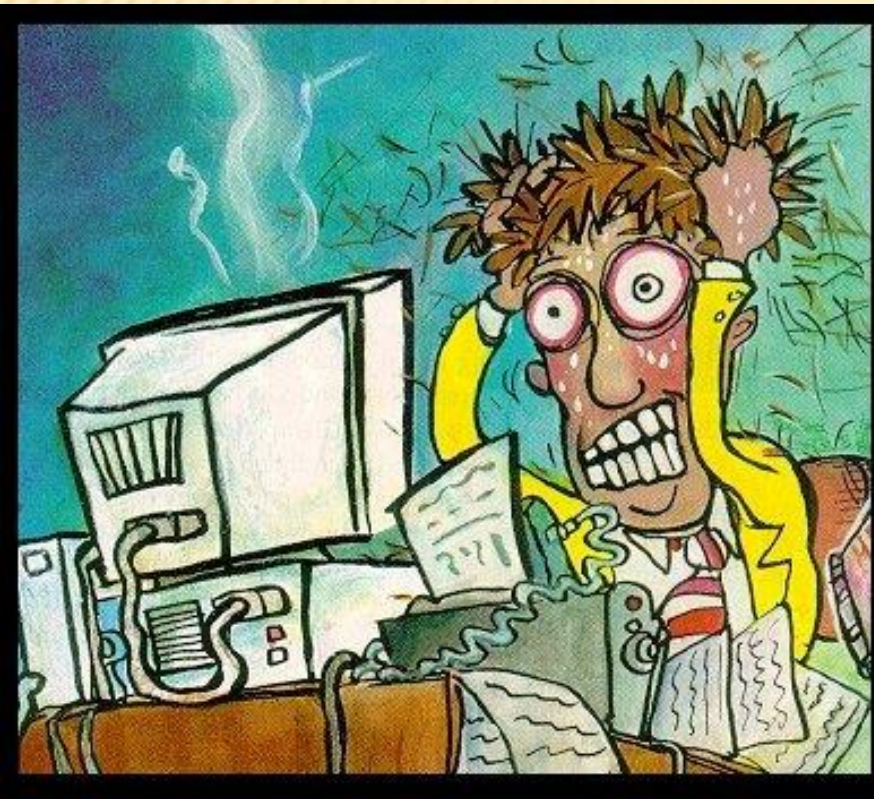
- ✗ If you want different results, you need a different system.



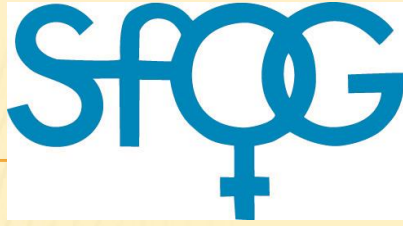


# VECKAN 2015

✕ Risk of Failure is inherent to any system



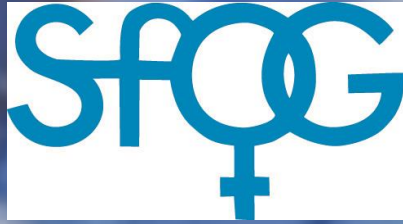
DIYFAIL.COM



# VECKAN 2015

- ✖ Risk of Failure is inherent to any system
- ✖ Failures cannot always be anticipated





