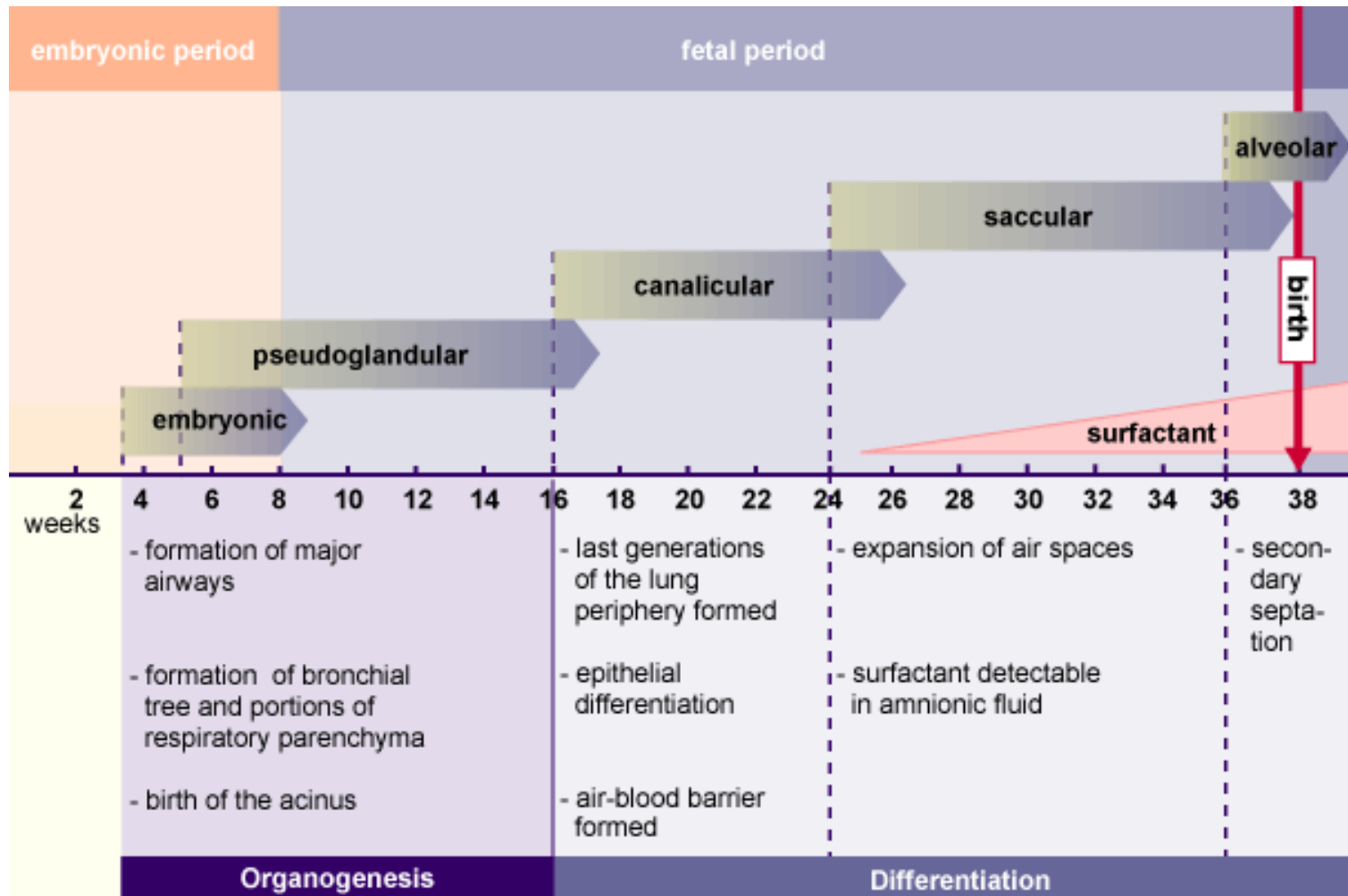


The Changing Landscape of Fetal Lung Maturity Testing

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Fetal Lung Development



Pulmonary Surfactant

- Synthesized by type II pneumocytes and packaged into lamellar bodies
- Deposited at alveolar air-liquid interface and decreases surface tension of hydrated inner layer
- Inadequate concentrations may result in newborn respiratory distress syndrome