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\*Error is inevitable

Because we are human

Tired

Distracted

Complacent

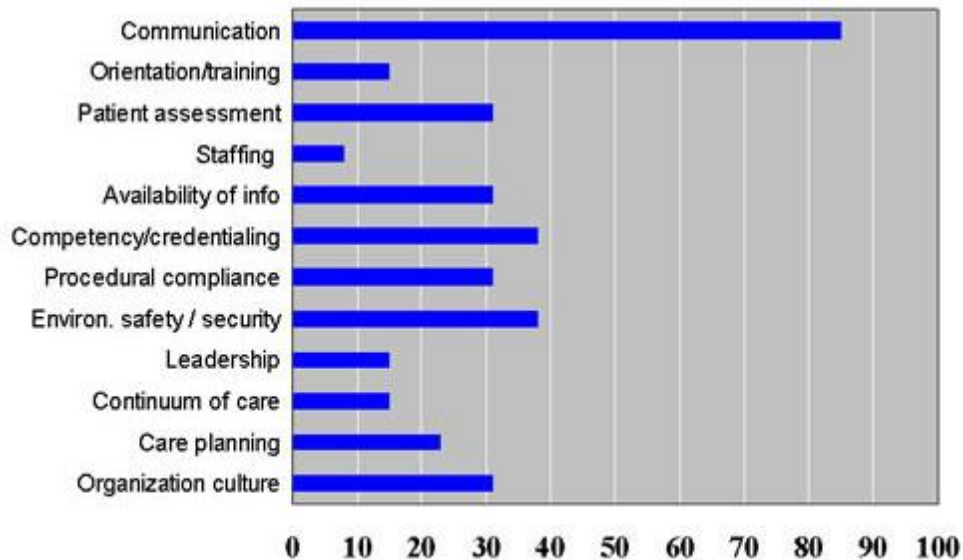
Overworked

Underworked

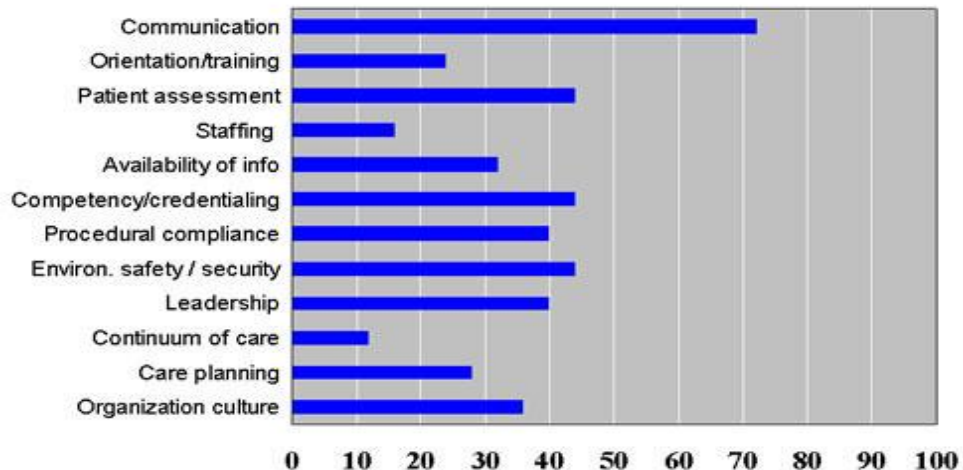
dreamstime.com



## Root Causes of Maternal Deaths & Injuries (2005)



## Root Causes of Perinatal Deaths & Injuries (2005)





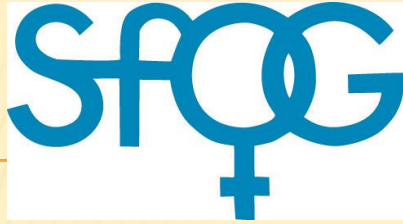
# VECKAN 2015

## Root Cause Information for Maternal Events

Reviewed by The Joint Commission (Resulting in death or permanent loss of function) 2004 through 2014 (N=125)

The majority of events have multiple root causes

|                        |    |
|------------------------|----|
| Human Factors          | 65 |
| Communication          | 60 |
| Assessment             | 51 |
| Leadership             | 49 |
| Information Management | 27 |
| Continuum of Care      | 19 |
| Physical Environment   | 17 |
| Care Planning          | 14 |
| Medication Use         | 12 |
| Anesthesia Care        | 7  |



# VECKAN 2015

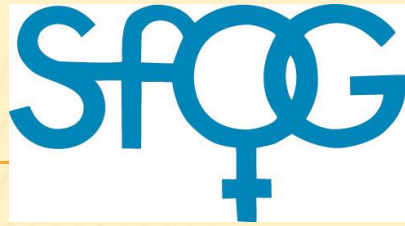
## Root Cause Information for Perinatal Events

Reviewed by The Joint Commission (Full-term infant 2500g or > and absence of obvious congenital abnormality; resulting in death or permanent loss of function) 2004 through 2014 (N=291)

The majority of events have multiple root causes

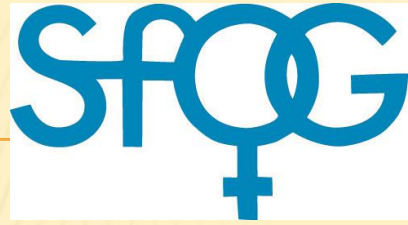
|                        |     |
|------------------------|-----|
| Human Factors          | 231 |
| Communication          | 204 |
| Assessment             | 197 |
| Leadership             | 183 |
| Information Management | 60  |
| Physical Environment   | 54  |
| Care Planning          | 31  |
| Medication Use         | 24  |
| Continuum of Care      | 24  |
| Patient Education      | 11  |





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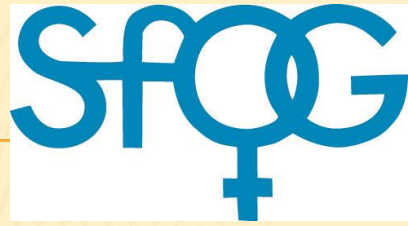
- \*Error is inevitable
- \*Harm is preventable



# VECKAN 2015

## ✕ Objectives

- + Recognize the complexity of the current medical systems in Obstetrics and Gynecology
- + Understand why reliable design strategies are critical in Obstetrics and Gynecology care
- + Recognize Clinical Bundles as a reliable design strategy
- + Apply reliable design strategies in the Obstetric and Gynecologic clinical setting



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✕ Why is this important?