Respiratory Distress Syndrome (RDS)

- Caused by a deficiency in pulmonary surfactant
- Most common cause of respiratory failure in neonates
 - 8th leading cause of infant death (2007)
- Incidence is indirectly proportional to gestational age at delivery

Weeks gestation at birth	Incidence (%)
<28	60-80
32-36	15-30
>37	5
Term	Rare

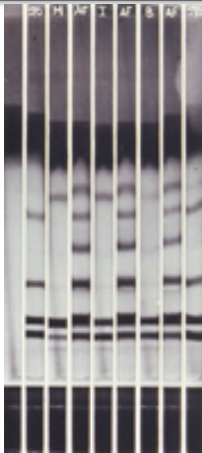
~20,000 newborns/year (US)

Fetal Lung Maturity (FLM) Tests

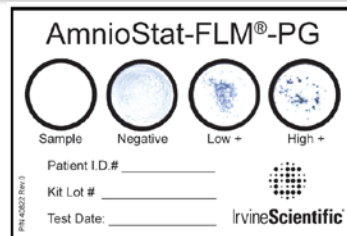
- Performed on amniotic fluid
 - 32-38^{6/7} weeks of gestation (ACOG 2008)
- Used for decision making
 - Allow or delay delivery w/ steroid administration
 - Uncertain gestational age
 - Transfer mother to facility with NICU
- Must have high sensitivity for immaturity & high negative (mature) predictive value
- Performed rapidly (ideally)

History of FLM Tests

Lecithin/Sphingomyelin Ratio (1971)



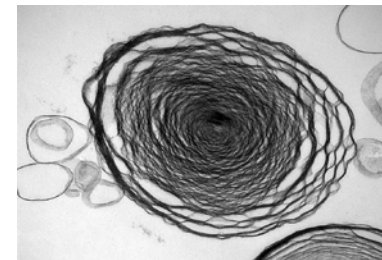
Phosphatidylglycerol (1983)



Surfactant/Albumin Ratio (1986)



Lamellar Body Count (1988)



- Marketed as Fetal Lung Maturity II by Abbott Laboratories
- Discontinued at end of 2011
- Reagent inventories to be exhausted in early 2012