# MAKING SYSTEMS WORK

- ✗ Highly complex
- ✗ Highly specialized

+ 1970

- ✗ It took 2 FTE for an average hospitalization

+ 2010

- ✗ It took 7-15 FTE for an average hospitalization

# MAKING SYSTEMS WORK

+ Knowledge has exploded since 1950

- \* Over 6000 medications
- \* Over 4000 procedures

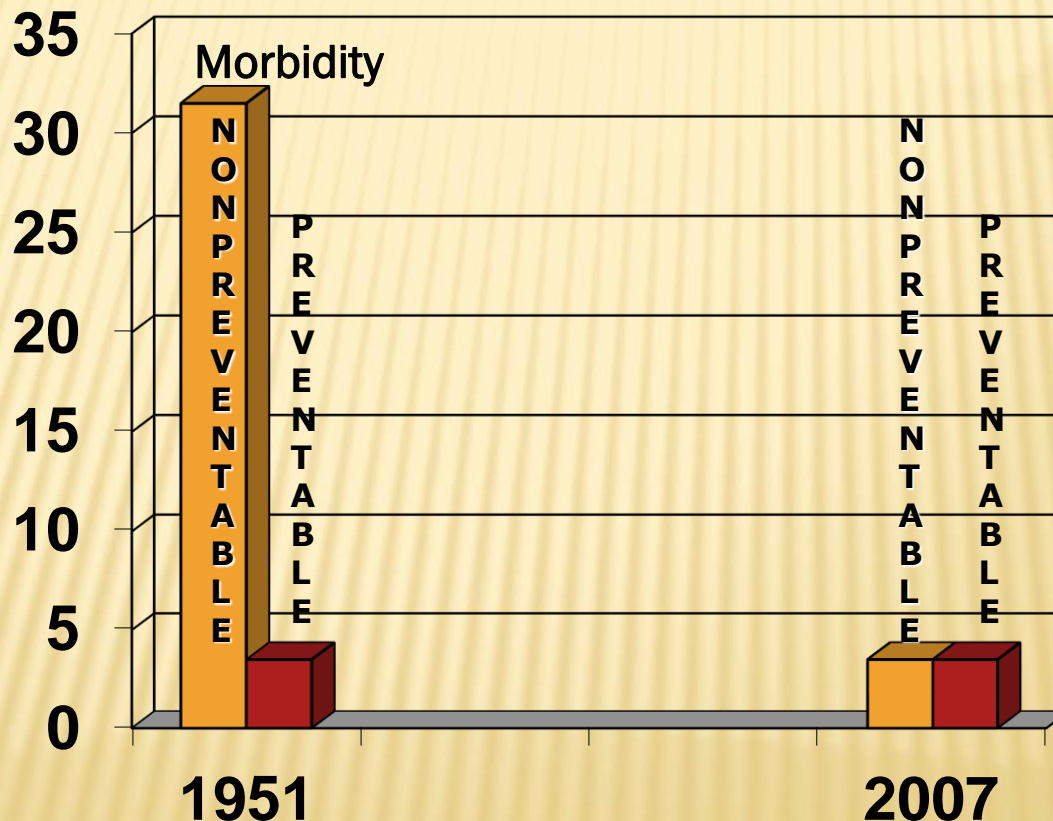




# PERINATAL QUALITY IMPROVEMENT

## WHY IS THIS IMPORTANT?

### Birth Injury per 1000

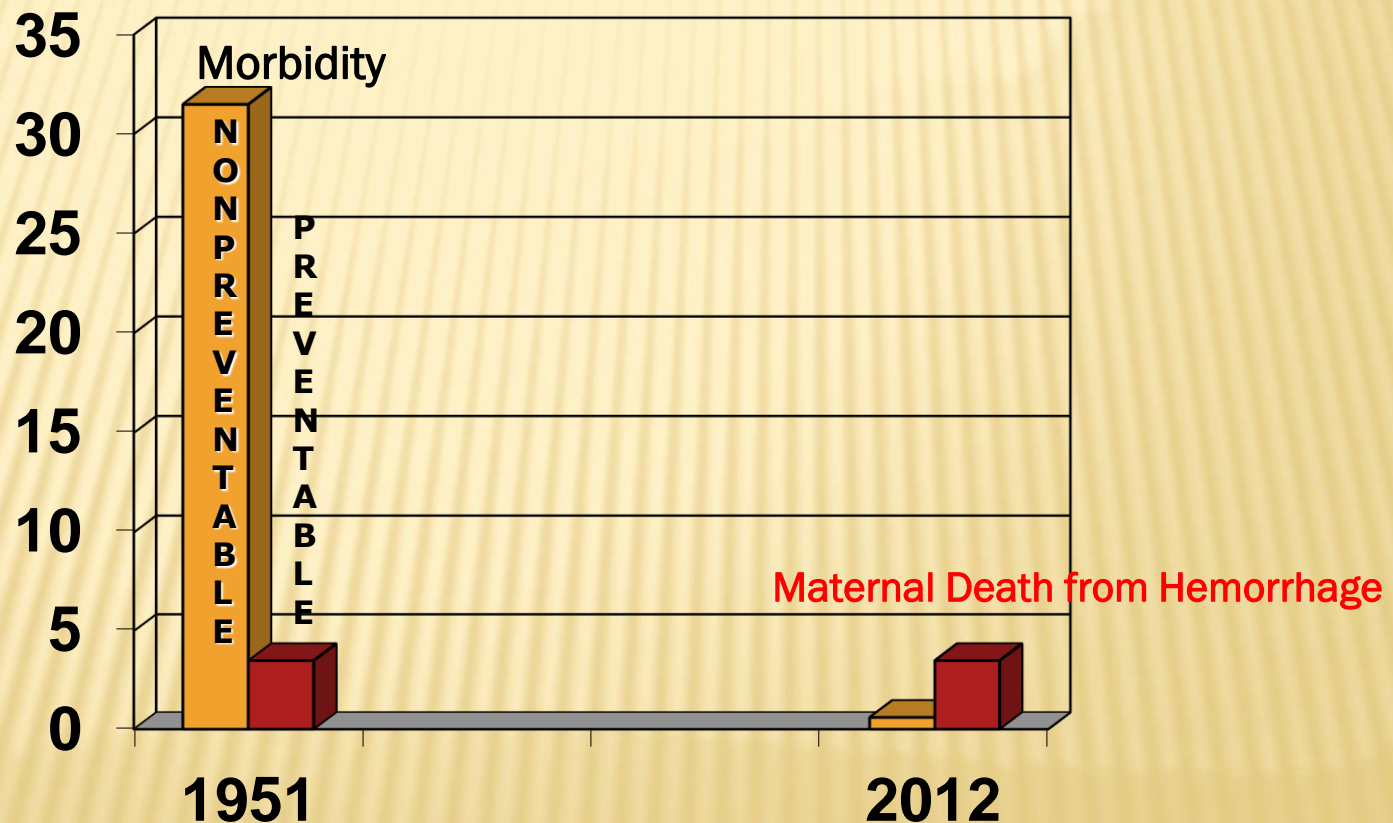


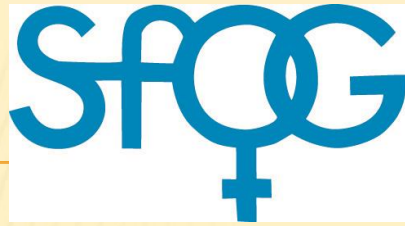
Mazza F, et al. Eliminating birth trauma at Ascension Health.  
*Jt Comm J Qual Patient Saf* 33:15-24, Jan. 2007