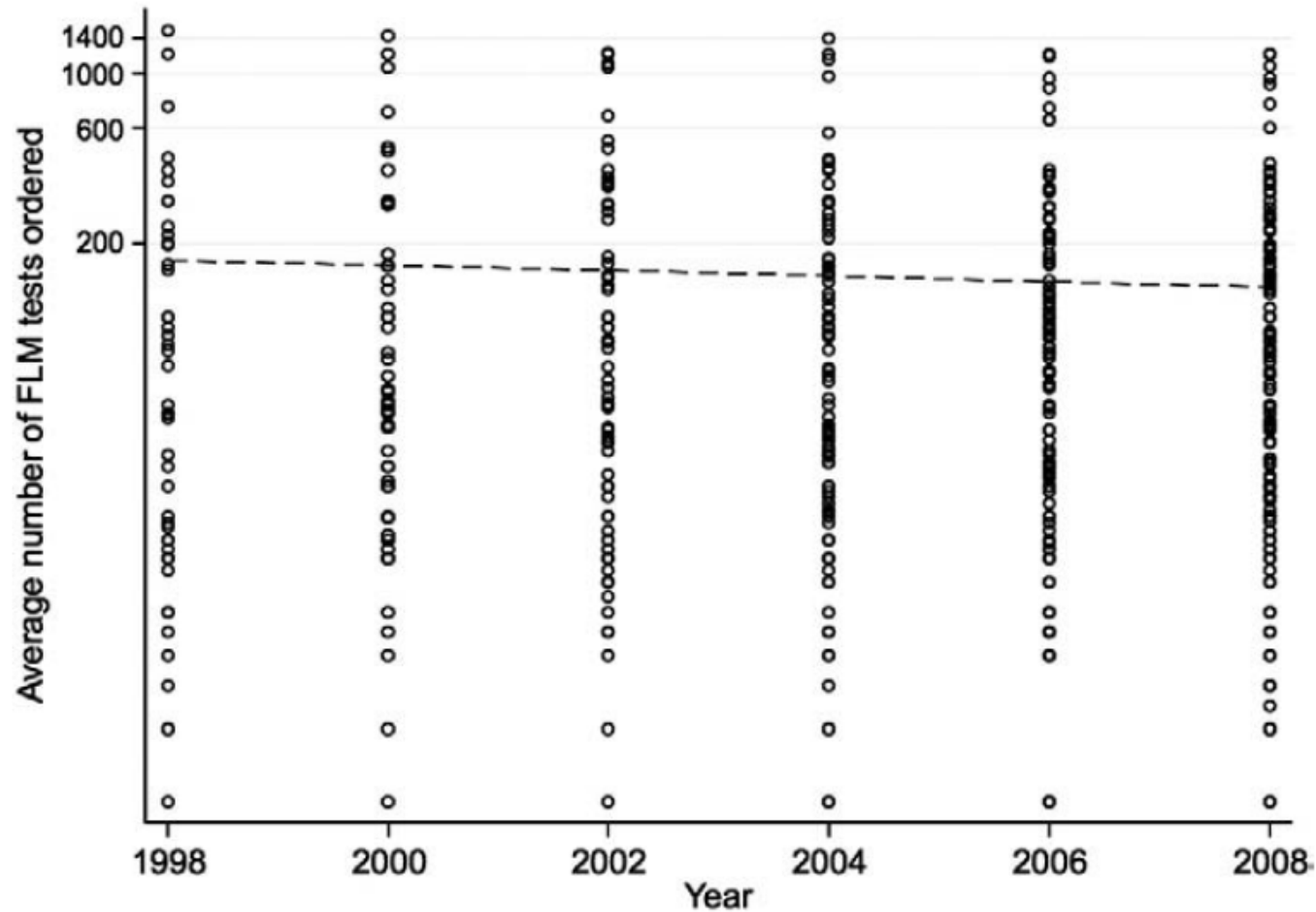
Clinical Performance of FLM Tests

Method	Sensitivity	Specificity	NPV (mature)	PPV (immature)
S/A ratio	99%	71%	99%	28%
Lamellar body count	97%	71%	99%	43%
PG (AmnioStat FLM)	96%	70%	99%	29%
L/S ratio	84%	82%	96%	42%

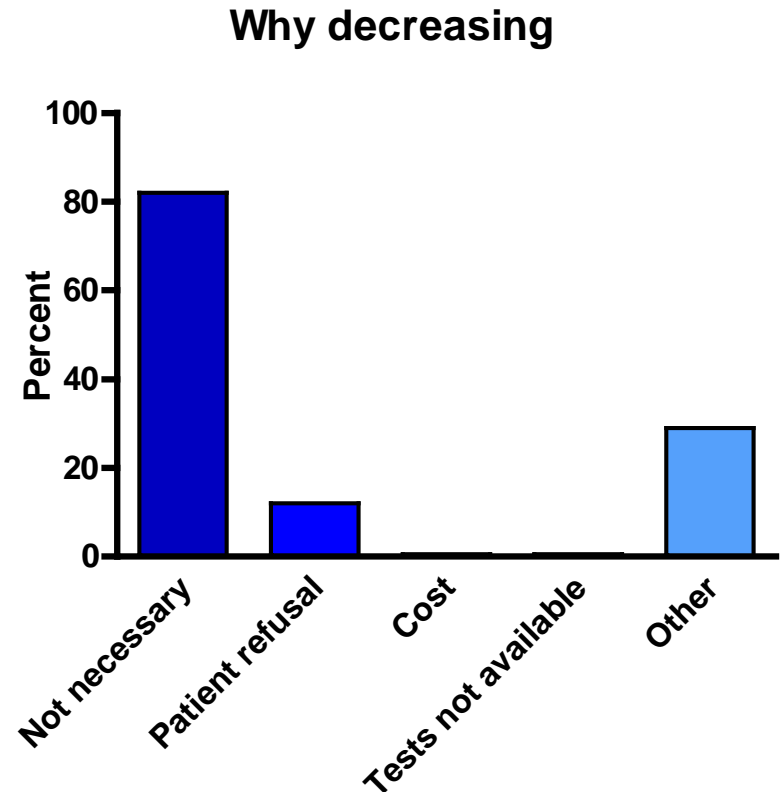
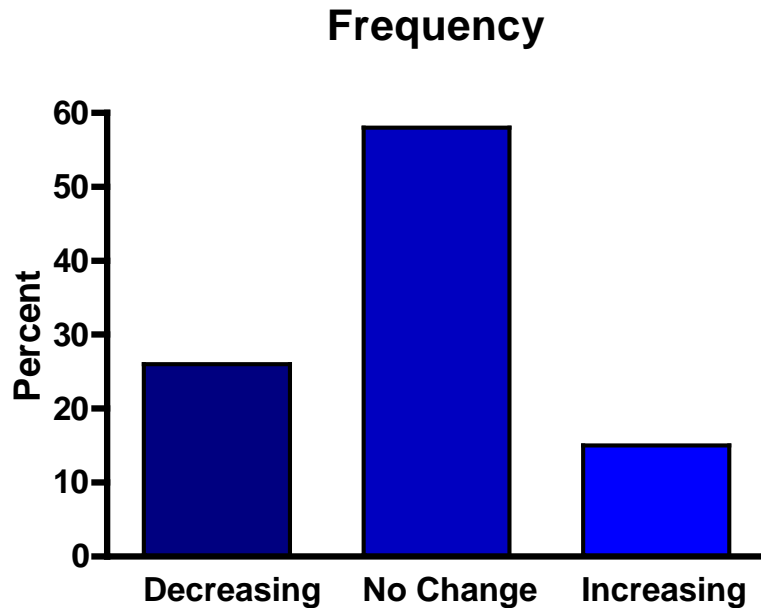
	Pros	Cons
L/S Ratio	<ul style="list-style-type: none"> • Good sensitivity for immaturity • Quantitative • QC/PT available 	<ul style="list-style-type: none"> • Technically difficult • Long analytical time • Imprecise • Effected by blood and meconium • Offered by few labs
PG	<ul style="list-style-type: none"> • High sensitivity for immaturity • Unaffected by blood or meconium • Rapid • QC/PT available 	<ul style="list-style-type: none"> • Late marker of pulmonary maturity • Qualitative test result • Subjective test interpretation • Single vendor
LBC	<ul style="list-style-type: none"> • High sensitivity for immaturity • Rapid and quantitative • Instrumentation widely available • PT available 	<ul style="list-style-type: none"> • Laboratory developed test • Effected by blood and meconium • Instrument-specific cutoffs for maturity • No commercial QC available