# PERINATAL QUALITY IMPROVEMENT

## WHY IS THIS IMPORTANT?





# VECKAN 2015

- ✕ How do we build a reliable healthcare system?



# WHAT IS RELIABLE DESIGN?

✗ “Reliability is failure free operation over time.”

David Garvin  
Harvard Business School





# WHAT NEEDS TO BE RELIABLE?



# RELIABLE DESIGN?





# **STUDY OF “RELIABILITY” IN HEALTH CARE**

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*Participants had received 54.9% of scientifically indicated care*

McGlynn, et al: The quality of health care delivered to adults in the United States. NEJM 2003; 348: 2635-2645 (June 26, 2003)



# STUDY OF “RELIABILITY” IN HEALTH CARE

## ✕ Conclusion:

- + “When applied to clinical processes consider the viewpoint of the patient by invoking the all or none measure.”

IHI Innovation Team

- + The “Defect Rate” in the technical quality of health care is:

45%

# THE RELIABILITY DESIGN STRATEGY

- ✖ Prevent initial failure
  - + intent and standardization function
- ✖ Identify failure (defects) and mitigate
  - + Redundancy function
- ✖ Measure and then communicate learning from defects
  - + Redesign function

# IMPROVEMENT CONCEPTS ASSOCIATED WITH $10^{-1}$ PERFORMANCE

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Primarily can be described as intent, vigilance, and hard work

- ✗ Common equipment, standard order sheets, multiple choice protocols, and written policies/procedures
- ✗ Personal check lists
- ✗ Feedback of information on compliance
- ✗ Suggestions of working harder next time
- ✗ Awareness and training



## **IMPROVEMENT CONCEPTS ASSOCIATED WITH $10^{-2}$ PERFORMANCE**

- ✗ Uses human factors and reliability science to design sophisticated failure prevention, failure identification, and mitigation

# **IMPROVEMENT CONCEPTS ASSOCIATED WITH $10^{-2}$ PERFORMANCE**

## **USING HUMAN FACTORS AND RELIABILITY SCIENCE**

- ✘ Decision aids and reminders built into the system
- ✘ Desired action the default (based on scientific evidence)
- ✘ Redundant processes utilized
- ✘ Scheduling used in design development
- ✘ Habits and patterns known and taken advantage of in the design
- ✘ Standardization of process based on clear specification and articulation is the norm

# **IMPROVEMENT CONCEPTS ASSOCIATED WITH $10^{-2}$ PERFORMANCE**

## **USING HUMAN FACTORS AND RELIABILITY SCIENCE**

- ✕ Hugh Patrick Ruffell Smith
- ✕ NASA Technical Memorandum 78482

<http://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/19790006598.pdf>



# WHY STANDARDIZE?

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- ✘ Contributes to building an infrastructure (who does what, when, where, how and with what)
- ✘ Support training and competency testing to sustain the process
- ✘ Achieve front line articulation of key processes by staff
- ✘ Allows the appropriate application of Evidence Based Medicine consistently
- ✘ Feedback about errors and application of learning to design is possible