Contemporary Issues

Decreasing Utilization of FLM Tests

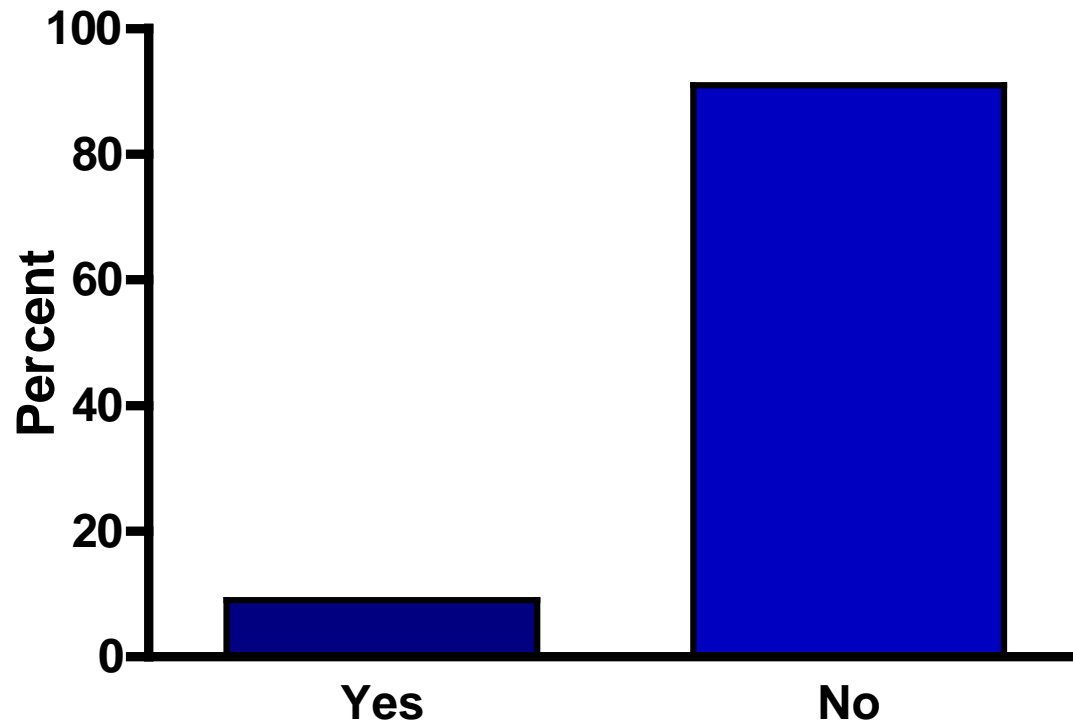


Is the frequency with which you are ordering FLM tests increasing, decreasing, or staying the same?