# WHAT TO STANDARDIZE?

✗ Ok

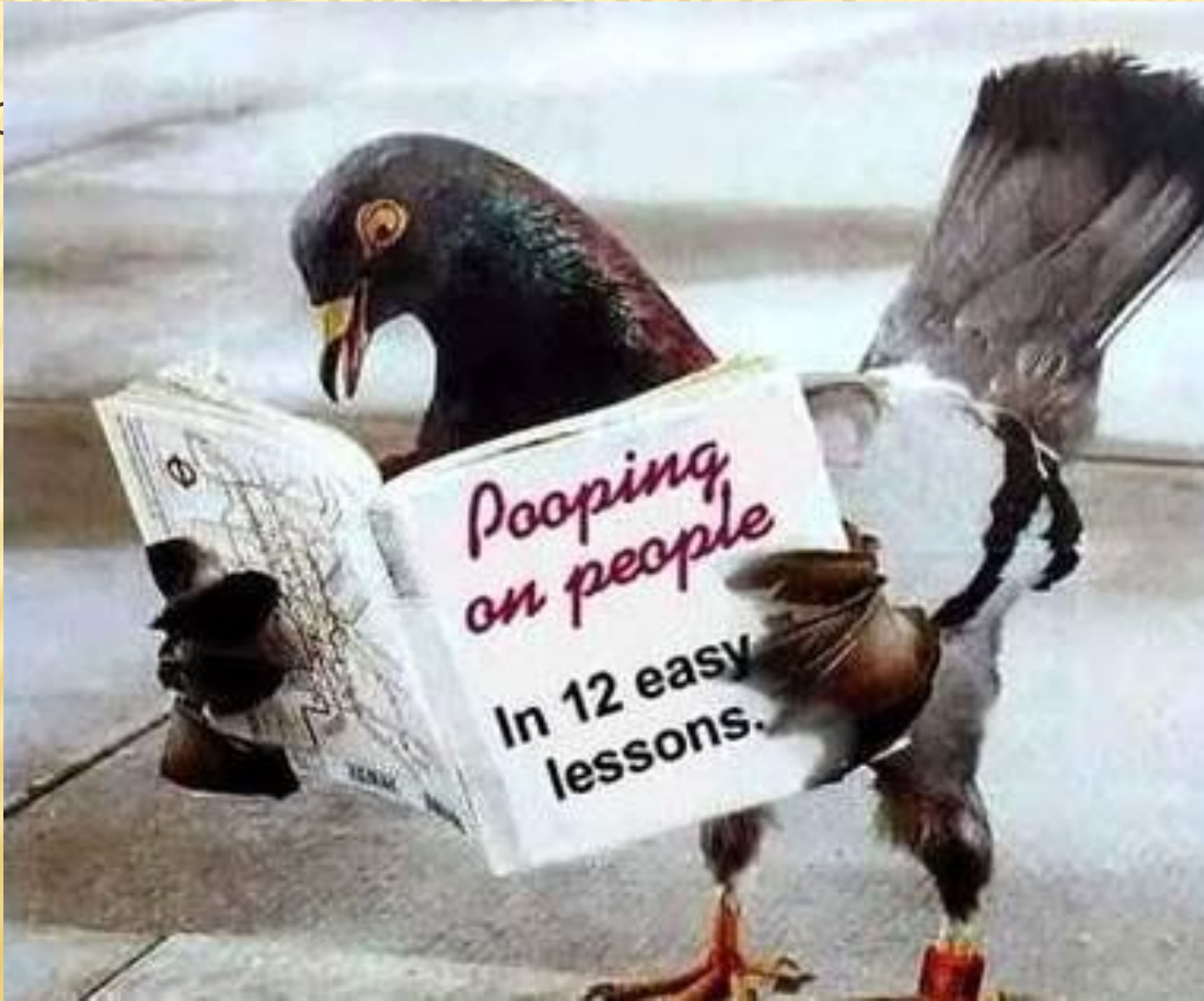
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## ✕ The Clinical Bundle as Standardization



# WHAT IS A CLINICAL BUNDLE

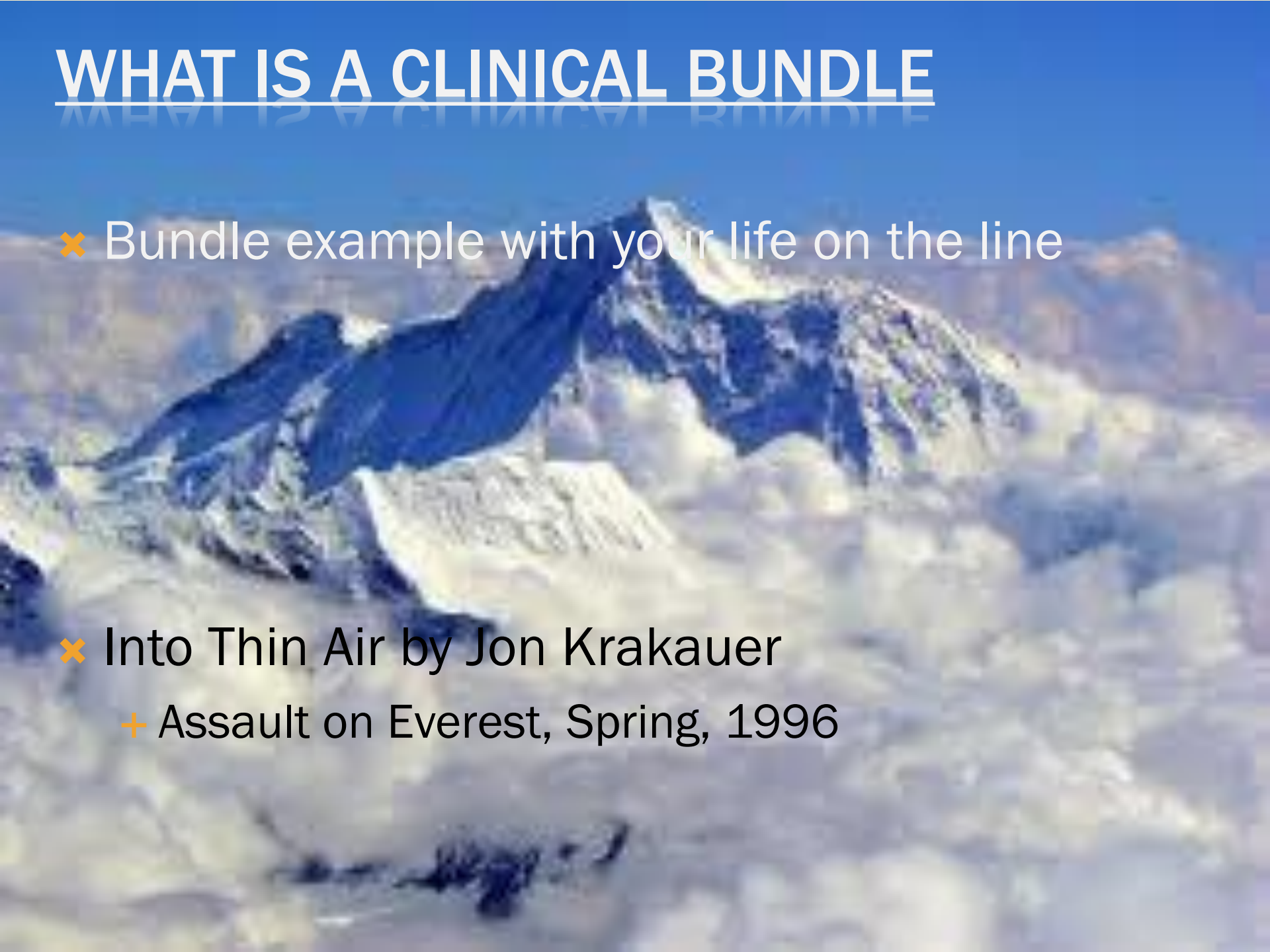
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- ✗ A group of clinical events that should happen every time a given process occurs
- ✗ Individual elements based on solid science
- ✗ Emphasis initially on process rather than outcome
- ✗ Based on failure modes
- ✗ Eventual endpoint is outcome improvement

# WHAT IS A CLINICAL BUNDLE


✗ Bundle example with your life on the line

✗ Into Thin Air by Jon Krakauer  
+ Assault on Everest, Spring, 1996



# ASSAULT ON EVEREST SUMMIT

## HARD AND FAST RULES

- 
- ✘ Acclimatization at altitude
  - ✘ Work together
  - ✘ Cannot assist someone on the ascent
  - ✘ Fixed turn around time



# ASSAULT ON EVEREST SUMMIT


## SUMMIT BUNDLE

- ✗ Standard acclimatization techniques
  - + # days and at what altitude
- ✗ Practice team work (between and among teams)
- ✗ No “short-roping” on the ascent
  - + No assisting with climbing on the ascent
- ✗ Turn around time fixed and honored
  - + (1 PM for most groups)