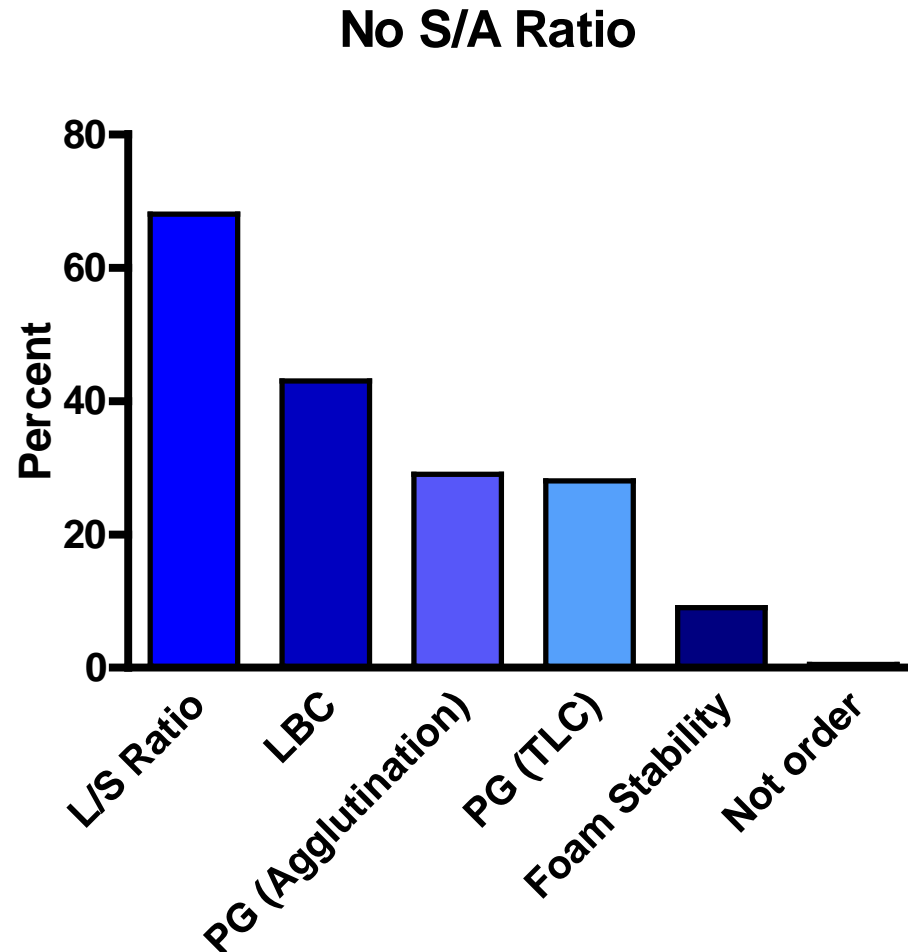


Could you provide your current level of care without any FLM test results?

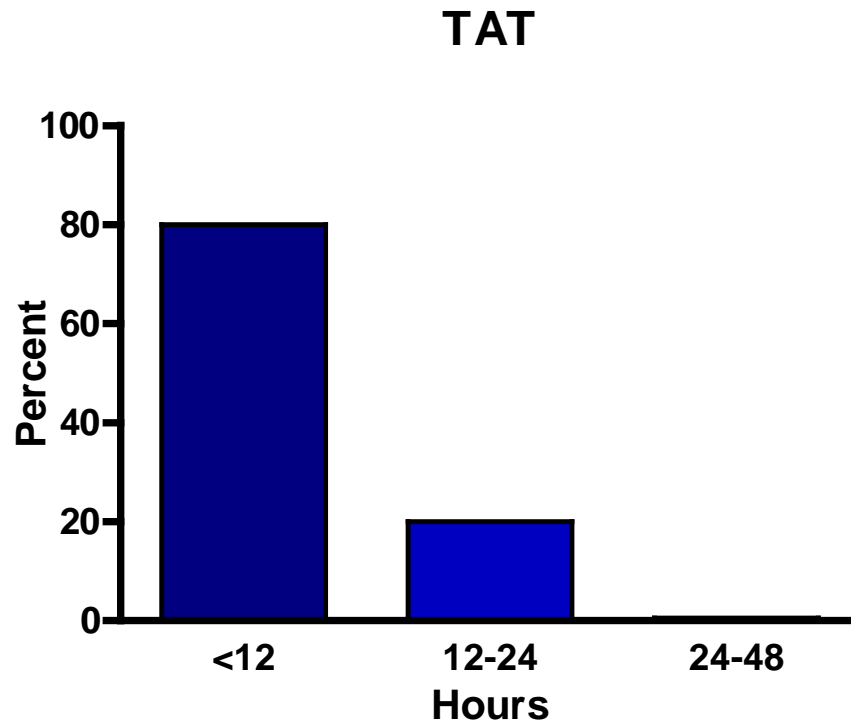
Practice without



Which FLM test would you likely order if the S/A ratio were no longer available?



Within how many hours do you require FLM test results?



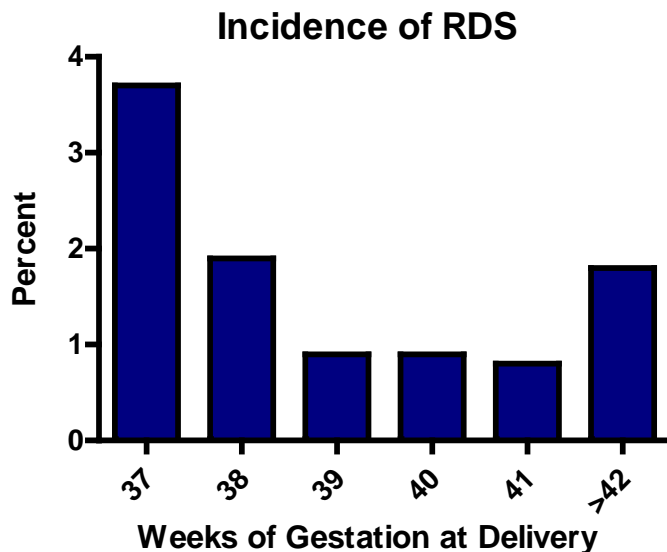
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Timing of Elective Repeat Cesarean Delivery at Term and Neonatal Outcomes