# ASSAULT ON EVEREST SUMMIT

## SUMMIT BUNDLE COMPLIANCE

- 
- ✗ All teams acclimatized but there was no standard
  - ✗ Teams refused to cooperate on timing through Hilary's Step (one person rope)
  - ✗ Some climbers were assisted on the ascent as it was felt they *had* to summit on this climb
  - ✗ Turn around time was set but not honored
    - + Last summit was about 5 PM



# ASSAULT ON EVEREST SUMMIT

## SUMMIT BUNDLE

- ✗ Standard acclimatization techniques
  - + # days and at what altitude
- ✗ Practice team work (between and among teams)
- ✗ No “short-roping” on the ascent
  - + No assisting with climbing on the ascent
- ✗ Turn around time fixed and honored
  - + (1 PM for most groups)



## OBSTETRIC BUNDLES

- ✗ Oxytocin bundles
  - + Elective induction bundle
  - + Indicated induction bundle
  - + Augmentation bundle
- ✗ Vacuum bundle

## GYNECOLOGIC BUNDLES

- ✗ Bathing bundle
- ✗ Sepsis bundle
- ✗ Central line bundle
- ✗ Universal protocol to prevent wrong patient, procedure, site
- ✗ Transfusion bundle

# **WHAT IS RELIABLE DESIGN?**

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Necessary clinical variation

Unexplained clinical variation



# MAKING SYSTEMS WORK

A silhouette of a cowboy on a horse, swinging a lasso, set against a bright, hazy sunset background with trees in the distance. The scene is backlit by the sun, creating a strong glow and silhouettes.

- Tightly organized teams
- Communicate constantly
- Assignments of specific roles
- Practice for contingencies
- Use checklists for routine assigned tasks
- Use prearranged and practiced protocols for emergencies



# PERINATAL IMPROVEMENT COMMUNITY AN IHI COLLABORATIVE



## ✕ Summary

- + Systems are designed to get the results they achieve
  - ✕ If you want different results the system needs to be changed
- + Focus on the structure and process of care
  - ✕ Reliable design strategies to consistently get the care to the bedside that we intended
- + Data for improvement, not for punishment
- + Measure, measure, measure
  - ✕ The need to know that change results in improvement
- + Leadership and ownership

# PERINATAL IMPROVEMENT COMMUNITY AN IHI COLLABORATIVE



Thank you

# PERINATAL IMPROVEMENT COMMUNITY AN IHI COLLABORATIVE

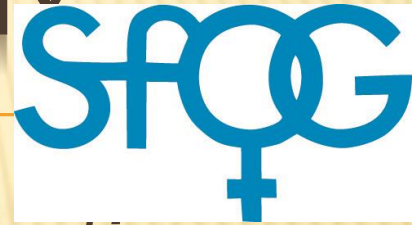


## Elective Labor Induction Bundle

- Confirmation of fetal maturity
- Category I EFM
- Absence of tachysystole with increases in pitocin/Response to tachysystole
- Pelvic assessment



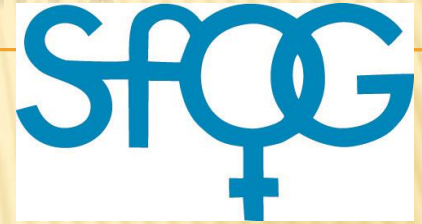
# PERINATAL IMPROVEMENT COMMUNITY AN IHI COLLABORATIVE



## Advanced Elective (Indicated) Labor Induction Bundle

- Gestational age  $\geq$  39 completed weeks
- Category I EFM
- Absence of tachysystole with increases in pitocin/Response to tachysystole
- Pelvic assessment

# PERINATAL IMPROVEMENT COMMUNITY AN IHI COLLABORATIVE



## Advanced Augmentation Bundle

- Estimated fetal weight
- Category I and some Category II EFM
- Absence of tachysystole with increases in pitocin/Response to tachysystole
- Pelvic assessment

# PERINATAL IMPROVEMENT COMMUNITY AN IHI COLLABORATIVE



## Vacuum Bundle

- + Alternative labor strategies considered
- + Prepared patient
  - × Informed consent discussed and documented
- + High probability of success
  - × EFW, fetal position and station known
- + Maximum application time and number of pop-offs predetermined
- + Exit strategy available
  - × Cesarean and resuscitation team available