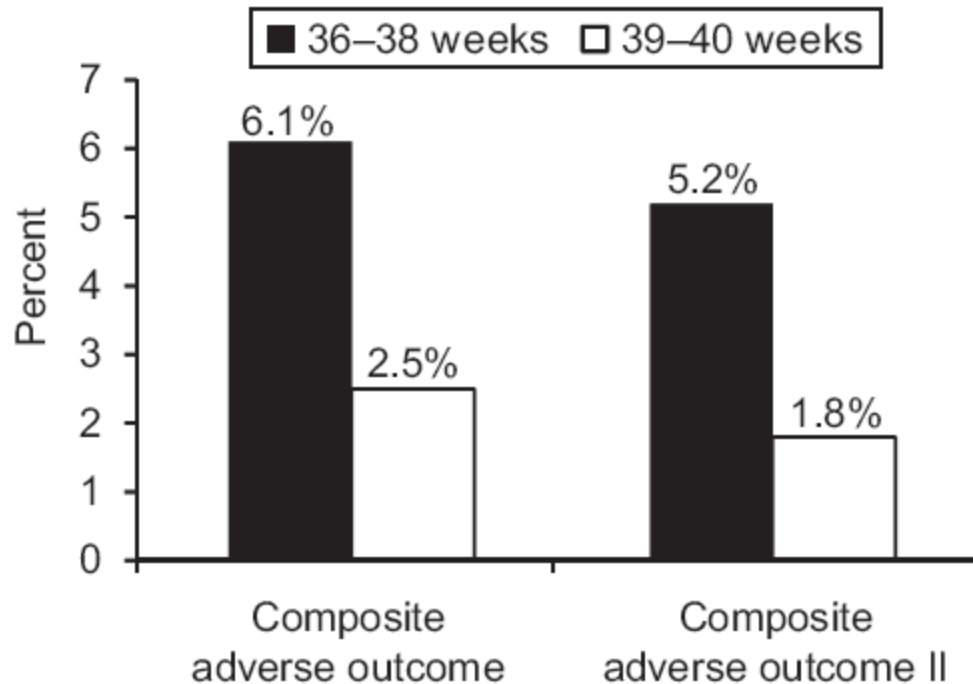


- 13,258 C-sections
- Delivery before 39 weeks associated with adverse respiratory outcomes
- Elective delivery at <39 weeks discouraged unless fetal lungs are mature

Neonatal Outcomes After Demonstrated Fetal Lung Maturity Before 39 Weeks of Gestation

Elizabeth Bates, MD, Dwight J. Rouse, MD, MSPH, Merry Lynn Mann, BS, Victoria Chapman, MPH, Waldemar A. Carlo, MD, and Alan T. N. Tita, MD, PhD

(Obstet Gynecol 2010;116:1288–95)



- Two cohorts
 - 36-38 weeks with mature FLM test result (N=459)
 - 39-40 weeks (N=13,339)
- Delivery before 39 weeks associated with increased risk of adverse outcome
- *Are FLM tests necessary anymore?*

Summary

- RDS is caused by a deficiency of pulmonary surfactant and is inversely related to gestational age at delivery
- All currently available FLM tests are good to excellent predictors of lung maturity but not immaturity
- The overall frequency of FLM testing appears to be decreasing but tests are not likely to become obsolete
- The loss of the widely used S/A ratio means that many laboratories will need to offer a replacement FLM test
- The L/S ratio is an imprecise test with many disadvantages and should not be considered the gold standard test
- The LBC is a rapid FLM test and an excellent predictor of lung maturity but is a lab-developed test that requires thorough validation

